Hyperflgiht Sky Series Assembly Guide

HyperFlight Ltd

Drybank Farm
Fosse Way
Ettington
Stratford-on-Avon
Warwickshire UK CV37 7PD

www.HyperFlight.co.uk
sales@HyperFlight.co.uk

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Warning, this is not a toy!

If you are new to the hobby of flying RC model airplanes, DO NOT attempt to fly this model by yourself! There are hundreds of BMFA (British Model Flying Association) clubs in the UK. Ask your local hobby shop for the location of the nearest club in your area, or check out the www.bmfa.org.uk (or your national modelling organisations) web site. Many clubs often have qualified instructors to teach you how to fly. If you are an accomplished pilot then you should have no problem in flying this model. However the Supra-e can fly very fast, and is potentially a lethal object. Do fly responsibly, and make sure your third party liability (eg BMFA) insurance is valid.

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Acknowledgement

HyperFlight would like to thank Steve Bowdler for his help writing this guide, based on his build of a Sky Master glider.

We would really appreciate input by other builders – both instructions for specific models, and some construction photos.

Preparation

The mouldings are of reasonable quality but may need cleaning up in a couple of places. The fuselage had a ridge around the centre line where the two halves had been joined. Not significant but I gently removed it with a fine file anyway.

The wings had “flashing” along the leading edge from the moulding process which, I believe, is more significant. I removed this with a fine file also.

I could see that as the fuselage has been constructed for toughness rather than minimum weight it will be necessary to mount all the equipment as far forwards as possible to obtain the required centre of gravity position.

I decided to build the model in the following order – Wings, V tail then fuselage. This would allow me to check the CoG at various stages and fine tune the fuselage installation as I went along.

Wings

For wing servos I decide to use Hitec 5065s as already had three. In the past I have attached them by wrapping masking tape around the servo and epoxying them directly to the wing upper surface. However, I have found that the servo occasionally wriggles loose in the tape so I tried a new (for me) technique with this model.

I bought some CNC cut plywood mounting plates which are designed for the 5065 and are close fit around the servo. These are epoxied to the wing upper surface and the servo is pushed into the mount and secured with a couple of spots of hot melt adhesive. They made setting up the controls much easier as the servo can be removed as often as needed before being finally glued in place.

The 5065s are 12mm thick and they only just fit into the aileron bay with literally no thickness to spare. This is the maximum thickness for the servo and assumes no addition thickness due to mounting the servo in the wing. There is more thickness available in the flap bays.

1. Servo mounts
    a. Remove about 1mm from the servo mount width so that it is a snug fit between the wing ribs and slides up against the rear of the main spar. The servos are all fitted with the horn facing a way from the fuselage.
    b. Wrap the servo with a single layer of cling film to prevent the servo being bonded to the mount or wing.
    c. Place the mount on a flat surface and press the servo home until the servo and mount are flush on the underside.

d. Coat the underside and contact edges of the mount with adhesive. I used microballoon / epoxy mix for this as it provides some gap filling whilst remaining low in density.

e. Press the servo and its mount into the servo bay and make sure that it is pressed against the wing upper surface.

f. Clean of any adhesive which is squeezed out.

g. Once the adhesive has cured pull the servo from the mount and remove the cling film.

2. Servo wiring

a. Use thin multi strand wire for the wings

b. Thread three lengths from the aileron servo bay to the root

c. Cut off the servo connector and solder directly to the wiring. One for positive, one for negative and one for control signal.

d. Use heat shrink to insulate the solder joints

e. Run a single length of wire from the flap servo bay to the wing root

f. Pull the aileron servo positive and negative cables out into the flap servo bay.

g. Cut of the flap servo connector

h. Solder the servo positive to the positive cable, servo negative to the negative cable and the servo signal to the new wire in the flap bay.

i. At the wing root solder on a 4 way socket e.g. Deans micro, and insulate the solder connections with heat shrink. Connect the cables in the following order- positive, aileron signal, negative, flap signal.

