

ARCUS II

 **robbe**
Modellsport



 Standard Version No.: 2649
Night Version No.: 2650

 RTF Version No.: 2651

INSTRUCTIONS AND USER MANUAL

www.robbe.com

V1_05/2019



GENERAL INFORMATION

- The model is designed for the components specified by us. Unless otherwise stated, servos and other electronic components are designed for standard supply voltage. Recommended cell count for Lipo batteries also refers to standard Lipos voltage of 3.7V per cell. If you use other servos, a different motor and controller, batteries, or propellers, please make sure they fit first. In the event of deviations, corrections and adjustments must be made by yourself.
- Before starting construction, always put the servos into neutral. To do this, switch on the remote control and move the joysticks and trim buttons (save the one for the throttle) to the middle position. Connect the servos to the corresponding outputs of the receiver and supply them with a suitable power source. Please observe the connection diagram and the operating instructions of the remote control system manufacturer.
- Do not leave your model in the blazing sun or in your vehicle for long periods of time. Too high temperatures can lead to deformation/distortion of plastic parts or blistering of covering foils.
- Before the first flight, check the wing symmetry, tail unit and fuselage. All parts of the model should have the same spacing from the left and right wing or tail plane to the centre of the fuselage or the same angle.
- If necessary, rebalance the propellers if vibrations are noticeable when the motor is running up.
- Bubble formation in the covering foils normal to a certain extent due to temperature and humidity differences and can be easily eliminated with a foil iron or hairdryer.
- For models in shell construction („full GFRP/CFRP“), burrs may occur at the seams due to the production process. Carefully remove them with fine sandpaper or a file.

GENERAL SAFETY INFORMATION

- Be sure to read the safety instructions carefully before operating your model.
- Always follow the procedures and settings recommended in the instructions.
- If you are using remote-controlled model aircraft, helicopters, cars or ships for the first time, we recommend that you ask an experienced model pilot for help.
- Remote-controlled models are not toys in the usual sense and may only be used and operated by young people under 14 years of age under the supervision of adults.
- Their construction and operation requires technical understanding, careful craftsmanship and safety-conscious behaviour.
- Mistakes or negligence during construction, flying or driving can result in considerable damage to property or personal injury.
- Since the manufacturer and seller have no influence on the proper construction/assembly and operation of the models, these risks are expressly pointed out and any liability is excluded.
- Propellers on aircraft and all moving parts in general pose a constant risk of injury. Avoid touching such parts at all costs.
- Note that motors and controllers can reach high temperatures during operation. Avoid touching such parts at all costs.
- Never stay in the danger area of rotating parts with electric motors with connected drive battery.
- Overcharging or incorrect charging can cause the batteries to explode. Make sure the polarity is correct.
- Protect your equipment and Models from dust, dirt and moisture. Do not expose the equipment to excessive heat, cold or vibration.
- Use only recommended chargers and charge your batteries only up to the specified charging time. Always check your equipment for damage and replace defects with original spare parts.
- Do not use equipment that has been damaged or got wet due to a fall, even if it is dry again! Either have it checked by your specialist dealer or in the Robbe Service or have it replaced. Hidden faults can occur due to wetness or a crash, which lead to a functional failure after a short operating time.
- Only the components and accessories recommended by us may be used.
- Do not make any changes to the remote control which are not described in these instructions.

SAFETY INSTRUCTIONS FOR CONTROLLERS

- Observe the technical data of the controller.
- Observe the polarity of all connection cables.
- Avoid short circuits at all costs.
- Install or package the regulator so that it cannot come into contact with grease, oil or water.
- Ensure adequate air circulation.
- Never reach into the turning circle of the propeller during start-up Risk of injury

Important information:

The receiver system is powered by the built-in BEC system of the controller. For commissioning, always move the throttle stick to the „Motor off“ position and switch on the transmitter. Only then connect the battery. To switch off always disconnect the connection battery motor controller, first then turn off the transmitter. During the functional test, move the servos of the rudders to neutral position with the remote control (stick and trimming lever on the transmitter to the middle position). Please make sure to leave the throttle stick in the lowest position so that the engine does not start. For all work on to the parts of the remote control, motor or controller, follow the instructions supplied with the units. Also read the instructions of the battery and the charger carefully before commissioning. Check the engine mounting bolts in the fuselage regularly for tightness.

SAFETY NOTE FOR MODEL OPERATION

Attention, danger of injury!

- Always keep a safe distance from your model aircraft.
- Never fly over spectators, other pilots or yourself.
- Always perform flight figures in a direction away from the pilot or spectators.
- Never endanger people or animals.
- Never fly near power lines or residential areas.
- Do not operate your model near locks or public shipping.
- Do not operate your model on public roads, motorways, paths and squares, etc., but only in approved locations.
- Do not operate the model in thunderstorms.
- Before each flight, check your remote control system for sufficient function and range.
- After flying, remove all batteries from the model.

Do not „aim“ the transmitter antenna at the model during operation. In this direction, the transmitter has the lowest radiation. The best position of the antenna is to the side of the model.

Use of devices with image and/or sound recording function:

If you equip your model with a video or image recording device (e.g. FPV cameras, action cams etc.) or the model is already equipped with such a device at the factory, please note that you could violate the privacy of one or more persons by using the recording function. An overflight or driving on private ground without the appropriate permission of the owner or approaching private ground can also be regarded as an invasion of privacy. You, as the operator of the model, are solely and fully responsible for your actions.

In particular, all applicable legal requirements must be observed, which can be found in the roof associations or the relevant authorities. Failure to comply can result in substantial penalties.

FLIGHT INSTRUCTIONS

- Before the first flight, observe the instructions in the „Safety Instructions“ section.
- When flying the model, you should choose a day with as little wind as possible
- A large, flat area without obstacles (trees, fences power lines etc.) is suitable for the first flights.
- Please carry out a functional test of the drive train / power set and remote control.
- After assembling the model on the airfield, check once again that all model components such as wing, tail units, wing mounts, engine, linkages, etc. are firmly and properly fastened.
- For a hand start a helper should be present, who can throw the model with enough thrust into the air.
- The start usually takes place against the wind.
- Do not stall the model near the ground
- Do not initiate tight turns in the immediate vicinity of the ground.
- Check the reactions of the model to the rudder deflections. If necessary, adjust after landing to increase or decrease the deflections accordingly.
- The minimum flight speed must be at an adequate safety altitude.
- Initiate the landing with sufficient speed

SAFETY INSTRUCTIONS FOR RECHARGEABLE BATTERIES

- Do not immerse the battery in water or other liquids.
- Do not heat, throw into fire or microwave.
- Do not short-circuit or charge with reversed polarity
- Do not expose, deform or throw the battery
- Do not solder directly on the battery
- Do not change or open the battery
- Only charge the battery with suitable chargers, never connect it directly to a power supply unit.
- Never charge or discharge the battery or charger on a flammable surface.
- Never leave the battery unattended during charging or discharging processes.
- Never charge or discharge the battery in direct sunlight or near heaters or fire.
- Do not use the battery in places subject to high static discharge.

All this can cause the battery to be damaged, explode or even catch fire!

- Keep the battery away from children
- Keep leaked electrolyte away from fire, as it is highly flammable and may ignite.
- The electrolyte liquid should not get into the eyes, if it does, rinse immediately with plenty of clear water and then see a doctor.
- The electrolyte liquid can also escape from clothes and other objects with a lot of water or washed off.
- Observe the safety instructions of the battery manufacturer and the charger manufacturer.

