EXTRA 330SC 2.3m

Version 1.0

B U I L D I N G I N S T R U C T I O N

EXTRA 330SC 2.3m

Accessories

This list will help you chose the main additional items needed to finish your Composite ARF Extra 330SC 2.3m

Some of the recommendations are strongly recommended and some easily chosen by you. The items we list here are highly recommended by C-ARF, and have been tested on various prototype aircraft used during the development of this aeroplane.

1. Servos (minimum 6 high quality servos) All the main control surfaces require a minimum 15kg digital servo such as the JR 8511/8711 metal geared servos. The prototype models used JR 8711 or MT80 Brushless 25kg servos. CARF would recommend servos over 20kg torque on the main controls.
2. Heavy duty servo metal servo arms are recommended, most servo manufacturers either offer arms like the JR items shown, or there are several after-market items available including the SWB items.
3. A receiver power supply system like the excellent Powerbox units is recommended, using two separate batteries through separate regulators. A 50-60cc model like this requires a regulator capacity above 10A.
4. Powerunit. The Extra 330SC was primarily designed around the Desert Aircraft DA 60R petrol engine. The motor dome design is based on the DA-60R backplate and the four fixing points are factory fitted with T nuts. The motor dome will still allow various other engines to be installed with minor modifications to the mounting plate, but we strongly recommend the DA 60 for reliability and power. A mini pipe #910080 TD75 Canister set and full pipe option #910090 RE2 Tuned Pipe set have been designed around the DA 60 Extra 330/Edge 540 2.3 making installation straight forward. There is limited space under the wing tube, so any system chosen All items are available from CARF. An in cowl Pitts style muffler would be another option, if available for your chosen engine.
5. The Extra 330SC cowling fixings have been factory completed, with captive nuts installed in the motor dome and holes drilled in the cowling halves, all reduce assembly time. The motor box design will allow various muffler options to be installed. We recommend our MTW muffler sets. Space under the wing spar tube is restricted, so if you go your own route check for clearance first.
6. A purpose produced composite, aluminium backed spinner is available from CARF-models.com part No 811100 is white, 811101 is Red, 811102 is Yellow, 811103 is Silver.
7. Fuel Tank. You will require a fuel tank suitable for petrol, we use a Dubro tank between 750 and 950cc (24-32oz). Use Tygon yellow tubing for all fuel connections.
8. A radio system with a minimum of 6 channels is needed, but C-ARF recommend using a quality radio system with mixing options allowing the very best to be gained from your Extra 300SC. (talk to your C-ARF rep for advice on a suitable system)
9. High quality extension leads are required and a guide to the sizes and quantities required are listed below.
10. Quality 102-104mm wheels are required, we recommend Dubro or Sullivan Skylite.
11. Light weight Tail Wheel assembly, like 801000 available from CARF-Models is required.

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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.

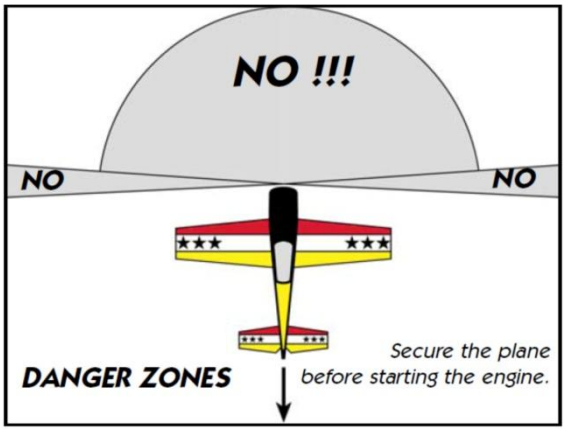
Please don't ignore our warnings, or those provided by other manufacturers. They refer to things and processes which, if ignored, could result in permanent damage or fatal injury.

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 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-maneouvers. 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 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 lightweight 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 and stab tubes are not damaged. Check that the front and rear antirotation 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 stablisers on to the aluminium tube are installed and tight, and that the hinge wires for the rudder 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 CARF-Models Extra 330SC.

General informations

Our tried and tested, painted in the mould, composite vacuum-bagged sandwich construction method has set the standards for several years now. The process has been mastered by our workers to give the most consistent models, that fly straight and stay straight. The strength is guaranteed and aerodynamics checked. The process of painted in the mould does leave a few down sides, the seams are visible and with negative painting, perfect edges sometimes do not happen. For a 100% perfect finish, painting outside the mould, with filled seams and thicker paint is the only option, with the down side of increased weight and more labour cost, even stepped edges.

