CORTINA

Building instructions

Specification:

Wingspan: 3485 mm.

Sweep angle: 18 degrees

Wing section: MPX

Weight: ca. 330 g

Wing area: 95 dm2

Wing loading: ca. 34 g/dm

RC functions:

Ailerons,

Elevator,

Airbrakes,

Optional aero-tow release

The control surfaces can be linked by either of the following methods:

1. Outboard pair of surfaces as ailerons only, and inboard surfaces as elevators only; 1 servo for each function in the fuselage.

2. Each surface driven individually by its own fuselage-mounted servo. With this arrangement the aileron and elevator functions can be mixed, i.e. each function superimposed on the other. To exploit this system you will need a transmitter equipped with suitable mixing facilities' This method of control is preferable, as it allows the pilot to adjust and optimise the control surface responses more accurately'

3. Each surface driven individually by its own servo mounted in the wings; the ideal solution if you opt for the true flying wing (i.e. no fuselage) layout.

Note: Do not use any solvent-based adhesives, especially cyano-acrylate (Hot Stuff, Jet etc.) when gluing the foam/veneer components. Use 5-minute epoxy or white glue'

The fuselage

The first stage is to assemble and install the wing joiner units in the fuselage.

Cut all the holes and openings in the fuselage wing root fairings as marked. Pilot drill the holes for the control linkages first then open them out to 8 mm. diameter using a file.

Glue together the two parts of the front and rear compression struts 14 and 15, keeping the edges flush, and trim them to fit in the fuselage.

Roughen up the fuselage where the struts locate and glue them in place using thickened epoxy.

Caution: Check carefully that the struts do not force the fuselage out of shape.

The wing joiner tubes 18 (rectangular brass tubing) are installed parallel with no offset (dihedral: 0 degrees). Fit the joiner tubes in the fuselage, hold them flush on one side and mark where they exit on the other. Saw off the excess and file the ends smooth.

Roughen up the ends of the brass tubing to provide a key for the glue, using coarse glass paper. Assemble the joiner clamp 19 as shown in the drawing and slide it over the front pair of tubes. Do not forget the rivet. Use either the slot-head or the Allen-head screw as the clamping screw.

Caution: Never tighten the clamping screw unless both wing blades are plugged in, otherwise the tubes will be compressed and it will be impossible to insert the blades.

The next stage - aligning and gluing in the wing joiner assemblies - is of crucial importance for the model's flight performance; care taken here will be amply repaid.

Roughen up the inside of the fuselage where the joiners are to be glued. De-grease the wing blades 20 and plug them into the wings (do not-glue yet). Fit the wing joiner assemblies in the fuselage and plug in the wings. Trim out the openings in the fuselage root fairings until the wings line up precisely with the fairings. When your are happy, spot-glue the brass tubes to the fuselage using a little 5 minute epoxy. Allow the glue to set for at least 15 minutes.

Carefully remove the wings and joiner blades, and apply tape over the outside ends of the joiner tube assemblies. These can now be securely epoxied in place, using a slow-setting epoxy (Araldite), thickened with micro-balloons, chopped glass rovings or glass scraps. We recommend that you glue one side at a time, a-, and leave the fuselage on that side until the resin has cured completely. Repeat the procedure for the other side. This method avoids any danger of resin creeping into the tubes.

Sand back the ends of the joiner tubes until they are flush with the fuselage sides (take care not to damage the fuselage).

Tow-hook support block

If you intend installing a tow-hook, the block 16 must be epoxied in place at this stage. The tow-hook should be located 315 mm in front of the tail end of the fuselage. Mark this point and drill a central 2 mm hole exactly at that position (through the moulding seam). Roughen up the gluing surface inside the fuselage, and tape over the hole on the outside. Glue the support block centrally inside the fuselage, orientated fore and aft. When the resin has set hard, drill a 1.5 mm hole at right angles through the block from the outside. Screw in the tow-hook 17 temporarily, and file off the point if it protrudes through the block.

Installing the servo plate and main bulkhead

If the control surfaces and airbrakes are to operate smoothly and efficiently it is absolutely essential to install the servo plate accurately.

