

# F-20 TIGERSHARK

EPP Slope Soarer

***By Canterbury Sailplanes***



## **Congratulations on your purchase of the F20.**

The F20 is a great looking and flying model. It is made from EPP which is a fantastic material for Model Aeroplanes; it is incredibly resilient and will take almost all the punishment you can give it.

Assembly is quite straightforward and should not be too difficult for the first time builder. If you have any problems please contact the shop you bought the kit from, a friendly modeller or us.

We hope you really enjoy building the F20.

We guarantee you will enjoy flying it!

**Canterbury Sailplanes**

E-Mail: [support@flycs.co.nz](mailto:support@flycs.co.nz)

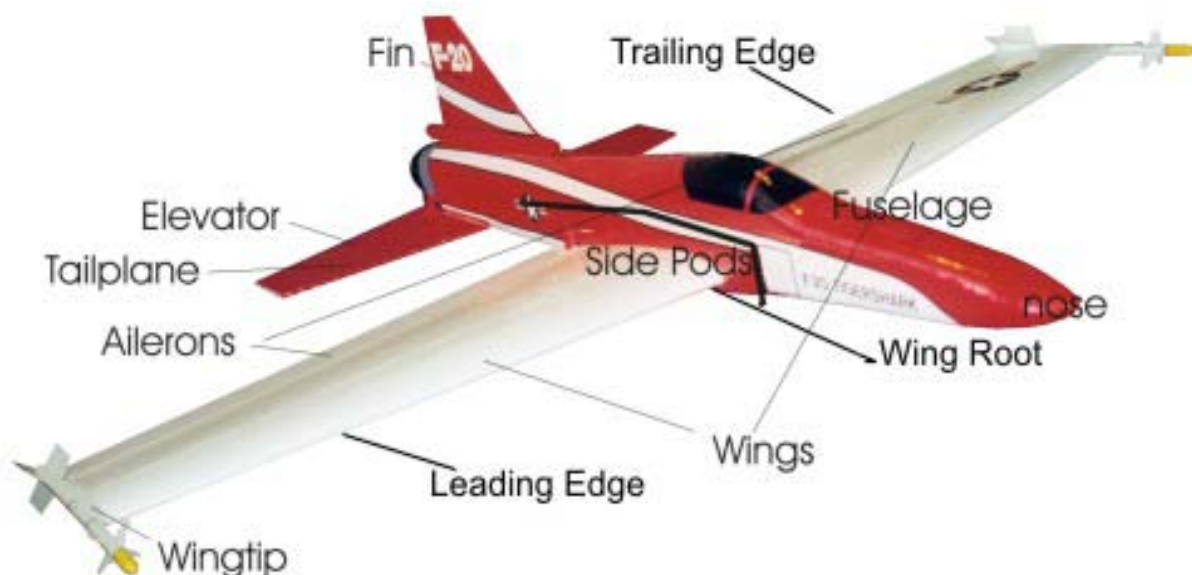
[www.flycs.co.nz](http://www.flycs.co.nz)

**GENERAL NOTES**

- This box contains nearly everything you need to build your model; only a 2-channel radio control set, a knife and some basic tools are required to get your model ready to fly. If your kit has been purchased or delivered outside New Zealand, shipping regulations prohibit sending 3M Spray 77 Contact adhesive. Locate it in your country by calling 3M and asking for your nearest stockist. (In Australia Call toll Free 136136) The Product Number for the small can we use is 3M ID No.62-4437-0926-6, Net Wt 2OZ/56g Spray 77. There are larger cans available. Spray 77 really helps the tape bond to EPP so do try to get some.
- The Kit includes Bostik Clear Bond. This Product is well suited for all gluing requirements. CA (Super Glue or instant) is OK on EPP, although it forms a hard bond which can break under the loads these models sometimes experience. Clear Bond produces a slightly flexible and more durable bond.
- The kit includes Coloured Polypropylene tape and Strapping tape (fiberglass reinforced) make sure you use the correct tape as specified in the instructions. There are 50 meters of Coloured tape and only 15 meters of Strapping tape. There is only enough Strapping tape to complete the model as described in these instructions.
- You might like to decorate your *F20* using different coloured tapes, iron on covering film (available from a model shop) or self-adhesive vinyl (available from your local sign writer). Where the Assembly instructions specify coloured tape, these other products can be used instead. If you use other coloured tape products, they must be of similar spec, i.e. Polypropylene or vinyl, but not PVC.
  - Iron on film produces a very good finish; apply it carefully; use low heat. There is no need to use clear or coloured tape first, just apply the iron on film after the strapping tape, use Spray 77 with iron on films as this will help the film bond to strapping tape and EPP. You can test covering film and heat settings on a scrap piece of EPP.
  - These Assemble instructions will however generally only refer to “coloured tape” in order to differentiate it from the “strapping tape”.
- It is worthwhile investing in a Lost Model Alarm, if your model lands or crashes in trees, bushes or long grass, it may be hard or even impossible to find. With a lost model alarm you can walk straight to your model. The alarm will sound for up to 2 days. Ask your model shop or check out our website.
- When applying the SPRAY 77 to the model; apply by spraying onto the model and leave it a minute or two, waiting until the glue on the surface is tacky, before laying the tape onto the glued surface. Once it is on however, it is difficult to remove - so take care.
- If you need help there are several resources available to you; apart from friends with some modeling experience, try the shop from which you bought the model, our website has FAQ pages and online forums where you may find answers or be able to post questions. We are keen to make these instructions and our kits as good as they can be – if you have suggestions, comments, or find fault in either, please let us know.
- Some of The pictures in the instructions show missiles on the wingtips, these are an option you might like to add, but the parts are not in the kit.