DISCLAIMER

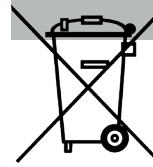
Modellbau Lindinger GmbH cannot monitor compliance with the assembly and operating instructions or the conditions and methods for installation, operation, use and maintenance of the model components. Therefore, we accept no liability for losses, damage or costs arising from or in any way connected with incorrect use and operation. To the extent permitted by law, the obligation to pay damages, irrespective of the legal grounds, shall be limited directly to the invoice value of the claims arising from the event causing the damage.

CONFORMITY



Modellbau Lindinger GmbH hereby declares that this device complies with the essential requirements and other relevant regulations of the corresponding CE directives. The original declaration of conformity can be found on the Internet at www.robbe.com, in the detailed product view of the respective device description or on request. This product can be operated in all EU countries.

DISPOSAL



This symbol means that small electrical and electronic devices must be disposed of at the end of their useful life, separated from the household refuse. Dispose of the device at your local municipal collection point or recycling centre. This applies to all countries of the European Union and other European countries with a separate collection system.

WARRANTY

Our articles are equipped with the legally required 24 months warranty. Should you wish to assert a justified warranty claim, always contact your dealer, who is responsible for the warranty and the processing. During this time, any functional defects that may occur, as well as manufacturing or other problems, will be rectified.

Material defects corrected by us free of charge. Further claims, e.g. for consequential damages, are excluded.

The transport to us must be free, the return transport to you is also free. Freight collect shipments cannot be accepted. We cannot accept liability for transport damage and loss of your consignment. We recommend appropriate insurance.

To process your warranty claims, the following requirements must be met:

- Attach the proof of purchase (receipt) to your shipment.
- The units have been operated in accordance with the operating instructions.
- Only recommended power sources and original robbe accessories have been used.
- There is no moisture damage, external interference, reverse polarity, overloading or mechanical damage.
- Attach relevant information for finding the fault or defect.

INSURANCE

Ground-based models are usually covered by personal liability insurance. Additional insurance or extension is required for aircraft models. Check your insurance policy (private liability) and take out suitable insurance if necessary.



Made in China



+14

This product is not a toy. Operate only under the direct supervision of adults.

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General instructions for the construction process:

Due to the high degree of prefabrication, the model can be assembled ready to fly in just a few steps.

In order to facilitate safe operation of this model, it is essential that you read these instructions carefully before using it for the first time.

All servos with linkage rods, the brushless controller and the brushless motor are pre-assembled.

We are constantly striving to adapt our products to the latest developments. Please inform yourself about technical improvements, updates and updates of the documentation in the internet under the respective product description on our homepage www.robbe.com

Technical data:

Lenght:	approx. 1.190 mm
Wingspan:	approx. 1.840 mm
Take-Off weight:	approx. 850g
Motor:	Brushless-Outrunner 28x30 1.100KV
ESC:	Brushless-ESC 20A 2-3s
Radio:	4 channel

RC-Funktions

Ailerons, rudder, elevator, motor, flaps (optional)

Recommended accessories:

- 4-channel computer radio with receiver
- No. 6532 LiPo-battery robbe RO-POWER EVO V5 11,1V 3s1300/25(50)C
- Suitable charger

Optional accessories

No. 264901 Upgradekit flaps
(linkages without servos) Arcus II

Required tools, aids and materials:

Screwdriver
Velcro stripe

Direction indications such as "right" are seen in the flight direction.

Repairs:

For repairs only use adhesives suitable for the material. Observe the safety and processing instructions of the adhesive manufacturer.

RC-Installation

For the correct connection of the RC components, as well as the programming of corresponding mixers and other settings, it is essential to observe the connection diagram and the operating instructions of the remote control system manufacturer. Depending on the selection of the remote control system, a V-cable may be required to connect the ailerons.

Explanation of technical terms

Engine speed ("throttle")

This controls the speed of the drive motor.
Lower stick = Motor off
Stick up = highest speed

Rudder

This controls the flight attitude of the model around the vertical axis.
Stick left = model flies to the left (rudder moves to the left)
Stick right = model flies to the right (rudder moves to the right)

Ailerons

This controls the flight attitude of the model around the longitudinal axis.
Left stick = left wing lowers
(left aileron moves up, right aileron moves down)
Right stick = right aileron lowers
(right aileron moves up, left aileron moves down)

Elevator

This controls the flight attitude of the model around the transverse axis.
Stick down, the model climbs (the elevator rises)
Stick up = the model descends (the elevator goes down)

C.G. = Center of Gravity

Servo Reverse

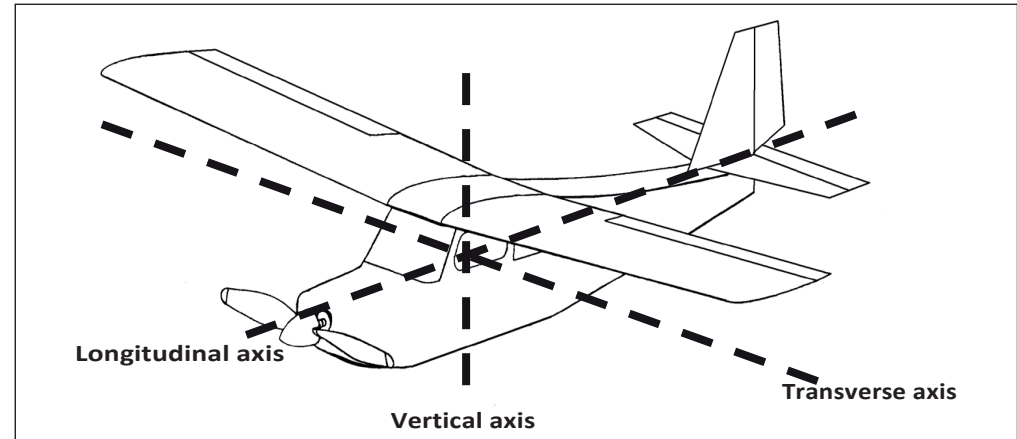
Reversing the direction of the servos

Dual Rate

Switchable travel reduction or extension for rudders
(fixed wing models) or inclination angle (multicopter)

Binden

Assignment of the transmitter / receiver to each other





Scope of delivery Arcus II

Standard Version No. 2649:

- Almost completely assembled model aircraft
- Foamed fuselage, wing and tail unit
- 4 pre-assembled 8g servos for control surfaces
- Pre-assembled brushless controller 20A 2-3s
- Pre-assembled brushless motor 28x30mm 1100KV
- Carbon wing tube for wings
- Small parts for assembly

RTF Version No. 2651:

- Almost completely assembled model aircraft
- Remote control included
- Foamed fuselage, wing and tail unit
- 4 pre-assembled 8g servos for control surfaces
- Pre-assembled brushless controller 20A 2-3s
- Pre-assembled brushless motor 28x30mm 1100KV
- Carbon wing tube for wings
- Small parts for assembly

Night Version No. 2650:

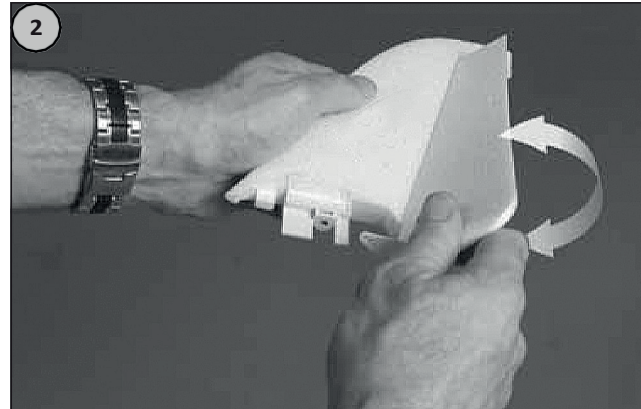
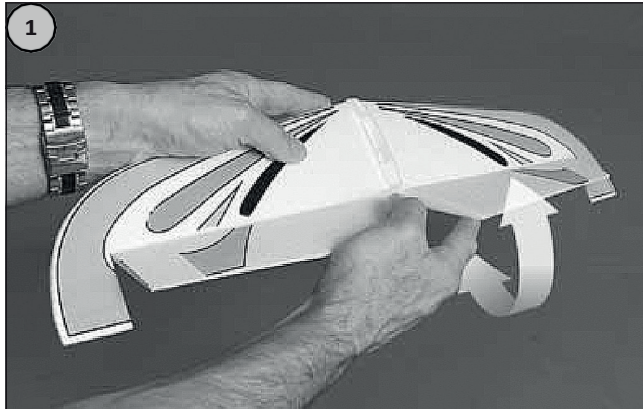
- Almost completely assembled model aircraft
- LED model lighting for fuselage, wings and tail units
- Foamed fuselage, wing and tail unit
- 4 pre-assembled 8g servos for control surfaces
- Pre-assembled brushless controller 20A 2-3s
- Pre-assembled brushless motor 28x30mm 1100KV
- Carbon wing tube for wings
- Small parts for assembly

Required accessories for retrofitting with flaps 2649/2650/2651:

- No. 264901 1x Upgradekit flaps (linkages without servos) Arcus II
- No. 264909 2x servos 8g
- 5-minute epoxy resin or other suitable adhesives.
- Servo extension and/or V-cable (depending on remote control system used)

Assembly

1. The tail

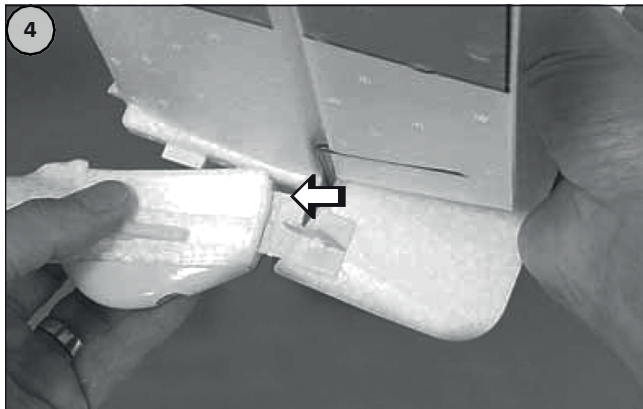


Pictures 1 and 2:

To make the elevator and rudder easy to move, they must be carefully moved up and down several times before assembly.

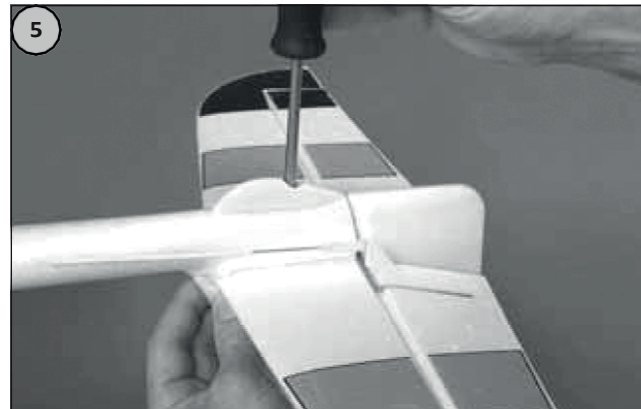
Picture 3:

Insert the vertical stabilizer into the horizontal stabilizer.



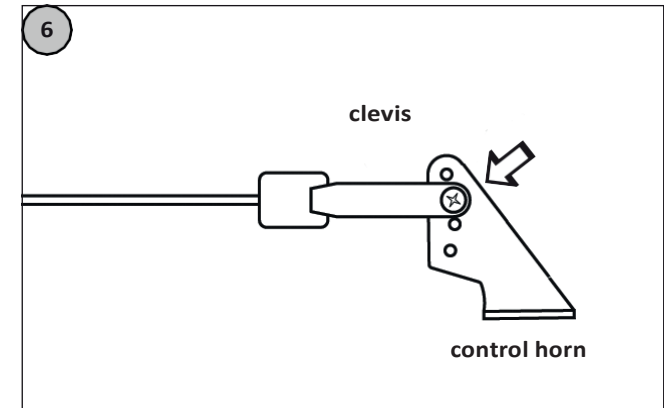
Picture 4:

The tail unit is mounted on the fuselage. The hinge is inserted into the rudder.



Picture 5:

The tail is secured from below with the enclosed screw M4x35mm. Tighten the screw with feeling, but firmly.

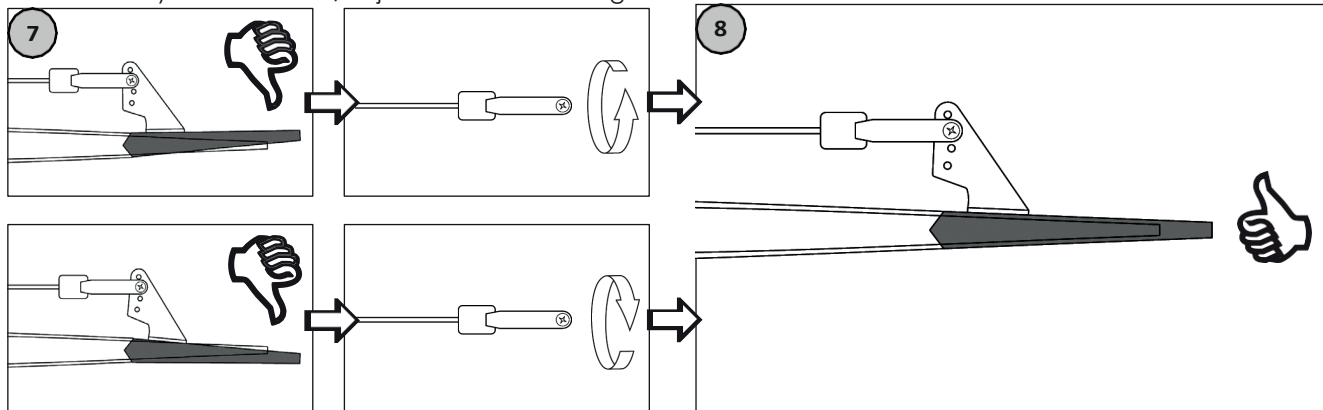


Picture 6:

Attach the clevis for elevator and rudder to the respective control horn as shown and secure with the screw.

