Assembly Instructions **" aero naut" model construction**
RC Electro Glider " Starfly " **Part number. 1321/00**

Technical data:

Span	approx. 2500mm
length	approx. 1135mm
Wing area	approx. 46,95dm2
Tail area	approx. 6,40dm2
Total Surface area	approx. 53,35dm2
Wing profile	SD 3021 of 9,5 to 8% profile
Geometrical aspect ratio	13,30.
Flying weight with 8 cells 1.7 ah	approx. 1730-1800 g
Wing Surface loading	approx. 36,8-38,3g/dm2
Total Surface Load weight 1730-1800g	approx. 32,4-33,7g/dm2

RC functions:
Elevator
rudder
motor speed control
Airbrake (Optional)

Spare parts:
GfK fuselage, part number. 1321/02
ABS canopy, part number. 1321/04

Recommended drives:
Johnson 6421-7,2V with gearbox 2,85:1 part.-number. 7120/23
Folding Propeller. 13,5x7 " part number. 7230/60 or 7233/60
Electronic speed controller or switch of 30Amp size

Design philosophy with the development of " Starfly " sailplane was for maximum output and good climbing performance while in powered flight . With 2500 mm span the model still remains visibe even on greater distances (and heights), which opens new flight experiences. We recommend adding the spoilers as explained in the structural drawing.

The aerodynamic design of the wing was derived from the "Panafly 400-G" which has a 9.5 to 8%. SD 3021 wing profile. Complete natural stability for circling, very good pentration, excellent en-route flight.
Powered flight tests using the drive combination optimized by us ensures engine run time of approx. 6 min.

Adhesives:
Some weight can be saved by selection of the correct adhesive.
Use Cyanoacrylate (from here on referred as cyano) where possible, thin or thick viscosity. The thin viscosity penetrates into the wood structure and reinforces it substantially. Balsa may be pressed (laminated) together, or stuck edge to edge. A supply of humid or damp air (e.g. breathing air) accelerates the adhesion.
Caution: Cyanoacrylate superglues are dangerous! Do not inhale vapour - ensure sufficient ventilation! Note the instructions on the packing!

Polyester Laminating Resin (fibreglass resin + catalyst) is used building this model. It is better than fast setting epoxy glue as it requires less adhesive for a strong join (= less weight). Laminating Resin penetrates well, gluing into the smallest joints. For some work epoxy should be thickened with thixotropiermittel so it can be laid directly on and will not flow away. These products may be obtained from good model suppliers.

Sanding:
While the fuselage is epoxy the rest of the model is created from balsa wood, therefore sanding has special importance. Sanding-blocks fitted with fresh sandpaper are necessary for accurate building of the model! Two sandings are required with (280 x 50 x 20mm and 230 x 25 x 20 mm), please check that they are done absolutely level. If necessary, while working on a corner or bend sandpaper it twice. Stick the sandpaper

strips to the bar with thin, double-sided tape (e.g. tape for carpets. A sheet with a middle (approx. 100 to 150 grade) is recommended, together with another more fine (approx. 240) grit sheet.
Sand sections made from thin balsa wood more gradually (e.g. the two-piece trailing edge) press down on the building board and chamfer for grain. Substantial sections or parts structures (vertical stabiliser fin) may also be sanded freehand. A more exact finish is achieved from the sanding bar in almost in all situations. With the sanding bar, the small building inaccuracies present are removed by continuously smoothing to a flat or evenly curved finish.
These are available in most model shops; many types have self-adhesive paper strip of different grits. Advantages are a very sharp abrasive with long life span; dust does not clog them. They sand evenly and quickly and are also good for use with harder woods.

Preparation for Building:
The pre-cut balsa and wood part sheets are shown reduced at the end of these building instructions. On the basis of this illustration write part numbers on the components with soft pencil. Then separate the components with a balsa knife from the pre-cut sheets. Cut out the plywood sections. Sand or adapt all component sections before installation in the model. Use a level (flat) building board for construction. Deviations from the assembly sequence set out in these assembly instructions may be made on your own discretion, but exercise care in this case!
For constant reference: use building instructions, together with building stage photos, parts list, plans showing engine with gearbox, servos, receiver, speed controller and flight NiCd battery packs.
Mini or the larger micro size servos and a small receiver are appropriate for this model.