**BEFORE YOU BEGIN ASSEMBLY**

- 1) Check that all the parts as per the parts list page are packed in the box. You will note that the parts list page also has pictures of some items to help you identify them. This will help you later when reading the assembly instructions.
- 2) Other tools that you will need include:
  1. Small hand or power drill
  2. 1.5 mm drill bit
  3. 2.5mm drill bit
  4. Small ruler or tape measure
  5. Sharp knife, scalpel or modeling knife, snap-off type knives are ideal
  6. Scissors (if you'd rather use them) to cut tape
  7. Sandpaper (40 grit is fine)
  8. Marker - a ballpoint pen will do.
  9. Small Phillips head screwdriver (for the servo's)
  10. Small flat head screwdriver (for the control horn screws)
  11. Needle / point nose pliers (or good tweezers)
  12. Soldering iron (not 'needed' but can be helpful)
  13. Either a clothes or modeling iron (for smoothing tape and film-not essential)
  14. Paper masking tape (not essential)
- 3) It's probably also a good idea while you're getting all these items ready, to make sure you have enough batteries for both your transmitter and components to be mounted in the *F20*. If you have rechargeable batteries, put them on charge now as they will probably need to charge overnight and you will need them to be ready prior to fitting the servos into the *F20*.
- 4) It is quite reasonable for a complete beginner to assemble the *F20* to a ready to fly state in 3 nights; the estimated time a "complete beginner" would take for each section has been suggested at each section heading. Decorating the model to a high standard will take a more time.

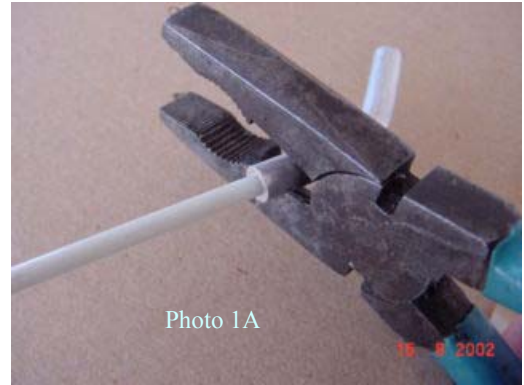


**ASSEMBLY INSTRUCTIONS****WINGS (part 1)** (estimated time = 1 hour)

- Notes:
- The bottom of the wing is the flatter of the upper and lower surfaces.
  - The spar slots are the grooves cut in the top and bottom surfaces of the wings.
  - The spars are the 4 longest rods in the package

1) Fold open the EPP that surrounds the wing cores and remove the wing cores

2) Join the fibreglass rods to make a top and bottom spar; Insert a fibreglass rod half way in to the alloy joiner tube and glue. Repeat the process to complete 2 spars. Use pliers or a crimp tool to put one crimp in each end of the joiner tubes, about 10mm in from each end. This will ensure they do not move. See photo 1A

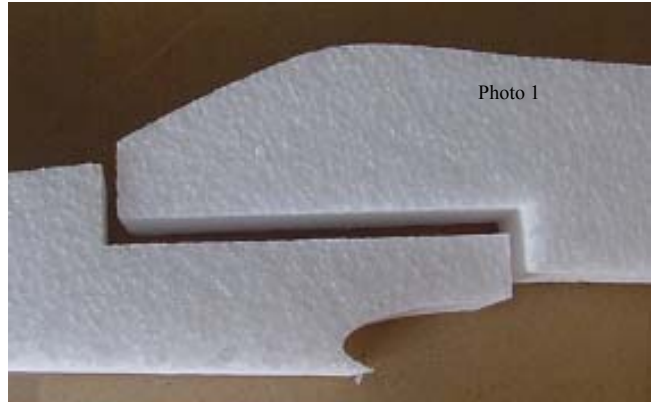


- 3) Place the left and right wing cores side by side on your table or bench and place the two wing roots together, check they line up OK. Glue together with *Spray 77* (you could use the Bostik but you would need to leave it overnight, the *Spray 77* is quicker). Weight down with a couple of phone books or a small pile of magazines - this will keep the wings flat.
- 4) After about 5 minutes, temporarily tape the wing halves together with a 300mm length of coloured tape applied top and bottom - avoid taping over the spar slots.
- 5) Lay one spar on top of the wing, mark the location of the joiner tube in the centre of the wing and cut away a **minimal** amount of foam to allow it and the spar to sit in the slot in the wing. Repeat for the underside. Test fit the completed spars to ensure a neat fit into the spar slots.
- 6) Apply a strip of coloured tape over the lower wing bed along the spar line, so that in the next steps, when you place the wings back in the beds, the wing won't stick!
- Squeeze Bostik Clear Bond adhesive into the top and bottom spar slots and spread out thinly
  - Push the spars into place, so they don't protrude above the wing surface.
  - Check the wing is straight and has no twists.
  - Wipe off excess adhesive. Put the wing back onto the lower foam beds, weight down and leave to set. If you need to put weight on the top spar, cover with tape or clear kitchen film.
  - Allow 24 hrs for the glue to set.
  - You can now begin work on the fuselage

**THE FUSELAGE, FIN AND TAIL**

(Estimated time = 3 hours)

The fuselage comes in four pieces; place the two small EPP side pods to one side for now. The two main fuselage parts have to be joined. See new photo 1.



