

## Building Instructions

### Bü-133 Jungmeister

RC-Electric Flight Aircraft  
Part No. 1348/00



#### Specification

Wingspan	approx.1100 mm
Length	approx.1008 mm
Wing area	approx. 35,36 dm <sup>2</sup>
Tail area	approx. 5,39 dm <sup>2</sup>
Total surface area	approx. 41,04 dm <sup>2</sup>
All-up weight incl. 12 cells	approx. 2300 g
Wing loading (wing only)	approx. 64,55 g/dm <sup>2</sup>

#### RC functions:

- elevator
- aileron
- rudder
- motor speed

„aero-naut“ Modellbau  
Stuttgarterstr. 18-22  
D-72766 Reutlingen

<http://www.aero-naut.de>

© by „aero-naut“ Modellbau

The most appropriate power plant for our Bücker 133 is the **actro 12-5**, which provides plenty of power whilst allowing the model to fly at a slow scale speed. The full-size Bücker 133 is not a high-speed aircraft, so the model is best suited to a geared motor and 10 - 12 standard-size cells (1700 - 2400 mAh capacity).

An alternative and extremely useful power' plant is the Speed 600 Race 8.4 V with 3.54:1 gearbox and 12 cells. This motor has to be converted to left-hand rotation for use with our gearbox, but this is no problem with a little skill and the right tools.

The first step is to release the backplate, which is held on the motor can by two pressed-in lugs. Cut through the motor jacket on either side of the lugs using a small, high-speed grinder (e.g. Proxxon) and a miniature disc cutter, then make a third cut across the lugs to remove them. This action releases the backplate, and should be rotated to the right (opposite to the new direction of rotation) by about 12 - 13 mm. This dimension is measured at the periphery of the motor can.

To fix the backplate in its new position, cut new slits in the motor jacket using the same disc cutter, in line with the recesses in the backplate, and about 2 - 3 mm apart. This creates two new lugs which can be pressed carefully into the recesses using a vice.

We recommend fitting a soft steel flux ring to this motor; ensure that the gap in the ring is located centrally over one of the magnets! The flux ring improves the motor's efficiency and reduces current drain.

You will require an 13/11 mm Ø aluminium spacer ring to mate the motor to the gearbox. If you don't wish to convert the motor in this way, you will need to obtain a different type of gearbox which does not reverse the direction of rotation of the motor. The Reisenauer Micro-Edition 3.5:1 planetary gearbox is an excellent choice; be sure to order a mounting flange with an 11 mm Ø bore.

Another very good choice would probably be one of the Ultra 920 motor series, mated with a gearbox such as the Kruse Intro Gear 400 (internal-tooth gear) or Syncrogear 800 (toothed belt reducer). This combination should provide plenty of power even with only 10 cells.

Nowadays the cream of the crop is the brushless motor. These power plants offer tremendous potential performance, very high efficiency and very low weight. Companies such as Kruse, Kontronik and Reisenauer will be glad to advise you by telephone, and help with information on drive system components.

### **12-cell power system:**

<b>Speed 600 Race 8.4 V</b>	(+ flux ring	Order No. 7124/27)
Gearbox, consisting of:		
Motor mount "M" with gearbox housing		Order No. 7120/95 + 7120/99
Aluminium spacer ring, 11 Ø x 13 Ø x 3.5 mm		
3.54:1 gear set		Order No. 7120/74
Front ballrace, 1 off		Order No. 7821/51
Rear ballrace, 1 off		Order No. 7822/50
10.5 x 7" E-propeller		Order No. 7228/56 or 7229/56

**Caution:** the motor bulkhead has no sidethrust or downthrust, and the motor mount must be installed with 3<sup>rd</sup> downthrust and 3<sup>rd</sup> sidethrust. This is achieved by fitting 2.3 mm packing (three washers (87)) under the top and lower left mounting points (all directions as seen from the tail, looking forward).

<b>actro 12-5</b>	Order No. 7002/05
actronic 40-18	Order No. 7002/52
12 x 7" propeller	
actro GRP bulkhead with stand-off pillars	Order No. 7002/88

**Caution:** the motor bulkhead has no sidethrust or downthrust, and the **actro** motor must be installed with 3<sup>rd</sup> downthrust and 3<sup>rd</sup> sidethrust. This is achieved by fitting 2.3 mm packing (three washers (87)) under the top left stand-off pillar (all directions as seen from the tail, looking forward).

### **10-cell power system:**

<b>actro 12-4</b>	Order No. 7002/04
actronic 40-18	Order No. 7002/52
10.5 x 7" propeller	Order No. 7229/56
actro GRP bulkhead with stand-off pillars	Order No. 7002/88

**Caution:** the motor bulkhead has no sidethrust or downthrust, and the **actro** motor must be installed with 3° downthrust and 3° sidethrust. This is achieved by fitting 2.3 mm packing (three washers (87)) under the top left stand-off pillar (all directions as seen from the tail, looking forward).