The servo plate 12 is die-stamped to suit Multiplex Nano servos (one servo for each control surface). If you choose a different servo arrangement, or if your servos are a different size, cut the servo openings to suit. Trim the edges of the servo plate 12 and the main bulkhead 13 to fit snugly in the fuselage; the bulkhead 13 is fitted through the fuselage hatch, and the servo plate 12 through the canopy opening.

Fix all the servos to the servo plate; we recommend that you screw them directly to the plate, minus the grommets, to ensure really precise control.

Position the bulkhead and the servo plate in the fuselage, thread the over-length pushrods into the outers in the wings, and plug the wings into the fuselage.

Adjust the position of the servo plate until the pushrods are directed exactly at the point on the servo output arms where they are to be connected. The rods must not be bent or curved at all.

Caution: check carefully that the fuselage is not distorted by the servo plate and bulkhead.

Remove the plate and bulkhead again and roughen up the inside of the fuselage where they will be glued. lnstall the plate and bulkhead again, position them carefully as before, and spot-glue them in place with 5-minute epoxy. When the resin has set, carefully remove the wings and servos and apply a fillet of slow-setting epoxy along all the joint lines.

Canopy

Trimming and installing the canopy and cabin frame

The cabin frame is assembled from parts 5, 6 and 7. Bevel the front and rear edges of the cabin floor 6 to fit the canopy recess, and bevel the bottom edge of the formers 5 and 7 to f it the cabin floor.

Tape the cabin floor on the fuselage, glue the cabin formers to the floor, and tape them in place until the glue has set hard.

Sand the edges of the cabin frame to follow the fuselage contours, remembering to relieve all edges by the thickness of the canopy moulding.

Position the cabin frame accurately on the fuselage, and drill a 3 mm hole for the locating dowel 9 centrally through the front former and the fuselage flange about 5 mm in from the edge. Plug in the dowel dry, and check that alignment is correct. Remove the cabin frame from the fuselage and glue the dowel into its hole, sanding the top end flush with the cabin former.

The canopy latch is a concealed fitting to enhance the model's appearance, and can be reached via the fuselage hatch. Drill a central 3 mm hole in the top rear flange of the cabin recess, and glue the tube 11 into the hole. The tube runs back as far as the wing joiner clamp 19. The aft end of the tube is glued to the top of the fuselage supported on a scrap wood spacer, to provide clearance for the fuselage hatch 3. Sand the end of the tube flush at the canopy end.

Bend one end of the canopy latch rod 10 at 90°, to form a "handle" 5 mm. long. Slide the rod into the tube. Fit the cabin frame on the fuselage, align it carefully, then press the canopy latch forward against it. This will produce a shallow dent in the wood, at which point you should drill a 2 mm hole. Check that the latch works correctly, and file out the hole if necessary.

Cut the canopy moulding 5 along the marked line. The ideal tool for this job is the curved scissors in the Multiplex range. Trim the canopy until it fits really well, then paint or apply film to the cabin frame before gluing the canopy to it.

If you observe the following procedure you can be sure that the canopy will fit really accurately. Fit the cabin frame and lock it in place with the latch. Place the canopy on top and adjust its position until it is exactly right. Using a water-soluble felt-tip pen, mark the position of the canopy on the moulding itself and the fuselage. This is very important, as you must position the canopy correctly first time when the glue has been applied.

A clear contact cement is the best adhesive for this job; if you work neatly, you will be rewarded by not having to paint the canopy edge at all.

Clean the cabin frame and the canopy and apply tape along the flange of the canopy recess, to avoid sticking the canopy to the fuselage. Lock the cabin frame on the fuselage. Working rapidly, apply a line of contact cement all along the edge of the frame. It is important to work fast here, as the glue must not be allowed to air-dry in the usual way.

Note: Do not apply glue to the canopy.

Place the canopy on the frame, aligning it according to the felt-tip markings. Check that it is correctly positioned, then tape it in place. Carefully wipe off any excess adhesive against the fuselage. The contact glue is now left to harden overnight. This method is not the normal way of using contact cement, and you can ignore the manufacturer's recommendations

When the glue has set hard (at least 12 hours) remove the tape and carefully prise the canopy from the fuselage. Press the edge of the moulding against the frame all round, remove the felt-tip markings, and carry out any minor trimming that is required to obtain a perfect fit on the fuselage.