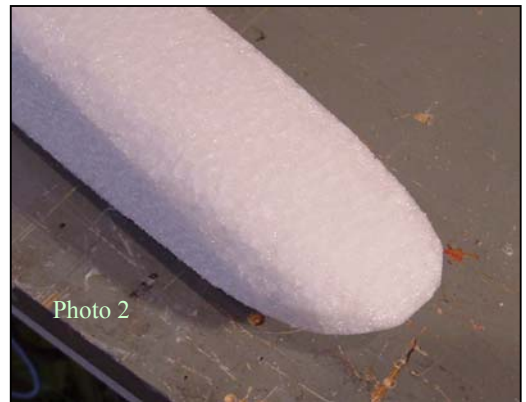
- Coat the surfaces to be joined with Clear bond (not Spray 77) adhesive, spread thinly all over the surface with a spreader such as an old credit card. Align the pieces carefully on a flat surface & push together firmly for 30 secs. The critical point to line up is the wing seat, this should be a smooth surface from the front to the rear.
- If after joining there is a slight mis-match in width of the front and rear sections, lightly sand the sides to get a good line up.

7) Spray a fine mist of 3M77 on to the sides of the fuselage only.

8) Apply a length of strapping tape along the side of the fuselage, starting 250mm (10") from the nose, to about 70mm from the tail. Repeat on the other side, making sure that the fuselage remains straight.

9) Put a piece of tape around the rear end of the fuselage across the slot for the fin to prevent sideways movement whilst rough shaping.

10) Use a sharp knife to shape the fuselage around the nose, the top of the fastback, the canopy and tail cone. Aim for a radius of about 1cm. Be careful with the nose. Don't make it too thin and pointy. Flat like a ducks bill is preferred See photo 2. DO NOT round the fuselage at all on the bottom, from forward of the wing cut out, all the way back to the back edge of the tailplane cut out.



11) If you intend at any time to launch your F-20 by catapult or bungee towline you will need to add a block of wood to hold the hook. Make a block by laminating four pieces of 3mm (1/8in) ply, 25mm (1in) wide and 75mm (3in) long.

12) Using a sharp knife cut a neat hole just big enough to sink the block in flush with the bottom of the fuselage just forward of the wing cut-out. Glue the block in place with plenty of Bostik Clear Bond, hold in place with a couple of pieces of masking tape and leave to set. We will be covering it later.

13) Use your knife and a ruler to cut a hinge on the underside of the Corflute tailplane by making a single cut *along the centreline of the first flute* forward of the two elevator halves. Use only the very tip of the knife blade, taking care not to cut into the other side. Run a screwdriver down the flute to fold in the cut edges, so they won't bind. (See plan).

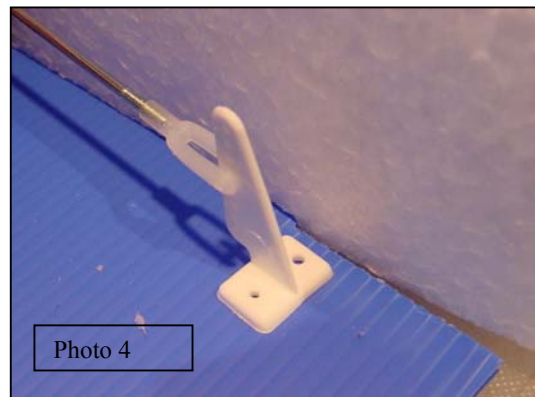
- 14) Fold the elevator halves up over the top surface and place the U shaped elevator hinge wire over the elevators, equally spaced both sides. Mark a spot on the exposed flutes of each elevator half, where the wire is to go in and drill a 1.5mm hole. Push the wire in on both sides, so that the plastic tube sits snugly in the back flute of the tailplane. Centre the tube between the 2 elevator halves and secure the tube with a piece of coloured tape. See photo 3.



- 15) You can now cover the tailplane and fin if you wish. De-grease the surfaces with warm water and dishwashing detergent, rinse and dry well. Cover with coloured tape or self adhesive covering film – but not iron on film, the heat will warp the corflute. We do not recommend painting the Corflute.

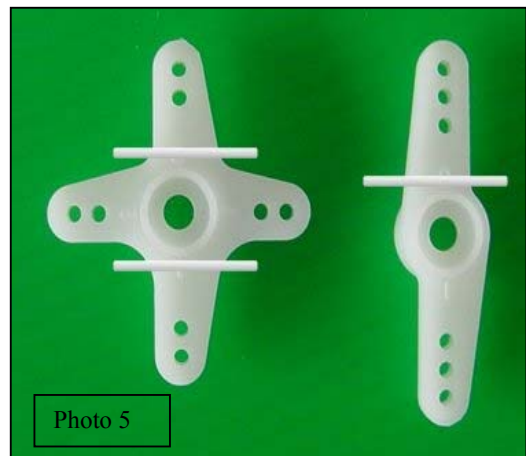
**DO NOT cover the upper surface of the tailplane or the fin in the area where they will be glued into the fuselage.**

- 16) Place the control horn in position on the elevator on the left top side as viewed from the rear, with the holes for the clevis aligned vertically above the hinge line and about 5mm away from the edge of the fuselage. (see photo 4) Mark the location, remove the tailplane and drill the 2 X 1.5mm holes required for mounting the control horn. Thread the screws provided through the holes and screw into the backing plate, which is placed on the elevator's lower surface, screw until firm, but do not over tighten or compress the corflute. Cut off the excess screws on the bottom side.