The full beauty of each paint job cannot be experienced until the model receives its first coats of wax polish. This removes mould release residual marks, it also protects the model from construction gluing accidents. Care handling the model is required as the skin can be marked by tools and hard objects. We supply wing and tail bags as standard to protect the finish during transport.

Our latest series of 2.3m aerobatic models are the most prefabricated kits we have produced in the under 100cc class. Most of the time consuming jobs are now factory completed, like canopy frame fitting, undercarriage fixings, cowl and motor dome fixings. These added to the now standard control horn and pre hinged surfaces make for a speedy assembly with the minimum of specialist tools.

A good quality epoxy adhesive will be required for the few bonding jobs left. Hysol or ZAP epoxy glues are recommended. Some CA glues are a useful addition too, particularly for tacking parts in place. A selection of drills, Allen keys, large Phillips Screwdriver and spanners will be required.

Before starting any construction work, it is good practice to assemble the model to check the basic fit of all parts. It is also worth noting that to achieve the recommended balance point, everything

should be kept forward in the model, mount batteries around the motor dome area and keep anything fitted at the rear as light as possible.

For any composite drilling, cutting or filing we recommend you wear a suitable face mask and eye protection. Handling epoxy adhesives requires care and you should follow the manufacturer recommendations with any chemical products handled.

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. However, as manufacturers, we are unable 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 used. 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. Unless otherwise prescribed by law, the obligation of the CARF models 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 CARF-Models.com 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 chosen radio control system correctly. For this reason CARF-Models are unable to guarantee to any individual or company that the model you have made will function correctly and safely.

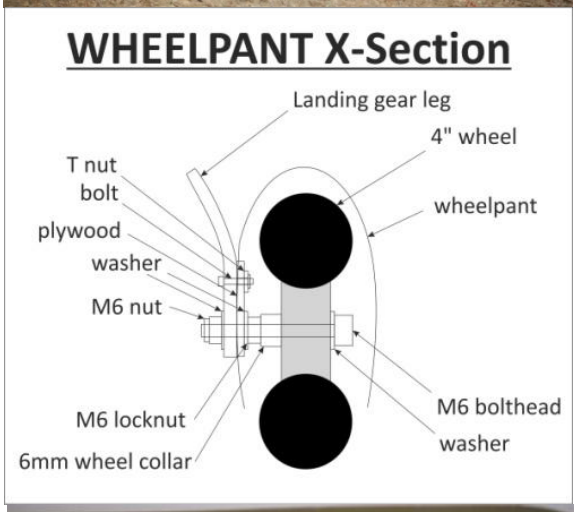
You, as the operator must ensure safe operation, though checks before every flight.

Building Instruction

Landing Gear

It is a benefit to install the landing gear legs early on, as these will make the fuselage more stable and keep the lower surface clear of your work bench.

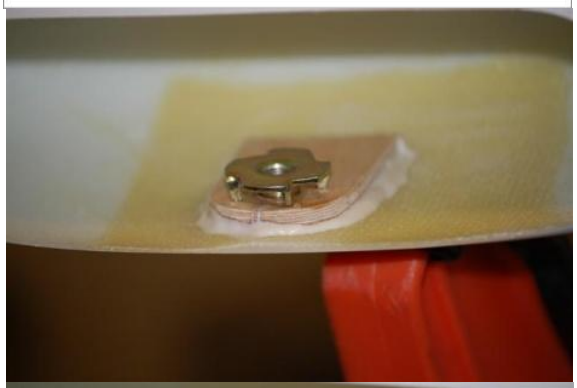
The Carbon fibre legs are not handed. Fixing nuts are already installed in the fuselage and the corresponding fixing holes are marked by recesses moulded into the landing gear legs. Drill these with a 6.5mm drill, care should be taken with the carbon fibre material removed by the drilling process.



It is worth completing the Wheel and wheel spat mounting work, even though leaving them off will reduce the chance of damage during fuselage handling.

The wheel axles provided are M6 x 60mm Allen Bolts, which are fitted from the outside of the wheel, various washers are provided to allow central spacing in the wheel spat. It is much easier to install the axles if you make a 10mm hole in the outer spat wall, allowing the axle to pass through.