Kontronik SUN 480.33 with 4.2:1 gearbox  
 11 x 6" propeller  
 Kontronik SUN 520-27 with 3.71:1 gearbox  
 12 x 8" propeller

It is also possible to install a power system based on a glowplug motor; details are left to the builder's discretion. A two-stroke of around 4.5 to 5 cc or a four-stroke of 5 to 6.5 cc would be a good choice. The ideal power plant would be our Saito FA 30, Order No. 7100/01 or 7100/02 with a 10 x 6" propeller, Order No. 7244/64 or 7241/60.

**Caution:** the motor bulkhead has no sidethrust or downthrust, and the motor must be installed with 3° downthrust and 3° sidethrust.

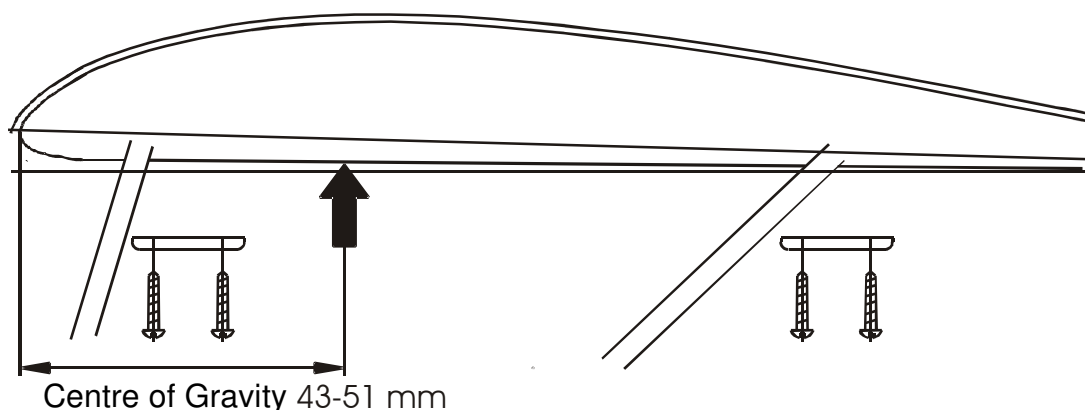
### **Preparations for construction:**

The building instructions include a reduced-scale drawing of the die-cut plywood sheets. Use this drawing to identify the components, and write the part numbers on them using a soft pencil. It is best to use a balsa knife to remove the components from the sheets. Trim all parts before fitting; many are slightly oversize to allow for this. You can deviate from the sequence of operations described in the building instructions if you wish, but do consider carefully, otherwise you might encounter problems later. During the construction process use the building instructions, parts list, motor and gearbox, servos, receiver and your selected battery as aids and reference points.

**Adhesives:** the wooden sub-assemblies are supplied factory-built and almost finished, but please note the following points regarding the use of laminating resin as an adhesive, which we strongly recommend. This material is fairly slow-setting, but it penetrates into the smallest gaps, and produces really strong joints. Remember that glued joints involving GRP parts will only be really sound if the surface is roughened beforehand by rubbing with abrasive paper. You will need to add a thixotropic filler to the resin for some joints, as this allows you to apply it in exactly the right place, without it running away from the joint! Laminating resin and fillers are available in any good model shop. The kit is highly pre-fabricated, but some building experience and manual skill are required to complete the model successfully.

### **Please note:**

Revised Centre of Gravity: 43-51 mm aft of the root leading edge of the bottom wing.



## **Wings and tail surfaces:**

The wing panels are supplied with their basic structure complete. Each wing consists of a left and right panel and a centre section. The joints are arranged in such a way that the root ribs of all the outboard panels are set at the same angle, which means that the top and bottom outer wing panels are interchangeable. The ribs feature pre-cut openings for the servo leads.

The ailerons have to be separated from all four outboard wing panels, as shown on the plan. We recommend the use of a fine fretsaw to cut the ailerons out. Shorten the ailerons by about 2 mm at both ends to allow for the thickness of the half-ribs (42). The end-gap between ailerons and wings should be about 1 mm wide.

Trim the wingtip components to fit neatly, fix them in place with a little cyano, and apply Ponal-Express along all the joints to reinforce them. When the glue has set hard, sand the wingtips smooth and flush using a sanding block. Cut the servo mounting plates from the 1 mm plywood (84) supplied, and install them as shown in the wing plan view and Section B-B. Glue 2 mm balsa sheet to the plates to stiffen them, and line the servo compartment with the same material. The plan view of the wing shows a suggested method of retaining the servos: cut two blocks from hardwood strip and glue them to the mounting plate; the servo is held in place by a strip of sheet aluminium, plywood or similar material about 8 mm wide, fixed with two screws.

Section B-B shows the servo / aileron linkage (bottom wing!). Drill a 3 mm Ø hole in the ailerons to accept the horns (72), and run a few drops of thin cyano into them to harden the material. Run the 3 mm Ø drill through the hole again when the glue has cured. The horns are fitted permanently at a later stage, when the model has been covered.

The top ailerons are actuated by means of the link pushrods (58), as shown in Section A-A. At this stage all you have to do is cut the slots in the ailerons to take the glue-fitting GRP horns (56). The horns (56) should be tacked in the slots with a drop of thin cyano, then the joints reinforced with laminating resin. Sand off the excess horn material on the top surface when the glue has cured.