Fuselage hatch

Check that the fuselage hatch is an accurate fit, and sand it back carefully if necessary. The hatch retaining latch is fitted next. Mark the position of the latch bolt using a felt-tip pen, drill a 1.5 mm. A pilot hole, and file it out to a slot using a small needle file. The slot should be about 10 mm. long. Apply a drop of oil to the latch mechanism to avoid glue gumming it up. Fix the latch in the fuselage with a little S-minute epoxy, and check that it works correctly. When you are satisfied, apply plenty of epoxy round it, taking care that no resin gets into the mechanism. The latch bolt can be cut shorter to make it less obvious.

Wings

Sanding the wings and fitting the control surfaces

The first stage here is to sand down the trailing edge of both wings. The thickness of the trailing edge should be no more than 1 mm, and it is important that the thickness is constant. Work carefully, and take particular care when sanding the control surfaces. Keep the wings supported in their foam negative shells at all times when sanding.

After marking the saw-cut lines using the template 44, the control surfaces can be separated. The template ensures that the cuts are exactly parallel to the line of flight.

Divide each control surface in two equal halves and remove a strip 7 mm. wide from the narrow end (to make room for the end sealing strips). The manufacturing process inevitably leaves rounded corners to the pre-cut slot, which must be sanded back carefully to accurate square corners. Sand off the small projections on the leading edge of the control surfaces.

Blank off the exposed foam in the wing recess and on the control surfaces themselves with the balsa sealing strips 32, and sand them flush when the glue is dry. It is important that the top edge - which forms the hinge pivot line - is left sharp. If this edge is rounded off the control surface hinge will not operate efficiently.

It is important to avoid building a twist into the control surfaces when fitting the sealing strips. To avoid this, weight the surfaces down on the building board, with the leading edge projecting slightly over the edge, and glue the strips in place.

Fit short lengths of the sealing strip 32 to the ends of the control surfaces and sand them back f lush. Offer up the pairs of control surfaces to the wings and trim them back where necessary. The gap between wing and control surface, and between each pair of control surfaces, should be about 1 mm. wide.

Installing the bellcranks

Drill a 3 mm hole in the bellcrank support plate 24 where marked. Assemble the "super-flat" bellcrank 26 as shown in the drawing, and screw it to the support plate. The cranks should rotate easily, but without any slop. If the fit is loose, the mating surface of one of the flanged bushes can be

relieved slightly by rubbing it down on 400-grade abrasive paper. Adjust the tightness of the screw carefully, and lock the nut on the reverse side with glue when you are satisfied.

Before the bellcrank is installed a little foam must be removed in the bellcrank well to provide clearance for the arms of the crank. Remove the minimum of foam, to avoid weakening the wing.

Fit the steel pushrods 21 and 22 into the Bowden cable outers from the wing root. ln each case pull the outboard end a short way out of the bellcrank well, roughen up the end, fit a qulcklink 27, and bend the final 2 mm. of the steel rod at right-angles. Slide the link to the end of the rod and solder it securely.

Connect the quicklink to the bellcrank and fit the bellcrank plate in the wing. Check that the connection points are as shown, and that the arm which connects to the control surface is pointing towards the fuselage. Check that the bellcrank rotates freely when the pushrod is operated' lf necessary, pull the Bowden cable outer towards the root slightly to provide clearance at the bellcrank end. Do not move the tube more than the absolute minimum; maximum distance from quicklink: 10 mm. At full movement. No part of the linkage system should come into contact with foam at any point in the bellcrank's arc of movement.

If it proves impossible to move the Bowden cable outer in the wing, twist a small round file into the tube from the root end. Carefully twist the tube one way and the other to release it from the sheeting. On no account use force. Do not pull the outer tube further than necessary, as it is very difficult to slide it back into the wing.

