Composite-ARF.com
The High Tech Discount Store
For Model Airplanes And More

Instruction Manual

Composite-ARF Extra 260, 3.0m

Instructions for Extra 260 IMAC-Airplane

Thank you very much for purchasing our Composite-ARF Extra 260 all-composite aircraft, made with the revolutionary Total Area Vacuum Sandwich (TAVS) technology.

Before you get started building and setting-up your aircraft, please make sure you have read this instruction manual several times, and understood it. If you have any questions, please don't hesitate to contact us. Below are the contact details:

Email:	**feedback@composite-arf.com**
or	**techsupport@composite-arf.com**
Telephone:	**Phone your C-ARF Rep!!! He will be there for you.**
Website:	**http://www.composite-arf.com**

Liability Exclusion and Damages

You have acquired a kit, which can be assembled into a fully working R/C model when fitted out with suitable accessories, as described in the instruction manual with the kit.

However, as manufacturers, we at Composite-ARF are not in a position to influence the way you build and operate your model, and we have no control over the methods you use to install, operate and maintain the radio control system components. For this reason we are obliged to deny all liability for loss, damage or costs which are incurred due to the incompetent or incorrect application and operation of our products, or which are connected with such operation in any way. Unless otherwise prescribed by binding law, the obligation of the Composite-ARF company to pay compensation is excluded, regardless of the legal argument employed.

This applies to personal injury, death, damage to buildings, loss of turnover and business, interruption of business or other direct and indirect consequent damages. In all circumstances our total liability is limited to the amount which you actually paid for this model.

BY OPERATING THIS MODEL YOU ASSUME FULL RESPONSIBILITY FOR YOUR ACTIONS.

It is important to understand that Composite-ARF Co., Ltd, is unable to monitor whether you follow the instructions contained in this instruction manual regarding the construction, operation and maintenance of the aircraft, nor whether you install and use the radio control system correctly. For this reason we at Composite-ARF are unable to guarantee or provide a contractual agreement with any individual or company that the model you have made will function correctly and safely. You, as operator of the model, must rely upon your own expertise and judgement in acquiring and operating this model.

Supplementary Safety Notes

Pre-flight checking:
Before every session check that all the model's working systems function correctly, and be sure to carry out a range check.

The first time you fly any new model aircraft we strongly recommend that you enlist the help of an experienced modeller to help you check the model and offer advice while you are flying. He should be capable of detecting potential weak points and errors.

Be certain to keep to the recommended CG position and control surface travels. If adjustments are required, carry them out before operating the model.

Be aware of any instructions and warnings of other manufacturers, whose product(s) you use to fly this particular aircraft, especially engines and radio equipment.

Please don't ignore our warnings, or those provided by other manufacturers. They refer to things and processes which, if ignored, could result in permanent damage or fatal injury.

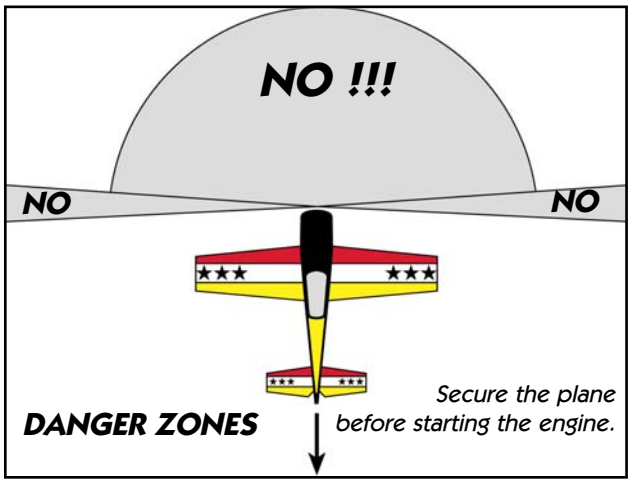
Attention !

This IMAC-Aircraft is a high-end product and can create an enormous risk for both pilot and spectators, if not handled with care, and used according to the instructions. Make sure that you operate your Extra according to the AMA rules, or those laws and regulations governing the model flying in the country of use.

The engine, servos and control surfaces have to be attached properly. Please use only the recommended engines, servos, propellers, and the accessories supplied in the kit.

Make sure that the 'Centre of Gravity' is located in the recommended place. Use the nose heavy end of the CG range for your first flights, before you start moving the CG back to a more critical position for 3D-manoeuvres. If you find that you need to relocate your batteries or even add weight in the aircraft to move the CG to the recommended position, please do so and don't try to save weight or hassle. A tail heavy plane, in a first flight, can be an enormous danger for you and all spectators. Fix any weights, and heavy items like batteries, very securely to the plane.

Make sure that the plane is secured properly when you start up the engine. Have at least 2 helpers hold your plane from the tail end or from behind the wing tips before you start the engine. Make sure that all spectators are behind, or far in front, of the aircraft when running up the engine.



Make sure that you range check your R/C system thoroughly before the first flight. It is absolutely necessary to range check your complete R/C installation first WITHOUT the engine running. Leave the transmitter antenna retracted, and check the distance you can walk before 'fail-safe' occurs. Then start up the engine, run it at about half throttle and repeat this range check with the engine running. Make sure that there is no range reduction before 'fail-safe'

occurs. Only then make the 1st flight. If you feel that the range with engine running is less then with the engine off, please contact the radio supplier and the engine manufacturer and DON'T FLY at that time.

Check for vibrations through the whole throttle range. The engine should run smoothly with no unusual vibration. If you think that there are any excessive vibrations at any engine rpm's, DON'T FLY at this time and check your engine, spinner and propeller for proper balancing. The light-weight sandwich composite parts don't like too much vibration and they can suffer damage. The low mass of all the parts results in a low physical inertia, so that any excess vibrations can affect the servos and linkages.

Make sure that your main spar tube is not damaged. Check that the front and rear anti-rotation pins for the wings and horizontal stabiliser are located correctly in their holes, and are not loose. Check that the 4 plastic wing retaining nuts are tight, that the M3 bolts retaining the horizontal stabilisers on to the aluminium tube are installed and tight, and that the hinge wires for the rud-der and elevators cannot come out.

If you carefully checked all the points above and followed our advice exactly, you will have a safe and successful first flight - and many hours of pleasure with your Composite-ARF Extra 260.

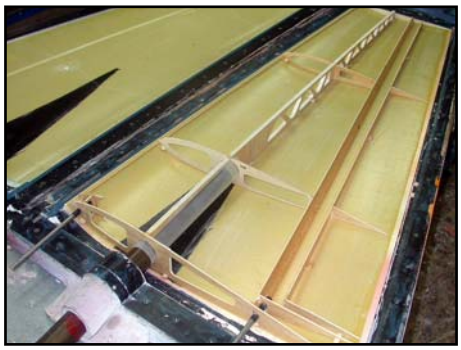
General information about fully-composite aircraft structure and design

All the parts are produced in negative molds, manufactured using vacuum-bagged sandwich construction technology. All parts are painted in the moulds, either single colour or designer colour schemes. A new production method, called TAVS (Total Area Vacuum Sandwich), enables us to present this aircraft with incredible built-in strength, while still being lightweight, and for a price that nobody could even consider a few years ago. This production process has huge advantages, but a few disadvantages as well. These facts need to be explained in advance for your better understanding.

Description of Parts

The Wings:

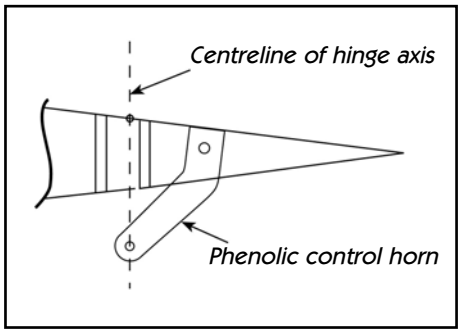
Both wing halves are made in negative moulds, and fully vacuum bagged, using only 2 layers of 2 oz. cloth in com-bination with a very hard 2 mm foam sandwich to form a hard and durable outer skin. Because of this TAVS technol-ogy very few additional structural parts are needed except for main spars.



The internal structure of the Extra 260 wings, before the carbon rov-ings are added above & below the spar during the joining process.

The ailerons are hinged already for you. They are laminated in the wing mould and are attached to the main wing with a special nylon hinge-cloth, sandwiched between the outer skin and the foam. This nylon hinge is 100% safe and durable. You will never have to worry about breaking it, or wearing it out. There is no gap at all on the top wing surface, and there is a very narrow slot in the bottom surface, where the aileron slides under the main wing skin during 'down' travel. This hinge setup is the cleanest you can ever obtain, but you have to take some care during assem-

bly for proper installation and servo set up.



First, the hinge line is on the top surface of the wing, not in the centre. This is NOT a disadvantage, if you set in about 10% NEGATIVE aileron differential in your transmitter program. This means that the 'down' throw needs to be about 10% more than the up throw.

Why? Because the axis of the hinge is not at the centreline of the aileron, so it moves slightly in and out when it travels, and the aileron gets a little "bigger" in surface area when moving up, and "smaller" when moving down. This is why you have to set the negative differential in your transmitter to compensate for the size changing. 10% is a good starting point, and you will find out the exact setting during the first flights, doing fast vertical rolls and watching the fuselage rolling in a perfect line. You can set it perfectly, this is guaranteed.

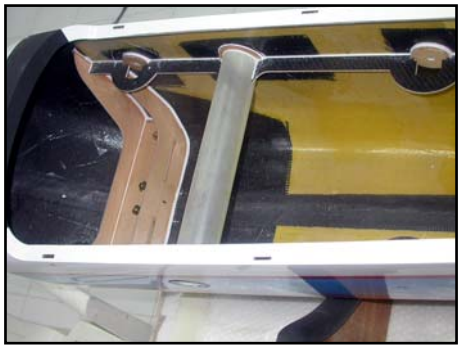
The bottom slot needs some explanation, too. The cut line is exactly in the correct position so that the aileron slides under the wing skin smoothly. If the cut was a few mm forward or back, it would not work properly. So, make sure that the lip is not damaged, and that the aileron slides under this lip perfectly. It will NOT lock at any time, as long as the lip is not damaged. If damage occurs to the lip, you can cut off 2-3 mm, but you should NEVER need to cut off more than this.

The wings are already set-up for 2 servos per aileron, with the option to install a 3rd servo toward the tip if you wish, and designed specifically around JR/Graupner 8511/8611 servos which fit into CNC-milled phenolic plates. They are attached to the fuselage with the 4 threaded aluminium dowel anti-rotation pins, with 4 big plastic nuts inside the fuselage. If the aluminium dowels come loose in the wing, the wing will slide outwards, away from the fuselage, and the main spar tube will definitely break. So take great care to inspect the glue joints of these anti-rotation dowels in the wing REGULARLY. Excessive vibrations or hard shocks can cause the glue joints to weaken or break. Monitor these joints whenever you set up your plane. Never forget to tighten the nuts inside the fuselage. Please DO NOT modify these attachment dowels in any way, their perfect function is proven for many years.

The Fuselage:

The fuselage is also made in negative moulds, and it is also constructed using TAVS technology, with carbon reinforcement in strategic positions. All the loadbearing internal parts are glued in during manufacture, to ensure accurate location and reduce the assembly time for you. The fibreglass tubes in the wings and fuselage to receive the wing tube spar, the stab spar tube, and the holes and reinforcement plates for the anti-rotation dowels, are already installed.

The strong landing gear mount is pre-installed and doesn't need any extra reinforcement. You have an extremely light weight fuselage, and the gear loads need to be led into the structure gently. No glue joint needs to be stronger than the materials that it is attached to, as it would just result in increased weight for no advantage. The landing gear is a fairly flexible design, which works very much like shock absorbers. This plane is not made for crashing, but the landing gear will take some hard landings without problems. Do not change or modify it, as the results would only be negative. We had plenty of time and experience to engineer the strength needed in this area - and we did !



(above) The fuselage as it comes 'out of the box'. All structural components are factory-installed.

The motordome and firewall are pre-installed, and provide plenty of strength for any engines up to 150cc on the market today. See the Engine Installation section for details of engine and setting thrust angles. The engine cowling should be attached using the method shown. It is only a little work and this mounting system has been tested and proven for many years.

The Stabilisers:

The stab parts are also vacuum bagged sandwiched. The rudder and elevator control surfaces are hinged with 4mm Ø tubes, fitted through phenolic hinge bearing plates which are installed during manufacture for perfect alignment.

All the structural parts are pre-installed. The horizontal stabs are mounted with on a 20mm aluminium alloy tube spar, and a 10mm diameter carbon rod anti-rotation pin each. The rudder & elevator design allows for at least 45 degrees throw. For the Extra 260 it is necessary to keep the tail area as lightweight as possible, but it is still *mandatory* that each stab is fitted with two powerful digital servos (JR8411 or 8511/8611 recommended) installed in each half. Please remember during assembly that every gram of weight should be saved in the tail area.

Servo Screws:

Fix the *all* the servos into the milled plywood servo mounts using the 2.9 Ø x13mm sheet metal screws provided in the kit, ***not*** the standard screws normally supplied with servos by the servo manufacturer. This is because all the holes in our milled servo mounts are 2mm diameter, due to our CNC manufacturing process, and this is too big for the normal screws.

Take Care:

Composite sandwich parts are extremely strong, but fragile at the same time. Always keep in mind that these contest airplanes are designed for minimum weight and maximum strength in flight. Please take care of it, especially when it is being transported, to make sure that none of the critical parts and linkages are damaged. Always handle your airplane with great care, especially on the ground and during transport, so you will have many hours of pleasure with it.

(left) An example of a one of our paint schemes, all applied to the Extra 260 in the molds at the C-ARF factory - this one originally designed for the legendary Frazer Briggs.

Ask your 'rep' for a quote on a custom scheme - you will be surprised at the low cost!

Tools and Adhesives

Tools etc:

This is a very quick and easy plane to build, not requiring difficult techniques or special equipment, but even the building of Composite-ARF aircraft requires some suitable tools! You will probably have all these tools in your workshop anyway, but if not, they should be available in all good hobby shops, or hardware stores like "Home Depot", or similar.