Drill 3 mm Ø holes in the wings for the interplane struts as shown in the wing plan view. Push short pieces of plastic sleeve (30) through the bottom wing and glue them in place with thin cyano. See Section A-A here, which shows the wing strut guides. The threaded sleeves (30.1) are fitted later.

The next step is to join the wing panels, but before you do this the servo extension leads must be fitted. Be sure to use servo leads with integral suppressors, or twisted cables!

Cut two 12 mm Ø servo lead exit holes in the top sheeting of the bottom wing centre section. Tip: cut pieces of suitable cable duct material (e.g. drinking straws) about 200 mm long, and fit them in the centre section from both sides, to form a guide for the leads through the sheeted portion of the wing (including the outboard wing panels). Leave part of the cable ducts projecting; they are pushed into the outboard wing panels when the wings are joined. The servo leads can then be pulled through from the centre with the connectors already soldered on, and the servo leads can easily be soldered to the extension leads.

Join the wing panels using thickened laminating resin, and be sure to carry out this important stage over a perfectly flat building board! Apply strips of adhesive tape either side of all joints before applying the adhesive. The tape can be removed when the joint has cured, keeping the wood surfaces unscuffed, and making any cleaning up much easier. Protect the building board with plastic film over the joint area before gluing the parts together. Prepare two strips of wood 10 mm and 24 mm wide, and around 100 - 120 mm long. These set the correct dihedral.

Apply an even coating of thickened resin to the mating surfaces, slip the cable duct into the outboard panel, and press the parts together. Fit the appropriate packing pieces under the wingtips, and pin them down. Remove excess resin, and carefully fix the outboard panels to the building board and the centre section to ensure that the glued joints are 100% sound. Clean up the joints carefully with thinners on a piece of kitchen paper.

When the resin has cured completely, sand both wings smooth overall, taking particular care over the joint areas. Cut the curved opening in the top wing with the help of the template S2, which is shown on the plan, and round off the trailing edge as shown in Section C-C. Cut strips of tissue about 15-20 mm wide and glue them over all four wing joints using laminating resin as adhesive. Sand the tissue lightly when the glue is hard.

## **Fuselage**

Carefully remove any rough edges from the GRP fuselage (1) and motor cowl (2), and sand all joint areas thoroughly with abrasive paper to provide a "key" for the adhesive, i.e. at all points where the

die-cut parts are to be installed. Remove rough edges from the fin and tailplane slots, the bowden cable exit slots and the cockpit opening using a high-speed diamond cutter. Rub down the whole fuselage and cowl using 400-grit wet-and-dry paper, used wet, to ensure that the final painted finish adheres really well.

Glue together the tailskid mount (21), the motor bulkhead (4+5), the tail post (3) and the wing retainer plates (19) in pairs, using laminating resin to produce really strong joints. When the resin has cured, glue the tailskid mount (21) in the fuselage using thickened laminating resin. When the glue has set hard, apply thickened laminating resin all round the tailskid mount (21) to reinforce the joint. Mix up some extremely thick resin and apply it between the tailskid mount (21) and the fuselage sides to form fillets. When the resin has cured completely, drill a 2 mm Ø hole through the mount at right-angles to the fuselage bottom. Assemble the servo mounts, fit the rails (46), and install the servos in the mounts. Drill out the servo output arms to 2 mm Ø to accept the pushrod connectors (74), and install the connectors. You can now drill the 2 mm Ø hole in parts (44) to accept the bowden cables (28); don't do this earlier, as the holes must line up with the pushrod holes in the connectors (74).

You will find marked points on the half-formers (26) and (27); these are guide-holes for the bowden cables and should be drilled 2 mm Ø. Mark the position of parts (26) and (27) on the fuselage and tack them in place using cyano, then reinforce the joints with thickened resin. It is best to install the bowden cables (28) and (30) through the fuselage from the rear, threading them through parts (26), (27) and (44). Tack the bowden cables to the fuselage using thin cyano where they project at the tail end, then apply a fillet of thickened resin on the inside of the fuselage. Tack the receiver aerial tube (30) to the fuselage side using thin cyano, then apply resin at several points to hold it in place. When the resin has cured, carefully slice off the excess bowden cable outers using a sharp chisel, leaving them flush with the surface. Glue the already joined wing retainer plates (19) in the fuselage as shown on the plan; use thickened resin and take care to produce strong joints at this important location.

Mark the position of the holes for the wing dowels (63) on the fuselage as shown on the plan, and drill them 3 mm Ø. File out the holes to 4 mm Ø, and check that the dowels are an easy, sliding fit, without being sloppy.

Place the bottom wing on the fuselage, align it carefully and tape it in position, so that you can mark the position of the dowels (63) on the wing leading edge working through the holes you have just cut. Cut slots about 8-10 mm wide in the top wing skin at the dowel positions; the correct length is shown on the plan. Cut semi-circular channels in the top of the channeled rail (undercarriage support rail) to accept the wing dowels - see plan. With the fuselage seated on the wing, check that the dowels are correctly located. If everything looks right, apply a little thickened resin to the recesses in the channeled rail, press the dowels into place from above, position the wing carefully on the fuselage and secure it again. When the resin has set hard, remove the wing, apply more resin round the dowels in their seating, and fill the slots with scrap balsa.