Fuselage - tail assembly
First we want to complete the fuselage. With a sanding bar smooth all rough edges to the fuselage exactly according to size in plan / plan view. This is to achieve a gap-free fuselage edge join later. Cleanly prepare the inside profile of the whole fuselage.
Note a marking in front. Here shorten the fuselage with a fine saw blade approx. 1 mm of the marking, deburr. Drill out with 2,2mm the exits for bowden cables (in the back), chamfer with smaller round file in such a way, so that the bowden cables can leave the fuselage briskly, without catching or tightness. An opening train (withdrawal of guide tube (8).
If the fuselage is to be painted later, it can be sanded ready now with wet 400-grade sandpaper. A matt surface ensures a good adhesion of lacquer/paint.

Fit heading frame (2) according to plan into the fuselage, it is not flush to the front edge, but is actually 2mm to the rear.
Caution! The wood can be deformed slightly by humidity differences in storage! This is not harmful as construction holds all parts in the correct place. Pay attention to the symetrical form here!
Motor plate (3) into the fuselage fitting in it runs parallel to the fuselage edges in the cab area. Engine also. install transmission with M3x10screws, begin trial fit into the fuselage (and heading frame). Driver with installed shaft onto the wave shift and check that everything sits correctly. Now stick the nuts/washers with stabilit express/epoxy. Make two drillings approx. 0 6mm into the (3) for the inlets to the engine according to plan. If the engine is inserted, still workstation for the switch remains on the (3). Now two cuts konnen of (4) crosswise, from down to be glued on, see fuselage side view.
Finally align heading frame (2) in the fuselage (the slot for the (3) horizontally!), tack/reinforce with thin cyano, bond later with laminating resin. Later reinforce with fillets of thickened lam. resin. Motor plate (3), align, bond just as thoroughly.
Transfer position of the frames (5) to the fuselage. Now the (5) must be adapted for exact fit in the fuselage, best done as follows: with the help of a round balsa ca.5mm dowel (stick together with (5)) insert the frame into the fuselage and check, where the fuselage-touches, remove, sand and repeat until frame fits snug on the place intended, without wedging. Drill 2mm for the bowden cables (7), 3mm for antenna guide (8).
In the plan a suggested arrangement of the bowden cable pipes is shown. Using this pattern bond bowden cables into (5) with thin cyano. The idea is to be able to insert the bowden cables successively into the outlet openings in the fuselage, one by one. Therefore they are not the same length, but are cut approx. 15mm gradated in length.
Insert steel wires (9) successively from the rear in appropriate executions and bowden cable pipes, i.e. e.g.: rudder bowden cable rudder, elevator on the right of bowden cable elevator. On the right, etc.. Be certain that the steel wires run next to each other in the fuselage and do not cross over! Once all steel wires are inserted (they then serve as guides of the respective bowden steel wires into correct places),. Slide frame (5) by the bowden cable bundles into the fuselage. As the first (8) come to place. Help it through from above with a tweezers, continue on with frame (5). In this way draw in all bowden cables (7) so far, until the