1. Sharp knife (X-Acto or similar)
2. Allen key set **(metric)** 2.5mm, 3mm, 4mm & 5mm.
3. Sharp scissors
4. Pliers (various types)
5. Wrenches **(metric)**
6. Slotted and Phillips screwdrivers (various sizes)
7. M3 tapping tool **(metric)**
8. Drills of various sizes **(metric)**
9. Small spirit level, or incidence meter.
10. Dremel tool (or Proxxon, or similar) with cutting discs, sanding tools and mills.
11. Sandpaper (various grits), or Permagrit sanding tools (high quality).
12. Carpet, bubble wrap or soft cloth to cover your work bench (most important !)
13. Car wax polish (clear)
14. Paper masking tape
15. Denaturised alcohol, or similar (for cleaning joints before gluing)

Adhesives:

Not all types of glues are suited to working with composite parts. Here is a selection of what we normally use, and what we can truly recommend. Please don't use inferior quality glues - you will end up with an inferior quality plane, that is not so strong or safe.

1. CA-Glue 'Thin' and 'Thick' types. We recommend ZAP, as this is a very high quality.
2. ZAP-O or PlastiZAP, odourless (for gluing in the clear canopy)
3. 5 minute-epoxy (highest quality seems to be Z-Poxy)
4. 30 minute epoxy (stressed joints must be glued with 30 min and NOT 5 min epoxy).
5. Epoxy laminating resin (12 - 24 hr cure) with hardener.
6. Milled glass fibre, for adding to slow epoxy for strong joints.
7. Microballoons, for adding to slow epoxy for lightweight filling.

At Composite-ARF we try our best to offer you a high quality kit, combined with outstanding value-for-money, and as complete as possible. However, if you feel that some additional or different hardware should be included, please feel free to let us know.

Email us: feedback@composite-arf.com. We know that even good things can be made better !

Accessories

Here is a list of the things you may need to get your Composite-ARF Extra 260 into the air. Some of them are mandatory, some of them can be chosen by you. What we list here are highly recommended parts, and have been thoroughly tested.

1. Power servos (min.12 required). We recommend JR8511/8611's for ailerons/elevators, and JR8411 or 8511/8611 for the rudder, or Futaba are 4 x S9351 for elevators and a pair of S9152 for each aileron. You can use either 3 x S9152's or 4 x 9351's for the rudder.
2. Throttle servo (1) Any standard servo will do (eg: JR/Graupner 4041)
3. Aluminium Spinner 125 mm dia (5"), eg: Tru-Turn or Dave Brown.
4. Main wheels 120 - 125 mm (4.5 - 5"). Kavan Light or Dubro wheels are recommended.
5. Engine DA-150. This is the recommended engine for your Extra 260. The instructions refer to that engine several times, but you could use any other 150cc engine.
6. Mini-Pipe Muffler Set. (Consists of 2 canisters, 2 aluminium headers, 2 Teflon couplers, 4 spring clamps, and mounting hardware - C-ARF product # 910160).
7. Tuned pipe set and manifolds - as shown in these instructions. Available as an option from C-ARF (product # 910200).
8. High quality heavy-duty servo extension cables, with gold connectors.
9. Receiver batteries. 2 x 2400 - 3600 mAH 5-cell NiCD or NiMH packs recommended.
10. Ignition switch and battery for motor. 4 cell 1400 - 2400 mAH recommended.
11. Powerbox 40/24 and dual powerswitches for Rx batteries.
12. Fuel tank (1500 ml) with gasoline stopper. We used a Dubro S-50 in this model.
13. Cable ties in various lengths.
14. Propeller. Carbon 32 x 10 or 32 x 12 Meijzlik or Menz.

About the Extra 260.

The C-ARF Extra 260 was developed in conjunction with several of the world's most experienced IMAC pilots, including Jason Shulman and Frazer Briggs... and using the expertise gained from all our previous planes to ensure it is the most accurate and neutral-flying Extra in the skies.

The level of prefabrication is carried to the limit. Canopy frame mounting, control surface horns, servo mounts, etc., are all completed, aligned and checked, or pre-assembled, at the factory ready for your gear installation. Reacting to customer feedback on other similar planes, we have not installed the fuel tank support and rudder servo tray, to give you the option of position to suit your layout. Of course, these parts are all cnc milled from carbon composite material, quick to assemble - and included in the kit for you to install wherever you want.

The general assembly of the Extra 260 is very similar to our 'SuperXtra" and you may find some extra information & photos in the Instruction manual for it, freely downloadable from our website.

Did you read the warnings above, and understand the instructions completely?

Then, and only then, let's start assembling your Composite-ARF Extra 260.

If not, please read again before you start the assembly...

Building Instructions

General Tips:
We recommend that you follow the general order of construction shown in this manual for the fuselage, as it makes access to everything easier and saves time in the end. The last item to be glued in position should be the Fuel tank mounting plate, as it makes access to the rudder tray and exhaust system more difficult. The wings and stabs can be done at almost any time, and only need servos installing anyway, as the control-surface horns are factory-installed for you.

The first thing to do is protect the finished paint on the outside of the model from scratches and dents during building - so cover your work table with a piece of soft carpet, cloth or bubble-plastic. The best way to stop small spots of glue getting stuck to the outside of the fuselage is to give the whole model 2 good coats of clear car wax first, *but* of course you must be sure to remove this 100% properly before adding any decals or markings. If you prefer you can cover the majority of the fuselage with the bubble-plastic used to pack your model for shipping, fixed with paper masking tape, which also protects it very well.

When sanding any areas of the inside of the fuselage to prepare the surface for gluing something onto it, do NOT sand right through the layer of glasscloth on the inside foam sandwich !
It is only necessary to rough up the surface, with 60/80 grit or equivalent, and wipe off any dust with alcohol (or similar) before gluing to make a perfect joint.

Before starting construction it is a good idea to check inside the fuselage for any loose glass fibres that could cut your hands, and a quick scuff over any of these with a coarse Scotchbrite pad will remove them.

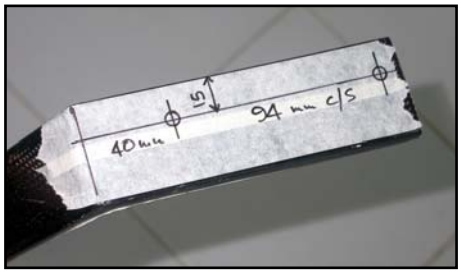
Note: It is *very important* to prepare the inside of all composite parts properly, by sanding and cleaning the surface with de-natured alcohol or equivalent, before gluing *any* parts to them.

Landing Gear

The 1st job is to fit the landing gear legs, and you can leave these in place, as they will protect the bottom of the fuselage during assembly and gear installation.

The carbon landing gear for the Extra 260 is the same as for our Giles G-202, and this has proven extremely strong and reliable. It consists of 45 degree laminated carbon fibre cloth and a huge number of carbon tows inside, all made under vacuum and heat-cured. However it is still light weight, and retains enough flexibility to take the shock out of any landings that are less-than-perfect!

The 4 undercarriage fixing bolts are installed from the outside, bottom, of the fuselage, as shown in photo P1. Mark the position of the holes on each carbon leg, and drill the holes with a sharp 6.5mm Ø drill. The centres of the holes are measured from the bend in the leg that will be positioned about 10mm outside the fuselage surface (photo P3). The outer holes are 40mm from the bend, and the inner holes are 94mm inside them. The centre of the holes is 15mm from the front edge of the carbon (photo right).
The legs are fixed to the plane with the M6 x 30 bolts and



(above) Dimensions for the drilling the two 6.5mm holes in each carbon-fibre landing gear leg.

13mm Ø washers into the blind nuts that are installed in the plywood supports during manufacture (photo P2). Both main legs are identical, until you have drilled the mounting holes, and can be used either side.

The method of fixing the wheelpants and axles to the landing gear legs is slightly different to the method we have described in the past, but it is even easier and works better. The wheelpants have a moulded-in recess for the end of the landing gear legs, which also sets the correct angle relative to the ground. Drill an 8mm Ø hole through the moulded-in 'dimple' for the axle, and another 8mm hole directly opposite, on the outside surface of the wheelpant for inserting the axle bolt. Prepare the inner surface of the wheelpants.

Take the 2 milled plywood 'U' shaped pieces and enlarge the 6mm Ø holes to 8mm diameter. Press the M6 T-nuts into the holes, just far enough so that the end of the T-nut projects through the hole a maximum of 1mm. The 'spikes' will still engage in the plywood, and the gap between the T' nut and the plywood is filled with epoxy and microballoons mixture later. (photo P4 and P5)

Glue the 2 'U' shaped milled plywood pieces to the inside surface of the wheelpants with 30 minute epoxy and microballoons mixture, over the kevlar reinforcement, in line with the moulded recess, and so that the hole in the plywood is exactly in line with the 8mm hole you have drilled in the wheelpant. Temporarily use the axle bolts to secure while the glue dries. At the same time secure the T-nut to the plywood with some of the thick epoxy/micro mixture, as shown in the photo (P5).

(above) The moulded dimple in the bottom of the carbon legs. Drill a central hole of 6mm diameter.

Drill 6mm Ø through the centre of the moulded dimples in the bottom of the carbon legs, and bolt to the wheelpants temporarily with the axle bolt. Drill a 3mm hole thru' the carbon leg and wheelpant, 25mm above the axle. Fit an M3 bolt and washer, and use an M3 T-nut inside - also secured to the plywood 'U' shape with epoxy/micro mixture. This bolt sets the precise angle of the wheelpant to the carbon landing gear leg (photo P6). Do not use a bolt of larger diameter, as the larger hole required could weaken the leg.

Install your chosen wheels (Dubro 5" shown), inserting the M6 x 70mm hardened steel axle bolt through the hole you drilled in the outside surface of the wheelpant. Depending on the thickness of your chosen wheel, you will need 2 or 3 of the M6 washers either side of the wheel to centre it - and also an M6 wheel collar (supplied) on the inner side as well, between the washers and the 'T' nut.

Tighten the axle bolt securely into the T-nut, and then secure the assembled wheelpant to the carbon leg using an M6 washer and M6 locknut as shown (photo P7). A drop of loctite on the M6 lock-nut is good insurance. Finally insert the M3 bolt thru' the carbon leg into the T-nut.

Tailwheel

Any large standard tailwheel assembly from a good hobby store is suitable for your Extra. The tail wheel setup shown here is an optional part available from C-ARF, and is mounted with 4 sheet metal screws and plastic 'U-shaped' brackets under the fuselage, screwed into the factory-installed plywood reinforcement in the fuselage.

If you generally fly from grass surfaces do not need to make the tailwheel steerable, a simple castoring action is fine. However, for asphalt runways it is preferable to connect it to the rudder horns with 2 springs as shown here.

It's easy to make these by winding some 0.8mm or 1.0mm Ø piano wire around a 5mm drill bit, turned *slowly* in a battery-drill, with a small hook in each end to connect the tailwheel steering arms to small holes drilled in the phenolic rudder horn.

Remember - keep it lightweight at the tail end!

(above) Connect the steering arm to the rudder horns with springs for steering option if required. SuperXtra shown here.

Cowling

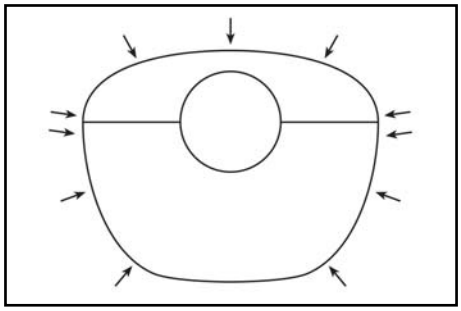
Attaching the 2 piece cowling is quite easy, as it is already cut and trimmed at the factory, and should need almost no adjustment for a perfect fit. If necessary you can sand the inside back edges of both halves of the cowling to have a perfect flush fit with the fuselage.

The top and bottom cowling halves are joined together with four M3 x 12mm allen bolts. The back edge of the lower cowling is secured to the fuselage with three M3 bolts each side, and the upper half secured with another five M3 bolts. All these bolts go into M3 T-nuts, which are glued to the inside of the cowling or fuselage, in *reverse* - that is with the 'spikes' pointing inwards (diagram P8). All bolt heads should have M3 washers under them, and these are included in the hardware.

Start by fixing the lower part to the fuselage with 3 equally spaced bolts each side. Tape the cowl firmly in position, and drill right thru' the cowl and fuselage sides with a sharp 3mm drill, about 7mm from the back edge of the cowl. Sand around each hole inside the fuselage, and clean off the dust. Insert the 6 bolts, check position, screw on the 'T-nuts' and secure each with one small drop of thick CA.

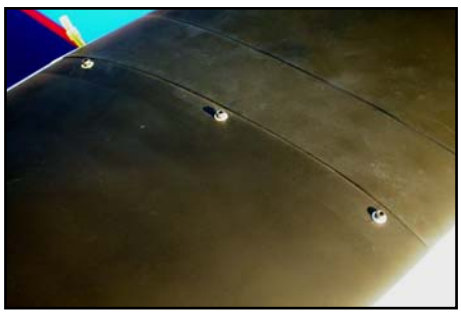
Now fit the upper part, taping it firmly at the back, and to the lower part at the sides - and secure in the same way with 5 equally-spaced bolts, and also CA the T-nuts into position.

Finally drill the 4 holes in each side joint to secure the upper and lower halves together. Insert all 8 bolts and tack-glue the T-nuts to the inside with CA. It is not possible to get to the back T-nuts, so remove the cowling and do these afterwards. You will also find that the back T-nut on each side touches the fuselage motor-dome, and you need to drill a hole of about 10mm diameter to clear it (see photo below)



(above) The cowling is secured to the fuselage with 11 bolts, positioned as shown.

(above/below) The cowling is secured with M3 bolts and washers, into T-nuts that are glued inside the fuselage.



Reassemble the complete cowling onto the fuselage with all bolts and washers to check the fit, and when correct finally secure all the M3 T-nuts with a drop of thick epoxy/microballoon mixture over the 'spikes', as shown in photos P9 and P10.