Fit the wing on the fuselage, align it as accurately as possible, and mark the position of the two holes in the bottom wing centre section (49) on the fuselage, ideally using a 5 mm Ø drill bit. Drill the holes at the marked points using a 4 mm Ø drill, then cut the thread for the wing retainer screws using an M5 tap. Run a little thin cyano into the tapped holes, allow it to cure completely, then run the tap through the holes again to clean up the threads.

Drill 4 mm Ø holes in the cabane plates (6), and glue them in the fuselage using thickened resin; the holes in parts (6) must line up with the pilot-drilled holes in the fuselage. When the resin has set hard, file out the holes neatly so that the brass sleeves (7) can be slid easily into place, without requiring force. Cut two pieces 122 mm long from the brass tube (7). The next step is to roughen the surface of the tubes prior to gluing: place the tube on a hard surface, press a sharp, flat file on top and roll it to and fro. De-grease the tubes, tack them in place with a little thin cyano, then apply thickened resin on the inside of the joints on both sides.

Assemble the flight pack cradle and glue the joints with thin cyano before reinforcing them with laminating resin. Check that the lugs of the battery cradle engage neatly in the slots in the motor bulkhead.

The instrument panel (22) should be fixed to the fuselage using Velcro (hook-and-loop) tape so that it can be removed easily for battery replacement.

Sand the periphery of the motor bulkhead to match the taper of the fuselage, and drill the holes required for your selected motor mount. Place the bulkhead in the fuselage, position it as accurately as possible, and tack it in place with thin cyano. Apply laminating resin all round the periphery to form a really strong joint. We recommend that you reinforce the joint all round with a strip of glass tape about 15 - 20 mm wide.

### **Adjusting the top wing:**

The kit includes two die-cut jigs S1. Carefully cut out these parts and the triangular gussets using a balsa knife. It is important that the jigs should be flat; if they are not, glue scrap pieces of spruce strip to them to stiffen them.

Position the jigs S1 on the building board as shown on the plan. We recommend that you glue them in place temporarily with cyano, using the gussets to set them exactly at right-angles to the building board. Glue a scrap piece of 5 mm thick balsa or similar material centrally between them as shown - this forms the support for the bottom wing.

Place the model between the jigs, with the wing fitted inside them, and the wing trailing edges resting against the jigs S1. Pin the parts together. Check that the bottom wing rests squarely on the 5 mm support under the fuselage!

Sand the joint areas of the cabane struts (9), (10) and (11) with abrasive paper prior to soldering. Take care! Parts (9) and (10) are supplied in the kit as handed pairs, i.e. one left, one right: see fuselage plan view. This means that you must select the correct part (11) for each side of the cabane assembly, as the angled ends of parts (11) are not identical. Locate the end with the tighter bend, and bind it tightly to the rear cabane strut (10) using soft wire. Solder the joints carefully, noting that part (11) must be at right-angles to the angled bottom end of part (10) when viewed from above or below.

Cut down the wing retainer screws (61) to a length of about 10 mm, and screw the cabane struts (9) and (10+11) to the right wing panel as shown on the plan (note position of screw loops). Now fit parts (9) and (10+11) in the brass tubes (7) which are already installed in the fuselage, align the top wing with the jigs S1, and pin it in place with the trailing edge resting against the jigs. The left-hand parts (9) and (10+11) can now be fitted. Adjust the cabane struts (11) if necessary, bind the joints tightly with soft wire, and solder them securely. The top wing should now be set at an angle of incidence of  $-0.5^\circ$  to  $-1.0^\circ$  relative to the building board (= underside of bottom wing). If corrections are required at a later stage, this can be done by placing packing washers on the cabane screw loops. Before gluing the cabane assembly permanently to the fuselage, attach the strut fairings (13) to the wire parts, cover the surfaces with tissue and apply sanding sealer. Remove the top wing, file notches in those parts of the cabane which project into the fuselage, then roughen and de-grease the parts, including the inside of the brass tubes. Glue the cabane to parts (7) using laminating resin; fit the top wing, fix the model in the jigs S1 as before, and leave it there until the resin has cured.

The wing struts (54) consist of steel rods with an M2 thread at both ends. The length of the straight section, i.e. between the top and bottom angles, is best found by taking direct measurements while the model is still set up in the jigs S1. Fit two washers (55) on each wire strut and insert the struts in the wings. Position the washers resting against the wing surface and solder them to the wires, after protecting the wood with scrap paper or similar. Secure the bottom end of the struts with the washers (55) and M2 self-locking nuts (86). We recommend that you glue at least one half of the strut fairings (13) to the struts with cyano at this point. Mark the struts before removing them, to avoid mixing them up later.

Undo and remove the top wing from the cabane, roughen the outside of the threaded sleeves (30.1), and screw them on the top end of the struts as far as the soldered-on washers. Run a little laminating resin into the 3 mm  $\varnothing$  holes in the top wing and fit the model in the jigs S1 again. Place the top wing on the threaded sleeves, and screw the wing to the cabane assembly.

Temporarily attach the ailerons to the wings. Assemble the link pushrods for the top ailerons using parts (57-60), as shown in Section A-A.