We recommend the use of Dubro 400TL 4" Treaded Lightweight Wheels or Sullivan Skylite 4 inch wheels, these will both require the centre hole opening to 6mm on a drill press.



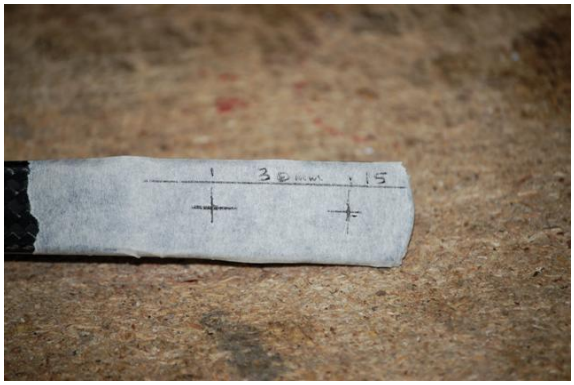
Drill the lower leg 6mm, ensuring that the hole is drilled square to the lower section of the leg. Before drilling the wheel spat, glue a 3mm plywood spacer-plate inside the wheel spat on the raised area created where the leg fits. This adds rigidity and aids correct centring of the wheel in the spat. Using the leg as a jig, hold the spat in position and drill through the wheel spat and spacer plate with a 6mm drill.

The wheel spat is assembled by first pulling a 6mm T nut into position. The T nut aids wheel spacing and create a positive lock for the axle bolt. Open the spat axle hole to 7mm and press/pull the T nut through the ply spacer until it is flush with the leg recess, some adjusting to the angle will be required to ensure the axle stays square to the wheel cut-out. Fill the void left between the T nut and plywood spacer with a thick epoxy. Once set 6mm washers added to the bolt to suit your chosen wheel width.

Using the Dubro wheels will require addition spacer washers to cover the plain section of the axle bolt. The axle bolt will require a 10mm clearance hole in the opposite spat wall to allow the axle to be installed. Fix each leg to the fuselage with two M6 x 20 Allen screws and M6 washers.

Tail wheel assembly

Whichever tailwheel unit you chose, thought should be given to selecting a light weight unit, CARF offer the 801000 tail wheel assembly which is perfect for the job.

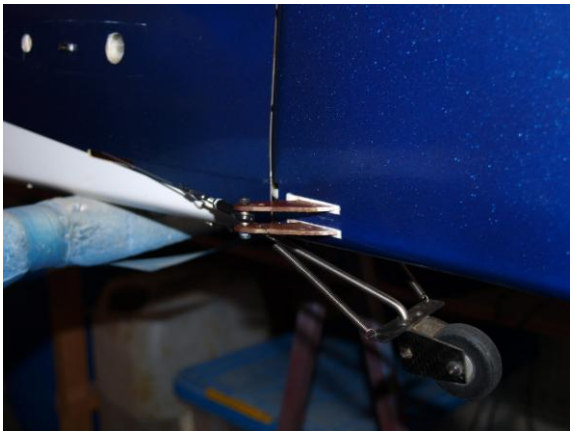


The fuselage is factory fitted with a plywood mounting plate bonded inside the tail area. The plate is approx 85mm long and starts 45mm from the rear of the fuselage. The fixings need to go into this plate. Fitting M4 T nuts is possible, or the plywood can be drilled and tapped M4 for a lighter installation.

If you are using the CARF unit, drill 4.1mm holes on the centre line 15mm from the front edge, at 30mm centres.

Use the tail wheel unit to mark the fuselage and drill though 4mm. Open the holes to 5mm and fit M4 T nuts from the cockpit opening. If you are taping the plywood, only drill 3.2mm and tap M4.

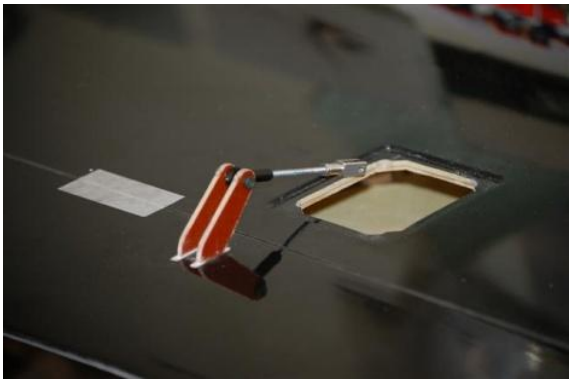
The tail wheel can be left to swivel freely, but adding springs to allow steering from the rudder control horns is also an option.