Assembly

1. Assembly of the tail unit/adjustment of the linkage rods

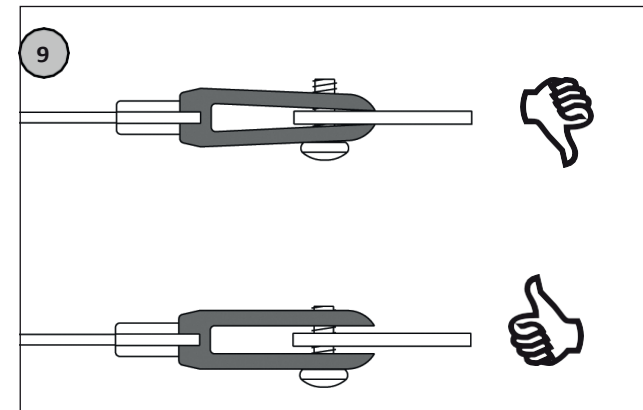


Pictures 7 and 8:

Put all servos in neutral position. All control surfaces must be in neutral position as well. If necessary, turn the clevises until the correct length is reached on the booms.

Note:

This is a schematic diagram for adjusting the rudders. It is only for orientation on how to adjust the rudders correctly and may not represent the scope of supply or equipment of the model supplied.



Picture 9:

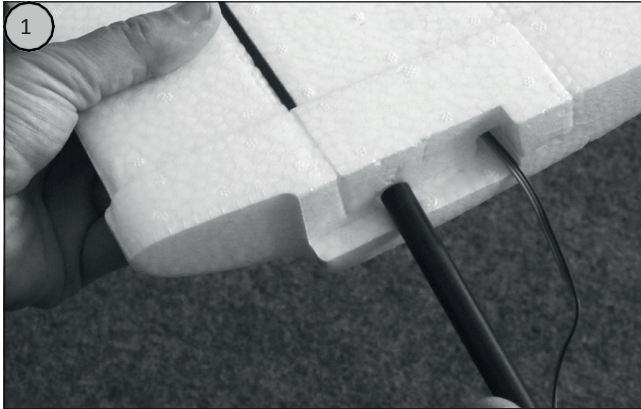
Tighten the clevis screws only moderately so that the linkage moves smoothly.

Note:

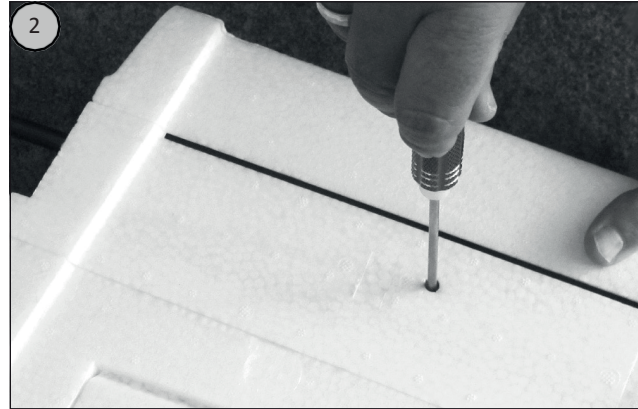
This illustration only applies if clevis are used on the model which are attached to the horn by means of screws.

Assembly

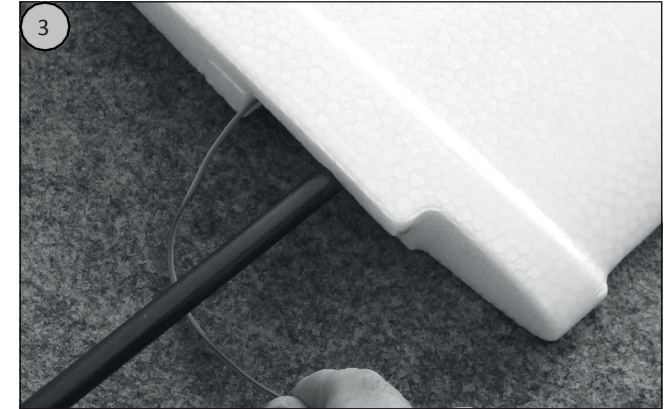
2. Wings



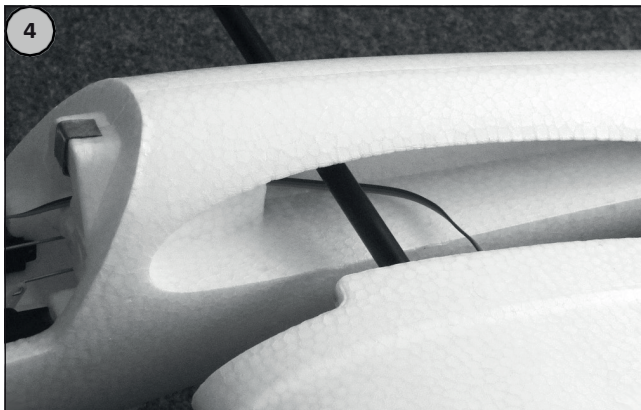
Picture 1:
Loosen the locking screw on the underside of the wing and push the wing onto the carbon fibre tube until it stops.



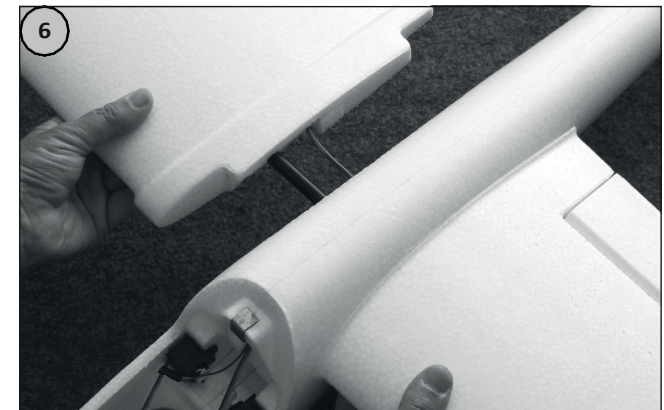
Picture 2:
Secure the wing on the carbon tube by tightening the screw on the underside of the wing. Tighten the screw with feeling, but firmly.



Picture 3:
Pass the aileron servo cable under the carbon fiber tube.



Pictures 4 and 5:
Slide the wing into the recess in the fuselage. Carefully pull the connecting cable through the recess in the middle of the fuselage to the front of the fuselage.



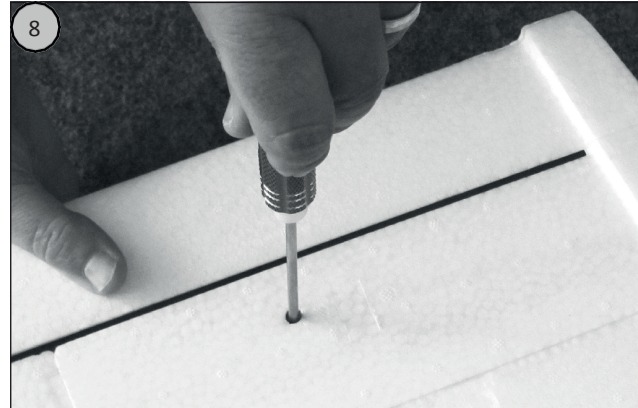
Picture 6:
Place the second wing on the carbon fibre tube and slide it into the recess on the fuselage. Insert the servo cable under the carbon fiber tube and pull it carefully through the recess to the front into the fuselage.

Assembly

2. Wings



Picture 7:
Now push the wings together completely.



