

Building instructions SHK scale glider



RC glider
Order No. 1125/00

Specification:

Wingspan	4000 mm
Length	1501 mm
Wing area	82 dm ²
Geometrical aspect ratio	20.2
All-up weight approx.	4300 g
Wing loading	52.4 g/dm ²
Wing section	Selig S4233 modified

RC functions:

Rudder and elevator (transmitter mixer)
Ailerons
Airbrakes
Optional retractable wheel, aero-tow release

Replacement parts

GRP fuselage, white	1125/02
GRP tail cap, white	1125/03
Canopy, cabin frame and vac.-moulded cockpit parts	1125/04
Pair of wing panels	1125/05
Pair of tail panels	1125/09
Pair of V-tail bellcranks	7492/20

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Preparations for building:

These building instructions include a reduced-scale drawing of the die-stamped plywood sheets. Write the part number on each component using a soft pencil, referring to this drawing. Cut out the parts from the die-stamped sheets using a balsa knife. All parts should be trial-fitted and trimmed as required before installing them permanently.

You may wish to deviate from the sequence described in these building instructions. This is your prerogative, but do think carefully about the result of your actions! Use the building instructions and parts list constantly while building the model, and use the actual servos and receiver battery to ensure the best locations. Good mini-servos with a rated torque of around 30 Ncm are completely adequate for the all-moving V-tail.

Cut back the flange of the cabin opening (= support for canopy frame) to an even width of 6.5 - 7 mm; see section A-A. Remove all rough edges.

The "snakes" have to be deployed inside the fuselage in a straight line, and this requires that the all-moving V-tail pivot and actuator system should be installed first. Glue formers (3+4) together using laminating resin, and trim them to fit in the fuselage. Press the tail pivot support (5) into the former. Position the captive nut (8) correctly using the screw (9), and glue it in place using thickened resin. Remove all rough edges from the two tail pivot rods (6) (length = 98 mm), push them into the pivot support (5) and fit the tail panel retainers (7) on them.

Cut away the edge of the fuselage to clear parts (7) - see view "X", noting the 43 mm co-ordinates. Check that the tail pivot support is positioned symmetrically, then tighten the screw (9) to secure it, with the pivot rods (6) resting on the former (4). To align these parts correctly we need a reference plane in the fuselage which acts as a substitute for the wing. Temporarily fit the joiner rod sleeve (33) in the fuselage and slip the wing joiner rod (44) into it. The double former 3+4 can now be installed in the fuselage together with the parts attached to it. Check alignment, and tack the former in place provisionally. Before gluing the parts permanently, check for symmetry with reference to the wing joiner rod: the position of the tail pivot rods as in view "X". The pivot rods (6) must also be exactly at right-angles to the root tail fairing when viewed from the side. The tail panel retainers (7) should project no more than 8 mm out of the fuselage - see Section E-E. When you are sure everything is right, glue the parts together and to the fuselage permanently using laminating resin, using fillets of thickened resin at crucial points.

Drill out the hub of the tailwheel (14) to 2.1 mm Ø, carefully remove all rough edges from the tailwheel leg (13), and sand the area to be soldered to a bright metal surface. With the wheel fitted (don't forget the washers on both sides), wrap soft binding wire round the leg as shown in sections B-B and D-D and solder the joint. Solder the side washers to the leg at the same time. Glue the tailwheel leg support (21) in place as shown in sections B-B and D-D. Fit the washers (12) and (11) on the screw (9), then the spacer tubes (10), and only then the tailwheel leg. Fit the aluminium plate (22) to complete the assembly. Drill the 3.2 mm Ø hole for the snake (25).

Drill out the outrigger parts (17) and (18) to 2.5 mm Ø at the marked points, and fit these parts in the former (3+4); they must lie parallel to the tail root fairing, and the holes must coincide with the centreline of the airfoil. Tack the parts in place initially using cyano.

The next step is to install the bellcranks, but first check the fit of the pins (56) in the oval hole; carefully adjust the hole using a round needle file if necessary. Parts (56) must glide smoothly in the slot - but without any trace of radial play.

Fit one washer (12) on the countersunk screw (15), followed by a spacer tube and bellcrank (caution - handed pair!), and then two more washers (12). Insert the screw in the outrigger, followed by another part (12) from underneath. Tighten the nut (16) fully. The bellcranks (20) must operate freely and smoothly, and without lost motion; a drop of machine oil may be necessary.

The next step is to check that the system works properly: press the steel pins (56) into the tail panels and fit the panels on the pivot rods (6). At the neutral position the pins (56) must be located at the front end-point of the slot! Operate the bellcranks with your fingers to check that the tail panels follow the movement perfectly smoothly, without binding. When you are sure that everything is correct, apply thin cyano from the underside, and apply more thin cyano to the plywood to stiffen the material.