When your Extra 260 is complete, and before the 1st flight, we recommend that you add one drop of Loctiite to all the cowling bolts.

(above) Drill 10mm Ø holes in the fuselage to clear the back T-nuts that hold the top & bottom parts together.

Cockpit Canopy

The canopy frame mounting has already been completed at the factory for you. It is held in place with 4 bolts (M4 x 12mm) into T-nuts inside in the plywood tongues, and the holes are already counter-bored so that the bolt-heads sit almost flush with the fuselage surface.

Fitting the clear canopy into the frame is a little bit tricky, but this is a step by step guide of how to do it successfully:

Sand the inside edges of the canopy frame carefully with rough sandpaper, to ensure a perfect fit of the canopy inside. Lay the canopy on top of the frame, and mark the rough shape with a felt pen or wax crayon. Cut the outer border of the clear canopy with sharp scissors, about 12mm (1/2") too big all around. Unless you are in a very warm room, we recommend that the canopy is slightly warmed up with a hair dryer to prevent cracking - but be careful not to melt or deform it! When the canopy fits inside the frame roughly, mark the final cut line on it. Then cut it to exact shape with a 6 - 8 mm overlap all around.

(above/below) With the clear canopy tacked into place with the frame on the fuselage, carefully remove it & complete the gluing on a flat table. Secure all around the inside edges with epoxy and micro-balloons mixture.

TIP: The rear sides of the canopy frame (for about 16"/400mm in length) are exactly straight, and it helps to temporarily fix a straight-edge on both sides of the frame while gluing the canopy in position to prevent you deforming it. Photo P11 shows a carbon tube CA'd onto paper masking tape to hold the edges of the frame straight during gluing in the clear canopy.

Make several hand-holds with wide duct-tape (photo P11 and 12) to make holding and positioning the canopy easier. With the canopy frame on a flat table, push the canopy up tightly inside the back of the frame and fix the just bottom 2 back corners with one very small drop of slow CA each (ZAP-O or Plasti-ZAP recommended).

Note: Do NOT use any CA accelerator/kicker - you will immediately 'fog' the clear canopy!

Tape the front of the canopy to the frame temporarily. Mount the canopy frame to the fuselage (use all 4 bolts), and tape the back of the canopy frame tightly to the fuse-

lage, closing any small gap that may be there. Then make visual check from the front and back to make sure sure that the canopy is straight. Using the duct-tape handles to pull the canopy outwards firmly against the frame, working from the back towards the front, glue the edges of the canopy in place in 2 more places each side, with just a single very small drop of CA at each position, all the time checking that the edge of the canopy is tight up against the frame at the front. It really helps to have 4 hands for this job, so get another person to help you !

Now that the canopy is fixed in position and cannot twist or warp anymore, you can carefully glue the rest of the canopy firmly in place.

You can either complete the gluing from the outside (with the frame still mounted on the fuselage), allowing the CA glue to wick into the joint between the frame and the clear plastic or, if you prefer, you can carefully remove the canopy frame from the fuselage, and use a 30 minute or 24hr epoxy and micro-balloon mixture for gluing all the edges to the frame on the inside surface. We highly recommend that you also glue all the inside edges with the epoxy and micro-balloon mixture to be sure that the clear canopy cannot come off in flight.

If you wish you can tint the inside of the canopy using one of the aerosol spray paints used for painting the inside of polycarbonate car bodies (eg: the Tamiya or Lexanit ranges). Use many very light coats to get even coverage.

Horizontal Stabs

The stabs are 100% finished at the factory, with the stab spar tube and retaining bolts, anti-rotation pins, hinging and dual elevator horns all completed - so you only need to install the 4 servos and linkages (photos P13 & P14).

Insert the 20mm aluminium alloy tube spar in the fuselage sleeve and slide on both stabs. The ends of the spar tube are marked left and right, so that the factory-installed blind nuts in the tube will line up with the M3 stab securing bolts that are installed in the underside of each stab.

(above) Stab spar tube already has M3 T-nuts installed at the factory for the securing bolts.
(below) Elevators are hinged with the 4mm Ø aluminium tube thru' the phenolic hinge plates. Carbon anti-rotation pin is factory installed.

Note: Try to always leave the stab tube fixed in one stab, and never remove that one bolt, as it is difficult to find the right position for the stab tube again if it is removed from both stabs!

The elevators are hinged to each stab using the 4mm Ø aluminium tubes provided. Make sure there is no burr on the end of the tube, and you can chamfer the end slightly with fine sandpaper to make it easier to get them through the holes in the phenolic hinge plates. Be careful inserting them, and if they are a bit stiff, then use a little grease on the tubes. Don't use too much force, otherwise some of the phenolic plates inside might break loose. Leave the tubes a bit too long during construction, and cut them to exact length when the model is finished. During final assembly, retain both ends of the tubes with a small piece of clear

tape on the root and tip ends of the elevators.

You have a choice of elevator servos, either a pair of the hi-power digital JR8511/8611's in each stab, or a pair of 8411's, which is also sufficient for each elevator. Although the JR8511/8611 servos are about 1 mm longer and wider than the 8411 type, you will find that both sizes will fit in the milled servo cutouts in the ribs without problems. If using Futaba servos, we recommend that you use 4 x S9351's, which also fit the milled servo cutouts in the ribs.

Important Note: Note that it is *mandatory* to install 2 servos in each stabiliser half, to prevent any chance of flutter.

All servos are installed with the servo output shafts towards the stab trailing edge. You must fit the outer (tip) servos first, as you will need to use a long screwdriver through the inner servo hole in the root rib to tighten the bolt that holds the servo arm onto the servo shaft. Use the 2.9mm Ø x 13mm sheetmetal screws provided in the kit to install the servos, *not* the standard screws provided with the servos.

The outer servo is fitted inverted, inserted through the pre-cut hole in the tip of the stab into the milled slot in the rib. Enlarge the hole in the tip if necessary, and when the installation is complete cover it with the pre-painted thin fiberglass sheet included in the kit, secured with CA or double-sided tape. You may need to grind a little off the inner end of the phenolic hinge plate that projects inside the false trailing edge of the stab for enough clearance to install the servo. Extend the servo cable before fitting the servo, and feed it though the milled holes in the ribs to the root.

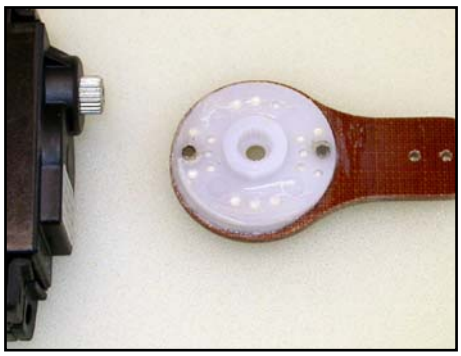
Depending on your servos and personal choice, assemble and fit the servo arms to the outer servos, centring them with the R/C and setting all the arms at 90° to the bottom surface of the stabs - before finally tightening the servo arm screw using a long screwdriver thru' the root rib.

If you are using JR8411 or Futaba S9351 servos, you can use the phenolic servo arms we include in the kit, glued and screwed onto standard 25mm Ø (1") diameter plastic servo output discs. Scuff up the arms and discs well, centre your servos using the R/C and glue (thick CA or slow epoxy) the phenolic arms onto the plastic servo discs. When the glue has cured, remove them and secure with at least 2 of the small 2.2 Ø x 10mm sheetmetal screws provided in the hardware.

Important Note: *The C-ARF phenolic servo arms supplied with the kit have to be attached to the servo output discs, but if using the JR 8511/8611 servos it is* ***mandatory*** *to use metal (aluminium) servo output discs for this, or full metal*

(above) Cut off inner end of outer phenolic hinge post if needed.
(below) Outer servos are fitted inverted, with output shaft towards the stab trailing edge.

(above) Servo access hole in stab tip is covered with pre-painted fibreglass sheet included in the kit.



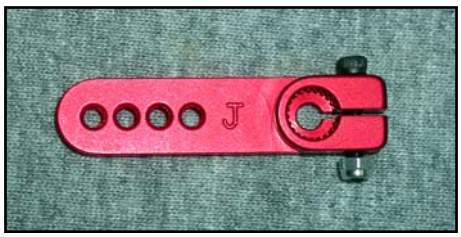
(above) The supplied phenolic servo arms are glued and screwed onto standard 1" plastic servo discs, but if using JR 8511/8611 servos you must use metal output arms or discs.

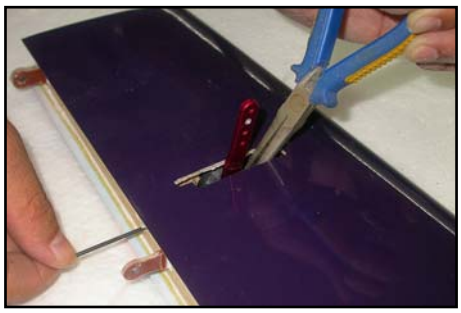
servo arms like these shown from SWB - and ***not*** *the standard plastic output discs supplied with the servos, as the extreme torque of these digital servos can strip the plastic splines from the inside of the disc - which will result in immediate flutter and destruction of your Extra 260.*

However we also *highly* recommend that you also use aluminium output discs/arms when using the JR8411 or Futaba S9351 servos, or other similar hi-torque digital servos. Several reputable after-market accessory companies make aluminium discs and servo arms, but you should check that the CNC machined splines fit onto the servo output shaft tightly, with a minimum of play.

If using JR8511/8611 servos you MUST use metal servo output discs, like these above, or metal arms like the SWB Double-Loc arms shown below. The SWB 1.5" half-arms will give you almost 45° elevator travel when servo throw is set to 150%.

If you chose to use metal output discs you can fit the Phenolic arms them as follows: Fit the discs to the servos and use a little Loctite on the retaining bolt in the centres. Centre all 4 elevator servos using your R/C and attach the phenolic servo arms to the outside of the metal discs temporarily with a couple of drops of CA, making sure that the servo arms are at exactly 90° to the bottom surface of the stabs using a set square. Then remove the arms and discs, drill through both, and secure with at least 2 small bolts, washers, locknuts and Loctite (M2 or equivalent size).





(above) Tightening the clamping bolts and nuts on the SWB servo arms for the outer stab servos can be done like this !
(below) The completed stab linkages with metal arms & JR8511's

At Composite-ARF we only use the aluminium 'Double-Loc' servo arms from SWB manufacturing (USA) and we highly recommend that you use these on your stabs - whatever servos you are using. These arms clamp onto the servo output shaft with no lost movement (play) at all.

Note: All the photos of the stabs in these instructions show the 2" SWB arms on the elevator servos, with the linkage in the 1.75" hole - and this was used for extreme testing of the model and stabiliser servo system, with more than 50 degrees throw possible. The 1.5" SWB arms are quite sufficient and will give you almost 45 degrees elevator travel. You will need to drill out the hole in the servo arm to 3.0mm Ø to suit the pins in the aluminium clevises. We also highly recommend that you apply a little grease on these joints to give smooth movement and prevent any inclination of the aluminium pin to bind in the servo arm hole.

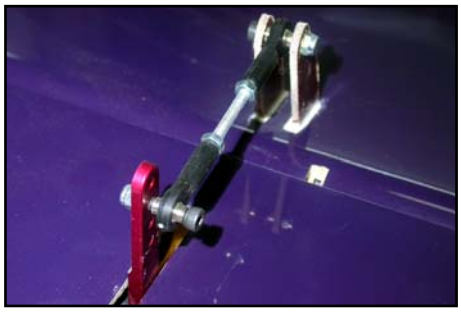
If you fit the SWB servo arms it is a little tricky to tighten the clamping bolt and nut on the servo arm, but you can do it by drilling a small hole in the false trailing edge of the stab (for the allen key/hex wrench) and using a pair of needle-nosed pliers to hold the very small nut (see photo above).

Note: If your chosen metal servo arm system does not line up perfectly with the pre-installed dual phenolic elevator horns you can use a single-sided ball-link on the servo arm - but *only* on a metal arm. If you do this on a plastic or phe-

nolic arm it will twist and cause flutter. This is a fact !

The inner stab servos are easy to fit, and are screwed into the pre-milled slot in the inner rib, using the 2.9 Ø x 13mm sheetmetal screws, provided as shown in photo P16. Access is also easy for tightening the SWB arms securing bolts if you chose to use them.

Make up the elevator linkages from the hardware supplied, using M3 threaded rods, an M3 aluminium clevise and M3 nut at the servo-end, and a ball-link in between the double horns secured with an M3 x 20mm bolt and locknut (P15).



*(above) If required for alignment you can use a single-sided ball-link on metal servo arms **only**.*

Extreme Throws:
If you wish to have more travel on the elevators than the factory assembly allows (about 45°) you will need to increase the length of the slots in the composite/balsa false leading edge of the elevators with a small file. The outer 2 slots in particular will need to be longer, and you can extend them almost right out to the composite skin.

Unfortunately it's not possible for us to mill these slots longer during manufacture - as the L.E. spar would fall apart on the CNC milling table. However, this is a very quick job with a Permagrit file, or similar (see photo right).

(below) If you want more elevator travel than the CNC milled slots in the elevator L.E will allow, you can extend them with a narrow file as shown here.

Rudder

The rudder is 100% completed, with the phenolic hinge posts and the dual phenolic rudder horns already glued in place at the factory during manufacture. Hinge the rudder to the vertical stabiliser with the 4mm Ø brass tube supplied, in the same way as the elevators. Check for smooth movement. You can solder an M4 metal washer onto one end of the tube, and then secure this with a small piece of clear tape for flight.

(above) The phenolic hinge points are all factory-installed and aligned, with double-thickness at the top and bottom positions.

The rudder is a huge surface on the Extra 260 and the choice of servo is up to you. For pattern flying 4 x JR8411 servos will definitely be sufficient, but for the ultimate response and holding power for 3D or Freestyle you may wish to install JR 8511/8611's, as shown here. Both servo types can be fitted in our CNC milled rudder tray, so the choice is up to you. If using Futaba servos, you can fit either 4 x S9351 servos (standard sized), or 3 of the larger S9152's would be sufficient.