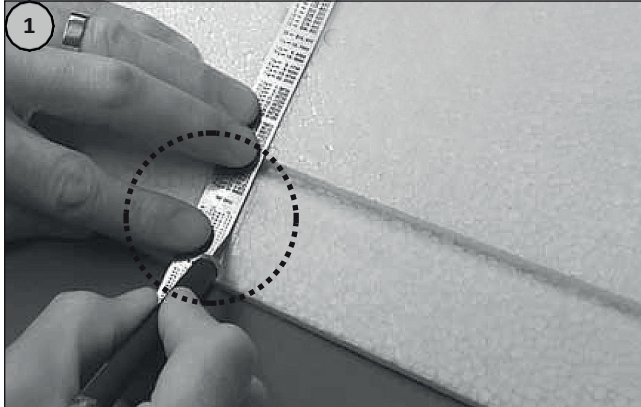
Picture 8:
Secure the second wing with the locking screw on the underside of the wing on the carbon fibre tube. Tighten the screw with feeling, but firmly.



Note: When installing and connecting the receiver, make sure that the servos are not blocked by cables. Secure the receiver and the controller in the model against slipping with Velcro tape in a suitable place. Observe the connection diagram and operating instructions of the remote control system manufacturer.

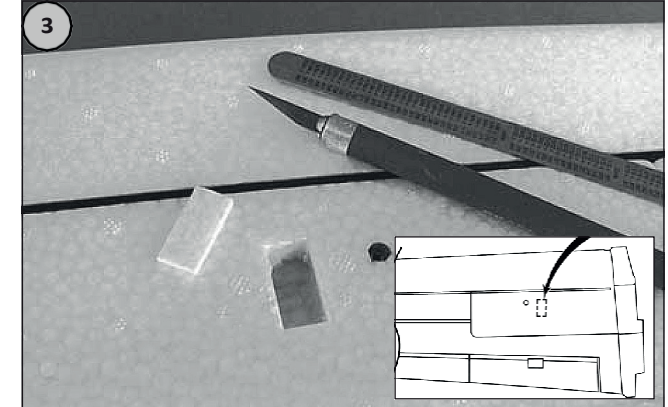
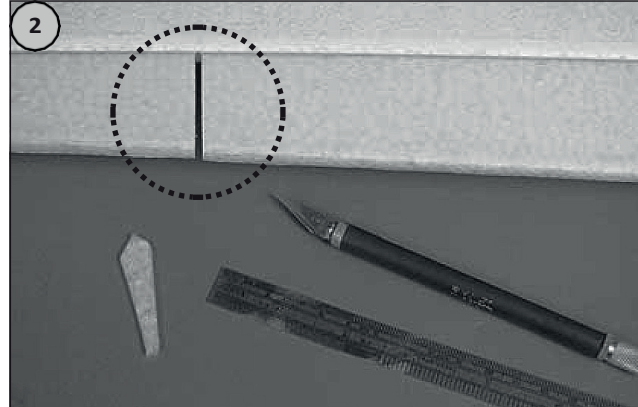
OPTIONAL: Retrofitting with flaps

3. Procedure for installation of flaps

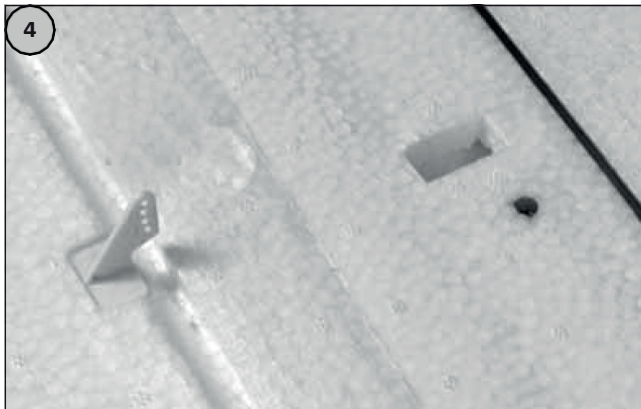


Pictures 1 and 2:

Cut the ailerons in the width of the formed dividing line (1-2mm) up to the hinge.



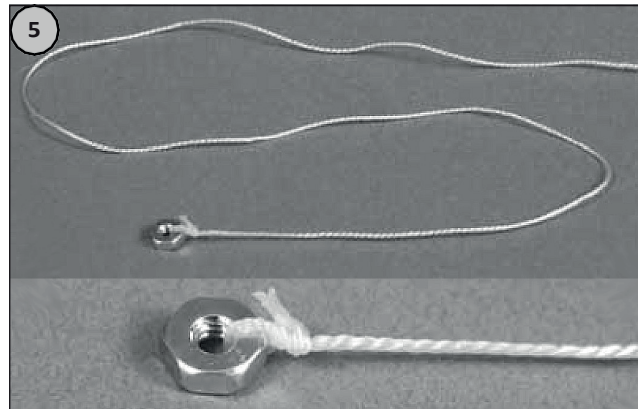
Picture 3: A sharp cutter knife is used to cut out the covers of the installation housings for the flap servos on the underside of the wings, left and right. Attention, these covers are 2-3mm thick, do not cut too deep.



Picture 4:

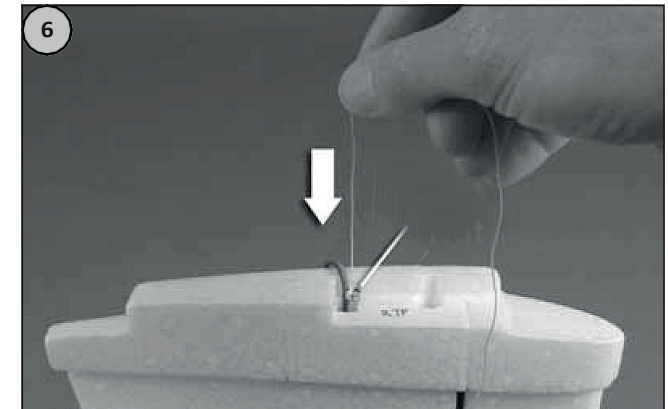
Then glue the rudder horns into the formed recess of the flaps. Use a suitable adhesive (e.g. 5-minute epoxy). Observe the safety and processing instructions of the adhesive manufacturer.

Make sure that no glue runs into the hinge.



Picture 5:

Attach a small weight to the end of an approx. 350mm long string.

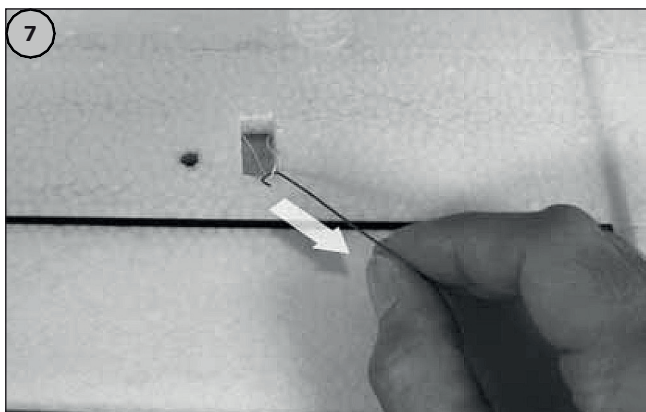


Picture 6:

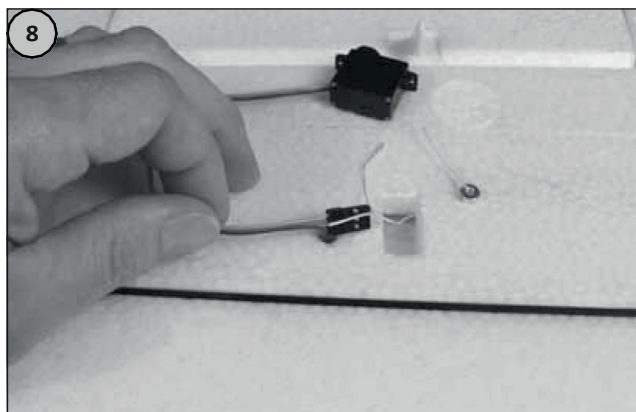
Thread the string with the weight in front into the cable guide of the wing. It is required for the additional servo cable.