- 17) Temporarily tape the tailplane in position under the fuselage, see instructions cover photo and plan.

- 18) Plug your radio control set together (including the servos and receiver) and turn them on. The elevator servo plugs into channel 2 and the aileron servo Channel 1. Centre the trims on the transmitter, this will ensure both servos are in the neutral position. Fit a one-sided servo horn about 15mm long to the elevator servo (the one which operates when the radio control lever is moved up and down), set at right angles to the servo (See photo 5). Fit a straight 2-sided horn about 25mm long to the aileron servo also set at right angles to the servo. If you have horns with more arms than required, cut off the extra horns with a pair of side cutters. Enlarge the holes in both the outer holes of the aileron servo horns and the outer hole in the Elevator horn with a 2mm drill.

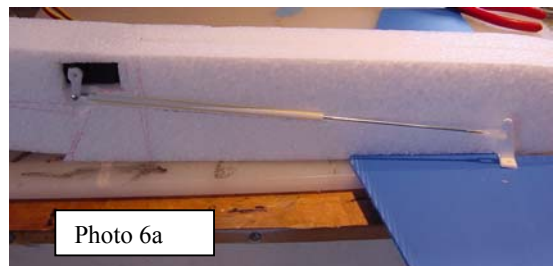
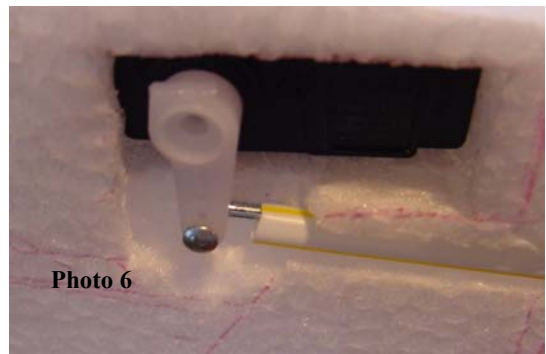


19)The elevator servo, receiver and battery will be fitted into pre-cut recesses in the fuselage that should be just the right size and depth for standard components. If you need to enlarge or make extra cut outs, do so with a knife to cut the outline down to the correct depth, then remove foam with point nose pliers. Work slowly and carefully – you don't need an oversize hole!

## 20)Mount the elevator Servo

Notes: The servo horn must be closest to the front of the model (see Photo 6) i.e. The 'body' of the servo will be behind the horn. The servo should go deep enough into the hole so that the top of the elevator servo horn will be just below the left surface of the fuselage.

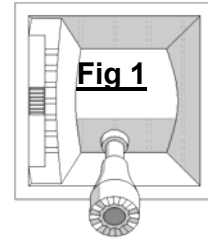
- It may be necessary to cut away any strapping tape covering the hole for the elevator servo
- Cut the mounting lugs off the sides of the elevator servo with side cutters or a very fine saw - be careful not to cut the servo lead! (Don't worry, new servo cases are cheap!)
- This hole is cut suitable for the shallowest servo; it may be necessary to make it deeper for your servo. If you wish to make the hole deeper, cut carefully thru the bottom of the hole around the edge, and remove the epp, but not the strapping tape (if any) on the right hand side of the model.
- Use a sharp knife to cut a small hole through the bottom of the elevator hole (if it is still there) to the other side of the fuselage. Thread the servo lead through the bottom of the hole and out to the other side of the fuselage.
- Cut away a small amount of EPP on the lower side of the servo so the elevator horn can move.
- Secure the elevator servo in position with a very small smear of clear bond.
- If you cut away extra foam to fit your servo, use this excess to make a block to fill in the hole remaining under the servo.



- 21)The elevator pushrod runs from the servo horn to the elevator control horn on the tailplane.
- Remove the elevator servo horn from the servo; put the screw in a safe place!
  - Slip the steel rod with the knob on one end through the end hole in the horn and slide to the end and around the corner. (See Photo 6a)
  - Slide a 100mm piece of drinking straw over the pushrod and thread the plastic clevis onto the threaded end of the rod.
  - Temporarily replace the horn on the servo.
  - Attach the elevator clevis to one of the middle elevator horn holes.
  - With the servo centred the elevator should be flat in line with the tailplane with no upward or downward trim. If the elevator is up then the rod is too long and needs to be threaded onto the tube and/or the clevis more, if the opposite is true then adjust the thread accordingly.
  - Plug the servo and battery into the receiver, turn on the transmitter (always turn the transmitter on first) Check the movement available. The above set up should achieve about 15mm of travel up and down of the elevator, measured at the middle of the trailing edge half, when the servo operates it. If it does not move that much you need to

move the clevis down to a hole closer to the elevator. To achieve less movement, move it to a hole further out on the horn.

- Cut a slot in the fuselage for the pushrod assembly about 6mm deep and 4mm wide, and about ½ way to the clevis (approx); check the pushrod moves back and forth without catching. (The tip of a soldering iron is good for this job)
- Test the elevator servo to check free movement, when the elevator stick on the transmitter is moved down (see Fig 1) or towards the base of the transmitter case, the elevator should move up and vice versa. If not, switch the reverse switch on the transmitter to correct.
- Position the drinking straw tube so it starts to cover the wire about 12mm from the end of the clevis attached to the servo. Fix the tube in place in the fuselage slot with two or three blobs of Bostic Clear Bond
- Refit the screw into the servo horn.
- Apply a piece of strapping tape from about 50mm forward of the servo, over the servo and about to 50mm back from it, take care not to stick the tape onto the servo horn as this will jam it, if this looks possible, cut a small piece of paper the size of the top of the servo and apply it to the tape first, then place the tape over the hole.