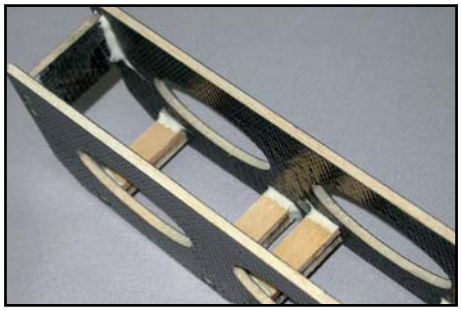
Make up the rudder tray from the milled carbon-plywood parts supplied. Prepare all joints by sanding, and assemble

as shown, using thin CA to secure all the tabs and slots. Cut 8 small pieces of plywood from the strip supplied and epoxy onto the bottom of all the servo rails. Finally reinforce all joints with epoxy and micro-balloons mixture. If you fit JR 8511/8611 or Futaba S9152 servos you will have to sand the ends of the slots for the servos about 2mm, as they are a bit longer then the 8411's. Drill the 2mm Ø holes for the 2.9mm Ø servo mounting screws before gluing the assembly into the fuselage - it's much easier!

(above) The milled carbon/balsa parts for the rudder tray, and the end support bulkhead.
(below) The completed rudder tray is light and very stiff.

It is your choice where to install the rudder tray, but these photos (P19) show the 'standard' position - where the back end of the rudder tray is glued against the milled slots in the bulkhead at the back of the cockpit area, and the front is glued into the slots in the milled carbon bulkhead that is supplied loose in the kit.

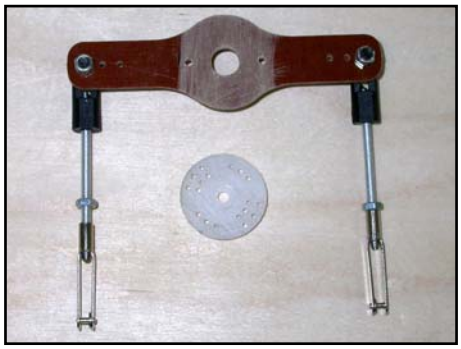
In our set-up shown here, using a DA-150 with carbon prop, 2 x 5 cell 3600MAH NiMH receiver batteries and a 4-cell 2400 Nicad for the ignition, the Centre of Gravity was exactly in the recommended position with the Rudder tray installed as shown. However, if you chose to use lighter weight batteries (especially Li-ion or LiPo types), we recommend that you install the rudder tray further forward, immediately behind the landing gear support bulkhead.



It is easiest if you extend all the servo leads, and install the servos and linkages in the rudder tray before gluing it into the fuselage.

Install the servos into the rudder tray using the 2.9mm Ø x 13mm screws supplied, with the servo output shafts towards the tail of the plane, as shown in photo P19. Provided in the kit are 2 complete sets of CNC milled phenolic rudder horns, one set is 2mm thick and the other is 3mm thick. We recommend that you use the 3mm thick arm for the rearmost servo, and here we have used the 2mm thick phenolic arms for the front 3 servos.

(above) Glue plywood doublers to the bottom of the servo rails.
(below) The 4 phenolic rudder horns are glued and screwed onto standard 1" plastic servo discs.



Rough sand the top surface of 4 standard 25mm (1") diameter plastic output arms with 60 grit, and the bottom surface of the 4 phenolic rudder servo arms chosen to ensure good glue adhesion (see photo above). Then fit the plastic output discs to the servos and connect all 4 servos to your R/C system (through the Powerbox) to centre them.

With the R/C still switched 'ON' place the C-ARF rudder servo horn with the 2 hooks in it on the back servo (hooks facing forwards, of course !) and align so that it is at 90° to the rudder servo tray, and glue in place either with a few drops of thick CA, or with a slow thixotropic epoxy like Hysol 9462. You can do this using a plastic 90° set-square, and aligning one edge of it with the centre of all the servo

arm bolts. The more accurately you do this, the easier it will be to set up the linkages, but 3° or 4° 'out' will still be OK. Then do the same with the other 3 horns.

When the glue has cured, drill through the small holes in phenolic arms and through the plastic discs below, with a sharp 1.8mm Ø drill. Secure all the phenolic arms to the plastic discs with at least 2 of the small (2.2mm Ø x 10mm) sheet metal screws provided, and cut of any excess thread that could touch the servo casing. It is a good idea at this point to number the phenolic horns so that you know which one goes onto which servo, and which is the front of the horn.

Note: It's not necessary to use metal rudder servo arms for the rudder set-up, even when using JR 8511/8611's, as the load is spread over 4 servo discs. We have no reports of failures using the phenolic arms on our 4-servo rudder system, but of course it's your choice....

The linkage system needs a little time to set-up properly so that the 4 servos don't fight against each other, and again it is far easier to do this before the rudder tray is finally glued into the fuselage. Connect the horns together with the 45mm long M3 all-thread, ball-links, quick-links, M3 x 16mm bolts and locknuts provided. The easiest way to do this is to firstly connect the back 2 servos together, and adjust them so that there is no servo 'buzzing' at idle or full throw. Then connect the next servo, and do the same adjustment, and finally connect the last servo. In this way you always know which linkage to adjust when you have 'buzzing', but if you just connect all 4 servos together immediately it can take for-ever to get them right!

Note that you will need to re-drill the alternate outer and inner holes (2nd hole from the end) in each phenolic arm 2.9 or 3mm Ø for the M3 bolts. Don't forget to put the M3 nuts on each threaded rod and tighten them up against the quick-links when you have finished the adjustment, and add a drop of Loctite to the locknuts to make sure the ball-links cannot come loose.

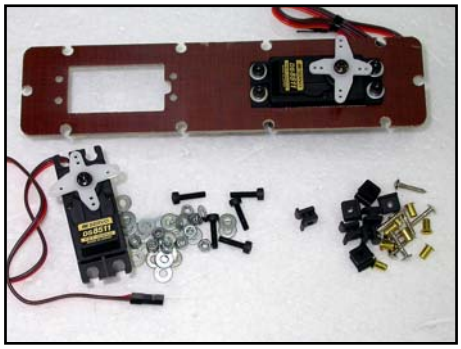
Prepare the inside surface of the fuselage carefully with sanding and clean off with de-natured alcohol (or equiv.), and glue the complete rudder tray assembly in place with epoxy and micro-balloons mixture, with a nice fillet on all joints. Make up the pull-pull wires for the rudder from the hardware supplied, with a loop at the front that goes over the hooks on the output arms, and a quick-link with turnbuckle/threaded end and locknut at the rudder end. For security pass the closed loop cable through the supplied 'crimping tubes' 2 times before squashing flat with pliers (see photo P20). Make sure that the wires are tight, and check and adjust after the first few flights as the cables straighten out. Even a small amount of slop will prevent your Extra from perfect tracking.

(above) Cut the slots for cable exits with a sharp knife. If the rudder tray is in the standard position, then the back of the slot will be 355mm from back of fuselage, and 48mm up from bottom of fuselage.

With the rudder tray positioned as shown, you will need to cut 50mm (2") long slots for the cable exits. With the rudder tray as shown here, the back of the slots is 355mm (14") from the finpost/back of the fuselage, and 47mm (1 $^{7}/_{8}$") up from the bottom of the fuselage.

Mark the slots on a piece of masking tape stuck to the fuselage, and cut them out a bit too small to begin with, using a very sharp knife, and then adjust with a small file - all the time checking the alignment with the rudder cables.

Wings



(above) The recommended JR8511/8611 servos and supplied mounting hardware.
(below) The 3 phenolic servo arms, prepared before gluing and screwing into position.

The wings are 99% finished at the factory, and have already been installed on your fuselage to check the alignment. The inner dual phenolic aileron control surface horns have been installed for you. Slide the wings onto the 50mm Ø wing spar tube and check for a perfect fit. You can sand the edges of the wing roots a little if needed. The 4 plastic nuts screw onto the M6 threaded aluminium wing dowels.

The standard wing set-up is for 2 x JR 8511/8611 servos for each aileron, but you can chose the fit a 3rd aileron servo in the outboard rib, for improved 'snap' response. If you fit 2 of the Futaba S9152's you won't need the optional 3rd outer servo.

The 2 servos of the standard set-up are installed in the CNC-milled phenolic plate supplied in the hardware package. This plate is designed for a pair of JR8511/8611 servos or the Futaba S9351's. Also included in the hardware pack is another pair of phenolic plates, which are milled to suit the larger Futaba S9152 servos.

If you chose to use JR/Graupner 8411's (or equivalent torque digital servos) we recommend that you also install the optional 3rd outboard servo.

The pairs of phenolic servo plates are identical, and there is no 'front' or 'back'. First fit the servos into the plate as shown (photos P21 & P22), using the supplied M3 x 12mm bolts, washers and M3 locknuts on the back face, *without* using the rubber grommets supplied with the servos.

Use a steel straight-edge to make sure that both servos are parallel. Prepare the 25mm Ø servo arms and C-ARF phenolic servo arms as usual, by rough sanding for a good glue joint. Note that one of the long phenolic arms will need the central hole re-drilling to fit over the centre boss on the *underside* of the standard plastic servo disc (Ø 10mm for JR/Graupner servo discs), as shown in the photo below.

Fit the plastic servo discs to the servos and centre them both using your R/C system. Using a small 90° square (photo P23), set the shorter single phenolic arm on top of the plastic servo arm on the front servo, and glue in place with a few drops of thick CA (or slow filled epoxy), making sure that the output hole for the clevis is at 90° to the centreline of the servos.

Do the same with the 2 phenolic arms for the back servo, sandwiching the plastic servo output disc between the 2 phenolic arms as shown. Again make sure that the hole for the clevis is at 90° to the centreline of the servos. Temporarily insert an M3 bolt thru' the outer holes in the long phenolic arms to set parallel alignment while you are gluing them onto the disc.

Finally secure the phenolic arms to the servo discs using at least 2 of the supplied small sheet-metal screws (2.2Ø x 10mm) in each. Make up the linkage between the 2 servos *exactly* as shown in the photo (above), using the 60mm long M3 all-thread, 2 nuts and 2 x M3 clevises. This is important to make sure that there are no 'twisting' moments induced, which could cause

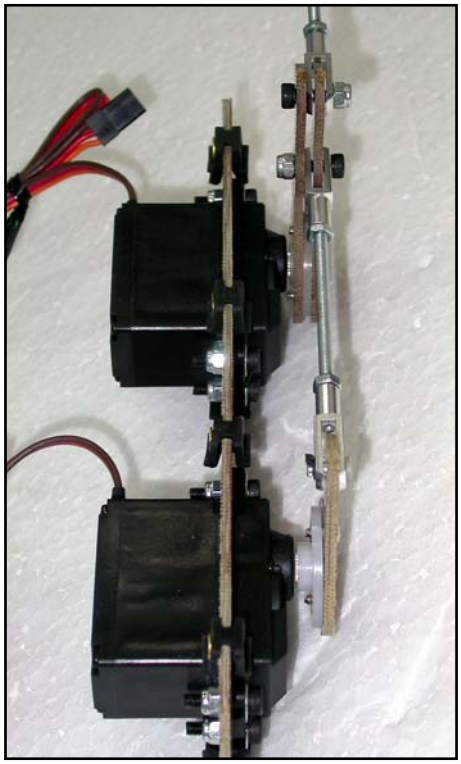
aileron flutter.

Note that the back clevis is secured between the 2 arms on the back servo with an M3 x 16mm bolt and locknut, but the nut must *not* be over-tightened or it will prevent smooth movement. The front clevis is fixed using the pin and 'C' clip. Carefully adjust the linkage length so that there is no 'buzzing' from the servos at neutral or full throw positions.

Then make up the linkage that goes from the end of the back phenolic arm to the aileron horn, using the M3 all-thread, one clevis, 2 x M3 nuts and an M3 ball-link on the end. As before the clevis is secured between the 2 phenolic horns with an M3 bolt, and the nut must *not* be over-tightened. We advise one drop of Loctite on all the bolt threads so that the locknuts definitely cannot come loose.

Important: Note that both clevises on the rear phenolic servo arm are fitted to the *outside* horn, to keep all the forces in line. This is important to make sure there are no twisting moments, which could cause aileron flutter.

(below) Please position the horns and clevises exactly as shown here, to prevent any twisting moments which could cause flutter.

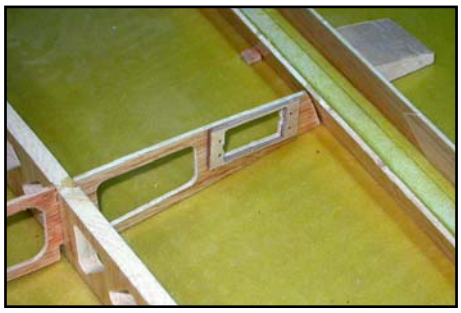


Extend the servo cables as needed to reach your chosen connector system at the wing root. Fit the rubber grommets and brass ferrules (supplied with the servos) into the 10 milled slots around the edges of the phenolic plates as shown. You will need 2 extra rubber grommets per wing. Install the completed aileron plates in the wing, using a long X-head screwdriver and secure with 10 of the 2.9Ø x 13mm sheetmetal screws provided, into the holes that are milled in the composite plywood/balsa rib for you during manufacture (photo P25). Route the servo extension cables through the hole milled in the rib for this purpose, above and in front of the servo cutout. Be careful not to trap the servo cables between the phenolic servo mounting plate and the rib.

Check that the phenolic servo horn and linkage align with the dual control surface horns in the aileron. With the R/C switched 'On', adjust the length of the linkage to the aileron, and connect the ball-link between the horns with an M3 x 20mm bolt and locknut (photo P26). You will probably need to make the slot in the wing a little wider to clear the bolt and locknut on the phenolic servo arm at full throw.

Optional 3rd Servo

We have added the option for fitting a 3rd aileron servo, which is recommended if using the JR8411's, outboard of the standard pair of servos. This extra servo gives improved response for 'snaps' etc, but it is not absolutely necessary if you are using JR 8511/8611 servos with a 5-cell battery system.