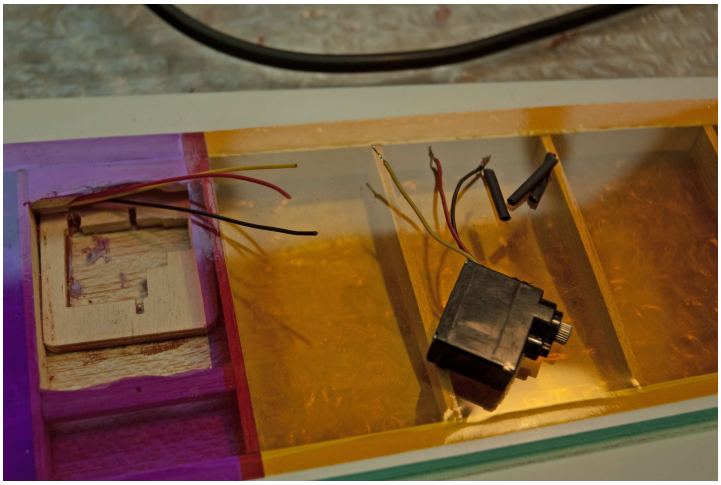
j. Make up two leads to connect the wing wiring to the receiver.

k. For each lead use two servo extension leads.

l. Cut off the servo end connectors of each lead.

m. On one lead remove the positive and negative cables completely

n. Solder a matching four way plug to the cut ends of extension leads to match the connections to the wing – positive, aileron signal, negative, flap signal.



3. Fitting the control surface horns

   a. Open up the pre-drilled holes in the control surface horns to suit the linkages to be fitted as this is easier to do before the horns are fixed into the wing.

   b. Replace the servos in their mounts with the servo arms fitted.

   c. Put a piece of masking tape on to the control surface in the approximate location of the each control horn

   d. Using a straight edge mark the masking tape where the horns are to be fitted.

   e. Cut a small slot in to the control surface for each horn. Be sure not cut completely through to the upper surface. I used a disc in a Dremel for this.

   f. Lightly abrade the control horns in the area where they will be bonded to the wing.

   g. Give the bonding surfaces of both wing and horns a light coat of adhesive. I used micro fibre / epoxy mix to ensure a good bond with excellent gap filling properties.

h. Place each horn into its slot and align with the servo and ensure it is vertical. Each pair of horns (aileron: aileron, flap: flap) should be as identical as possible in terms of the position of the linkage holes. They should be the same height above the control surface and the same distance from the hinge line. Ailerons should have the hole directly above the hinge line. Flap horns can be placed with the hole a little way behind the hinge line to assist in achieving the large downwards travel of the flap.

i. Leave the adhesive to cure.

4. Fitting the linkages

    a. Cut eight lengths of 1mm diameter piano wire.

    b. Form Z bends in the end of four of them and L bends in the other four

    c. Cut four lengths of 3mm od x 1mm id carbon fibre tune

    d. Centre the wing servos and the clamp the control surfaces in the neutral position.

    e. Fit Z bend push rods into the control surface horns

    f. Slide the CF tubes over them

    g. Fit the L bend push rods into the servo horns.

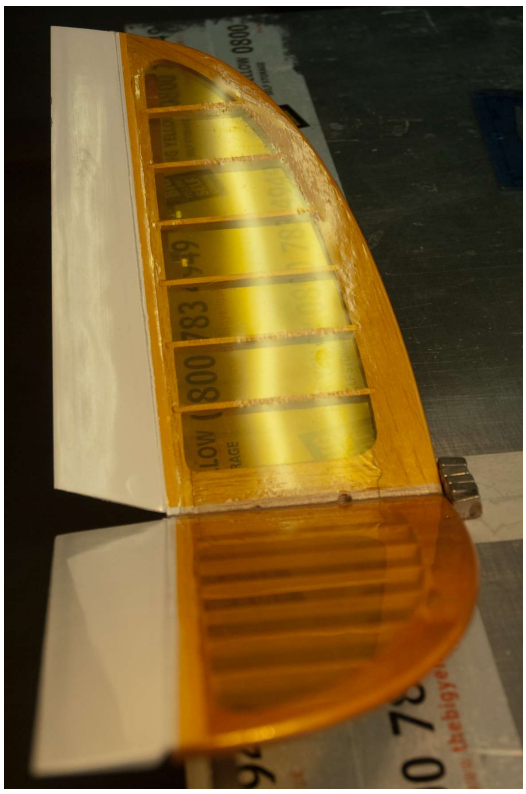
    h. Slide the CF tube over the L bend rods and centre equally on both the L bend and Z bend rods.

    i. Run a small drop of thin CA adhesive onto each rod / CF tube joint and allow to cure.

    j. With the servos and control surfaces still centred, add a small drop of thick CA adhesive to each push rod to horn joint. Zap with a small amount of accelerator and the flex each joint. This removes all slop in the linkage.