Note: If you are fitting one servo per control surf ace in the fuselage, it is inevitable that the quicklink and threaded coupler at the root end will foul the wing at full movement. In this case the wing tubes must end 15 mm. short of the root rib. Hollow out the foam in this area, and open up the holes in the fuselage and root ribs to ensure that the linkage is not obstructed. Glue the end of the Bowden cable outer to the foam, using 5-minute epoxy.

Epoxy the bellcrank plate into the wing well, taking care that it is set sufficiently deep in the wing, and that no glue gets onto the bellcrank.

Move the bellcrank to the neutral position and position the threaded control surface pushrod 29 on the wing, at right-angles to the leading edge of the control surface. Mark the line of the pushrod on the sheeting. Using a pointed round file, cut a tunnel from the sealing strip through the foam to the bellcrank well. Work carefully here, to avoid weakening the wing unduly. Screw the quicklink on the threaded pushrod, bend the rod as shown in the drawing, slide it through the tunnel, and connect it to the bellcrank. Hold the control surfaces in place against the wing - checking for equal gaps at either end and in the middle - and mark the position of the horns 30.

File out the horn slot in the control surface and hollow out a little foam around the slot. Check that the horn fits snugly, and glue it in, using plenty of epoxy. Before applying glue, apply tape around the slot to avoid excess epoxy soiling the wood surface.

Note: The position of the horn relative to the pivot line must be identical on all the control surfaces; otherwise control movements will be unequal.

Temporarily fix the control surfaces to the wings with tape, and pin them in the neutral position. With the bellcrank at neutral, mark the point at which the threaded pushrod meets the horn. Bend the end of the threaded rod at right-angles, cut down the bent end to a length of 10 mm and connect it to the horn. Check that the linkage works correctly by operating the pushrod from the wing root.

Seal off the bellcrank well with the cover plate 25, with the wood grain parallel to that of the wing sheeting. To avoid a weak point in the wing it is important to glue it securely. Sand the cover back flush with the wing when the glue has set hard. Fill any gaps with filler paste and sand smooth.

Installing the wing-mounted servos

We can only provide general guidelines here, as different servos call for different methods of installation.

The servo well cover can either be made removable, or glued permanently in place. A removable hatch considerably weakens the wing, and it is essential to fit reinforcements in a span-wise direction to compensate for this. We recommend gluing spruce or plywood reinforcements into the wing, as shown in the drawing.

A permanent installation is by far the better solution. It is very rare for a servo to fail, and even if this should occur it is very easy to cut out the cover and replace it with a new one after repairing the servo. This is much easier and quicker to do, and does not weaken the wing at all.

Passing the servo extension leads through the wing is relatively simple, as the Bowden cable outer tube is not fixed. Pull the outer out of the wing a little way at the servo well end, cut off the end of the extension lead at an angle, and glue it into the end of the tube with a drop of cyano-acrylate. Now pull the Bowden cable outer out of the wing from the root end, and the lead is pulled through with it.

We strongly recommend that separation filters are fitted in the extension leads if servos are installed outboard in the wings. These should be in accordance with the radio manufacturer's recommendations, and fitted right at the wing root end of the lead. Multiplex extension lead kits including separation filter are available under Order No. 8 5138.

The link from servo to horn consists of a length of 2 mm studding (threaded rod) fitted with an adjustable quicklink at the horn end. Check that the servo is not obstructed over its entire arc of movement.

Winglets

Assembling and fitting the winglets

Glue the tip rib 34 and the doubling rib 35 together with the markings approximately lined up.

Caution: Be sure to make one left-hand and one right-hand pair.

Drill 3 mm. @ holes through the assembled tip ribs at the marked points.

Remove foam from the wingtip to accept the doubling rib, and check that it fits snugly inside the wing core, with the tip rib proper in contact with the wing sheeting all round. Securely epoxy the assembly into the wing, and tape it in place until the resin has cured.

Cut a thread in the holes by driving in the thread-cutting screw 38. Drill 4 mm holes in the second tip rib 34, and fix it to the wing-mounted tip rib using the machine screws 39. Repeat with the other wingtip. The thread-cutting screw 38 is not needed again.

Sand the assembled wing tip ribs flush with the wing skins.