(above) The milled servo slot, screw holes and plywood reinforcement in the outer rib for the optional 3rd aileron servo.

The outer rib is already has a hole pre-milled for this servo and a plywood reinforcement glued in place during manufacture (see photo right). The servo is fitted with the output shaft towards the trailing edge of the wing, in the same orientation as the back inner servo, and uses another pair of

the same phenolic arms.

You have 2 choices for servo installation; you can make a very long X-head screwdriver and insert it from the wing root (see photo P27), which is quite tricky but neat - or you can cut a servo hatch in the bottom of the wing surface. If you chose to cut the servo hatch you will need to re-use the section of wing that you cut out for the hatch cover, so be careful cutting it out. Reinforce the underside of the wing skin with the milled plywood frames that are supplied in the hardware, and secure the hatch using four 2.9 Ø x 10mm sheetmetal securing screws in each.

The aileron horns for the optional 3rd servo are not factory-fitted, but it is an easy job. Duplicate the angle and set-up from the inner aileron horns using a card template, but make sure that the 3mm holes in the horns are 8mm further out from the aileron surface to get the same throws, because the wing is 8mm thinner from the top-hinge axis at this position. Mill the 2 slots in the aileron at least 20mm deep, sand the portion of the phenolic horns that will be glued inside into the factory-installed balsa block, and glue them in place with epoxy and micro-balloon mixture.

The pair of phenolic servo arms must be glued and screwed onto both sides of a standard plastic servo disc, in exactly the same manner as for the back/inner servo, making sure that the servo is centred with the R/C first. Extend the servo lead and route to the wing root.

With the servos installed using the 2.9Ø x 13mm sheetmetal screws provided in the kit, cut a slot in the bottom wing surface for the servo arms, and make up the linkage from the M3 threaded rod, M3 aluminium clevise, nuts, and M3 ball-link supplied using the same method as for the inner servos.

(above) The hardware & plywood servo hatch reinforcement parts for fitting the optional 3rd aileron servo are all included in the standard kit.

(below) The completed 3rd aileron servo horns and linkage, installed using a very long screwdriver from the root rib. A little fiddly to do - but neat.

Engine and Exhaust Installation

Here we show the installation of a Desert Aircraft DA-150 motor and Manfred Greve tuned-pipes (available from C-ARF as an option) which is a highly recommended combination with lots of power, and a very good throttle response throughout the whole range, yet extremely lightweight. Of course, you can also use any suitable canister set-up, such as the excellent MTW mini-pipes with matching headers - which are also available from us as an accessory.

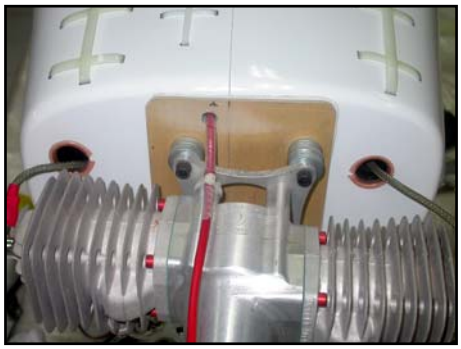
The DA-150 motor fits fully enclosed in the cowling, and no cutouts or holes are needed. Of course many other engines in the 120 -150 cc range are suitable as well. All measurements shown here are according to this set-up, but in the future we hope to add the mounting dimensions for other popular engine and muffler combinations to our website.

The integrally-moulded motor dome is reinforced inside with plenty of carbonfibre during manufacture and does not require any additional strengthening, and the plywood reinforcement plates on the inside and outside surfaces are already installed for you. The firewall has no downthrust (or sidethrust) built in to it. You can check this easily by setting the wing at 0° incidence and checking the vertical face of the firewall with an incidence meter if you wish. When using the DA-150 and a 32 x 10 or 30 x 12 carbon 2-blade propeller, it is usual that this combination requires about 3 ° sidethrust, and nominally 0° - 0.5° upthrust.

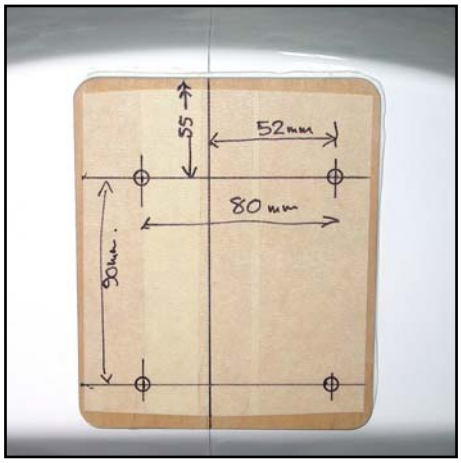
To set the positions for the 4 mounting holes for the DA-150, first accurately mark a vertical centreline on the front of the plywood firewall, in line with the joint seam of the fusealge, as shown right. Then use a steel straight edge placed on top of the fuselage in front of the cockpit (*not* on the cowling area which is lower) and measure vertically downwards 55mm on the centreline (see photo above).

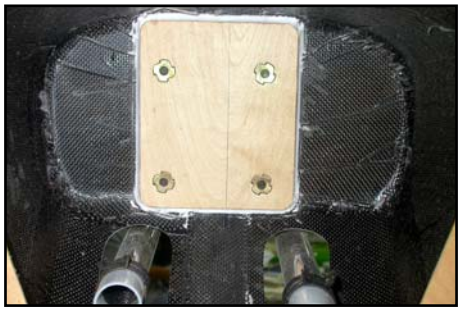
Mark a horizontal line across it at this position. The 1st hole (top left hole in pilot's view) is positioned on this horizontal line, 52mm to the left of the vertical centreline. Drill *only* this hole 7.5mm Ø and fit an M6 blind nut inside the firewall and fit the engine in place using one of the supplied M6 x 40mm bolts to check alignment. You will need to pack the engine mount off the firewall by about 18mm (photo P28) using a stack of large washers so that the spinner backplate has about 4 - 5mm minimum clearance from the front edge of the cowling.

Bolt the cowling in place and put the spinner backplate (125mm/5" Ø) on the motor. Check that the overall height of the motor is correct, and that the top edge of the spinner



(above) Use a steel straight edge on the black part of the fuselage (in front of the cockpit) to measure the 55mm vertically down.
(below) Set-out dimensions for the DA-150 engine mounting.





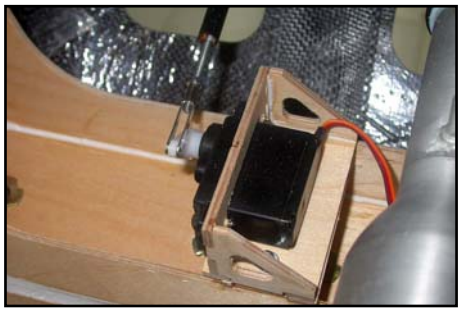
(above) M6 T-nuts on the inside of the plywood firewall. Secure with a little 30 min. epoxy.

is in line with the top of the cowl. Drill the 2nd hole, exactly 80mm to the right of the first hole (pilots eye view). Again mount the motor temporarily, packed off the firewall with a stack of washers about 14mm thick, for the sidethrust. Re-fit the cowling and spinner backplate. Ideally the spinner backplate should be in line with the centre of the cowling now.

If the position is OK, or close enough, then remove the cowling and drill the bottom 2 mounting holes, fit the T-nuts and bolt in place - also using 2 stacks of washers 14 and 18mm thick. Side and down/up thrust can be finely adjusted by adding or removing washers. The centres of the 4 mounting holes of the DA-150 are 80mm horizontally, and 90mm vertically, and with the first 2 holes drilled it is easy to mark the lower ones, using a 90° square and offsetting from the 1st two holes. Finally glue the 4 blind nuts to the inside of the firewall with a little 30 minute epoxy.

NB: In the instance that your 1st hole was not in the correct place you can enlarge it a little with a file to correct it, and refit the blind nut, or plug the hole with a piece of hardwood dowel, glued in with slow epoxy and re-drill in the correct position when it is completely cured. Adjustments to sidethrust after the first flights, if needed, are made by adding or removing washers between the back of the engine mount and the firewall. In the future we hope to add the mounting hole dimensions for other popular motors to these instructions, or on the website.

Throttle servo: Make up the throttle servo mount, as shown, from the milled plywood parts supplied, assembled with thin CA, and then glued firmly with 30 minute epoxy and milled-fibre mix.



(above) The throttle servo mount is made up from the milled plywood parts supplied in the kit.
(below) We made up a simple carbon tube pushrod to connect to the carburettor.

It is your choice where to mount it, but we *do not* recommend that you mount it on the back of the firewall because the engine vibrations will 'kill' the servo quickly.

In the Tuned-pipe set-up shown here, a good position is to mount it on top of the plywood landing gear bulkheads. A small piece of 3mm plywood was glued between the 2 bulkheads, with 2 M3 T-nuts underneath, and the complete mount secured with M3 x 12mm bolts and washers. It is very easy to remove if needed, and gives a nice direct route to the motor throttle arm. We made up a pushrod from a carbon tube and M3 all-thread to connect to the throttle arm on the carb.

(below) A choke rod was made from M3 all-thread and a ball-link.

All DA motors need quite a lot of servo throw to get the full throttle range, so make sure you can fit a long output arm on the servo, and allow for this when cutting the clearance hole in the firewall for the linkage.

Tuned pipes:

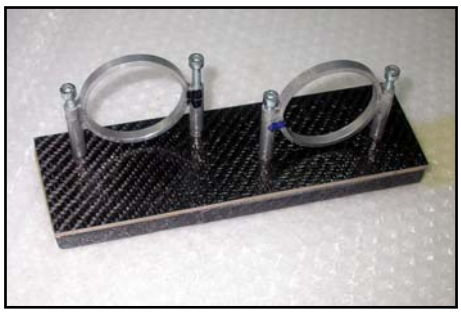
For these instructions we fitted a set of the Manfred Greve tuned pipes and manifolds (available as an option from C-ARF), because they are small, lightweight, give absolutely superb throttle response throughout the whole range ... and they are extremely easy to install !

Included in the set are a pair of aluminium 'clamps' that

secure the back ends of the pipes, which are isolated from vibration with the supplied silicone sleeves. The clamps are bolted onto a simple carbon/balsa or 3mm plywood plate that is glued across the fuselage at the back end of the pipes. It is important that the clamps are located within the last 50mm (2") of the pipe length, and there is no other pipe support needed - except for the stainless steel headers at the front. This mounting method has proved very reliable with no pipe breakages to date.

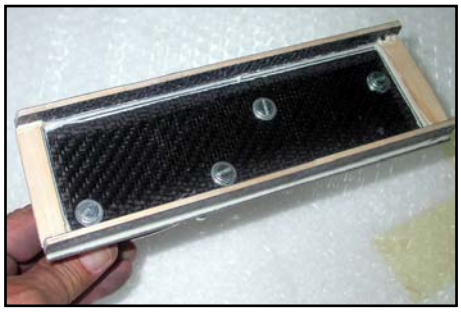
(above) Pipes are isolated from vibration with the silicone sleeves provided, under the clamps.

The total length of each exhaust system should be between 920 - 970mm, measured from the exhaust flange on the motor to the end of the tuned pipe. We set them at 960mm in this set-up for the 1st flights, and positioned the pipe clamps at the back about 40mm from the end - to allow us the shorten the length (by cutting the manifolds) if needed.



Top and bottom views of the rear tuned-pipe support.

The support plate is a piece of 3mm composite carbon/balsa, but 3mm hi-quality plywood is also fine. The plate shown here is 224mm wide at the front, 214mm wide at the back, and 70mm deep. Glue 2 small stiffening ribs underneath it and bolt the aluminium clamps to it using washers under the bolt heads. Be careful not to deform the fuselage when gluing it into place - it should be about 1mm narrower than the fuselage. Access to the clamp securing bolts is thru' the air exit slots underneath the fuselage. Maintain approx. 8mm gap between the top of the tuned-pipes and the bottom of the fibreglass sleeve for the main wing spar tube to prevent burning. There is still plenty of space below the pipes for the standard rudder set-up and the cables to the rudder.



The ends of the pipes were extended with a length of 20mm aluminium tube, connected with high-temp silicone tube (Aerotrend) and spring-clamps, so that they extend out of the fuselage by about 10mm (photos P34 and P36).

The Greve tuned-pipes have smoke injector nipples at the front (for use with a smoke system), which need to be blocked off if you are not using them.

Standard Mufflers:

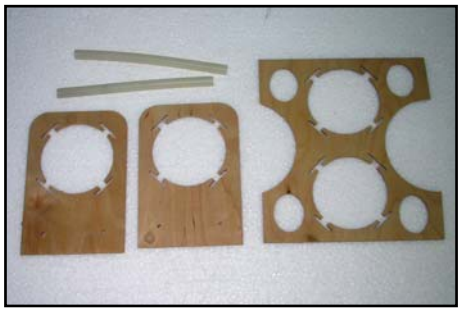
If you are using a standard muffler just mount it onto the engine and cut suitable clearance holes in the bottom of the cowl for the exhaust outlets.

(above) We highly recommend the MTW canisters, headers and teflon connectors, which C-ARF can supply as an option.

Mini - Pipes/Canisters:

An internal canister installation is a little more complicated than the use of standard mufflers, but sometimes you don't have any choice, especially if you have noise problems at your club field.

In Europe noise is always a problem, so Composite-ARF had to find a quiet and powerful solution, and we recommend the MTW canisters with the headers as shown in the installation in the prototype Extra 260 (photo 35).



(above) The milled plywood canister support bulkheads, and silicone spacers, are included in the standard kit.

They come complete with teflon joiners and swage clamps and this package can be ordered from Composite-ARF as an option (see photo above). This set-up gives the engine a nice throttle response, a perfect mid-range, and also increases the top end power slightly.

Included in the standard kit are 3 CNC milled plywood bulkheads, with hard silicone isolation spacers (photo right), that are designed especially to suit the excellent 70mm diameter MTW canisters. These canisters do move the weight of the main components forward in the fuselage a little, compared to full-length tuned pipes, which is useful if you plan on using Li-Ion or Li-Poly batteries that are much lighter than NiCads or NiMH types.