position intended is achieved in (5) in the fuselage. It should touch the fuselage wall with a perfect fit. Otherwise there will be " embossments " on the fuselage outside surface!
Tack frame (5) in the fuselage a few drop laminating resin (introduce with a long strip). It does not have to be heavily bonded -it only supports the bowden cables from flexing. In the back trim away the protruding bowden cables with a sharp blade flush to the fuselage surface, sticking with thin cyano to fuselage. Fill if necessary.
FIG. 1 shows, how to put in frame (6). Put upper (13) into (6) in the area of the wing mounting plate as required. The front end of (13) rests upon the epoxy fuselage bowl. Sand this place with a sanding bar, so that (13) is as high as possible here. Thus the inclination of the nicad ejector ramp is set. Fix frame (11) above that the recess for the upper (13) also meets with (13) and tack in fuselage with thin cyano. Trial fit both (13) for good nicad accommodation as check of accuracy. Remove upper (13), so that half frame (10) can be fit in and bonded. Now bond upper (13). Fig. 2.
The control units are 8 mm thick, all components must be right-angled for good in, otherwise there are joints when sticking. A small Dremel sanding tool is helpful here.
Here are a few tips for the assembly of the tail. Catch on with the trailing edge(14), directly on the plan covered with clear foil. If it is finished, into which sheet(16) train suitable keilformige recess, shorten in front after plan, bond. The front wedge is likewise to be made from (16). Chamfer leading edge fix wing tip edge, bond. Fit in and bond only then the bars from (15). The structure is drying, from the building board decreases, chamfer to plan view.
Attach rudders by means of pins to the fin, so that to the rudders will transfer the roundness of the Randbogen can. Make 3 mm drillings for the control horn (18) with sharp drill, run in a few drop thin cyano, leave. Drill out after hardening.
Roll metal control horns on a hard surface with a sharp file put against it to roughen it up for later sticking. The control units should be inserted only later, only if finished and at the fuselage installs the wing center sections. are (because of aligning).

Wing Centre Sections

The next building takes place directly on the plan (cover with a film from glue). Main spar (20) ends at the outside rib of ribs (26) see cross section cut J-J, sand other end according to detail in the plan. The same applies to the false spar (21). CARE you must make one left and one right part! See cross section cut K-K. Aufbeide of spars thoroughly glue on from down a pine strip (22). Weigh this down so that the spars remain level while drying! Fix part (23), likewise, false spar (21+22) with balsa 1.5 been subject to skin (24). rotect main spar with pins, provide for an even discharge! Cuts in the spar do not have to correspond exactly with the plan because of printing/paper inaccuracies!
Fit ribs (27) into both spars, ensure that they reach the lower edge of the spar! Stick ribs with 2-3 drops thin cyano on trailing edge (23). Drill out ribs (26) with a sharp 7 mm drill. Stick ribs (26) on the trailing edge, fix strip (33) on the ribs with pins, lower edge flush! Stick with thin cyano. Align internal and outside ribs by means of templates. Use both strips (22),ensuring they follow the profile exactly. Again decrease and stick with white glue. Now thin cyano all ribs to the spars. Remove structure from the board. Stick splices after with diluted white glue -. From position (25) rectangular skin sections adapt (bypass all three (26) and two extreme (27) with the trailing edge). These sections ensure the rectangular shape of the center section. Strip (33) from down the sand after profile and glue the lower skin on (24).
Assemble both center sections up to this stage, so that the upper trailing edges (23) can be glued on at the same time. Here one operates with thickened laminating resin and both center sections harden at the same time! Fix (23) thoroughly to the building board using both auxiliary strips 5x10 and 5x5 mm!
Now the 6 mm drillings in the ribs (26) must be increased on 7 mm, either with a drill, or with a round file. Fit brass tubes (they do not necessarily have to sit gap-free), afterwards connecting pins in (29), second center section to put in. Check both wing sections fit correct (trailing edge, profile, front parts) and are not rotated. Everything, with waste balsa after cut J-J aufflittern, protect tunes tubes with thin cyano and bond with thickened laminating resin. At the same time fit in and bond blocks (31) and (32). After hardening to glue on upper skin (24) refer to cut H-H
Spoilers are our suggestion, this is the time for the installation of the servos, examine the plan on (center section plan view, cross section cut H-H, and FIGs. 6-9 and 11. Servos are equipped with servo arm (grub screw) adjustable clamp links, placed in position they run synchronously over a " V"-cable.
When installation work is done, the skins from down and above can be vervollstfindigt (also the cap strips (57). Glue to leading edge (34), afterwards the termination rib (35).
Make spoilers from hard 1.5 mm balsa, which fit into recesses. From 2 mm approx. 5 mm broad balsa strip adapt and reinforce from down the flap - see FIG.11 Make an epoxy plate approx. 1.5 mm thick after cross section cut H-H lever, instal with thin cyano. The flaps should be stabilized from down with laminating resin. Make control linkages from 0.8 mm steel wire see cross section cut H-H , mount in control horn inserted in flap, put steel wire through apertureand into the adjustable servo link.