OPTIONAL: Retrofitting with flaps

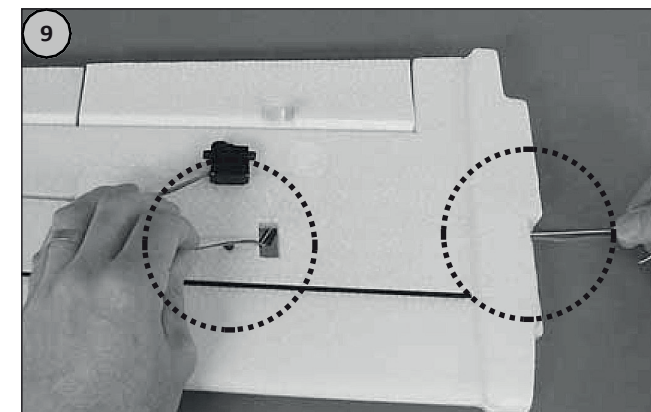
3. Procedure for installation of flaps



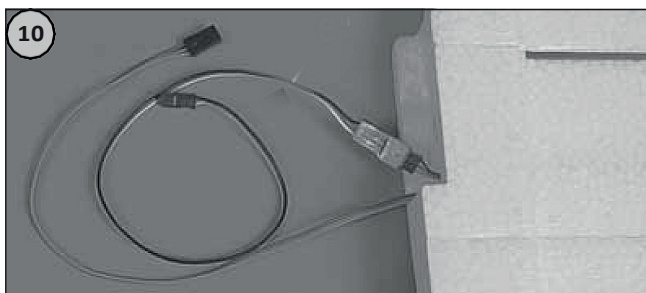
Picture 7: Use a pair of tweezers or a small hook to pull the end of the string with the weight out of the servo mounting slot.



Picture 8: Remove the weight from the cord and attach the servo cable to it.



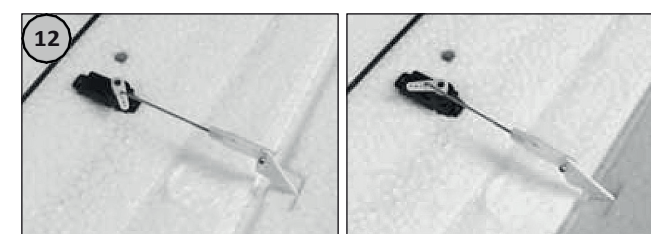
Picture 9: Pull the servo cable through the cable shaft. Then remove the cord.



Picture 10: Connect the approx. 20cm servo extension cable.



Picture 11: Insert the servos for the flaps into the housings as a trial. The direction of installation is determined by the servo cable shaft. If everything fits, the servos are glued in sparingly with a suitable adhesive (e.g. 5-minute epoxy). Observe the safety and processing instructions of the adhesive manufacturer.



Picture 12: Move flap servos to neutral position. Now mount the servo horns and the linkages. The wing flaps must align exactly with the ailerons and the wing.
The servos must work absolutely congruently.



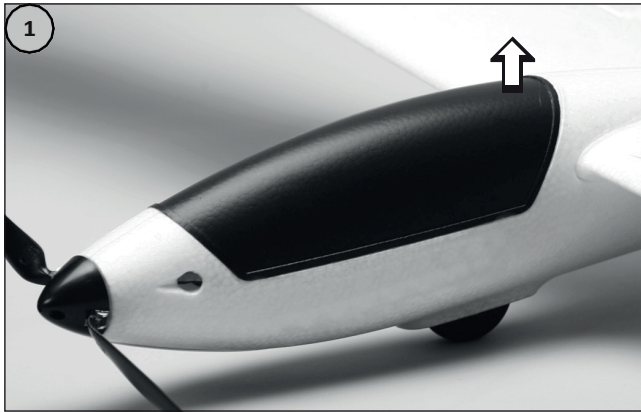
Note: The pre-pulled flap cables can be connected to the receiver with a V-cable or individually.

When using the flaps a butterfly should be programmed. Here the flaps move downwards, the ailerons upwards. A mixer should also be programmed for the rudder so that the model does not rebel when the butterfly is used. The correct values for this must be flown and adjusted individually by the pilot. Observe the connection diagram and the operating instructions of the remote control system manufacturer. The flaps can be operated together with the ailerons to have full control of the ailerons. If this is not the case, the agility of the model is reduced.

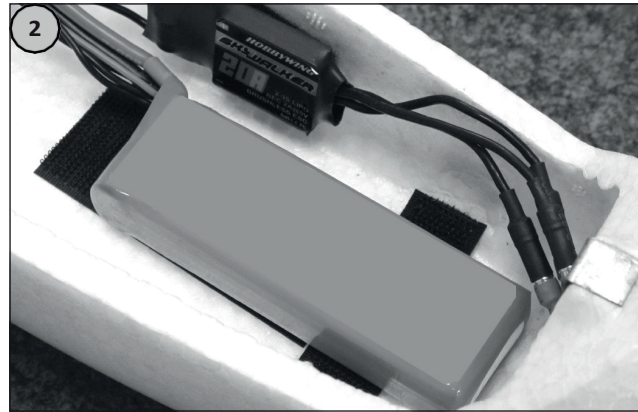


Note: When installing and connecting the receiver, make sure that the servos in the fuselage are not blocked by cables. Secure the receiver and the controller in the model against slipping with Velcro tape in a suitable place. Observe the connection diagram and operating instructions of the remote control system manufacturer.

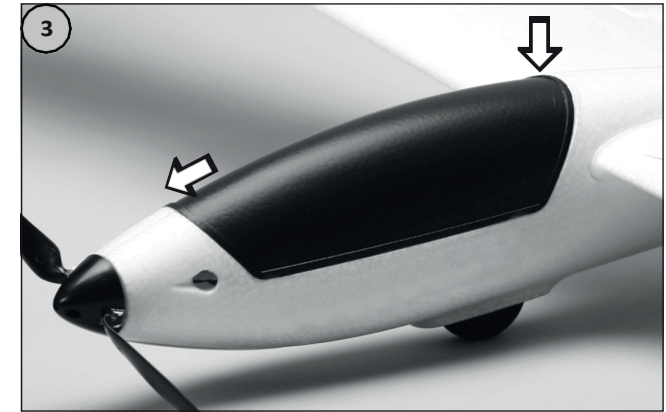
Mounting the canopy and inserting the flight battery



Picture 1:
The canopy is held with a magnetic lock. Pull the canopy upwards in the rear third to remove it.