When the manifolds and pipes have been fitted to the motor in their final position, the smaller bulkheads are simply slipped over the canisters from the back, trimmed to length if necessary, and secured to the back landing gear bulkhead with either 3 large sheetmetal screws each, and then permanently glued in place with epoxy. The larger bulkhead is then glued under the wing-tube to support the back of the canisters in the same way. Cut 20mm lengths of the supplied hard silicone tubing and install in the slots in each corner to isolate the canisters from the plywood parts. Photo P35 shows this type of installation in the original prototype.

Cooling:

Whether you use a tuned-pipe or internal canister exhaust system, it is very important to have enough cooling for both the engine and exhaust.

(above) Air exit slots either side of the rudder tray. Size 150 x 50mm. (below) Simple 3mm composite balsa baffle plate glued into the lower cowl for the DA-150.

Cut large enough holes around the headers under the motor to make sure plenty of cooling air can enter and flow around the canisters or tuned pipes. In the installation shown here (photos P31 and P32) the 2 rectangular holes are 150mm (6”) high and 70mm (2.75”) wide, and these sizes can be used as a guide. Leave at least a 50mm wide strip of fibreglass in between the cutouts, as this area has the carbon joining tape on the inside of the motor dome.

It is also just as important to make sure that all the warm air can exit the fuselage. If you fit the MTW (or similar) mini-pipes you will need to cut 2 slots in the bottom of the fuselage, just behind the landing gear support bulkheads, each of about 160mm (6.25” long) and 55mm (2.25”) wide.

If fitting a longer tuned-pipe system you will need 4 slots, as shown in photo P36. The front tapered slots are 160 x 45/55mm, positioned either side of the rudder tray, and the rear slots are 150 x 30/40mm, positioned so that the back of the slot aligns with the tuned-pipe exits. Radius the corners of all the slots to reduce any chance of tearing of the

composite skin. The 10mm thick composite balsa finpost also has many milled cutouts in it, which prevents a build up of warm air in the back of the fuselage.

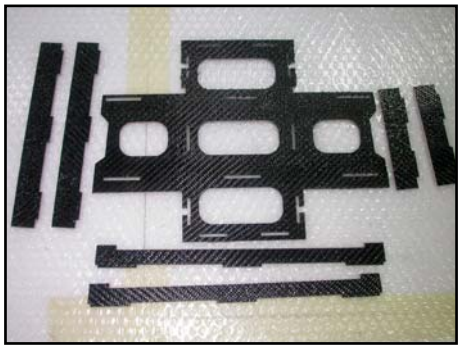
Depending on your motor, you will almost certainly need to make a simple 3mm thick balsa baffle plate inside the cowling to make sure that enough cooling air is directed through the engine cylinder fins, instead of just going directly out of the opening in the bottom of the cowling. See the photo above for an example, which improves the cooling considerably, and is strongly recommended. A full-size template for this baffle is included at the end of these instructions.
In any case, check that your motor is not overheating when you make the “engine-running” R/C range checks before flying.

Fuel proofing: We highly recommend that you protect all the bare wood parts inside the front of the plane with one thin coat of 24 hr laminating epoxy, or similar, brushed on. Be careful not to add excess weight here - it only needs about 30 grams (1 oz) of epoxy to fuel proof all the wood in the whole area inside the front of the plane.

Note: Please call your Composite-ARF Rep. or email us at: techsupport@composite-arf.com, if you need any additional information with the motor and exhaust system installation.

Fuel Tank Base

The Fuel tank base is supplied as several cnc milled parts, from 3mm carbon-balsa composite material (see photo right). Assembly is self-explanatory as all parts have interlocking tabs and slots. Four parts are glued on the top, to make a bay for the tank to sit inside, secured with cable ties in the milled slots, and the 2 longer pieces are glued on the bottom as support rails across the fuselage.



(above) The fuel tank base is made up from these milled carbon-balsa parts, for a Dubro S-50 tank.
(below) Top view of assembled fuel tank base.

Assemble with thin CA, in the same manner as the Rudder tray, and then secure with a good fillet of epoxy and microballoons as seen here. Please remember to sand all the mating surfaces a little for good glue adhesion.

The completed tray is glued over the top of the fibreglass wing tube sleeve, as shown, and the support rails underneath are glued onto the carbon side rails - both with an epoxy/microballoon mixture. We advise you to glue this assembly in position as the last task, as it makes access to the mufflers and rudder servo tray a little more easy.

The tank (1500 cc - Dubro S-50) is secured to the tray with 3 cable ties, and you may need to adjust the position of the pre-milled slots in the tray - depending on your choice of fuel tank.

There is plenty of space on both sides of the tank, and you can fit a PowerBox or additional smoke tank here if you wish.

R/C & Gear Installation

Everyone has their own favourite methods when fitting the R/C and gear, but the installation shown here can be used as a guide, and similar set-ups have worked perfectly in all of our planes flown by C-ARF factory staff, and many of our customers.

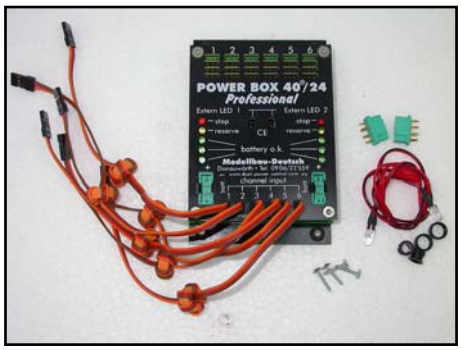
C-ARF highly recommend that you install a dual receiver battery system, with a high-quality servo powerbus unit and dual switches as shown, for the ultimate in safety and security. The full 'PowerBox' range is all available from C-ARF as an option. Visit our website for more details.

We recommend 2 Rx batteries of 5-cells, either NiCd or NiMH of between 1800 - 3600 mAH each. If you have built the Extra 260 using the DA-150 and the tuned-pipe set-up shown in these instructions you should find that with all 3 batteries positioned as shown (just behind the firewall) the C of G will be spot on, with no lead needed. We used two 5-cell 3600 mAH packs for the receiver, and a 4-cell 2000 mAH Nicad for the motor ignition.

(above) General view of the R/C installation, with Powerbox on the fuel tank base, and receiver fixed to side of fuselage behind it. Keep all the wiring and tubes firmly fixed so they cannot rub on any composite material, or touch the hot exhaust system.

(Please double-check the manual for your R/C system if the use of 5-cell NiCads is recommended, or not)

We advise that you pack all your battery packs in foam to absorb the vibration. At C-ARF we always separate the receiver packs and switches on one side of the fuselage (left side here) and the ignition battery, ignition unit and ignition switch on the other side so that there is the least possibility of any interference between the high voltage ignition system and the R/C.



Highly recommended Powerbox and Powerswitches are available as options from Composite-ARF.

You can easily fix the battery packs using cable-ties passed through small slots filed in the fuselage, as shown in photos P38 and P39. Make sure that all the batteries, and other heavy items, are fixed very securely in the plane, as the forces on these items during high 'G' manoeuvres is extremely high.

Powerbox installation

The PowerBox 40/24 power control unit is designed especially for large models and provides dual battery inputs with hi-amp connectors, multiple outputs for 6/7 channels/24 servos (no 'Y' leads needed), automatic voltage regulation

and stability, built-in servo amplifiers for those long servo cables, as well as dual visual LED battery displays. It comes complete with hi-current connectors and is fitted with RF-suppression chokes on all channels.

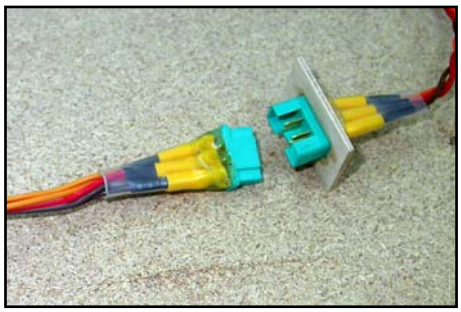
The Powerbox is screwed to the left side of the fuel tank base, and the receiver is mounted on the side of the fuselage immediately behind it, in a foam sleeve, and secured with cable-ties or similar. This position keeps the receiver as far away as possible from the motor and ignition system.

With the R/C installation described here and this motor and tuned-pipe set-up, you should not need any additional ballast in the nose to obtain the correct 'Centre of Gravity' for pattern flying.

Switches

We highly recommend the high-quality 20 Amp PowerBox powerswitches (see photo above) for the dual receiver batteries, available as an option, and we also use one of these in the ignition circuits of all our planes. Remember the high current that 14 digital high power servos can draw during 3D and Freestyle manoeuvres when deciding on your R/C equipment.

If fitting the switches into the outside surface of the fuselage (photo P40), please reinforce the area inside with a small patch of 3mm thick plywood to reduce vibration transmissions to the switches (photo P41). The switches come with paper templates, making it easy to cut accurate slots in the fuselage. We fit the 2 Receiver switches on the right side, and the single Ignition switch on the left side (photo right).

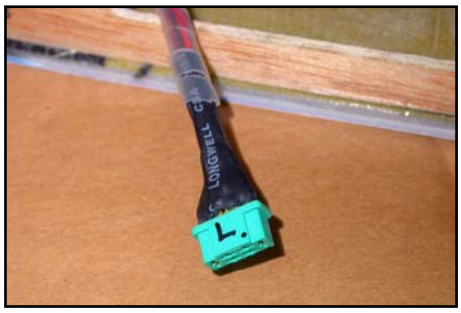


(above/below) We use these 6-pin Multiplex connectors for all the removable connections between wings/stabs and fuselage.

Composite-ARF advise you to keep all the cables between the motor ignition battery, ignition switch, and high voltage ignition unit as far away as possible from the receiver and R/C system.

Servo extension leads etc.

Please make sure that you use good quality 3-core twisted-cable extension leads, of heavy gauge wire with gold-contact connectors, to all the servos. Certainly we recommend that all servo leads and extensions longer than about 30cms (12") are fitted with ceramic chokes (ferrite rings) to prevent RF noise, at the receiver end - normally within 100mm (4") of the receiver. Of course, if you are using a 'Powerbox' this unit is already fitted with all the ceramic chokes etc, and comes with the required high-quality switches. Also no 'Y' leads are needed, as the powerbox provides 4 inputs for each channel.

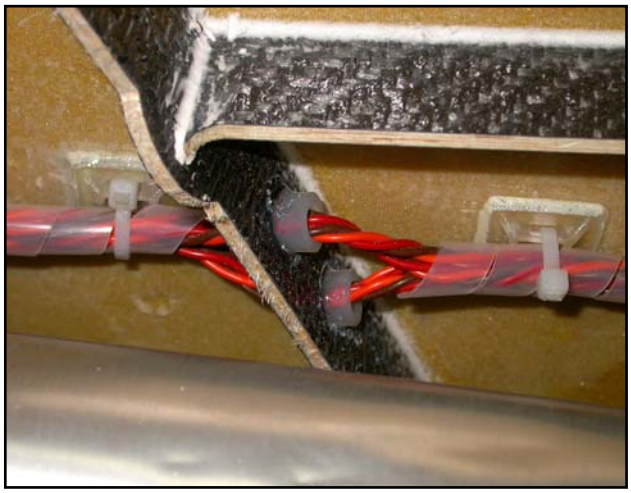


At C-ARF we hard-wire all our servos with twisted cable leads of the exact length required and Multiplex 6-pin connectors (see photos), so you can use 1 pin for each wire. We glue the female connectors into small plywood plates in the sides of the fuselage for connecting the stabs and

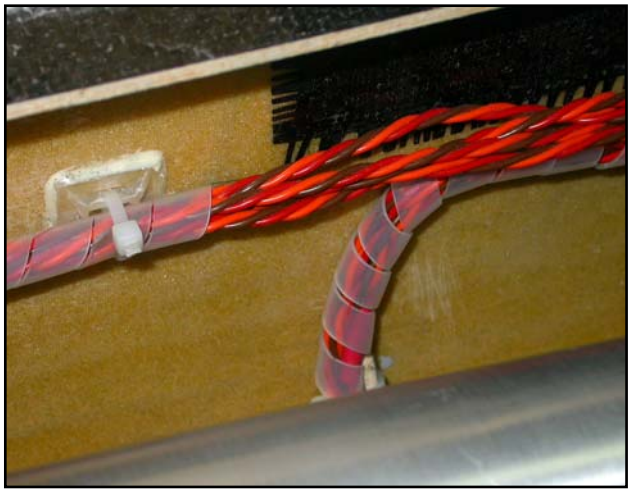
ailerons when assembling the plane (see photo right).

Making up the proper extension cables and connectors is only a little work, if you are proficient with a small soldering-iron, and makes assembly of the model at the airfield very quick and easy! Once all wires are soldered to the gold-plated pins, fit a short length of heat-shrink tube over each one. Finally protect all the connections from vibrations etc with a nice blob of glue from a hot-glue gun. Job done.

Important Note:
Make absolutely sure that all wires and tubes are protected where they pass through, or near to, sharp carbon or fibreglass edges. With the vibration from the engine in flight the composite materials can cut through these critical items in less then 1 flight - which will cost you your plane.



(above & below) It is very important to protect all tubes & wires where they pass thru' fibreglass or carbon parts, or near to composite milled parts, where they could be damaged due to vibrations. Use grommets or split silicone tube around the edges of holes in composite material, and plastic spiral-wrap.



You must also make sure that no important services (wires or fuel tubes) can touch hot items, such as the exhaust cannisters. If you chose to fit full-length tuned pipes then good 'wire management' is even more important and you should secure all wires as far away from the pipes as possible.

We advise you to protect all these items with plastic 'spiral-wrap' (or equivalent), and make sure that all wires and tubes are firmly fixed to the sides of the fuselage with cable-ties or similar.

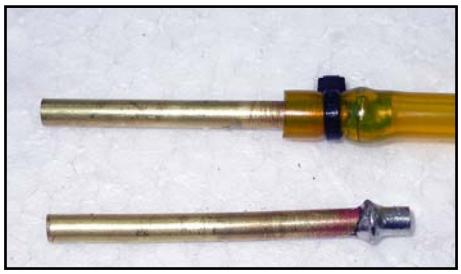
Some of the pictures here, and on the Photosheets will give you some hints for the proper fixing of these important items.