The top wing is removed as follows: first undo the four M2 nuts; of course, the top end of the struts is now screwed to the wing. Unscrew the struts, glue the second half of the fairings to them, and sand them to the correct profile. We recommend that you tissue-cover the strut fairings and seal the surfaces.

Place the undercarriage legs (31) and (32) in the fuselage channels as shown on the plan, and fit the straps (17) to secure them. Attach the undercarriage cross-piece (15) to the legs, bind the joints tightly with soft wire, and solder the joints. It is important that the wheels should have around  $2^\circ$  toe-in per side, as this improves the straight-running characteristics of the model considerably. Place the fuselage on the building board without the wheels, and hold a straight edge (steel rod or similar) against the front of the wheel axles. The outside end of the axles should touch the straight edge, and form a curved gap towards the fuselage centreline. If necessary, adjust the angle of the axles until this is the case. Remove the undercarriage and solder the top brace (14) to the assembly as shown on the plan. Carefully trim the undercarriage fairings (38) to fit and glue them to the legs using Stabilit-Express. Any gaps can be made good using polyester filler paste. The wheels (33) are designed for 4 mm  $\varnothing$  axles, so for this model a 4/3 mm  $\varnothing$  brass reducer sleeve (34) must be pushed into each wheel.

Check that the wheels are absolutely free to spin, with very little axial play. A drop of thin oil will lubricate the wheels effectively.

Roughen up the top section of the tailskid (66), file notches in it, and de-grease the surface. Solder the top washer (55) in place before gluing the unit in the hole in the fuselage (using laminating resin). Open up the hole in the tailwheel (64) to 3 mm Ø, and press the 3/2 mm Ø brass sleeve (65) into it. Secure the wheel by soldering two washers (55) to the axle.

The basic structure of the tail panels is completed at the factory. All you need to do is round off the tips and sand the surfaces smooth. Drill 3 mm Ø holes for the horns (72) in the elevators and rudder, and apply thin cyano to the holes to strengthen the material.

With the bottom wing attached to the fuselage, slide the tailplane into its slot. Check alignment with the wing, and measure the tail incidence and longitudinal dihedral. When you are confident that everything is positioned correctly, glue the tailplane to the fuselage using laminating resin. Glue the fuselage tail post (3) in place, followed by the fin.

The motor cowl is attached to the fuselage as shown on the plan. Tip: tack a piece of plywood to the motor bulkhead on the motor cowl axis and mark the centrepoint. From this starting point it is easy to measure off the correct distance to the end of the three cowl support rails (8); this ensures that the cowl is truly central.

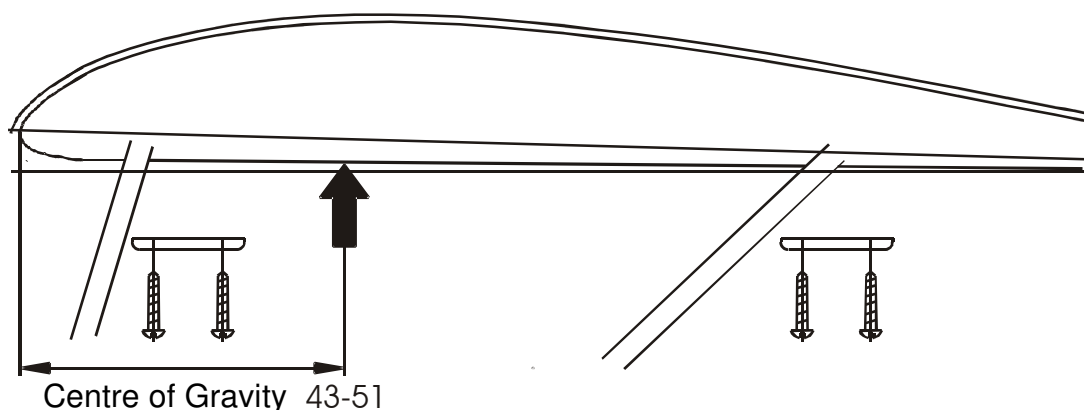
The kit includes a number of optional scale fittings, and the plan clearly shows how these parts are installed. Just one tip here: the wire bars (36) which support the mudguards should be soldered into the collets (37). Drill the collets to accept the wires using a 1.2 mm Ø bit.

### **Preparing and covering the flying surfaces:**

Before covering we recommend that you give all the wooden parts a coat or two of thinned sanding sealer. When the sealer has set hard, rub down to a completely smooth surface using 400-grit abrasive paper, and blow away the sanding dust with compressed air. You have already sanded the GRP parts and ABS plastic mouldings, and they should now be de-greased using a detergent solution, and then allowed to dry really thoroughly before painting.

The lightest covering material is probably iron-on film. However, as some parts of the model have to be painted, you should ensure that the colours of the film and paint are a good match. We recommend Oracover film and Orapaint colour paint, both in the colour CUB YELLOW. The paint adheres well even on the film, i.e. you can safely spray the red areas onto the yellow Oracover. The dummy engine, exhaust pipe and instrument panel are best painted using enamels intended for plastic kits (e.g. Humbrol, Revell etc.).