It is a good idea to harden the threaded holes with a drop of instant glue, but do not f it the machine screws again until the glue has set hard.

Glue together the winglet components 36 and 37 and sand them to the final outline. Position the free tip rib 34 on the winglet and mark the position of the mounting holes. Drill and file out the holes in the winglet to a diameter of 7 mm. Glue the tip rib to the winglet, with the holes accurately centred.

Caution: Be sure to make one right-hand and one left-hand winglet; the tip rib in each case is glued to the inside face of the winglet.

Round off the leading edge of the winglets and taper the trailing edge to a constant thickness of 1 mm.

Assembling the airbrakes

The Cortina is supplied with double-blade super-airbrakes built in as standard. The brakes can now be linked up and the blades fitted. Roughen up one end of the steel pushrod 23 and bend the final 2 mm. of it at right-angles. Fit a metal quicklink onto the rod and solder the joint well.

Raise the airbrake arms and move the airbrake actuator towards the wing root. Thread the steel pushrod into the outer tube from the brake well, running it below the pins which project from the back of the arms. This is absolutely essential if the brake unit is to function correctly. When the brake is retracted these pins hold the pushrod in position. Thread the rod into the outer tube and connect the quicklink to the actuator lug. Move the rod to and fro and check that the system works correctly.

The bottom brake blade 40 is fixed first, followed by the upper blade 41. They are fixed in place with the brass screws 42. This job must be tackled with care; it is essential that the fine flange on the screw heads engages in the blades to ensure that the brake unit works correctly, with no danger of jamming.

As the screw heads are thin you will need to work carefully, and use a screwdriver with a perfectly square blade tip. Take care also that the blades are not bent or deformed. Straighten them if necessary.

Check that the airbrake unit operates correctly, then fit the brake capping strip 31 as follows: cut it to length, trim it to fit snugly, and glue it in place using contact cement. Use of 5-minute epoxy here may result in the airbrake becoming glued to the wing, which inevitably leads to serious damage.

Sand down the brake cap flush with the wing skin, using no more than moderate pressure. As the pivots 42 take the form of screws, it is possible to remove and replace the blades a few times, which can be useful when finishing the model. Nevertheless please take great care with these screws and never use force.

Wing joiner blades

The next step is to install the wing blades 20. The blade boxes in the wings are deliberately left slightly oversize to allow for adjustment, so this procedure necessarily involves the fuselage.

The blades should reach almost to the opposite side of the fuselage. Plug them into the fuselage and mark the root end of the projecting blade with a felt-tip pen. Roughen up and thoroughly de-grease that part of the blade which is to be glued into the wing. Apply tape over the joiner socket in the fuselage, and cut through it for the blade. Repeat the procedure at the wing root. The tape will avoid the excess epoxy soiling the fuselage and wings. Assemble the wings, blades and fuselage "dry" and check alignment.

The two blades for one wing can now be installed; it makes no difference which wing is tackled first.

Mix plenty of slow-setting epoxy (Araldite) and press it into the blade box, distributing it evenly inside the box using a thin metal rod. This task is made easier if you bevel the edges of the box all round, using a sharp knife, to form a bowl-shaped depression.

Slide the joiner blade into the blade box as far as the marked point (normally this is as far as it will go). Carefully wipe off excess epoxy.

Fit the fuselage onto the projecting blade and align the wing and root fairing as accurately as possible. Tape the components together in this position.

With the fuselage still attached, prop the wing up vertically on its tip and allow the resin to harden.

Note: The wing and root fairing must be lined up absolutely perfectly; this is of crucial importance for the model's performance in the air.

Repeat the procedure for the other wing.

Cut 3 mm holes for the pushrod tubes in the root facing ribs (8 mm. @ it the quicklinks have to move inside the wings), and cut the slots for the wing joiner blades.

Please follow this procedure to obtain a really precise wing - fuselage transition: The root facing ribs 33 are die-cut 1 mm oversize; fix them in the correct position on the fuselage root fairing with small pieces of double-sided tape.

Note: The facing ribs are not glued directly to the wings, as is normal practice.

Plug in the wings and check the position of the ribs. If there is a small gap, do not worry; it will be filled automatically when the ribs are glued in place.