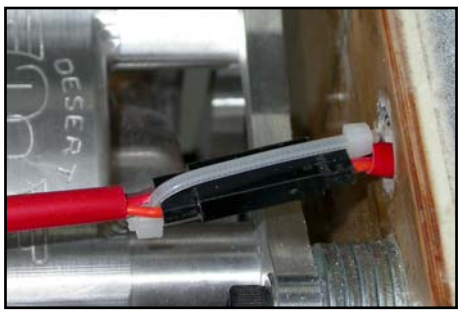
See photos right, and photo P42 and P43.

Fuel tank installation

Photo P37 shows the 1500cc fuel tank (Dubro S-50), which is held to the tank base with 3 large cable-ties. Drill a hole in the motor firewall where necessary for the fuel feed tube from the tank, and protect it where it passes through the hole using a rubber grommet (photo right). Fix the tubing securely to the underside of the top of the motordome with a couple of cable-ties or equivalent, to make sure that it cannot touch the hot exhaust.

(above) Use a rubber grommet where the fuel tube passes through the firewall, and a cable tie to make sure it cannot come off the carb.





Fit the correct stopper to the fuel tank for the fuel type used. (If using Dubro tank the gasoline stopper has a small 'O' marked on the top of it). We use the excellent 'Tygon' brand of fuel tubing for all our models. It is totally gasoline and kerosene-proof, and does not go hard and crack with age. Secure the feed tube inside the tank to the clunk with a small cable tie. If the tube is even a little loose on the brass tubes though the stopper, you can be sure it will come off at just the wrong moment and your engine will quit !

Therefore please solder small rings, or short lengths of larger brass tube onto the brass tubing (easily made from the soft wire of a paperclip wrapped around a small screw-driver) and also secure with a fuel-line clamp or cable-tie (see photo). Don't miss this small detail - it could cost you your plane ! We use the normal 3 tube plumbing system, one from the clunk to feed the motor, one out of the bottom of the plane (vent/overflow) and one at the top for filling (close for flight).

If you want to fit a smoke system the smoke tank can be fitted alongside the fuel tank. Follow the manufacturers instructions for fitting the smoke system.

Motor ignition system

The ignition unit is fixed to the underside of the motor dome, immediately behind the firewall, on foam pads, retained with 3 cable ties each, as shown in photo P38. Add a very small cable ties, or 'safety clips', around the connector from the motor pick-up to the ignition unit, and also between the switch and ignition unit - for extra security (see photo right).

Final check

Now check that you have fixed all components securely. Keep in mind that all the components inside the aircraft are loaded with the same G's as the wing and the wing spar during aerobatic manoeuvres. Check engine, cowling, wing and stab mounts carefully again.

Are all extension leads, cables and fuel tubes securely fixed to the side of the fuselage and cannot come loose when subjected to high 'G' forces during flight. Are all tubes and wires protected from chafing where they pass thru' the holes in fibreglass parts or bulkheads with rubber grommets, or short lengths of split silicone tubing?

Make sure that no fuel tubing or wires can come into contact the exhausts or manifolds. Use the plastic spiral-wrap to tidy up groups of cables and make sure that they cannot move around in the plane under high 'G' manoeuvres by fixing them to the sides with small cable ties. If using the easily-available cable-tie plastic fixing plates, please do not trust the double-sided tape that they usually have on them which can fail under vibrations. Peel it off, rough up the back face with coarse sandpaper and glue them to the fuselage sides with 30minute epoxy.

- Did you fit small Tygon or silicone tube pieces over all the steel quick-links?
- Did you tighten the M3 locknuts against all the quicklinks and clevises?
- Are the swages crimped up nice and tight on the rudder cables?

- Add one small drop of loctite/thread locking compound on all the bolts that hold the servo arms to the servos, especially important with digital types, as the occasional 'buzzing' you hear is actually high-frequency vibration which, over some time, can cause the servo arm securing bolts to work loose. We have seen this happen several times - so you can treat it as a fact !

Then you can go on set up all the linkages, control throws and R/C system as described below.

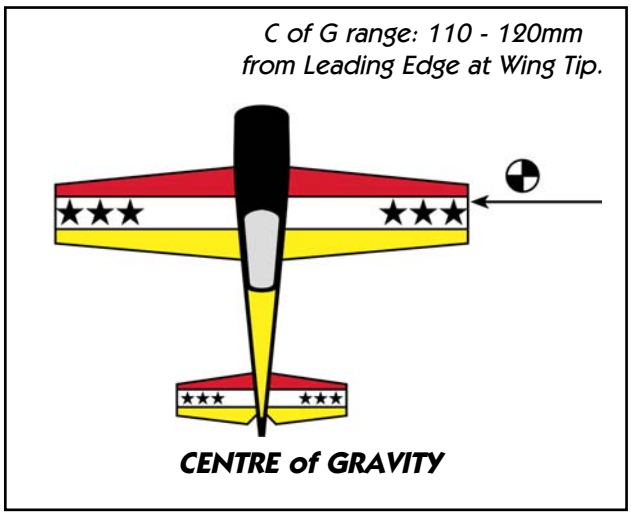
Setting Up Your Aircraft

Centre of Gravity:

For the 1st flights, set the Centre of Gravity on the centre of the wing spar tube. This is equivalent to 120 mm back from the leading edge at the wing tips.

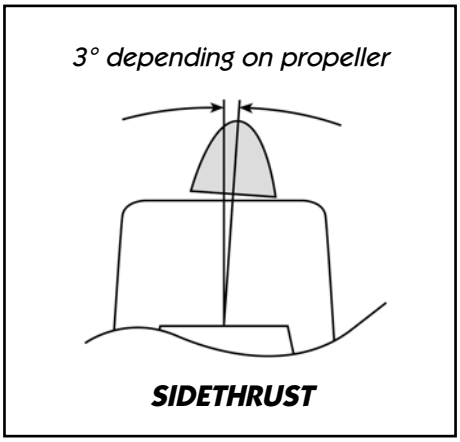
Hold it with a helper at both wing tips in this position and make sure the plane balances horizontally.

Don't forget to balance the plane laterally also, holding the motor propeller shaft and a fingertip under the finpost, and if needed add a small weight to the light wing tip to make it track correctly.



Engine Thrustline:

Already given in the instructions, this should initially be set between 0° and +0.5° degrees upthrust and right thrust set at 3° degrees, depending on the prop used. We recommend a 32 x10 or 32 x 12 carbon 2-blade prop for any 150cc engine. It is a very quiet and powerful solution. They are normally CNC-designed, so the prop is balanced perfectly statically, dynamically and aerodynamically, which keeps the vibration down to a minimum.

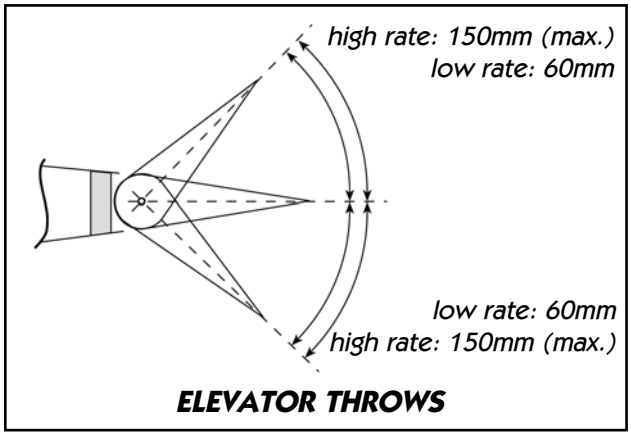


Control Throws:

All measurements are measured at the root/trailing edge position.

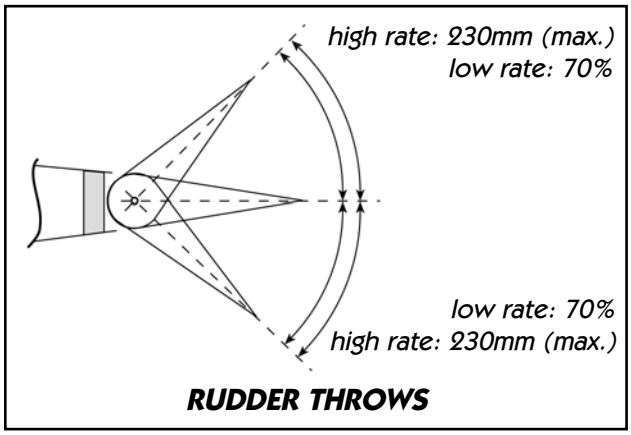
Elevator

All controls should be set with a dual rate switch. On high rate the elevator should really be at maximum, up to 50 degrees both sides (approx. 150mm), but in this case with 50% exponential. Low rate should be no more than 60mm (2 1/2") both sides. This is the perfect throw for nice and crisp snaps. If you like you can add about 25% exponential to the low rate setting as well.



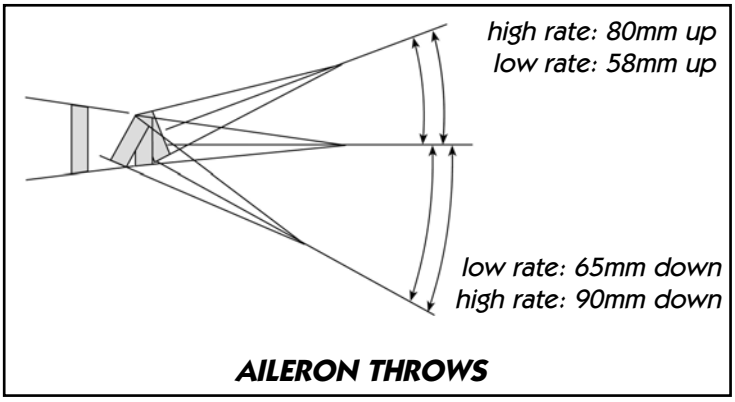
Rudder

Set the high rate to maximum throw (about 220mm) both sides, and at low rate reduced to 70% (about 150mm). The Extra 260 needs quite a lot of rudder for nice stall turns, so you should at least add 25% exponential for smooth tracking corrections. At the same time you should remember that the Extra rudder is VERY sensitive, and the plane starts shaking at high speed if the rudder linkage is not really rock solid. So check your linkages and closed-loop cables again and make sure that there is NO slop at all ! On the other hand these characteristics are also the reason for best rudder sensitivity at the slowest 3D-speeds.



Ailerons

Aileron throw for high rate is 80mm up, and 90mm down, Use at least 30% exponential at high rate. For low rate you should decrease the throw to the TOP to 50 mm, and the BOTTOM to 60mm. Yes, you're right - this is a *reversed* differential due to the hinge line being in the top skin instead of on the centre line. You need to finalise this differential figure during flight, as mentioned earlier in this instruction book. At high rate, for 3D manoeuvres, this doesn't effect the rolling too much, so you can maximize the throws to whatever is mechanically possible, even more up than down if you wish.



In General

Your Extra 260 has very large control surfaces. This makes it very sensitive and reactive. It is always possible that these huge control surfaces can flutter at high speeds if the assembly, servo installation and linkages are not made perfectly, and if a servo gear or output disc/arm strips the flutter will not stop until the plane hits the ground….

So please do yourself a favour, and make sure that you only use the best servos and output arms available, and take the utmost care making your linkages. Check every linkage for slop, and rather reduce the maximum throw than risking a high speed flutter due to sloppy servo gear or linkages. To prevent this for sure, we recommend reduced control travels (reduced by using shorter servo arms, not by using electronic settings). Using 2 servos per control surface as described in this manual will never overload or damage high quality servos, even if the maximum travel of each servo is slightly off. The aileron control surfaces have enough torsion flexibility so that damage to the servos should not occur.

Flying the Extra 260

The Composite-ARF Extra 260 builds on the experience with our Extra 300's and Yak's. The structural design is very similar, combining the incredible strength of the airframe with light weight. Lots of input from Jason Shulman, who's basic design it is, and from Frazer Briggs, who has been flying Extra 260's for as long as he can remember, united with 15 years of composite production experience, has made this plane structurally and aerodynamically unique.

The advantage of a 260 over all 300s is the mid wing design. The full scale had to abandon this design because of the poor visibility, and the limited space in the cockpit due to the wing spar. That's why Extra have moved the wing down, which was never an advantage for us modellers, since we watch our plane from the ground, and visibility is not a problem there. Still, the 260 had a very low profile fuselage, due to the small canopy, and this had to be changed slightly in our model. We tried to move the canopy forward as much as the 10% rule would allow, and also raised the turtle deck, to get an even better knife edge and rolling performance than what the mid-wing design itself would already promise.

So now the Composite-ARF Extra 260 really is even more than expected. Not to downgrade our SuperXtra, but the performance in rolling circles, knife edge and point rolls is really breathtaking. This was also confirmed by the long time TOC competitor Frazer Briggs from New Zealand, who has up already had many, many hours on our first prototype - prior to the completion of this Instruction manual. And he really had tried to push it to the point where we would see what is the limit of this plane: There is no limit. The only limit is the pilot...

However, some mixing is required to compensate the rudder coupling. Depending from your CG settings, we have found that about 4% opposite aileron and 6% up elevator is a good starting point (taken from the low rates, that's why you almost don't see the deflection). Thrust lines are quite standard, and a slight up thrust will reduce the need to mix 1-2% down elevator at idle for the perfectly straight downlines. But again, this depends very much on your preferred CG settings. With the settings given in this manual, you can go right into your first IMAC contest and will feel great with the plane.

3D capabilities are unlimited. Since the elevators do not have a counter balance, we only could hope that the efficiency would be enough. We were positively surprised after the first heavy 3D maneouvers, what that plane can do. Harriers are rock stable, tumbles and knife edge spins are so easy to perform. We tried to keep the stab size at the lower end, so it would not be "overstable", and this might be the deciding factor for how great the 3D capabilities of this 260 are. And the huge wing makes the plane feel even lighter than it really is, especially in High-Alpha Rollers and other slow motion stuff.