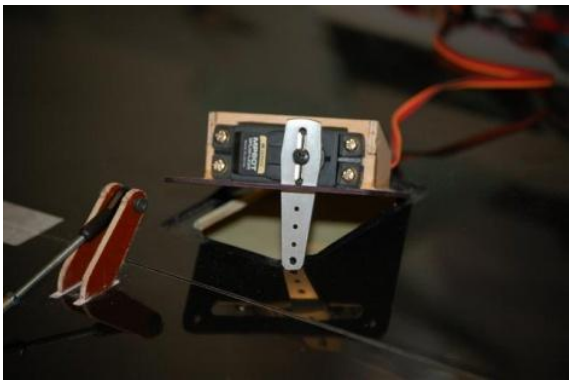
Wings

There is very little construction required to complete the wings. The ailerons are live hinged, with the twin control horns factory installed. All fixings are complete for the wing alignment and retention system. The two aluminium dowels have 6mm threads that accept our tried and tested nylon nut. Assembly at the field could not be quicker. The wings are factory test fitted, and rigged, all that is required is installation of the servo and linkage. Before working on the wings it is a good idea to test fit them to the fuselage. The root rib is purposely recessed back from the root wing skin, this allows a small amount of the wing skin edges to be sanded, should the fit have changed on the fuselage during transport.

The single aileron servo is fitted to the ply/composite servo hatch. It is very important you achieve a strong bond between the servo mounting frame and servo cover. Sand the glass finish with 120-180 grit paper, until a matt finish is seen.

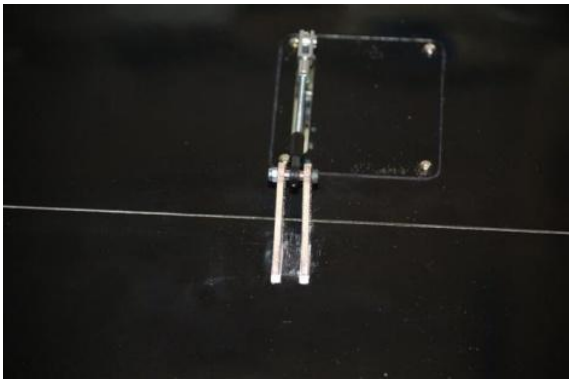


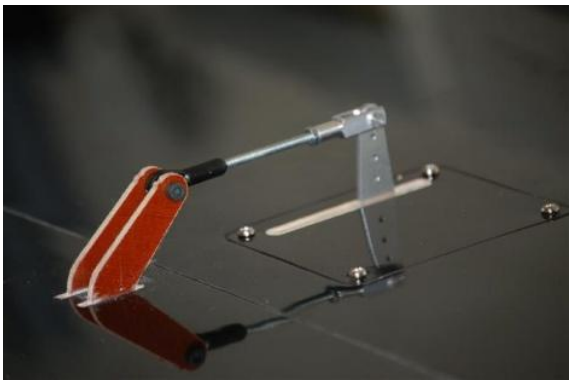
Assemble the three part servo mounting frame from the CNC cut parts provided. A stronger bond will result if you sand the flat surfaces before cutting loose the servo frame parts, as the plywood may have a fine coating from the manufacturing process. We assemble the frame with SLO-ZAP, before strengthening with epoxy.



Use a straight edge and take a line from between the double control horn to check the pushrod line through to the servo arm slot in the hatch.

Assemble and centre your chosen servo with 1 ½" arm fitted, before this step. We used JR Propo 38mm (1 ½") clamp arms. The arm requires drilling 3mm to accept the Aluminium clevis pin. Care should be taken to ensure the hole is drilled square to the arm, the hole also needs to be no larger than 3mm to ensure minimal free play.





Mark the underside of the servo cover with the line of the pushrod, temporarily mount the servo in position in the frame and place the servo and frame, so the arm lines up with the mark. Either tack the frame to the cover plate using CA or accurately note the frame position and remove the servo before fully bonding the frame to the cover with CA followed by epoxy resin. Either way a secure bond must result. Mount the servos with the four sheet metal screws supplied-do not use the servo screws supplied with your choice of servo. The screws are (2.9 x 16). The servo hatch is mounted to the wing with four 2.9 x 13 sheet metal screws. Add tape to the drill bit to stop any chance of breaking through to the wings top skin when drilling the four servo hatch mounting holes.