Final assembly during the covering is effected with film see later.
Thoroughly sand the trailing edge to 1 mm thick (and even). Treat with diluted surface primer, finish with 400 sandpaper.

Wing Mounts

Plug center sections together, place at the fuselage and hold in place (best with the help of an extra two hands!). The fuselage is already provided with two 5 mm drillings which serve for a guide when boring the holes into the surface. See in addition cut G-G, or fuselage side view. Use a small, not too "thick" drill bit for boring. Trim pegs (36), bond, wing again on the fuselage. Position of the drillings for the nylon screws determine and make drillings 0 4 mm. See also cut G-G (axle of the drilling right-angled to the surface). Drillings in the surface on approx. drill out 5.1-5.5 mm, reinforce with thin cyano. Cut M5 thread into the fuselage, reinforce thinly with cyano, re-cut after hardening. Fasten wing at the fuselage, with it the linings (38) to be fit in and can be stuck together -see FIG.10.
If the surface is installed, the vertical stabilizer can be fit in into the fuselage and bonded with laminating resin. Make sure that the slot for the horizontal stabilizer is situated parallel to the upper edge epoxy bowl. This corresponds to a EWD wing incidence angle of +3,5°! Correct / fill transition as required with high-speed putty, resand. The fin should be covered and painted with fuselage see FIGs. 4 and 5.
First process canopy (39) in two phases to fit in into the fuselage. When it sits perfectly in the fuselage, install surface on the fuselage and the " tongue" sand/chamfer incrementally, until it is fully on the surface. Open up air cooling inlets and outlets. From brass wire 0.8 mm, make two hooks according to plan, attach with cyano thinly on the motor plate (3) and canopy, with stabilit express

Wing Outer Sections

Wing outer parts are assembled exactly the same as the center sections.
Sand/chamfer main spar (40) again according to detail, the spar ends at rib (50). Fit wing structure as already done.
When framework is finished, lay complete lower skin down on the plan, add cap strips (57). Underlay trailing edge with a 5x5 mm strip (upper trailing edge (41) is already stuck), press wing in front on the building board, press down, fix with pins. Insert auxiliary trapezoid strip 3x12 mm from the front - this stands up the structure from the board and the skin can fix onto the framework. These supports insert the washout twist of the outer wing, which is "fixed in" by gluing on "D-box" top skin (58). At the same time fit in and glue cap strips (57). Glue to leading edge (34), sand/chamfer to match the cross section profiles in the plan.
Stick wing tip edges (55) with trailing edge reinforcements (56), note the end profile and sand/chamfer accordingly before gluing on. If one wants to have the trailing edge still fixed, the (56) from down a strip plywood 0.5-0.8 mm is glued on. Only then glue, leave to dry thoroughly. Now sand the outer parts. Pay attention to the exact seat to the center sections (as gap-free as possible) and agreement of the profiles in the new join.
Important! In the plan reinforcements (37) are drawn in in the wing-break area. One may easily omit these. If they are inserted, approx. 15 mm broad sections of the upper skins (around the main spar) must be removed carefully to give them a god fit. With a fine saw blade (cut approx 1 mm wide) saw through end ribs up to the lower skin. Put in (37) with glue, fix with clothes pegs to the spar and seal up later.
Now make the dihedral "V"-form of the outer parts by a Anstuetzung see detail in the plan. Since the wing sections are stuck with thickened laminating resin, skins should be protected -. in this area. The range (end profile) of both sections with adhesive masking tape, cut off excess tape with a sharp blade. Cover building board with a film at the gluing area area, placecenter section, align, fix down to the board.
With thixotropierrnittel thickened laminating resin provide the end rib of the outer part (evt1. also link (37) main spar) press in slightly and on the center section thoroughly. Wipe unnecessary resin away, check the profiles, align, pin in place. Clean splice (tape) with a damp tissue. Leave over night at 20°C to harden!
Take the protecting tape off after hardening, check the whole splice, sand/chamfer. It should pipe here give, correct directly with laminating resin.
Caution! Check once again the **EWD wing incidence angle**, is correct. Fine tune everything, cover horizontal stabilizer. For the gluing with fin first remove the covering film from the fin the fuselage bonding area! A bonding effected with highly liquid laminating resin to the best mixed resin warmed up (to 40°)" it becomes water thin and pushes nicely into the smallest joints! Install the fin at the fuselage, align, fix fin with pins until hard. Cover elevators, free openings for the rudder horns with a sharp balsa knife. Detail in the plan shows how the rudders are to be fastened by means of hinge strip. Insert steel wires (9) into the fuselage, afterwards continue wire into control horns. Determine the best location of horn cross hole with the help of the wires. Control horns get over approx. above 0,5 mm! They are bonded by thin cyano.
Screws M2 for RC system installation needs no comment, only one tip, as the receiver antenna is to be drawn (8) into the guidance. Insert, around end of the antenna several times spiral tape binding wire from the rear. Put when drawing in into the guidance the end of antenna with tweezers into the opening and in the back binding wire take off. Protect end of the antenna at the fuselage with tape.