The outrigger can now be glued permanently to the double former using laminating resin. When the resin has cured open up the slots for the snakes - see section B-B. The base plate (19) is designed to increase the torsional strength of the outrigger; trim it at an angle and glue it in place with laminating resin.

Since the tail panels are operated by relatively stiff GRP snake inners (26), the snake outers (25) must be deployed in the fuselage in a straight line otherwise friction in the system will be excessive. The fuselage side elevation gives the height co-ordinates where the outers (25) must be located. It is best to slip a length of 2 mm Ø spring steel rod into the snake outers (25) and fix them to the fuselage side with tape, "aiming" them straight at the bellcrank linkage point. Press the snake outers (25) against the fuselage side and tack them in place with cyano. Reinforce each joint with thickened laminating resin. The position of the front and rear joints is stated in the side elevation; these positions allow a certain amount of leeway for directional errors. Each snake outer (25) can now be glued to the fuselage sides at four points using thickened resin. Please keep to the stated position of the front and rear joints! To provide better access to the rear joint position you can cut away the double former (3+4) below the plate (19). Install the sleeve for the receiver aerial (25) at the same time.

Trim the openings for the wing joiner rod sleeve (33) in the fuselage as required; check that the fuselage width is exactly 148 mm! Adjust the length of the hardwood dowel (32) with the joiner sleeve (33) fitted, and glue it in the fuselage. It is important that it does not push the root area of the fuselage out of shape! Glue it in place securely using thickened resin. Roughen the ends of the joiner sleeve (33) with a file, remove all traces of grease, and glue it in the fuselage using laminating resin.

Assemble the servo mount (30+31), glue the assembly in the fuselage and install the servos. Fit a threaded coupler (27) and clevis (29) on one end of each of the GRP snake inners (26). Secure the couplers (27) with a drop of cyano, and crimp the sleeve lightly at several points with a pair of pliers to grip the snake inner. Slip the inners (26) into the snake outers (25) (already in place) from the front end. Fit the servo output arms facing the fuselage sides, and connect the clevises to the servos. Position the plywood supports (39) against the fuselage sides exactly as shown on the plan. Tack them in place with cyano, then reinforce the joints with resin. Note that the 20 mm dimensions must be maintained, otherwise you will have problems when installing the cockpit fittings in the fuselage.

Cut out the base plate from the cabin frame (37), and trim the height of the outside edge as shown in section A-A, so that the frame rests snugly on the fuselage at the front. This is easy to do using a razor plane fitted with a brand-new blade. Cut away the oval hand-hold openings. Drill holes in the fuselage as shown, and insert the dowel (38) in them. Sand back the end of the dowel (38) which is to be fitted in the cabin frame, so that it is an easy fit in the recess in the frame. When everything fits correctly, apply glue to the joints and tape the frame to the fuselage.

Detail drawing A shows the plan view of the frame support on the fuselage, together with the cut-out for the support (39). Glue the two parts (39) together, and drill the 2.5 mm Ø hole at an angle as shown. This will be enlarged to 3 mm Ø later.

Glue the canopy latch (40) to a piece of 3 mm plywood using Stabilit Express as shown in Detail A, and glue this assembly in the fuselage using thickened resin. The latch (40) must be positioned in such a way that the support (39) disengages reliably. Open up the hole in part (39) gradually and lock it in place on the fuselage. Align the cabin frame on the fuselage. Check the location of the joint relative to part (39), and sand back gradually until the frame is located perfectly. Glue the parts together carefully, and tape the frame to the fuselage again.

Carefully cut out and trim the canopy, leaving it as long as possible at the rear. A balsa plane (razor plane) set to a fine cut works very well for trimming the plastic. Hold the blade at an angle to the edge of the moulding for best results. There is a bulge in the joint area of the cabin frame, and this must be removed if the frame and canopy are to fit well - see also the "cabin frame" detail drawing on the plan. Either trim it using a sharp file or scrape it back using a stiff knife blade.

The frame should be painted before the canopy is glued to it, but take care not to paint the joint surface. Mask out the fuselage carefully to prevent it sticking to the canopy. Place the cabin frame on the fuselage, align it carefully, and fix it temporarily to the fuselage. We strongly recommend Bison plastic cement, Order No. 7646/42, for gluing the canopy to the frame. The glued joint is extremely

long, so please work quickly to avoid the glue hardening prematurely. Place the canopy in position and tape it securely to the fuselage.