22) Remove the tailplane.

23) Take the side pods and sand the top edges and the bottom edges forward of the wing seat cut out, to a nice round radius. Do not sand the bottom edges in the area the wing will go or rearward of the wing seats. Make sure that you have made a left AND right hand panel.

24) Make a slot in the left side pod for the elevator pushrod to pass through

25) Spray the inside surfaces with 3M77 and allow to set to a dry tack.

26) Set the side panels in place, aligning the wing seat cut outs with those on the fuselage and the rear end of the fuselage. Do this carefully and accurately. You only get one shot at it. Press firmly to bond.

27) Do a final sanding of the whole fuselage with 40-60 grit sandpaper to round and smooth the corners. Use the cross sections shown on the plan and pictures as a guide.

28) Brush, vacuum or blow the fuselage to remove all sanding dust.

29) Install a square battery pack in its recess near the nose. Note the receiver and battery pack are not glued in place, just a tight fit. **Tip:** put a band of insulation tape around the battery case, and join the ends of the tape together to make a tab with which to pull the battery pack out.

30) Cut a 4mm deep knife slot from the battery and elevator servo to the receiver recess; push the leads into the slot. If using a switch make a small hole just large enough to fit this into. Make a narrow tunnel from the aileron servo recess in the fuselage thru to the receiver cavity, through which you will later thread the aileron servo lead.

31) Temporarily install the receiver in its recess with the leads facing inwards; it may be necessary to cut a deeper recess to accommodate the leads where they plug into the receiver.

- 32) As the receiver is central the aerial begins in the middle of the model and should be long enough to go from the receiver, around the tail and back up the other side. Around the rear is also best for damage control. Cut a slot for the aerial along the side of the fuselage and back along the other side. **WATCH OUT FOR THE ELEVATOR SERVO LEAD!** Leave about 20mm slack in the receiver hole and push the rest of the aerial into this slot.
- 33) You can either use a switch set into the fuselage or just plug the battery straight into the receiver, in which case you will need to install the receiver with the leads facing outwards. Note that if you are installing a switch, make sure ON is forward and OFF is backwards, that way when throwing your glider you will not accidentally turn it off. Also if you have a rechargeable battery and will be merely unplugging the battery and plugging in a charger, try to place the joiner in a place you can easily get to which is also out of the way of where you will hold the model when launching. (Note; Launching grip is between thumb and forefinger, just forward of the wing).
- 34) Lightly spray the fuselage with Spray 77 Adhesive.
- Apply a length of strapping tape full length down each side, along the top from in front of the fin to the top of the canopy. Where required, wrap the excess tape around the sides and bottom or top of the fuselage. You will find the compound curves difficult to tape without creasing the tape, take your time and carefully split the tape length ways so it will go around the curves. A warm iron is also very useful for shaping tape around curves.
- 35) Now we will “Barrel wrap” the nose with strapping tape. Work carefully with the strapping tape around the front of the dummy intakes, it may be necessary to make a few slits in the tape, this is ok, but do not cut right across the tape as this will critically reduce the strength of the tape as a reinforcement of the fuselage sides.
- Starting forward of the dummy jet intakes, wrap pieces of strapping tape over the top of the nose and forward part of the canopy and 2/3rds of the way down the sides.
  - Repeat this going forward, overlapping each piece 5mm (1/4”). As you approach the nose use thinner strips of tape by cutting the 50mm (2”) wide tape down between the fibre strands. This is best easily done by tearing the tape along lengthways. As each piece is stuck in place, shrink down wrinkles with your iron set to 150deg C. Try not to cut across the fibres as that destroys the effectiveness of the “Barrel Wrapping”. Don’t scrimp here as weight in the nose is beneficial at this stage. Repeat the process on the underside overlapping up the sides.
  - Finally go over the whole nose carefully with the Iron to get the tape as smooth as possible.
- 36) Now cover the fuselage with the coloured tape provided, or with iron on film. The tape is easiest applied in bands around the fuselage, work from the rear to front. In the under wing area lay the tape length ways; don’t tape where the wing will be attached later.
- 37) Cut slots to permit access to the receiver and switch. If you are using dry cell batteries, cut away the tape and secure the battery holder in position with insulation tape – it is much easier to remove and reattach. If you have rechargeable batteries it is possible to leave only the charging socket or the plug between battery and switch outside the tape to enable easy charging.
- 38) Permanently glue the fin and tailplane to the fuselage. Make sure the tailplane is parallel to the bottom of the fuselage bottom as viewed from the side, this will ensure the wing and

tailplane are at the same angle to the fuselage. Also check that the fin is at right angles to the tailplane as view from the rear of the model.