Carefully mask off the wing skins at the root, and the fuselage surface around the root fairing, to avoid soiling.

Apply 5-minute epoxy to the whole surface of the wing root, taking care not to allow any glue to enter the Bowden cable outers.

Plug in the wing and press it firmly against the fuselage. Wipe off excess glue, and allow the joint to harden well (at least 2 hours). Remove the wing, prising it off with a thin, sharp knife if necessary. Do not use force.

Using a sanding block, sand back the root facing ribs flush with the wing surface, checking the transition repeatedly by plugging it into the fuselage. Fill any gap with filler paste and sand smooth.

If you have followed this procedure to the letter the transition from wing to fuselage will be perfect.

The manufacturing process may result in a slight depression on the top and bottom surfaces of the wing root in the joiner blade region. This is not normally visible, but may be felt by the hand. If you find such a depression, fill it with filler paste and sand smooth. Take particular care not to sand into the wing skins, as this would seriously weaken the whole wing.

Aero-tow release mechanism

There is no reason why the Cortina should not be aero-towed, but we do recommend the use of a launch dolly because of the model's minimal ground clearance. This can be made up very simply from a few strips of wood, two piano wire axles and three model aircraft wheels. A vertical rod fitted to the dolly engages in a hole in the bottom of the Cortina's fuselage, coupling the model to the dolly until lift-off.

A simple, reliable aero-tow release can be made as follows: Cut a vertical slot 2 x 5 mm. in size in the right-hand fuselage side, as close to the nose as possible. Drill a 2 mm pilot hole for the slot and file it to size.

Install the tow release servo in the front section of the servo plate, as close to the right-hand side of the fuselage as possible.

Bend a length of 2 mm. I.D. brass tube (not included in the kit) to follow the curvature of the fuselage side, and cut it to correct length. Make the pushrod from 1 mm piano wire and bend a joggle (double 90" bend) into one end. Alternatively, bend the end at right-angles and f it a retainer clip. The length of the pushrod should be as follows: with the servo at neutral (centre), the tip of the rod should be visible in the slot (halfway point).

Note: Be sure to use a powerful servo; it should offer an output torque of at least 2.0 cm/kg. Connect the pushrod as close in as possible to the out-put shaft.

Roughen up the brass tube and the fuselage side and epoxy the tube in place. Check that the system works correctly.

Painting

Either remove all the RC system components from the fuselage or cover them over.

Wash down the fuselage with white spirit, and remove the spirit residue with soapy water. This step is essential, as it removes any traces of release agent from the moulding.

Rub down the fuselage using 400-grade wet-and-dry paper, used wet.

Filler-primer can be applied either by hand or with a spray-gun. Any microscopic holes which show up can then be filled and the fuselage rubbed down again.

Continue the cycle of filling, priming and rubbing down until the primer coat is even and smooth overall.

The fuselage can now be painted in the colour of your choice. Check beforehand that the primer and top coat are compatible.

The edge of the canopy can also be painted if necessary. If you use a darker or lighter colour than the fuselage any slight gap between canopy and fuselage will tend to disappear.

Mask off the canopy with Sellotape, and wash the plastic surface with white spirit before painting.

Finishing the wings and winglets

There are many possible methods of finishing the wings and winglets. One excellent course is to cover the flying surfaces with Multiplex Multikote or Super Multikote. Our range includes a wide variety of colours, and the material is simple to apply. In the shortest possible time and with the minimum effort you achieve an outstanding finish and a smooth surface, which is important for your model's performance.

Before applying film the wings must be rubbed down to a smooth surface using wet-and-dry paper, in this case used dry. Remove all traces of dust with a stiff brush or a blast of compressed air. To be absolutely sure of removing the last speck of dust, we recommend that you wipe over the entire surface with the palm of your hand.

Note: The top and bottom surfaces of the wings should be covered on the same day; otherwise differences in aerial humidity could produce a warp in the wing.

Fitting the control surfaces

With covering complete, the control surfaces can be hinged to the wings using the coloured adhesive tape 43.