So, it is again one of those best flying planes on the planet... You will just love it from the first day on you fly it.

The performance of this aircraft is unlimited, and if maintained regularly and carefully, you will enjoy it's performance for many, many hours. With the 260 you have the potential to move up to the unlimited "cracks", it's up to you now! You can't blame it on the aircraft anymore.

We hope that you enjoyed building your Extra 260. We have tried to make this airplane as complete as possible. With good feedback from customers you will help us to continue making good things even better. We appreciate your comments very much.
Email: feedback@composite-arf.com

Thank you!
Your Composite-ARF Team

Appendix:

Extra 260, 3m Kit (version 1.0)

Kit Contents

Quantity	*Description*
1	Fuselage
1	Wing, right
1	Wing, left
1	Stab, right
1	Stab, left
1	Elevator, right
1	Elevator, left
1	Rudder
1	Cowling, top
1	Cowling, bottom
1	Protection bag set, fuselage, wing, stab
1	Canopy frame
1	Wheel pant, right
1	Wheel pant, left
1	Landing gear, carbon, right
1	Landing gear, carbon, left
1	Wing tube aluminum 50mmØ x 1000 mm.
1	Stab tube aluminium 20mmØ x 380mm approx. (with threaded holes)
1	Clear canopy
1	Elevator hinge aluminum tube set, 4mm Ø x 570 mm. 2 pcs (in stab)
1	Rudder hinge brass tube 4mm Ø x 630mm (in fin)
1	Milled wood parts bag
1	Hardware bag
1	Pre-painted fibreglass sheet for stab tip covers (150 x 100mm)
1	Instruction Manual (English)

Hardware List

Wing Pack (2 sets)

Quantity	*Description*
1	CNC milled phenolic 2 servo tray (JR)
1	CNC milled phenolic 2 servo tray (Futaba)
4	Servo horn 2 mm phenolic. Long version
1	Servo horn 2 mm phenolic. Short version
2	Aileron Horns, phenolic (for optional 3rd servo)
14	Sheet metal screws 2.9 Ø x 13 mm (servo and phenolic plate fixing)
4	Sheet metal screws 2.9 Ø x 10 mm (for optional servo hatches)
6	Sheet metal screws 2.2 Ø x 10 mm (to fix phenolic to plastic discs)
8	Allen bolts M3 x 12 mm
8	Washer M3.
14	Stop Nut M3
7	Nut M3
2	Allen bolts M3 x 16 mm
2	Allen bolts M3 x 20 mm
4	Aluminum Clevise M3 (with 1 pin and E-clip only)
2	Ball links M3
3	Plastic nut M6
2	All Thread M3 x 100 mm.
1	All Thread M3 x 65 mm.
1	Plywood servo hatch frame

Stab Pack (2 Sets)

Quantity	*Description*
2	Servo horn 2 mm phenolic. Long
4	Sheet metal screw 2.2 X 10 mm.
2	Spring steel clevis M3
2	Stop nut M3
4	Nut M3
2	All Thread M3 x 75 mm.
4	Allen bolt M3 x 20 mm.
2	Ball link M3
8	Sheetmetal screws 2.9 Ø x 13mm

Rudder Pack

Quantity	*Description*
8	Allen Bolt M3 x 16 mm (ball-links to servo arms)
2	Allen bolt M3 x 20mm (ball-links to rudder horns)
10	Stop nut M3
14	Nut M3
16	Sheet metal screw 2.9 X 13 mm (servos)
2	Sets of phenolic servo arms for Rudder set-up (2mm and 3mm thick)
9	Sheet metal screw 2.2 x 10mm.
6	Spring steel clevises M3
8	Ball link M3
2	Pull-Pull Cables 0.9mm Ø, 2 metres each
6	Crimp tube 2.6 mm I.D.
2	Threaded ends M3 for Pull-Pull Cables
6	All thread M3 x 45 mm.

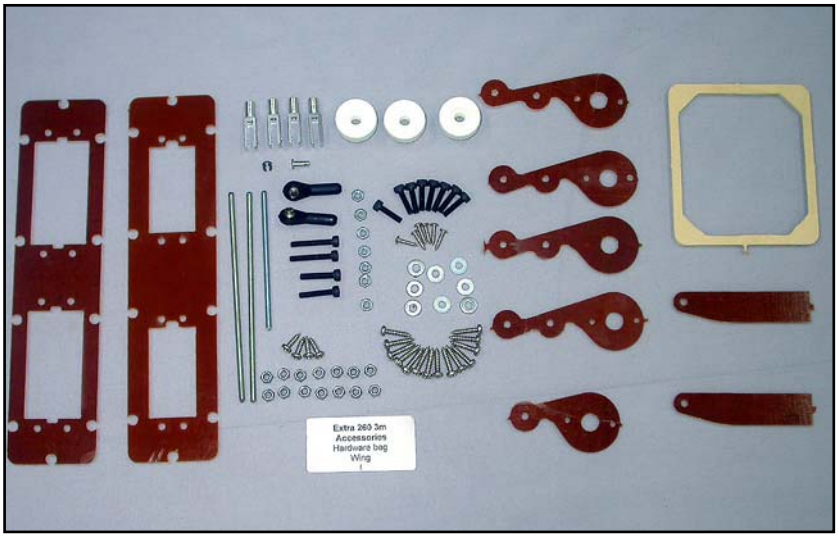
General Pack

Quantity	*Description*
4	Allen bolt M4 x 16 mm (canopy mount)
19	Allen bolt M3 x 12 mm (cowling)
21	T-nut M3 (cowling and wheelpant alignment)
6	T-nut M6 (engine mount and wheelpants)
2	Allen bolt M6 x 70 mm (for wheel axle)
4	Allen bolt M6 x 30 mm (landing gear mount)
4	Allen bolt M6 x 40 mm (engine mounting)
12	Washer M6 (wheelpants & engine mount)
4	Wheel collars 6 mm I.D. (wheelpants)
2	Stop Nut M6 (wheelpants)
2	Allen bolt M3 x 20mm (wheelpants)
21	Washer M3 (cowling and wheelpants)
2	Nut M3 (throttle linkage)
1	Clevise steel M3 (throttle linkage)
1	All thread M3 x 100mm (throttle linkage)
1	Ball-link M3 (throttle linkage)
1	Stop Nut M3 (throttle linkage)

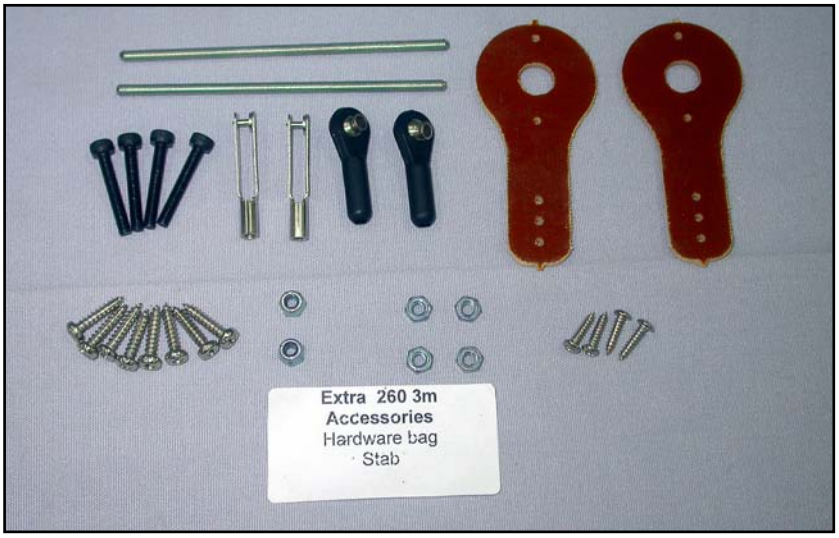
Available Accessories

Desert Aircraft DA-150 motor
Tail gear setup with 50mm Ø wheel
MTW canisters and manifold set # 910160
Greve Tuned pipes and manifold set # 910200
PowerSwitch 20A
PowerBox 40/24 (Dual battery crossover unit)

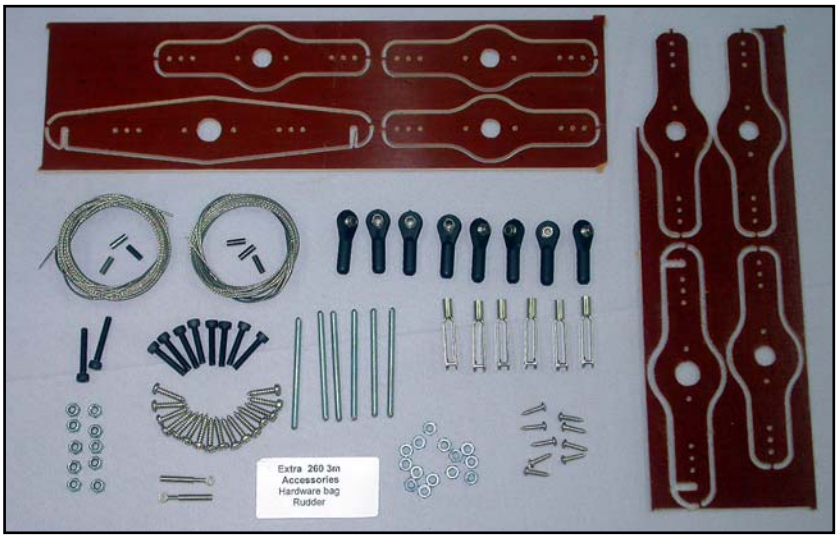
(above) The complete kit as shipped, except for the wing, stab, and fuselage bags which are not shown here.



(above) Wing Hardware for each wing (2 sets included in kit)

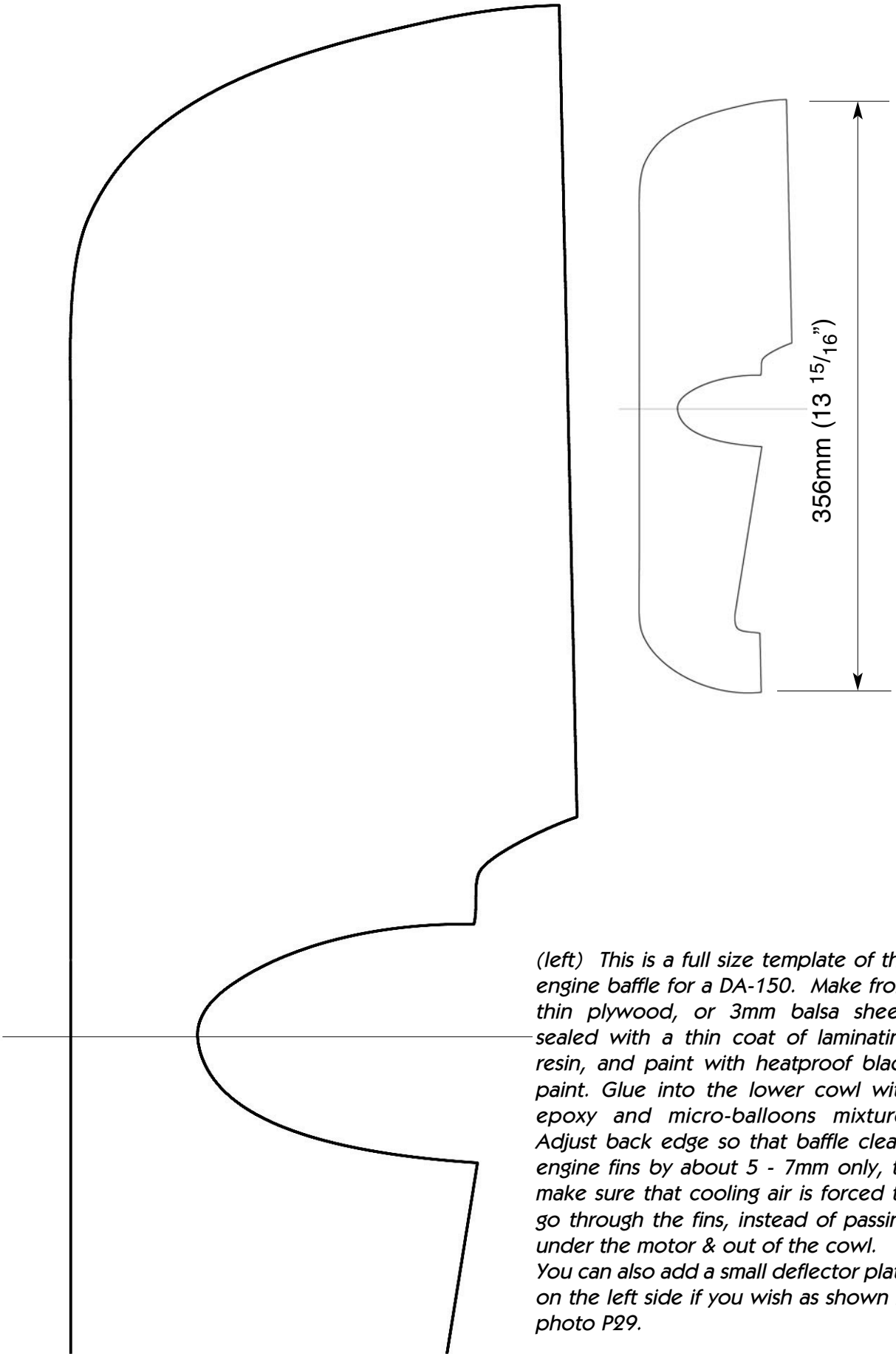


(above) Stab Hardware for each stab (2 sets included in kit)



(above) Rudder Hardware pack

(above) General Hardware pack



(left) This is a full size template of the engine baffle for a DA-150. Make from thin plywood, or 3mm balsa sheet, sealed with a thin coat of laminating resin, and paint with heatproof black paint. Glue into the lower cowl with epoxy and micro-balloons mixture. Adjust back edge so that baffle clears engine fins by about 5 - 7mm only, to make sure that cooling air is forced to go through the fins, instead of passing under the motor & out of the cowl.
You can also add a small deflector plate on the left side if you wish as shown in photo P29.