When the final finish has been applied, assemble the model completely, ready to fly, and balance it by adjusting the position of the flight battery (stated CG position refers to bottom wing). Fix the battery securely in its final position. You may find it necessary to use two packs, one above the other, in order to balance the model correctly.



Re-check the longitudinal dihedral, program the correct control surface travels and check that the undercarriage produces a straight ground-roll (check toe-in if not).

As the model is relatively small and the power relatively high, the very large propeller produces quite a marked tendency to swing left on the take-off run. The best way of avoiding this problem is to increase motor power gradually, initially accelerating with the tailwheel on the ground (i.e. with up-elevator held in). Apply right rudder to maintain the correct heading, and when adequate speed has built up, return the elevator to neutral and continue to accelerate until the model lifts off by itself. The Bücker's handling is extremely good-natured in the air. It is also capable of aerobatic manoeuvres, but its scope

depends on the power available.

Initiate the landing approach with the motor still running, and flare out gently close to the ground; chop the throttle, and it will settle neatly by itself.

We hope you have many hours of pleasure flying your new model.

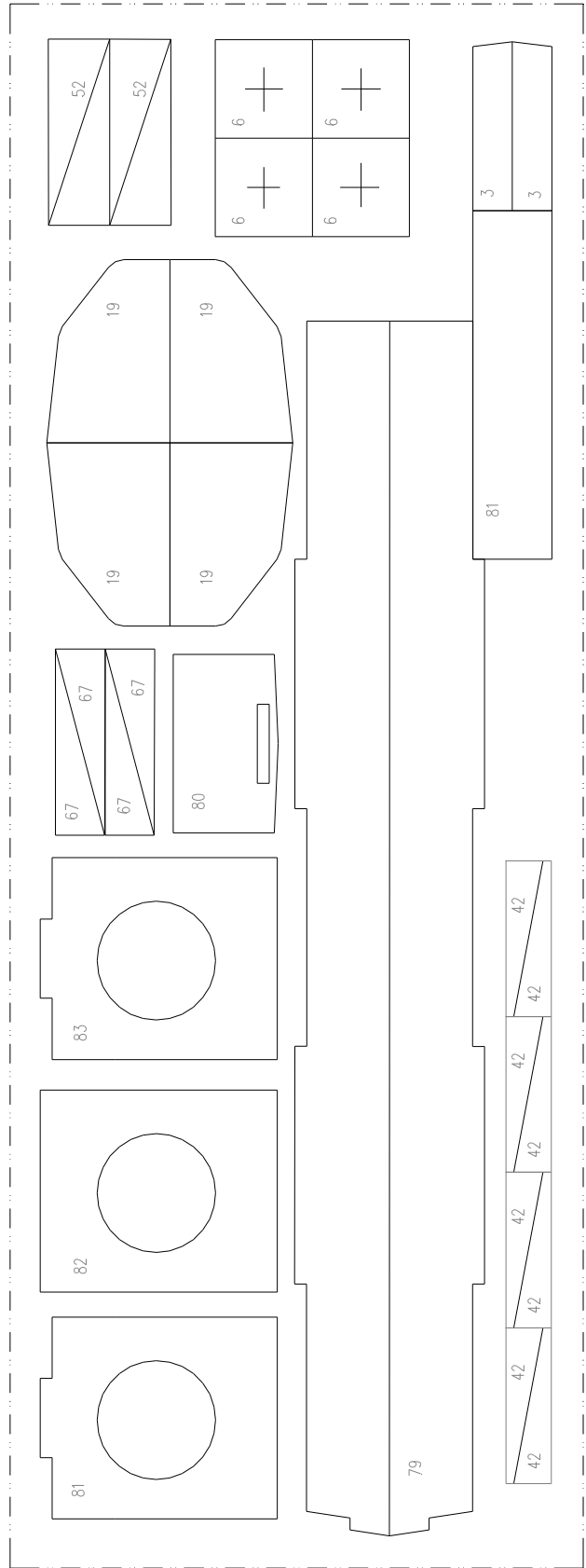
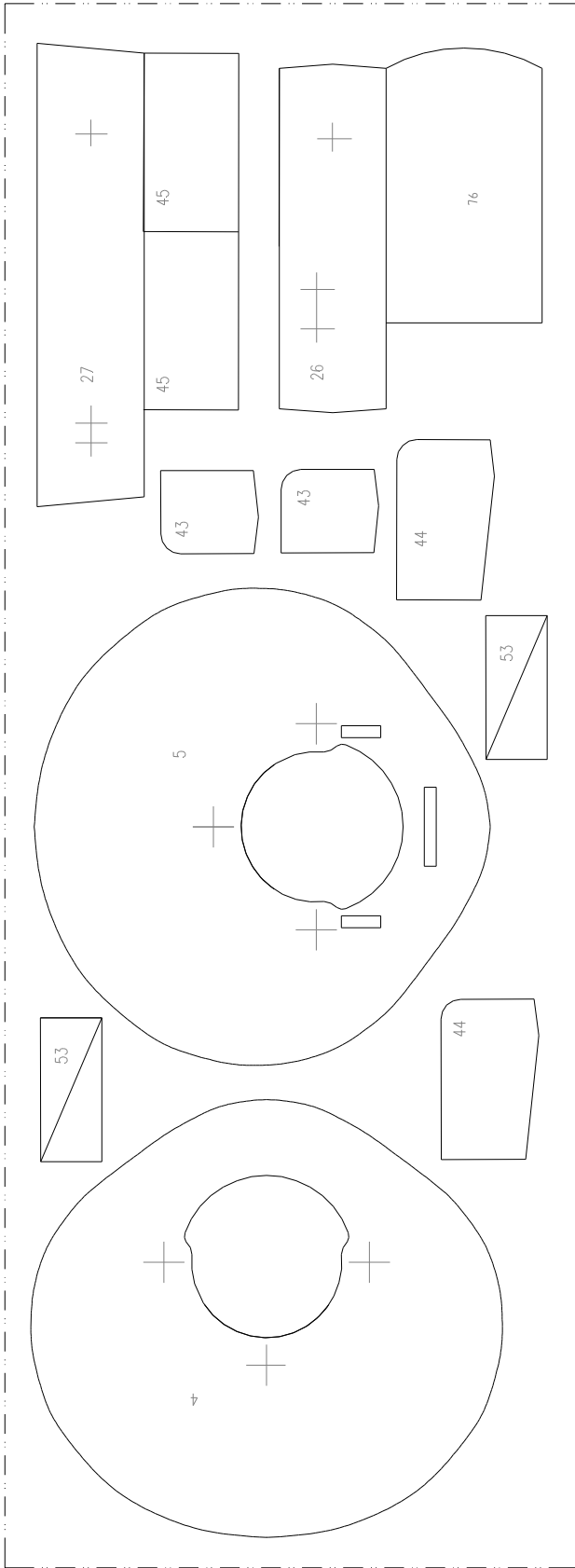
Happy landings!