The method of assembling the cockpit fittings is self-explanatory. The assembly should be fitted into the fuselage at an angle, then pushed back as far to the rear as possible (mind the servos!); set it horizontal, then slide it forward.

The wing roots feature accurately cut holes to accept the joiner rod sleeves (43). Integral ribs are fitted to distribute the joiner loads; these transfer the forces to the wing skins, which are reinforced with glass cloth on the inside. A small bottle of PU adhesive is supplied in the kit for fixing the joiner sleeves.

First roughen the surface of the sleeves (43) and seal one end of each: butt a piece of 2 mm plywood against the end, glue with cyano, then sand off the excess wood. Cut down the incidence pegs (45) to a length of around 25 mm, remove rough edges and glue them in the root ribs, projecting by about 10 mm. The model can now be assembled "dry": fit the wing joiner in the fuselage and slide the joiner sleeves (43) on it, followed by the wings. The plan shows the correct dihedral; pack up the wingtips to achieve this. Check that the wing roots are a snug fit (no gaps) against the fuselage.

Before gluing the sleeves in the wings, it is vital to protect the components from soiling by excess glue. The PU adhesive is very difficult to remove when set - even from GRP. The next stage will take at least one hour, as you will need to check the structure very carefully while the glue is hardening - see below.

Apply a thin layer of Vaseline to the wing joiner rod and fit it in the fuselage. Cut a piece of 5-6 mm Ø wooden dowel at least 250 mm long, and use this as a tool to apply the PU adhesive to the inside of the sockets in the wings - be sure to apply glue to the whole inside surface! Apply a light coating of adhesive to the joiner rod sleeve (43) and slide it onto the wing joiner. Carefully slide the wing onto the sleeve, removing the excess adhesive as it is squeezed out at the root rib. Once both wings are in place, fix them to the fuselage securely using adhesive tape. This is essential, as the PU adhesive foams when curing, and this could push the wings away from the fuselage. Set the correct dihedral and secure the whole model so that it cannot move.

The pot life of the PU adhesive is around 30-45 minutes, depending on how it is used. First it assumes a honey-like consistency, then it starts to foam under the effect of humidity, i.e. the volume increases. At 20°C it hardens in 2 hours, but it takes 24 hours to reach full strength. This means: leave the model packed up and secured overnight. When the adhesive has cured completely, dismantle the model again and clean off any soiling.

The wings should be given a final overall sanding using a straight sanding block fitted with new 220-grit abrasive paper. The kit includes three templates for the leading edge (root, centre, tip), which make the task easier. The trailing edge should also be sanded - from both sides. Glue the wingtips (46) in place in their raw form, then plane and sand to shape. View "Y" shows the final shape.

Mark the position of the horns (49) on the ailerons and drill 5 mm Ø holes for them. Remove about 10 mm of the aileron lining strip, and scrape out a little foam. The cavity is then filled with resin thickened with micro-balloons, which surrounds and supports the horn spigot. Roughen the spigot before gluing.

Glue the ply base plates (48) in the servo wells, again using resin and micro-balloons. The plan shows a suggested aileron servo installation. Pre-formed threaded pushrods (50) and clevises (51) are supplied for the airbrake linkage. The two servos should be assigned to separate channels - we don't recommend using a Y-lead.

The tailplane panels (53) are fixed to their pivot rods by means of grubscrews (55), which engage in the recesses in the tail panel retainers (7). The panels are already pre-drilled to accept the threaded sleeves (54). Remove a little foam, and glue the sleeves in place using thickened resin.

The counterbalance weights (58) are simply screwed into the sleeves (57) for flying, and are thus removable for transport. Caution: the sleeve is only threaded M2 at the end with the cross-hole. Seal the holes (including the end-hole) with thickened resin, roughen the sleeve and let it into the tail panel tip. Note that the plan shows it glued into the panel itself, i.e. into the foam core. Carefully sand the

panels overall and check that they move freely.

We recommend the use of heat-seal adhesive to ensure that bubbles do not form under the covering film. Attach the ailerons to the wings using hinge tape. If you wish to paint the GRP components, sand the surfaces carefully beforehand with 400-grit wet-and-dry paper, used wet.

For the first flights we recommend the following control surface travels:

- Ailerons 12 mm up, about 4 mm down
- Elevator +/- 6-7 mm, 50% exponential, for safety's sake also Dual Rates with increased travel
- Rudder +/- 5-6 mm; you may find differential travel effective: a rudder command, e.g. left, causes the left panel to deflect about 1-1.5 mm less than the right panel. The optimum setting will vary according to your piloting style.
- Centre of Gravity - for the first flight use the setting shown on the plan - 90 mm.

We hope you enjoy many hours of pleasure flying your new model. Happy landings!