Assemble two pushrods from the supplied M3 all thread (M3 x 50). Screw a moulded ball-link on one end and a single M3 full nut, followed by one of the aluminium forked clevis, the opposite end. The ball-link should be fixed between the double control horns with an M3 x 15 Allen screw and nyloc nut. Before fitting the Aluminium clevis end lightly grease (or use vaseline) the pivot pin to reduce the chance of pick-up. Ensure the C clip retainer is fitted before flight.

Tailplane

The jobs now factory completed, leave the tail halves only requiring the hinge rod, servo and linkage fitting. The two halves have been test fitted to the fuselage at the factory and the M3 retention screw holes through the tail lower skin drilled. The carbon tail spar fitted with the two M3 captive nuts, ready for installation. Note, once the tails are complete we recommend leaving the spar screwed to one half to speed up assembly at the field. Before starting note that some trimming of the root rib opening will be required to allow installation of the elevator servo, particularly when using 20mm wide servos. Inserting the hinge rod is easier if you take the corners off the rod before

you try to insert it. With the hinge wire flush with the outer surface on the elevator, bend the root end ninety degrees and tape the bent return to the elevator. To gain full movement the hinge slots will need cleaning up with a sharp scalpel or small flat file.

The elevators are actuated by M3 threaded rods with an M3 ball link sandwiched between twin phenolic horns on the surface and a M3 machined clevis at the servo end. * Some servo types may feature a case height that places the servo arm position away from a direct line on the control horn positions. In this case a second ball link could be used.*

Before attempting to install the servo, check that the servo opening, in the installation rib is clear of glue, particularly over the servo mounting area. Any excess glue can be cleaned from the opening using a sharp scalpel and file.

Many servos use a 3mm thread in the output spline, with the deep servo position, you can screw in one of M3 x 60 elevator pushrods to use as an installation tool. This will make handling the servo in the recessed position easier.

The servo mounting rib will require a hole making to allow the servo lead to pass through. Drill two 4mm holes next to each other and slot to allow a servo plug to pass through. Installation is easier if you pass a draw string or spare servo extension lead through the hole before installing the servo.

The slot cut in the lower skin will require lengthening to suit the arm throw and widening to allow arm clearance either side. The servo is mounted with the spline positioned towards the leading edge of the surface.

Make up the elevator pushrod, the centres should be approximately 91mm.

Use the supplied sheet metal screws (2.9 x 16) to mount the servos. Ensure your chosen screwdriver fits the screws cross head correctly.

Aluminium control arms need treating in the same way as the Aileron units. It is important to drill the arm accurately with a clean sharp 3mm drill.

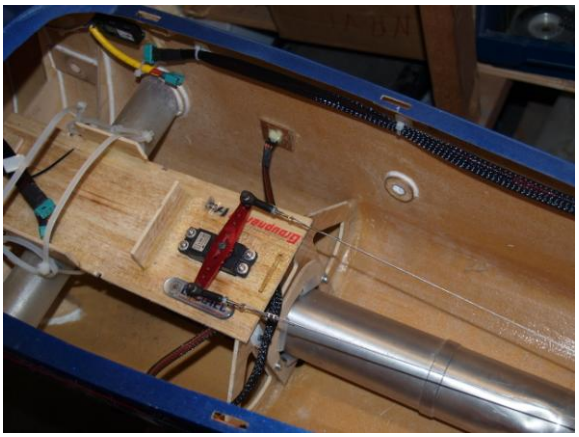
Fuselage

Many of the time consuming jobs have been completed in the factory. The canopy frame mounting system is complete. The five motor dome mounting holes and fuselage M4 captive nuts are completed. For our recommended DA 60 engine four M6 T nuts are fitted ready to accept your engine. We have even adopted the split cowl design of our largest aerobatic types and completed the required M3 fixings. The wing location on the 330 SC allows a long pipe installation. CARF offer both a mini pipe #910080 TD75 Canister set and full pipe option #910090 RE2 Tuned Pipe set, both suitable for the DA-60 engine we designed the Extra around. Extensive testing has shown the RE2