“aero-naut” Modellbau

### Bü-133 Jungmeister parts list

Part No.	Description	No. off	Material	Dimensions in mm
1	Fuselage	1	GRP	Ready made
2	Motor cowl	1	GRP	Ready made
3	Fuselage tail post	2	Plywood	3 mm, die-cut
4	Motor bulkhead	1	Plywood	3 mm, die-cut
5	Motor bulkhead	1	Plywood	3 mm, die-cut
6	Cabane plate	4	Plywood	3 mm, die-cut
7	Sleeve		Brass	2.5 / 4 Ø
8	Motor cowl rail		Lime	8 x 8, as plan
9	Cabane strut	2	Steel	Ready made
10	Cabane strut	2	Steel	Ready made
11	Cabane strut brace	2	Steel	Ready made
12	Triangular strip		Balsa	5 x 25, as plan
13	Profiled fairing		Balsa	Profiled /strip
14	Undercarriage brace	1	Plated steel	Ready made
15	Undercarriage cross-piece	1	Plated steel	Ready made
16	Rubber band, undercarriage	1	Rubber	Ready made
17	Undercarriage retainer strap	4	Plastic	Ready made
18	Self-tapping screw	12	Steel	2.2 Ø x 9.5
19	Wing mount plate	4	Plywood	3, die-cut
20	Wire “star”, motor		Plated steel	1.2 Ø, as plan
21	Tailwheel unit support	2	Plywood	3, die-cut
22	Instrument panel	1	Plastic	Ready made
23	Pilot’s seat	1	Plastic	Ready made
24	Headrest	1	Plastic	Ready made
25	Velcro tape		Plastic	Ready made
26	Half-former	1	Plywood	3, die-cut
27	Half-former	1	Plywood	3, die-cut
28	Bowden cable inner sleeve	3	Plastic	1 / 2 Ø, as plan
29	Steel rod	3	Steel	0.8 Ø, as plan
30	Bowden cable outer sleeve	1	Plastic	2 / 3 Ø, as plan
30.1	Threaded sleeve	4	Metal	3 / 8 Ø, M2
31	Main undercarriage unit	1	Steel	Ready made
32	Rear undercarriage unit	1	Steel	Ready made
33	Balloon wheel	2	Plastic	72 Ø, ready made
34	Wheel bush		Brass	3 / 4 Ø
35	Mudguard	2	Plastic	Ready made
36	Mudguard support bar		Plated steel	1.2 Ø, as plan
37	Collet	4	Brass	Ready made
38	Undercarriage fairing	2+2	Plastic	Ready made
39	Dummy engine	1	Plastic	Ready made
40	Exhaust collector ring	1	Plastic	Ready made
41	Exhaust	1+1	Plastic	Ready made
42	Half-rib	8	Plywood	3, die-cut
43	Servo mount, side	2	Plywood	3, die-cut
44	Servo mount, side	2	Plywood	3, die-cut
45	Servo mount	2	Plywood	3, die-cut