Parts list

Part No.	Description	No. off	Material	Dimensions in mm, Order No.
1	Fuselage	1	GRP	Ready made 1125/02
2	Skid	1	Lime	Strip, 10 x 10 x 100 mm
3	Former	1	Plywood	3 mm, die-cut
4	Former	1	Plywood	3 mm, die-cut
5	Tail pivot support	1	Aluminium	Ready made
6	Tail pivot rod	2	Steel	4 Ø, length 98 mm
7	Tail panel retainer	2	Aluminium	Ready made
8	Captive nut	1	Steel	M3, ready made 7766/33
9	Screw	1	Steel	M3 x 20 mm 7775/20
10	Spacer tube	1+2	Brass	4 Ø, 1 x 2 mm, 2 x 18 mm
11	Washer	1	Brass	9 Ø / 4.3 Ø x 0.8 7780/09
12	Washer	9	Brass	7 Ø / 3.2 Ø x 0.5 mm 7780/08
13	Tailwheel leg	1	Steel	Ready made 7358/23
14	Tailwheel	1	Alum./rubber	Ready made 7361/22
15	Countersunk screw	2	Steel	M3 x 30 mm
16	Nut	2	Steel	M3 7774/03
17	Outrigger	1	Plywood	3 mm, die-cut
18	Outrigger	1	Plywood	3 mm, die-cut
19	Base plate	1	Plywood	3 mm, die-cut
20	Bellcrank	1+1	Aluminium	L+R, ready made
21	Tailskid support	1	Plywood	5 x 10, 40 mm long
22	Plate	1	Aluminium	2 x 8, 20 mm long
23	Self-tapping screw	1	Steel	2.9 Ø x 16 mm
24	Fuselage tail cap	1	GRP	Ready made 1125/03
25	Snake outer	1	Plastic	3 Ø / 2 Ø, length as plan
26	V-tail actuator	2	GRP	2 Ø, 1000 mm long
27	Threaded coupler, plain	4	Chromed steel	M2 / 2 Ø
28	Nut	6	Brass	M2 7773/02
29	Clevis	6	Chromed steel	M2 7489/01
30	Servo plate	2	Plywood	3 mm, die-cut
31	Servo plate support	4	Plywood	3 mm, die-cut
32	Dowel	1	Beech	8 mm Ø, as plan
33	Wing joiner sleeve, fuselage	1	Brass	14 Ø / 12 Ø x 148 mm
34	Cockpit floor	1	Plastic	Ready made
35	Backrest	1	Plastic	Ready made
36	Instrument panel	1	Plastic	Ready made

37	Cabin frame	1	Plastic	Ready made	
38	Dowel	1	Beech	3 Ø x 48 mm	
39	Support	2	Plywood	3 mm, die-cut	
40	Canopy latch	1	Brass/steel	Ready made	7329/00
41	Canopy	1	Plastic	Ready made	1125/04
42	Wing panel	1+1	Foam/obechi	Ready made	1125/05
43	Wing joiner sleeve, wing	2	Brass	14 Ø x 12 Ø, 155 mm long	
44	Wing joiner rod	1	Steel	12 mm Ø	
45	Incidence peg	2	Steel rod	4 Ø x 50 mm	
46	Wingtip block	2	Balsa	16 x 45 x 135 mm	
47	Airbrake	2	Alum./plastic	Ready made	7329/45
48	Base plate	4	Plywood	1 mm, die-cut	
49	Aileron horn	2	Aluminium	Ready made	7491/05
50	Threaded rod	6	Plated steel	M2 x 200	7488/04
51	Clevis	2	Plastic	Ready made	7489/03
52	Wing retainer	1	Steel/plastic	Ready made	7329/55
53	All-moving tail panel	2	Foam/balsa	Ready made	1125/09
54	Threaded sleeve	2	Brass	Ready made	
55	Grubscrew	2	Steel	M3 x 4 mm	
56	Pin	2	Steel	2 Ø x 20 mm	
57	Horn	2	Chromed steel	Ready made	7491/06
58	Tailplane counterbalance	2	Brass	Ready made	
59	Servo well cover	1+1	Plastic	Ready made	
60	In-fill piece	1	Balsa	2.5 mm, as plan	
61	Self-tapping screw	8	Chromed steel	2.2 x 6.5 mm	7768/21
62	Plan	1			
63	Building instructions	1			
64	Decal sheet	2			
65	PU adhesive	1			
66	Tip block	2+2			
S1-S3	Airfoil template		Plywood	3 mm, die-cut	
	Binding wire		Plated iron	Not included	
	Hinge tape		Plastic	Not included	