With somewhat smaller temperature iron-up air brake with covering film. The flap will thereby bend itself upward. After ironing bend downward with something, so it remains even. First apply the covering top side center section, open the opening for air brake with a fresh blade, iron edges after. Flap from above z. T. begin, thereby the control wire into the front, narrow opening (down) to press leaves itself. Put end of the wire into servo arm link, bring flap fully into the closed position. In front stick on full length hinge strip. With switched on radio transmitter lock the control wire in the servo arm link with a grub screw. Make a functional test of both flaps in all intermediate positions

Covering

Now the structure of the model is terminated, next is the covering. Fuselage with Seitenflossse, possibly also rudder should be painted. FIG.5 shows the treated vertical stabilizer covered with paper and with shrink/sealing laquer. Wet sanding with a 400-er sandpaper provides a clean "key" for the paint. Install rudder with hinge tape. See detail in the plan (elbow 2). Check that the horizontal stabilizer slides cleanly into it's slot.

Surface finished bebuegeln. At the building board verify that both wing tips have the same washout twisting, (trailing edge is raised the same on each side at the tip, and that center sections are even! A distortion-free wing and control unit are essential!

Centre of Gravity

Assemble the model, locating centre of gravity after plan by varying the position of nicads. Remove nicad, marking it's position, glue a cell-size piece of india rubber in the back, to secure the rear position of nicad. The nicad pack is secured in front also by a piece of india rubber. This must be oversize and wedge in frame (11).

RC

As optimal control movements are : elevator approx: 8-10 mm, rudder as much as possible.

Deploying the spoilers in flight causes top-heaviness, so you can adjust this away easily by mixing in approx. 2-2.5 mm of elevators. With " freshly charged " nicad you must a slight allowance with elevator after launch make otherwise the model wants to climb too steeply and can thereby lose forward speed. A speed controller works better than a switch.

We don't have special comments regarding flight of "Starfly", the model is completely problem-free to control. However - the rudder effect too kept must have it something travel! Particularly with the approach flights importantly. A recommendation: practice descent maneuvers first in locations where the model is highly visible! Only then can you bring the model reliably from any height!

We wish you many happy flights with the " Starfly " and safe landings!