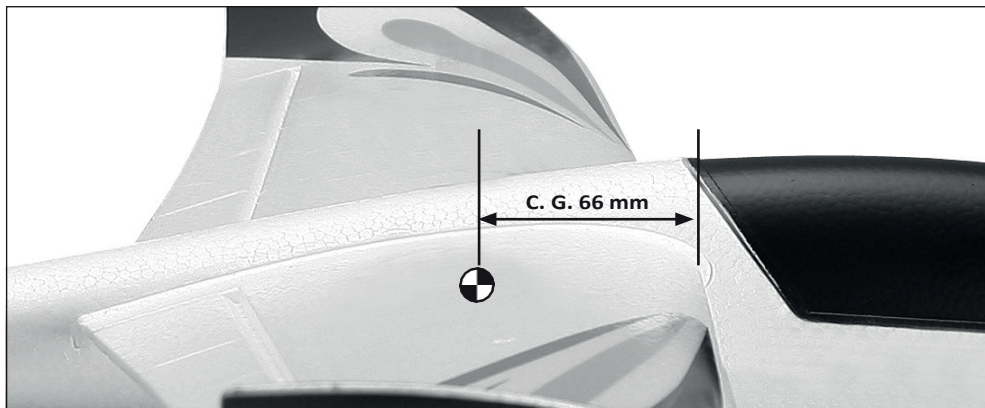
Picture 2:
To secure the flight battery against slipping, glue the Velcro tape (hook side) to the fuselage floor. Insert the flight battery so that the model is in the centre of gravity (page 14). Make sure that the Velcro tape on the battery (fleece) is correctly hooked into the counterpart in the fuselage. The weight distribution changes when the camera bracket and camera are mounted. Note centre of gravity (page 14)
Do NOT connect the flight battery!



Picture 3:
Place the canopy on the main frame of the fuselage. The magnet lock holds the canopy securely to the fuselage.

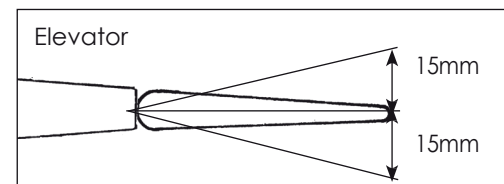
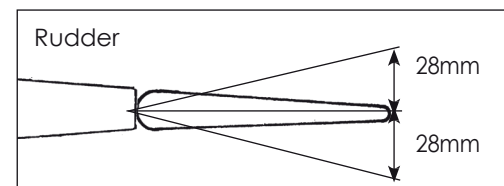
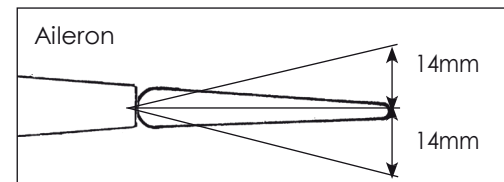
Center of gravity and rudder deflections

1. C.G. = Center of Gravity



- The centre of gravity C.G. is measured at a distance of approx. 66mm from the leading edge of the wing.
- The battery must be inserted in the model for a precise check of the centre of gravity.
- Support the model at the indicated centre of gravity and let it swing. The ideal position is reached when the model remains in the balance with its nose slightly inclined downwards.
- If necessary, move the flight battery forwards or backwards accordingly.
- Mark the battery position in the fuselage so that the battery can be replaced in the same position.

2. The rudder deflections



- The specified values are approximate values. Care must be taken to ensure that all control surfaces are exactly aligned in the neutral position. Deviations can be corrected with the trim keys, the clevis adjustment or the servo center.

Flight preparations

Perform a functional check of the model before each flight.

Make sure that all rudders run in the correct direction and align correctly with the surfaces, and that the motor rotates in the correct direction.

Rudder function check

When the aileron is actuated to the right, the right aileron must lift and the left aileron must lower. When actuated to the left, the rudder movements are reversed. When the rudder is actuated to the right, the rudder must deflect to the right. When the rudder is actuated to the left, it must deflect to the left.

Pull the stick for the elevator towards you (below), the elevator must move upwards (climb). Push away the stick, the elevator must move downwards (descent).

Motor function check

The engine must turn to the right when the throttle stick is actuated upwards, seen in flight direction.

When checking the motor, make sure that the model cannot move away, that nothing blocks the propeller or the motor, and that you do not reach into the rotating area of the propeller or into the running propeller. Risk of injury!

Divergences

If deviations are found during the functional check, the correct connection of the servos, the controller and the motor must be checked. If necessary, reverse the running direction of the servos via the remote control system (servo reverse). The running direction of the motor can be changed by exchanging 2 of the 3 connecting cables to the controller.

Also always check that the propeller and the motor are seated correctly.

Caution! Observe the connection diagram and operating instructions for the individual components of the manufacturer!

Correct procedure before the start

1. make sure that the flight battery and the transmitter are charged.
2. choose a day with absolute wind direction or light wind only.
3. turn the speed stick all the way down and switch on the transmitter.
4. Connect the flight battery as described.
5. The transmitter and receiver are ready for operation, repeat this procedure each time the aircraft is put into operation.

If the propeller turns, this must be balanced with the speed trim until the propeller comes to a standstill.

Correct procedure after landing

1. Remove the flight battery and disconnect from the ESC.
2. Switch off the transmitter.



Please observe the safety instructions on pages 2 and 3!

The first flights, flying in

Always stand behind or at right angles to the model to avoid wrong control commands.

With calm steering movements you slowly get used to the model. With changing flight directions you can practice curves, ovals and circles.

Tip:

If the model flies towards you with its nose, the functions (except elevator and speed control) are reversed.

Always refer to the Flight Preparation section!

Starting

Models with undercarriage can be started from the ground or, depending on the size of the model, also from the hand.

Models without undercarriage can be started from the hand.

The correct take-off procedure must always be adapted to the model and the flight characteristics of the airfield.

When starting models with landing gear from the ground, a few short roll tests are carried out before the start to make sure that the model does not get stuck.

A helper should be present for the hand start, who can transport the model into the air with not too little thrust.

Bring the engine speed to full power and start the model against the wind.

When launching models with landing gear from the ground at sufficient speed, lift the model off the ground with a short elevator deflection.

Trimming

The model must be trimmed so that it adopts a stable flight attitude. If necessary, the trim buttons of the remote control system can be used to slightly trim the model. The trimmings should be carried out at a sufficient safety height.

For larger trim interventions, either the boom length or the servo centre position should be adjusted via the transmitter after landing.

To do this, the trim adjustment must be removed using the trim buttons on the remote control system.

After the correction has been made, check the trim with another flight.

Landing

The landing shall be initiated with sufficient speed. Care must be taken to avoid a stall. The minimum flight speed should be flown at a sufficient safety altitude.

On models without landing gear, make sure that the propeller has come to a standstill before landing. This avoids damage to engine and propeller.

On models with landing gear, carefully put on the model with a little drag throttle, then reduce the engine speed to zero.

Notes on the flight battery

When the motor power decreases, land immediately and disconnect the battery from the controller. Do not empty the battery, otherwise it will be deeply discharged and permanently damaged. Let the battery cool down before recharging.

Replacing the prop

A damaged prop must be replaced immediately!