V Tail

The V tail angle mounting in the fuselage boom is 110 degree so the V tail needs to be fixed at this angle. T he V tail is designed to be removable but I could not find a secure and yet removable linkage system to use between the control horns and push rods so I decided to make my V tail fixed.



1. Joining the V tail halves.
    a. Stick a length of parcel tape or similar to the building board at right angles to the front edge of the board. This is to stop the V tail being bonded to the board.
    b. Mark a centre line on the tape perpendicular to the straight front edge of the building board. This is the centre line of the V tail join.
    c. Find or make two suitable pieces to prop up the V tail at the correct angle. They need to be exactly the same height and about 100mm high. Two pieces of scrap balsa block will do.
    d. Calculate the distance the props need to be way from the centre line to achieve an inclusive angle of 110 degrees. With 100mm props this is 142mm each side of the centre line. Mark two more lines perpendicular to the board edge at this distance each side of the centre line. This is the position of the inside edge of each props.
    e. Hold each prop in place with its inside edge on these lines.
    f. Dry fit the V tail halves in place with the join over the centre line and the V tail panels propped up at the correct angle by the props. Align the hinge line of the rudder surfaces over the front edge of the building board. The hinge line should be straight from one end of the V tail to the other.
    g. Once everything fits, remove the V tail halves and coat both surfaces of the join with adhesive. I used micro fibres / epoxy mix for this as there was some gap filling to be done.
    h. Put the two halves back into the jig and push the two halves together at the join. Align the hinge lines over the board front edge and the join on

the centre line. Check that everything is square and true. Leave the adhesive to cure.

i. Clean up the upper surface of the epoxy join and dry fit the supplied centre piece to the V tail join. Adjust as required to get a close fit of the centre piece to the V tail.

j. Epoxy in place ensuring that the holes align with those in the V tail

2. V tail push rods

    a. Fix the control horns as required. I removed the horns from their mounting bases and epoxied them directly into slots in the control

    b. Make the push rods from two 1 metre lengths of 0.9mm diameter piano wire.

    c. Form L bends on the ends of each

    d. Slide the push rod into the factory fitted outer and fit the L bend into the control horn.

Fuselage

Mount all the RC equipment well forward in the fuselage in order to achieve the correct CoG without adding any lead.

1. V Tail servos

    a) Trim the ply servo tray to fit the chosen servos

    b) Fix the servo tray in position by using epoxy to bond it to the fuselage sides

    c) Make sure the tray is fitted such that the servo horns are at the same height as the pre-installed push rod outers.

    d) My servos are fitted in the area of 130mm to 155mm measured back from the fuselage nose.

    e) Make up two short push rods long enough to reach the V tail push rods and overlap by 20mm. Make L bends in the end of each

    f) Centre the servo horns and the V tail surface.

    g) Fit the short push rods into the servo horns.

h) Slide a short length of heat shrink over the V tail push rods.

i) Apply a small amount of epoxy to the V tail push rods, align the servo push rod with the V tail push rod and slide the heat shrink over them both.

j) Check the surface and the servo are still centred and then shrink the heat shrink with a hot air gun or similar. Allow the epoxy to cure fully.

k) Treat the ends of the push rods with CA adhesive, as per the wings

l) Make tapered support pieces from 3mm balsa to hold the front ends of the push rods in place and eliminate play in the V tail controls. Fix the supports between the fuselage sides and the push rod outers with CA adhesive.

2. Final assembly

    a. Fix the receiver behind the servo tray with Velcro

    b. Run the wing extension leads from the receiver to the wing seat. And connect to the wings.

    c. Fit the wings to the fuselage with the nylon screws.

    d. Connect the V tail servos to the appropriate receiver channels.

    e. Fit a receiver battery pack into the nose of the fuselage with Velcro.

    f. Hinge the canopy with Diamond tape along one side and fix it shut with a smaller piece of tape on the other side.

    g. Program the radio as required.

3. Set up

    a. Rudder function - +/- 12mm travel at root of V tail

    b. Elevator function - +/- 6mm travel at root of V tail

    c. Aileron function - +12mm, -8mm

    d. Flap function - 80 degrees down at full flap

    e. Centre of Gravity - usually 70mm from wing leading edge - see HyperFlight web site