46	Servo mount rail		Lime	6 x 6, as plan
47	Top wing centre section	1	Balsa	Ready made
48	Top wing outboard panel	1+1	Balsa	Ready made
49	Bottom wing centre section	1	Balsa	Ready made
50	Bottom wing outboard panel	1+1	Balsa	Ready made
51	Wingtip	4	Plywood	3, die-cut
52	Wingtip gusset	4	Plywood	3, die-cut
53	Wingtip gusset	4	Plywood	3, die-cut
54	Wing strut (threaded rod)	4	Plated steel	2 mm Ø, M2, as plan
55	Washer	16	Brass	2 Ø, as plan
56	Horn	4	GRP	Ready made
57	Clevis	4	Steel	Ready made
58	Threaded rod	2	Plated steel	M2 / 2 Ø, as plan
59	Threaded coupler	2	Steel	Ready made
60	Nut	4	Brass	M2, ready made
61	Wing retainer screw	4	Plastic	M4, ready made
62	Wing retainer screw	2	Plastic	M5, ready made
63	Wing locating dowel	1	Beech	4 Ø, as plan
64	Tailwheel	1	Plastic	35 Ø, ready made
65	Wheel bush	1	Brass	2 / 3 Ø, as plan
66	Tailwheel unit	1	Steel	Ready made
67	Wingtip gusset	4	Plywood	3, die-cut
68	Fin	1	Balsa	Ready made
69	Rudder	1	Balsa	Ready made
70	Tailplane	1	Balsa	Ready made
71	Elevator	1+1	Balsa	Ready made
72	Horn	5	Plated brass	Ready made
73	Horn screw	5	Brass	M2 x 18, ready made
74	Servo connector	2	Steel	4.5 / 2 Ø x 10, ready made
75	Servo connector	2	Steel	6 / 2 Ø x 10, ready made
76	Pilot's seat base	1	Plywood	3, die-cut
77	Washer	4	Brass	2.5 Ø, ready made
78	Windscreen	1	Plastic	Ready made
79	Battery cradle side	2	Plywood	3, die-cut
80	Battery cradle bulkhead	1	Plywood	3, die-cut
81	Battery cradle cross-piece	1	Plywood	3, die-cut
82	Battery cradle cross-piece	1	Plywood	3, die-cut
83	Battery cradle cross-piece	1	Plywood	3, die-cut
84	Wing servo plate		Plywood	1, as drawing
85	Wing plate		Balsa	2, as drawing
86	Self-locking nut	4	Metal	M2
87	Washer, motor	6	Brass	3 Ø



## Text from the plan:

1	Glue the star, part 20, to the motor, part 39, using STABILIT-Express. Glue the motor to the cowl, part 2, using thickened resin	31	Edge of decal
2	Wing incidence relative to tailplane +1°	32	Section B-B
3	Spinner, Order No.	33	Shorten part 72
4	Glue the exhaust, part 41, in the opening in the cowl, part 2, using STABILIT-Express	34	Bend the "star", part 20, to shape and solder the joints
5	Wing incidence relative to tailplane +1.5°	35	Solder braces, parts 14, 15, to main undercarriage legs, part 31; see building instructions
6	Suggested installation of ACTRO 12-5 motor, Order No. 7002/05	36	Brass main wheel bush, part 34
7	Reinforce with woven glass tape	37	Hole for receiver aerial sleeve, part 30
8	Order No. 7002/88: GRP motor bulkhead and stand-off pillars Three 0.8 mm thick washers for sidethrust and downthrust; fit under this pillar only.	38	Aileron servo lead
9	Glue undercarriage leg fairings, parts 38L + 38R, to completed undercarriage assembly using STABILIT-Express	39	Relieve top of channeled rail - see building instructions
10	Solder part 36 into collet - see building instructions	40	Cut slot - see building instructions
11	Glue mudguard 35 to part 36 using STABILIT-Express	41	Solder parts 9 and 10 to washers, part 77
12	Bind joint tightly with soft wire, solder joint carefully	42	Glue cabane struts, parts 9 and 10, in brass sleeves, part 7, using laminating resin
13	Applying the hinge tape	43	Slot (left-hand side) - rudder linkage
14	Hinge tape (short pieces)	44	Slots (both sides) - elevator linkage
15	Hinge tape (full-length)	45	Fix sleeves, part 30, with thin cyano
16	Jig S1	46	Fix aileron horn 56 with laminating resin
17	Adjusting the top wing using the jigs S1	47	Section A-A
18	We reserve the right to modify any feature in order to improve our products	48	Solder washers, part 55, to interplane struts, part 54
19	Top wing - dihedral	49	View A
20	Bottom wing - dihedral	50	Installation of elevator servo (right-hand fuselage side)
21	Plan view of bottom wing	51	Section C-C
22	View B	52	Template S2
23	Position of jig S1 when adjusting the top wing	53	Solder washer, part 55, to tailwheel unit, part 66
24	Removable seat (23) for access to battery	54	Tailwheel - see building instructions
25	Fix receiver to fuselage side with Velcro (hook-and-loop) tape	55	Flight battery: 10 - 12 cells, 1.7 - 2.0 Ah capacity
26	Bind tightly with soft wire, solder together	56	Centre of Gravity (C.G.) 43 - 51 mm
27	Glue profiled cabane fairing strips, part 13, to completed cabane assembly using STABILIT-Express	57	30 mm - see building instructions
28	Black fuel tubing, 3 Ø	58	Glue M3 nuts in place using STABILIT-Express
	Black fuel tubing, 2 Ø, not included	59	Glue remainder of part 54 in the cowl and exhaust using STABILIT-Express
29	Velcro (hook-and-loop) tape		
30	Receiver aerial guide tube		