Disconnect the pushrod from the horn and fold the control surface up and over, so that it ends up inverted, flat on the top surface of the wing. Check that the control surface is correctly aligned (1 mm gap at each end) and apply a single strip of tape centrally along the inside of the wing and control surface. Cut off the excess tape. It is important that there is no gap between control surface and wing.

Swing the control surface back down to its normal position. Press it against the wing; so that the space between it and the wing is as small as possible (ideally all you will see is a fine line). Apply a second strip of tape centrally along the top of the hinge line.

Move the control surface up and down several times, so that the two strips of tape adhere in the centre to form an efficient hinge. Check that the control surface deflects freely in both directions; it must not jam up at any point.

Connect the threaded pushrod and apply a tiny drop of 5-minute epoxy to the end to prevent it falling out.

Applying the transfers

Applying large-area transfers can be a problem; please follow the procedure described in the instructions supplied with them, and you will find it a simple, straightforward job.

Installing the control system

Fit the servos in the fuselage and screw them down. Set the' main control servo output levers to neutral, and the airbrake servo to the "brakes retracted" end-point.

Fit quicklinks onto the threaded couplers, leaving some room for adjustment in both directions, and connect them to the output arm holes shown.

Plug in the wings, hold the control surfaces at neutral and lock the airbrakes closed.

Align each pushrod parallel to its respective threaded coupler and mark the pushrod where it lines up with the thread/sleeve shoulder of the coupler. Remove the wings and snip off the pushrods at the marked point.

Roughen up the pushrod ends where they are to be soldered, bend the ends into a gentle "S" shape, and solder them into the threaded couplers.

Now check and adjust each linkage until the servo can rotate to its fullest extent in both directions with no jamming or mechanical obstruction. Stalled servos consume a very high current and can easily flatten a battery in a very short time; this is one of the most common causes of a crash.

The receiver battery - we recommend the Multiplex pyramid- form 1200 mAh pack - is fitted into the extreme nose of the fuselage and packed round with foam rubber.

The receiver is fixed to the servo plate '12 using Multiplex hook and-loop tape.

It is important that the receiver aerial should be deployed in a straight line for its entire length. The best way of achieving this is to pass the aerial through the fuselage at the tail and allow the excess length to trail freely. Do not forget a strain relief (a knot) where the aerial exits the fuselage. Install the ON/OFF switch inside the fuselage on the servo plate.

It is not possible to state the correct control surface throws precisely. Every pilot has his own ideas of the ideal control response in a model; ideas which develop in the course of time. As a general guide the movements for the Cortina should be similar to those of an orthodox model. By that we mean that no one surface needs to have substantially more or less movement than normal. Fine tuning of all controls is carried out later during test flying

Because of the unusual aerodynamics of a flying wing no aileron differential is required. The aileron linkage in the Cortina is designed to produce little or no differential movement.

If you have installed two aileron servos, and if your transmitter offers suitable mixing facilities, you can experiment with small amounts of differential - in either direction - to see whether there is any advantage in terms of control response. It may be that you will detect some slight advantage, depending on the finish and quality of your wing surfaces. Once you have established the best setting, leave the system alone.

Centre of Gravity

Because of their aerodynamic peculiarities flying wings are sensitive to CG position. In consequence it is essential to work with extreme care when determining the balance point; a change of a few millimetres in either direction produces major differences in f light characteristics.

The model should initially be balanced for an average CG position. Minor errors in building are inevitable, and may mean that the balance point shown is not absolutely correct, but this will be established and corrected during flight testing.

The average CG position for the Cortina is 286 mm aft of the wing leading edge, measured at the fuselage root fairing.

Mark the CG position on the underside of both wings, using a water-soluble felt-tip pen. Install the entire airborne radio system, and fit the canopy and the fuselage hatch.

The normal method of balancing a model on your fingertips is not accurate enough for flying wings. For this reason we recommend that you make up a U-shaped support bracket made of 4 mm piano wire, and fit protective end pads. The materials for this are not included in the kit. Fix the bracket in a vice and place the model on it. This method provides a simple means of accurately establishing the CG position.

Add lead ballast until the model balances horizontally, with the nose inclined slightly down. If nose ballast is necessary pack it in foam rubber to prevent it shifting in flight.