39) Let the glue set overnight

### **THE WING - PART 2**

(Estimated time = 3 hrs)

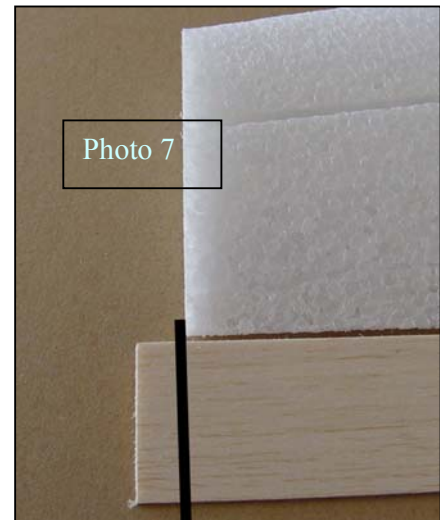
40) Now we are going to reinforce and cover the wing with tape. It is possible to build in curves and twists during this phase; **TAKE CARE NOT TO APPLY THE TAPE UNDER TENSION**. Lay the wing on a flat tabletop. Try not to get any wrinkles and creases in the tape.

- Remove the tape you put on before gluing the spars in.
- Lightly spray the wing top with Spray 77 Adhesive. Allow to cure for a few minutes.
- When dry you can add the strapping tape to the top of the wing as shown in the wing taping drawing.
- Now tape the underside of the wing as shown.
- Apply the strapping tape smoothly, avoiding creases or bubbles. Do not stretch it tight, but lay flat and smooth down with a finger or cloth pad as you lay it down with the other hand.
- When the wing is all taped up, go over it with a warm iron (100 deg C) to ensure maximum bonding.
- Increase the iron's temp to 150 Deg C and firmly iron down all the edges of the tape to get a smooth surface. Move evenly and keep moving so you don't overheat any one spot. Follow the iron with a damp cloth pad to cool the tape quickly, and feel the edge of the tape with a finger tip. If you can feel it standing proud ---iron it again.
- This way you will get a very smooth surface on the whole wing.
- Pay particular attention to minimise creases in the wing tips, especially if you are going to add the sidewinder rockets.
- Draw a line 30mm either side of the wing join line, parallel to the join line, to indicate where NOT to apply coloured tape in the next step. Repeat for the underside. (This makes it easier to bond the wing to the fuselage as the coloured tape does not bond well)
- Re spray the wing top with spray 77; apply lengths of coloured tape to each side of the wing, starting from the marked line out to the wing tips. Start at the trailing edge and work forward, half overlapping the previous layer of tape. Continue until you have reached the leading edge.
- Apply coloured tape to the bottom of the wing using the same technique described for the top.

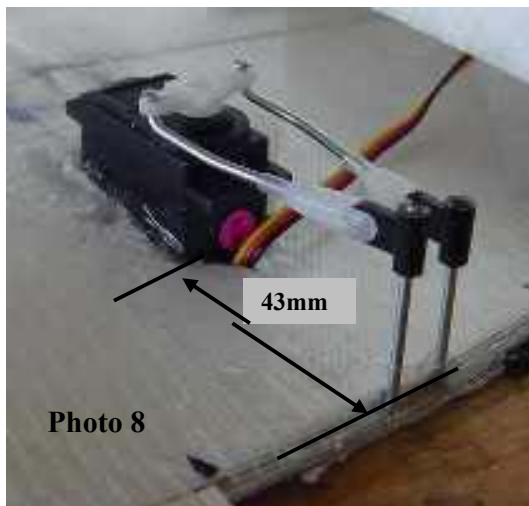
### **AILERONS**

41) The Balsa ailerons provided are slightly too long, let's now cut them to the correct length.

- Carefully position the wing in place under the fuselage, place one side pod next to the fuselage.
- Lay the ailerons in position behind the wing, with a gap of about 3mm between the fuselage side pad and the aileron.
- Use a ruler and pencil/pen to draw a line on the outer ends of the ailerons. See photo 7
- Trim the aileron to length with knife or razor saw.



42) Take your aileron servo and remove the horn. If the servo horn still has four arms, cut two off opposite each other, to make a horn about 25mm long. Carefully set aside with screw for now. Some aileron differential is provided by the slight rearward bend in the aileron wires (Aileron Differential helps the model roll more axially rather than like barrel rolls). If you would like more aileron differential, use a round servo horn rather than a horn with arms and fit the pushrod wires in the 30deg rearward holes on the servo wheel. (see plan)



43) Wrap the body of the servo in paper masking tape to protect it from the glue.

44) Place the servo in position on the wing join line. The rearward edge of the servo should be 43mm from the trailing edge of the wing, measured on the centreline. Mark the outline of the servo. See photo 8

45) Cut a rectangular hole down to, but not through, the bottom layer of strapping tape. Make it a snug fit for the servo. Glue the servo in place with a dab of glue; align the servo so its bottom is flat with the underside to the wing. The servo horn goes toward the rear of wing see photo 8.

46) Locate the pre-bent aileron rods. Screw the black nylon horns onto the threaded ends of the aileron rods. Screw them all the way down until the wire is flush with the top of the horn.

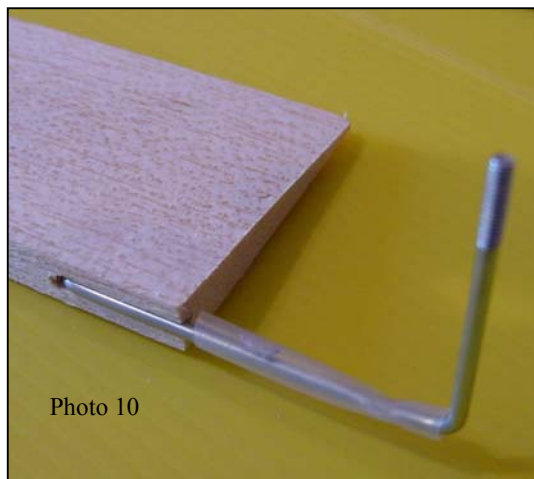
47) Drill a 2mm hole into the forward edge of each aileron, 30mm from the root of the aileron; make the hole 23mm deep. Take care that the hole is parallel to the bottom surface of the aileron. See Photo 10

48) Use your knife to make slot in the leading edge from the hole to the end of the aileron for the wire to push into. See photo 10

49) Glue the ends of the wires into the balsa ailerons.