Aero-naut Model Construction

Parts list..Starfly **Part number. 1321/00**

Part	Description	No.	material	dimension in mm.
1	fuselage	I	epoxy	finished unit
2	heading frame	I	plywood	3 mm; Pre-cut
3	motor plate	I	plywood	3 mm; Pre-cut
4	strip	I	lime tree	6x6 mm, n.Z.
5	frame	I	plywood	3 mm pre-cut
6	frame	I	plywood	3 mm; Punch-hurry.
7	bowden cable interior pipe	3	plastic	02,0/1,0 mm; n.Z.
8	bowden cable external	I	plastic	03.0/2.0 mm; n.Z.
9	steel wire	3	steel	00.6 mm; n.Z.
10	half frame	I	plywood	3 mm; Punch-hurry.
11	frame	I	plywood	3 mm; Punch-hurry
12	wing mounting plate		beech	8x12 mm; n.Z.
13	Nicad guide	2	plywood	225x25x3 mm " of ' cm
14	strip		Balsa	8x12 mm; n.Z. '." '
15	strip		Balsa	5x8 mm; n.Z. ~
16	sheet		Balsa	8x30 mm; n.Z. ~
17	rudders	I	Balsa	240x80128x8 mm!J:ef-
18	rudder horn	3	Brass	03x20 mm r;b~b
19	elevators	2	Balsa	265x46/24x8 mm ~

20	main spar interior	2	Balsa	460x5x13 mm
21	false spar	2	Balsa	460x5x9 mm -, 2
22	Strip		pine	2x5 mm; n.Z.
23	trailing edge interior	4	Balsa	540x30xl, 5 mm of
24	skin	4	Balsa	530x50xl, 5 mm of
25	sheet		Balsa	100xl, 5 mm; n.Z. 2
6	rib	6	plywood	3 mm; Pre-cut
27	rib	16	Balsa	2 mm; Pre-cut
28	tubes	4	Brass	90x07,016,1 mm of
29	connecting pin	4	steel	finished unit
30	rib section	4	Balsa	2 mm; Pre-cut
31	block		Balsa	20x12 mm; n.Z.
32	block		Balsa	20x20 mm; n.Z.
33	strip		Balsa	3x8 mm;n.Z
34	ledge	4	Balsa	finished unit; n.Z.
35	end rib	2	plywood	3 mm; Pre-cut
36	round timber		beech	05 mm; n.Z.
37	links	4	plywood	0.8 mm; Pre-cut
38	lining	1+1	ABS plastic	I mm; Finished unit
39	canopy	I	ABS plastic	I mm; Finished unit
40	main spar outer part	2	Balsa	460x13/7x5 mm of
41	trailing edge outer part	4	Balsa	680x30xl, 5 mm of
42-54	rib ever	2	Balsa	2 mm; Pre-cut
55	wing tip edge	2	Balsa	finished unit
56	reinforcement		plywood	15x3 mm; n.Z.
57	cap strips		Balsa	6 x 1.5 mm; n.Z.
58	skin outer part	4	Balsa	670x50140xl, 5 mm;
Auxiliary strip trapezoid		2	Balsa	1100x3xl2
auxiliary strip trapezoid		3	Balsa	1000x5x5
auxiliary strip trapezoid		2	Balsa	1000x5x10,1

Small material -without Part. No..

Designation	**piece**	**material**	**dimension in mm**
rubber band	3	rubber	1x1 / 040 mm,
brass wire	1	brass	100x00,8 mm of
screw	4	steel	M3x10 mm of
nut/mother	4	steel	M3
nylon screw	2	nylon	M5x50 mm of
screw	3	brass	M2x18 mm
linkage link	2	steel	04.5 / 2x10 mm
grubscrew	2	steel	M3x3 mm of
pin spanners	1	steel	SW1,5 mm

n.Z. = after drawing. Appropriate dimensions are obtained from the structural drawing.

For the building the following articles, which are not contained in the component system, are needed:

	part number.
Ponal express	7638/09
UHU hard	7631/02
Pattex Stabilit express	7646/01
Pattex Superglue	7639/21
Pattex Superglue gel	7639n5 t
aero fixed primer surfacer	7666/02
aero fixed dilution	7675/05
hinge strip, plastic, width 19 mm	