Launching and flying

Give the model a thorough pre-flight check. The basic points to check are as follows: CG position, correct control surface movements (and in the right directions), batteries charged and checked, wing joiner clamping screw tight, radio range check completed (about 30 m. range with aerial collapsed).

Wait for a really good flying day for first test flights, and seek out a large, unobstructed flying site.

If you are test flying at the slope simply launch the model strongly into wind, with the nose inclined slightly down. Persuade an assistant to launch for you if possible.

If you are test flying on a flat field site, do not attempt too many hand-glides. With a model of this size hand-launches are rather dangerous. It is usually sufficient to run into wind, holding the model

aloft and almost releasing it, to give you an indication of whether the model is trimmed more or less correctly.

On a winch launch apply slight down elevator immediately after releasing the model, to ensure a rapid gain in airspeed. On no account pull up strongly in the initial phase of the launch. If line tension fails for any reason (cable break, insufficient winch power etc.), the model will stall catastrophically and you will have a total loss on your hands.

Once airspeed is adequate, you can continue the climb steadily. Slight up elevator will result in increased launch height.

The winch operator should constantly watch the wings for flexure during the tow. The degree of flex indicates the level of load on the model, and what action he needs to take in regulating the throttle or switch.

After releasing the tow, concentrate initially on flying straight. Adjust the transmitter trims until the model flies "hands off". Now fly a few circles, preferably in both directions, to gain some idea of the control surface responses.

Should one control be too sharp or too slow, land the model and alter the control surface movement by reconnecting the appropriate pushrod at the servo. It makes no sense at all to fly the model for a long period with the controls badly set up.

On the other hand, once the model is set up well, do not continue to make changes, as an unorthodox model such as a flying wing demands a certain amount of airtime before the pilot can get the best out of it in terms of performance, and every alteration to the trim sets the pilot back a step.

During one of the early f lights you should attempt a simple flight manoeuvre which helps to establish the correct Centre of Gravity position. This must be done at a safe height, as it can result in a considerable height loss.

We must emphasize that this test represents a means of fine tuning, and it will not work if you have made gross building errors, or if the average CG is not correctly set.

The test checks the model's ability to recover from an induced dive.

This aspect of a model's flight characteristics is an expression of the interplay between a model's centre of lift and centre of gravity at different speeds.

With the model at a good height, apply down elevator briefly to put the model into a steep dive. Release the stick. If the model is perfectly balanced, it will pull out of the dive by itself in a broad, gentle curve, and resume level flight. If the model immediately recovers from the dive when you release the stick, and rears up in a stall, then the CG is too far forward. Remove nose ballast in small stages (5 or 10 g. at a time) and move the elevator trim lever slightly forward.

If the model shows no sign of recovering from the dive when the controls are released - there may even be a tendency for the dive to become steeper - extend the airbrakes immediately and gently

pull the model back up to level flight. The CG is too far aft. Add nose ballast in small stages (5 or 10 g. at a time), and move the elevator trim lever slightly back.

During the final stages of a landing approach never attempt to fly steep turns or circles. Major changes in direction at low altitude, with their associated angles of bank, put the model in great peril. The airbrakes can be used to adjust the glide angle on the landing approach with great precision. They can also be used to advantage in aerobatic flying. If you make a serious mistake which results in loss of height and a rapid speed build-up, extend the brakes and the speed will quickly be reduced. If the model climbs too high in a powerful thermal, deploy the brakes again to reduce height quickly and safely.

Take your time and fly your Cortina as often as you can. Once you have mastered the model you will find its performance is on a par with the best of the modern 4-metre gliders.

Please bear in mind the safety aspect at all times when flying. Operating a model aircraft demands a high awareness of responsibility from the pilot. Never fly in such a way that you endanger or annoy other pilots or spectators.

We think that you will be fascinated with this unusual model. The Cortina is equally at home handling a good blow at the slope or circling in thermals at the flat field, and its unique shape, its excellent performance and its outstanding handling will, we are confident, be a constant source of delight.

We hope you have many hours of pleasure with your Cortina, and wish you innumerable happy landings.