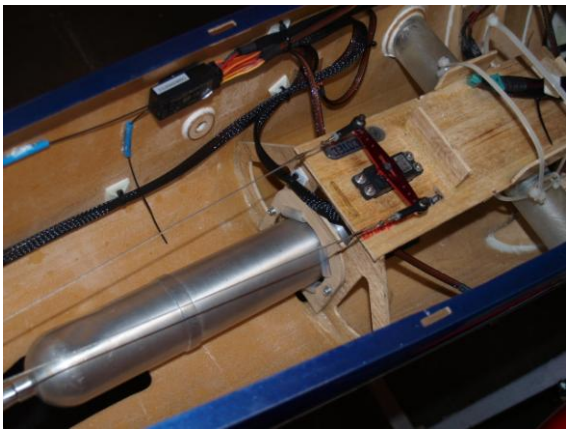
Tuned Pipe set offers staggering performance with

the DA 60R, it is our all time favourite power-plant that we have flown in our 2.3 class models. Exhausts need to be a maximum of 55mm dia to fit under the wing tube.

Installation of the long RE2 pipe requires an opening to allow the tail end of the pipe to protrude just below the fuselage lower surface. This allows for wing tube clearance and provides cooling for the exhaust system. The fuselage is very thin at this point and some additional reinforcement with carbon roves are recommended around the cut-out. The cut-out required is 180mmx 60mm. The cut-out starts approx 450mm from the fuselage flat front (where the motor dome bolts on) An additional 20mm wide slot at the rear is required for tail pipe stinger clearance. We provide two types of wood exhaust mount, suitable for most exhausts likely to be used this aeroplane. Use the two part mount installed on the rear vertical tank vertical support for the long pipe. This is fitted with silicon isolation tubes which soft mounts the rear end of the pipe. The front is supported by the Teflon joiner tube only.



The Canister set features a front outlet pipe, the outlet tube will protrude just below the cowling line without any extension. It is important that none of the exhaust touches the fuselage structure. We recommend cutting one or two cooling holes in the lower fuselage behind the canister position. These should be roughly 10 x 2cm each. Use one of the single piece exhaust mounts provided, this is mounted to the rear of the wing tube. (It's possible to have one mounted either side of the tube for extra security. Cut down the mount to ensure the fuselage is not distorted and the tank tray unaffected. Install 4 pieces of silicon tube in the isolation slots to restrain the pipe.



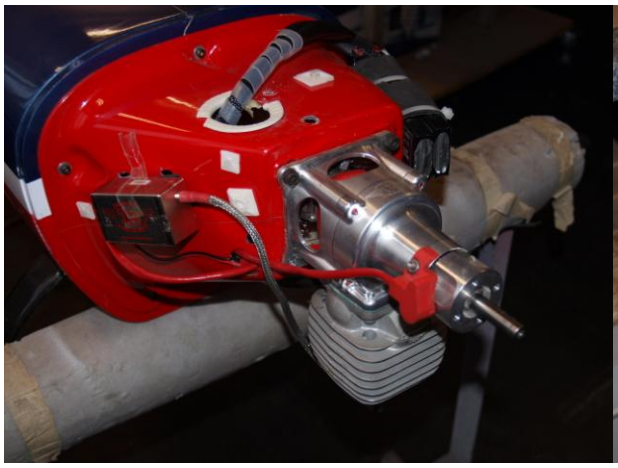
Motor Dome

The motor dome is fixed with five M4 x 16 Allen Screws, fitted with M4 washers. The captive nuts are factory installed in the fuselage front former and the mounting holes pre drilled in the motor dome.

DA 60

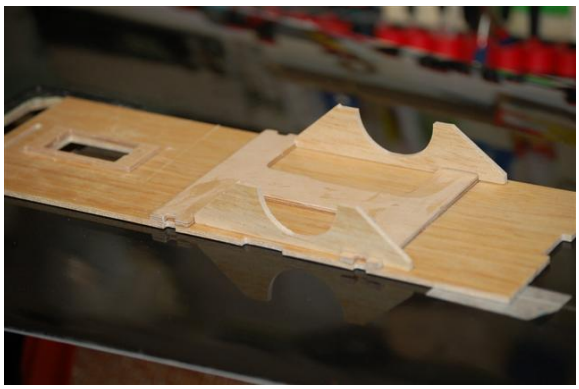
A clearance hole needs cutting for the carburettor. You can either cut a simple square opening in the front face 60mm wide and 60 high, or sculpt a rectangular hole approx 60mm high x 50mm wide with notches to clear the levers and nipples. Two holes or a slot will need making in the top surface of the dome to allow high and low needle adjustments. Drill two holes 6mm, (looking from front) 46mm left of the top right hand engine mounting screw, 15 and 22mm back from the front face.