50) Spray the underside (including the small forward facing edge) of the ailerons with Spray 77 Adhesive.

- Cover the undersides of the ailerons a layer of coloured tape laid lengthways. Work carefully and do not stretch the tape, ensure you do not build in any twists. Stick it on from the 'leading' edge back and allow the extra tape to just 'trail' off the trailing edge (the tape does not wrap around the trailing edge very well, so when doing the upper side of the aileron we will let the tape join together at the trailing edge, then cut with a ruler and knife about 2mm beyond the balsa.



51) Turn the ailerons over and do almost the same (read the points below) to the upper surface, after spraying with Spray 77 Adhesive;

- Cover the upper surface of the ailerons with a layer of coloured tape laid lengthways. Again work carefully and do not stretch the tape and do not build in any twists. This

time however overlap the tape a little (about 20mm) over the 'leading' edge, allowing the extra tape to also just 'trail' off the trailing edge. This tape will meet the tape from the underside and will join together at the trailing edge.

- Cut the tape at the trailing edge off using a ruler to get a straight line about 2mm beyond the edge of the balsa.

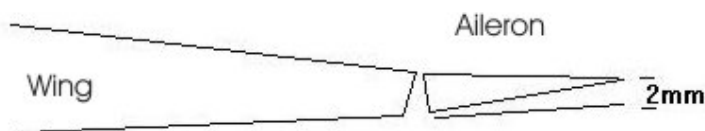
52) Position the ailerons with about a 1mm gap between the wing and ailerons, and about 3mm between the ailerons and fuselage.

- Temporarily hold in position with 2 short pieces of tape on the underside of the wing.
- Apply coloured tape the length of the hinge line on the top surface only.

53) Tape the tube over the aileron wires to the rear of the wing. See Photo 8

54) Make the Aileron pushrods

- Slide both of the wire aileron pushrods through the outer holes in the aileron servo horn.
- Thread a clevis onto the end of the pushrod.
- Centre the servo using your RC gear, check that the trim lever (on the transmitter just below the aileron stick) is in the middle and re-install the servo arm making sure it is at a right angle to the centreline of the wing.
- Some aileron differential is provided by the slight rearward bend in the aileron wires (This helps the planes rolls to be more straight and axial rather than like barrel rolls). If you would like more aileron differential, use a round servo horn rather than a horn with arms and fit the pushrod wires in the 30deg rearward holes on the servo wheel. (see plan)
- Clip the clevises into the black aileron connectors. See photo 11
- **Adjust the length of the pushrods by threading in or out the clevises so that both ailerons are reflexed 2mm (see diagram) this helps to stabilise the model in pitch mode (up and down) as the tailplane is quite small.**



**Without the JW wing section and reflex the F20 does not fly well, but with it.... you will soon find out! 😊**

- Check also that both ailerons are lined up with each other, adjust the length of the linkage if required
- When the transmitter aileron stick is moved left, the left aileron goes up and the right aileron goes down. If not, switch the reverse switch on the transmitter to correct.

55) Check all linkage attachments are secure. Check the system for free movement and for proper aileron movement up and down (about 15mm up and 12 down measured at the trailing edge of ailerons)

56) Now before you glue the wing on, Re-check;

- The aileron servo is securely mounted in the wing,
- Put the screw back in the servo horn.
- The clevises are properly clipped into the aileron connectors

Make sure the servo lead won't get in the way of the linkage. If you are not sure, make a recess up toward the RX (a soldering iron does this easily) and stuff the excess wire up into it using a wooden stir stick as you offer the wing up to the fuselage.

- 57) Test fit the wing to the fuselage. It will most likely be necessary to remove a little more foam from the fuselage either side of the where the aileron servo will be situated to allow the servo horn to move freely, carefully trim away a little foam at a time until there is just enough clearance. The rear of the fuselage cavity may also need a little more space for the aileron pushrods wires to move freely back and forth
- 58) You can either glue the wing on using plenty of the Bostik Clear Bond adhesive in the leading edge and trailing edge notches in the fuselage. Make sure the wing is square across the fuselage and level with the tailplane, and then put aside to set; Alternatively double sided sticky tape does a very good job - particularly if you are sticking tape to tape.
- 59) When the glue is dry, spray a mist coat of 3M77 adhesive along the entire bottom of the fuselage. Mask off the wing and tailplane so that the 3m77 only goes on the centre sections under the fuselage. Lay a piece of strapping tape along the fuselage from 50mm (2in) in front of the wing to 50mm (2ins) behind the wing. Add a single piece running the full length of the fuselage and over the centre underside of the tailplane and the full length of the tail cone. Smooth the tape down with the iron at 100deg C and the edges at 150degC as usual.
- 60) Add 3 x 50mm lengths of strapping tape as reinforcements each side between the wing and fuselage.
- 61) Now you can complete the covering of the fuselage with coloured tape or covering film. Dress up your F-20 Tigershark with insignia etc.
- 62) If you wish to put "Sidewinder" rockets on the wingtips for display, make them from pieces of 10mm (3/8th in) balsa dowel. Round one end for the warhead, make 4 large fins and 4 smaller fins from .4mm (1/64th in) ply. Cut slits in the balsa stick where the fins go. Push the ply fins in the slits. Check they are all sticking out at right angles, and then treat each one to a drop of thin CA at the base. Paint the warhead Red, Yellow or Black. The plastic cap over the tailpipe is Red. The body and fins are White.
- 63) If you want your F-20 Tigershark to fly with rockets on, make them out of rolled paper, with blue foam warheads, and ply fins. Secure the rockets to the wingtips with Velcro so they will knock off easily, but won't come off in the air.
- 64) It is essential to balance your model so it will fly properly. The design and location of components is optimised so the model should balance close to the Center of Gravity without much adjustment, however individual builders may have added a little more tape or glue here or there so it is important to check and fine tune the balance. The balance point at which to test fly is right under the wing spar in the centre of the wing (i.e. under the fuselage). Balance the model at this point on your fingertips, if necessary add lead or similar weight (coins, nails) to the nose or tail until the model balances. While you are fine tuning the balance just tape the weight on to the top of the nose. When you are happy you have it right make a small hole under the nose or tail for the weight and then tape it over to secure.