A four piece 3mm plywood servo mount is supplied for use as a throttle servo mount. Bond this to the inside of the motor dome. Make the throttle linkage using the M3 x 80 all-thread.



Fuel Tank and rudder servo mounting plate

Assemble the tank mounting plate from the CNC milled balsa/glass sandwich parts, with the 3mm Plywood H brace and rudder servo doubler bonded to the lower surface. The balsa laminate material is exceptionally strong, easy to work with and offers lower weight than similar plywood parts.

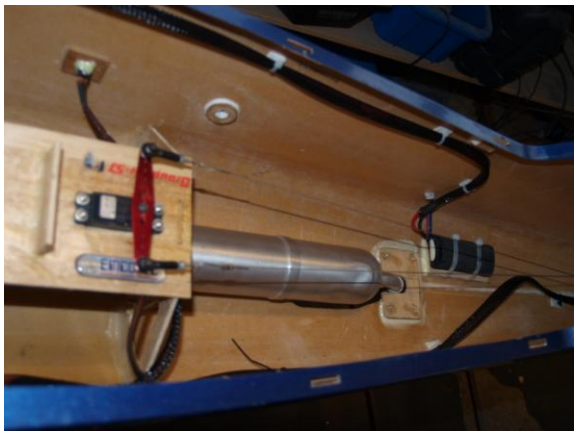


You can use CA or epoxy to assemble the parts, but ensure all the balsawood edges are sealed before the assembly is installed in the fuselage.

The tank mounting plate is large enough to accept most 24oz tanks like the Dubro item we show here. A slot will require cutting to locate the rear retaining tab. The side tabs can be easily adjusted to suit any tank you chose to use. The tank will be retained with two cable ties looped around the tank, over the side notches. The front cable tie will require a slot cutting in each mounting tab. Ensure the cable tie goes through the hole. Ensure the plywood H section brace is bonded in position with the notches aligned with the corresponding tank plate notches.

The two semi-circular cut out mounting tabs, mounted on the lower side of the tank plate locate on the glass wing tube sleeve, positioning the tank plate perfectly. The location notch in each mounting tab is placed to the front of the H brace. The rear support former has an arch cut out to allow the long tuned pipe to pass through. Ensure the former fits the fuselage shape without deforming the thin structure. Only light sanding should be required for a perfect fit.

Leave bonding the plate in position until after the engine and exhaust installation is complete.



Holes need making in the fuselage sides to allow the elevator and aileron servo leads to pass through. Each surface has a single servo only, so standard servo connections work well. We recommend fixing the leads close to the connection

point, with the minimum lead able to move, there is little chance of the connection unplugging. It is still good practice to protect the wire insulation with heat shrink tube slipped over the wire as it passes through the fuselage side.

Rudder and linkage

The rudder is almost ready to install. The hinge slots will require cleaning up to allow maximum movement. The hinge rod is CARF's tried and tested 2mm steel wire. Grind a point on one end to make installation easier. The rod can be restrained by either inserting it into the tail wheel bracket, or by bending the rod 90 degrees.

Ball links are used at either end. Fit the M3 hook eyes to each ball links. The rudder ball links are fixed between the twin horns using M3 x 16 Allen screws and M3 Nyloc nuts.

The close loop rudder linkage will pass through the fuselage side approx 40mm above the lowest level, at a point 215mm forward of the fin/fuselage back edge. Make a suitable slot either side of this point-note the line made by the wires are slightly angled down.

Canopy hatch Frame

The canopy hatch frame has had the fixings completed in the factory. Some additional trimming/cleaning up of the mounting tab slots maybe necessary, for easy fitment and removal.

The canopy glass should be trimmed with sharp scissors. Ensure the canopy glass has been stored in a warm location before you start to trim the canopy to size.

Once you are happy with the glass fit, some work is required on the canopy frame before fitting. It is important that the addition glass tape added to the seam is sanded/filed down to leave a smoothly blended area, with as uniform a thickness as possible without weakening the area. Check also for high spots from resin build up. The perfect tool for these tasks is a Dremel with large sanding drum.