## CONGRATULATIONS – Your F20 is now assembled – LET’S GO FLYING!!!

### A few notes on flying for beginners

**If you haven’t flown before it is well worth getting some help.** Ask at the local model shop or go to a local flying slope, most fliers will be very happy to help.

If you are a first time flier, before going to a slope, go to the local park and practice throwing and gliding the plane flat and level into the wind. This will get you used to the controls so that corrections become quick and automatic because on the slope you don't get time to think about which stick to push in which direction. Before flying, check the basic functions, i.e. up is up, down is down (stick forward) and right is right and left is left. Check the radio range, with the Transmitter aerial down you should get at least 5M. These initial flights will also be a good opportunity to trim your model for straight and level flight.

When you have mastered level flight try some turns. As you turn you will need to add a small amount of up elevator to keep the model level. Be very gentle on the controls, the model will not fly well if you use lots of Jab type control movements on the sticks. It is best to **always turn into the wind** as down wind turns can take up a lot of airspace; it can also be tricky to judge the correct airspeed.

Good soaring slopes are a little hard to find, however this makes an interesting challenge for this captivating sport. A good slope is characterised by the wind blowing straight up a slope that is steeper than 45 degrees. Tall sand dunes over about 6 Meters and hills higher than about 30 Meters should provide sufficient. You will often see birds soaring in these areas. It is best to talk with local flyers or see where others are flying to find the best sites for each wind direction and strength. You can also then get first-hand tips on flying.

Choose a place to fly that offers a landing site. With EPP models this is less important - just dodge rocks if you can. Long grass, tussock or bushes are fine.

Thermals will also assist flying. Thermals are generated by sun the sun heating the land, warming air which then rises as it is lighter than surrounding air. This makes a sunny slope work better than a sheltered one. Most foam planes will fly well in winds from 10 knots to 20 knots. Experts can fly outside this window. Before flying, ensure that your transmitter batteries are charged. Follow your radio manufacturer's instructions for proper safe radio operation. Always make sure that no one is on your frequency before turning your radio transmitter on. In any case, turn the receiver on first and make sure the control surfaces stay stationary after the initial glitch; this should confirm no-one else is on the same frequency.

When you choose a slope, have a good look around and imagine where you will fly, pinpoint areas such as trees and cliffs where you don't want to fly and decide where you will land. Before throwing off, check you radio gear by standing about 20 paces from the plane with the transmitter antenna pushed fully home.

Always throw off straight into the wind, straight and level and quite hard. Be ready to stop a steep initial climb by pushing the stick forward. Also be ready for a sudden turn to one side. Concentrate on keeping the model in front of you and heading away from the slope. If the model heads down and out from the slope, try pulling up a little. If the model continues to sink, land it before you lose it!

If the model climbs nicely but starts to go back over your head, push down to get speed up and hold down until you can fly it some meters in front of you. Once you are comfortable, try some

zigzag turns, always turning into the wind. Remember to add up elevator when turning. Don't try fancying moves; just concentrating on getting your hours up. Practice, practice, practice.






Note bad areas are below the horizon and down wind of you. This will put you out of the lift in into turbulence.

It can be quite cold on the slope so be prepared to dress warmly so you can enjoy the day.

**WARNING:** Model Aircraft, even those made from foam like the F20, can be dangerous if you hit someone, be careful, think about where you are going to fly and the safety of yourself and those around you.

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## F20 PARTS LIST

EPP Wing	Left & right	
Balsa Ailerons	2	
EPP Fuselage	2 (front and rear)	
EPP Side pods	2 (left and right)	
Corflute tailplane	1	
Corflute Fin	1	
Spars	4	
Drinking straw	1	
Long Steel Rod with knob (elevator pushrods)	1	
Short steel rod with knob (aileron pushrods)	2	
Bostik Clear Bond Adhesive	1	
Strapping Tape roll 15m	1	
Black Plastic Aileron connector	2	
Coloured tape roll (50 metres)	1	
Wing Spar joiner tubes	2	
Control Horn & Base Plate	1 set	
Control Horn screws	2	
Plastic Clevis	3	
Aileron Control wire (pre bent)	2	
Elevator Connector wire	1	
Instruction Manual	1	
Spray 77 can (NZ only)	1	
Graphics Sheet	1	