It is important to start the canopy glass installation with the frame mounted to the fuselage, with a piece of tape holding the rear frame/loop firm to guarantee a consistent gap to the fuselage rear deck. It is also easier to complete this stage before the motor dome is bolted in position, as it allows you to reach inside the fuselage to help position the glass during gluing.

There are various ways to go about the installation, you may have your own favourite method. The method I use is to tack the top front and back centre-line position using ZAP Slo (Zap 20) and a foam friendly kicker. This will set the rear hoop position and rear gap. From here it is possible to tack each side, mid way-it is important to lift the sides when doing this to ensure no gap exists around the curved section. At this point is it possible to remove the canopy frame to allow spot tacking on the glass edge, working in sections and replacing the frame after every few applications, checking for distortion, as you go. When you are happy you can either run around the edge with Hysol or ZAP 560 canopy glue to permanently fix the glass in place.

Settings

For the first few flights set the balance at 95-100mm from the leading edge of each wing tip. Each pilot has his or her preferred feel, so adjust this if the response in pitch is not to your liking. You will need everything as far forward as possible to achieve this balance without additional weight.

Most radios have the option of at least two rate/expo movements. Set your high rate to achieve the largest possible movement on the elevator and rudder. The Ailerons set to 45mm up and 50mm down, measured at the trailing edge root of the aileron. Expo figures are a matter of personal feel through the control sticks. Seasoned pilots will have their own preferences, our recommendation would be to set the high rate expo at 60% on elevator and 50% on Aileron and 20% on rudder. Low rate figures of Aileron 30mm up and 35mm down, with 35% Expo and Elevator 45mm each way with 30% Expo and the rudder at 100mm each way with 20% Expo.

Note the top hinged ailerons need negative differential (more down, than up movement) to produce an axial roll. The clean aerodynamic hinge design means the lower surfaces slides inside the wing skin with down movement, so a greater angle of travel is required on the down side, hence the figures above.

Petrol engine models vibrate, any wiring or tubing that rubs, even against a wooden edge will eventually wear. Nuts and bolts work loose. We recommend you check all the fixings after the first flight and every few flights after until you are confident things are not coming loose. Glue joints need checking too.

Wings Pack

Quantity	Description
8	Sheetmetal screws, 2.9 x 16mm
8	Sheetmetal screws, 2.9 x 13mm
2	Allen bolts, M3 x 16mm)
2	Stop Nuts, M3
4	Nut; M3
2	Aluminium Clevise; M3 (with aluminium pin E-clip)
2	All thread, M3 x 50mm
2	Ball-links; M3

Elevators & Stabs Pack

Quantity	Description
2	Aluminium Clevise; M3 (with aluminium pin E-clip
4	Nut, M3
2	All thread, M3 x 60mm
2	Ball-links, M3
8	Sheetmetal screws, 2.9 x 16mm
2	Stop Nut, M3
2	Allen bolt, M3 x 16mm
2	Allen bolt, M3 x 12mm

Rudder Pack

Quantity	Description
4	Sheetmetal screws, 2.9 x 16mm
4	Allen bolt, M3 x 16mm
4	Stop Nut, M3
4	Nut, M3
4	Ball-link, M3
4	Threaded ends for cables, M3

2	Steel cable, 0.8mm x 1300mm
4	Crimping tubes,I.D. 2.8mm (rudder pull pull linkage)

Fuselage

Quantity	Description
4	Allen bolt, M6 x 20mm
2	Allen bolt, M6 x 60mm
2	T-Nut, M6
2	Stop Nut, M6
10	Washer, M6
4	Allen bolt, M6 x 20mm
5	Allen bolt, M4 x 16mm
5	Washer, M4
10	Big washer, M6
2	Washer, M6
15	Allen bolt, M3 x 12mm
15	Washer, M3
1	Thread end, M2 x 200mm
1	Ball link, M2
1	Bolt, M2 x 10mm
1	Nut, M2
2	Sheetmetal screws, Ø2.9 x 16mm
2	Washer, M3
2	Allen bolt, M3 x 12mm
2	Washer, M3
2	T-nut, M3
4	Sheetmetal screws, Ø2.9 x 16mm
2	Clevise, M3 (with aluminium pin E-clip)
1	All thread, M3 x 80mm
2	Nut, M3
4	Plastic nut, M6