Spare parts



For „Standard-Version“ No. 2649 / „RTF-Version“ No. 2651:

Item-No.	Discription
264902	Horizontal- and vertical stabilizer
264903	Wing set (w/o servos)
264904	Fuselage (w/o canopy)
264905	Canopy Arcus II
264906	Spinner and folding prop 9x5 Arcus II
264901	Upgrade-Kit flaps (linkages w/o servos) Arcus II
264907	Decal sheet Arcus II
264908	Brushless-Motor 2830 outrunner 1100KV Arcus II
264909	Servo 8g ArcusII / W-2000
264910	Wing joiner tube carbon ArcusII

For „Night-Version“ No. 2650:

Item-No.	Discription
265001	Wing set (w/o servos) ArcusII Night
265002	Horizontal- and vertical stabilizer ArcusII Night
265003	Fuselage (w/o canopy) Arcus II Night with LED lighting

1. Technical data ESC:

Typ	Cont. current	Boost current (max. 10 Sec.)	BEC-Modus	BEC-output	No. of cells		Weight	Measurements mm
					LiPo	NiMH		
-20A	20A	25A	Linear	5V/2A	2-3S	5-9	19g	42x25x8

2. Programmable adjustments:

1. Brake: **enabled** / Disabled
2. Battery type: **Lipo** / NiMH
3. undervoltage protection (Cut-Off Mode): Soft Cut-Off (Gradual reduction of power) / Cut-Off (Immediate standstill)
4. cut-off voltage for undervoltage protection (cut-off threshold): low / **medium** / high
 - 1) For lithium batteries, the number of cells is calculated automatically.
Low / Medium / High cut-off voltage for each cell is: 2.85V/3.15V/3.3V.
For example: For a 3S LiPo, with "Medium" switch-off setting, the switch-off voltage is 3.15V x 3 = 9.45V.
 - 2) For NiMH batteries the cut-off voltage is: low 0% / medium 50% / high 65% of the output voltage (e.g. the nominal voltage of the battery pack) and 0% corresponds to the deactivated undervoltage protection.
For example: For a 6 cell NiMH battery the voltage after charging is 1.44V x 6 = 8.64V, for "medium" setting the cut-off voltage is 8.64V x 50% = 4.32V.
5. Start mode: **Normal** /Soft /Super-Soft (300ms / 1.5s / 3s)
Normal mode is suitable for any aircraft. Soft or Super-Soft Mode is suitable for helicopters.
The first start in soft and super soft mode is slower, it takes 1.5 seconds for soft start or 3 seconds for super soft start from first start to full throttle. When the throttle is fully released (throttle lever in lowest position) and is operated again within 3 seconds (throttle lever in full throttle position), the repeated throttle shock is performed temporarily in normal mode to avoid the possibility of a crash due to too slow a throttle reaction.
This special function is especially useful for aerobatics, where fast throttle reactions are necessary.
6. Timing: **Low** 3.75° / Medium 15° / High 26.25°
Normally a low setting is suitable for most engines. For more speed a higher timing setting can be selected.

3. Using the ESC

IMPORTANT! Due to different throttle ranges with different remote controls please calibrate the throttle range before the first flight!

Throttle adjustment:

(The gas range should be reset each time the remote control is changed.)

1. Switch on the radio with throttle stick up (full).
2. Connect flight battery and wait for approx. 2 sec.
3. A "beep" sound should be heard, this confirms the setting of the full throttle position.
4. Put the throttle stick to lowest position, more „beep“ sound should be heard, which show the number of cells
5. A long „beep“ sound should be heard which confirms the lowest throttle stick position.

Normal Start-Up procedure

1. Throttle stick to lowest position, switch on radio.
2. Connect battery to ESC. Special tone as "•123" means the voltage input is ok.
3. More "beep-" tones should be heard to show the number of cells.
4. A long „beep“ tone sounds after self-test.
5. Move the throttle stick upwards to increase the power.

Safety functions

1. **Startup Fault protection:** If the motor is not started within 2 seconds after throttle movement starts, the controller switches off the throttle function. In this case the throttle MUST be reset to the lowest position. (Such a situation occurs as follows: The connection between governor and engine is not stable, the propeller or engine is blocked, the gearbox is damaged, etc. (The throttle is in the lowest position).
2. **Overheat protection:** If the temperature of the controller rises above 110°C, the controller reduces the output power.
3. **Lost of transmitter signal:** The controller reduces the output power if the transmitter signal fails for 1 second, further loss for 2 seconds causes the output power to be switched off.

4. Troubleshooting

Failure	Possible cause	Solution
After switching on, the motor does not work, no tones can be heard.	The connection between ESC and battery is not correct.	Check the connection carefully. Change the connectors.
After switching on, the motor does not work, the following warning tone is heard: "beep-beep-, beep-beep-, beep-beep-" (each "beep-beep-" has an interval of approx. 1 second)	Input voltage is not normal, too high or too low.	Check the battery voltage.
After switching on, the motor does not work, the following warning tone can be heard: "beep-, beep-, beep-" (each "beep-" has an interval of approx. 2 seconds)	Throttle signal is not correct.	Check radio and receiver. Check servo wire of ESC to receiver
After switching on, the motor does not work, the following warning tone is heard: "beep-, beep-, beep-" (every beep- has an interval of 0.25 seconds)	The throttle stick is not in lowest position.	Move the throttle stick to the lowest position.
After switching on, the motor does not work, the following warning tone "•56721" can be heard after 2 beep tones (beep- beep-)	Throttle is reversed, ESC is in programming mode.	Change the direction of throttle (servo reverse).
Motor turns in wrong direction	Change the connection between motor and ESC.	Exchange two connecting cables between motor and controller at random.

5. Programming the ESC with the transmitter (4 steps)

Note: Please note that the throttle curve is set to 0%, the throttle lever to neutral position and the deflection to 100%.

1. Start programming mode
2. Select program point
3. Setting the program point (value)
4. PExit programming mode.

1. Start programming mode

- 1) Switch on transmitter, set throttle stick to full throttle, connect battery to ESC
- 2) Wait 2 sec., a double „beep“ must be heard
- 3) Wait another 5 sec., special tone like “♪56721” should be heard. This confirms the programming mode.



3. Setting the program point (value)

You hear different tones in a loop. Set the value by tone by moving the throttle to full throttle. Then you hear a special tone “♪1515” which confirms and saves the selection. (Holding the throttle to full throttle brings you back to step 2 and you can select another point. Moving the throttle lever to the neutral position within 2 seconds will exit the programming mode.)

Point	Tone		
	“beep-” 1 short tone	“beep-beep-” 2 short tones	“beep-beep-beep” 3 short tones
Brake	Off	On	
Battery type	Lipo	NiMH	
Cut-Off	Soft-Cut	Cut-Off	
Cut-Off voltage	Low	Medium	High
Start mode	Normal	Soft	Super Soft
Timing	Low	Medium	High



2. Select program point

After starting the programming mode you will hear 8 tones in a loop with sequence. If you move the throttle to the neutral position within 3 seconds after listening to a tone, this point will be selected.

1. “beep”	Brake	(1 short tone)
2. “beep-beep-”	Batt. type	(2 short tones)
3. “beep-beep-beep-”	Lower volt.	(3 short tones)
4. “beep-beep-beep-beep-”	Cut-Off volt.	(4 short tones)
5. “beep-----”	Start Mode	(1 long tone)
6. “beep----beep-”	Timing	(1 long 1 short)
7. “beep----beep-beep-”	Factory reset	(1 long 2 short)
8. “beep----beep----”	Exit	(2 long tones)



4. Exit programming

There are two ways to exit the programming:

1. In step 3, after the special tone “♪1515”, move the throttle stick to the neutral position within 2 seconds.
2. In step 2, after tone “beep----beep ” (e.g. point 8) bring throttle stick inner 3 sec. Into neutral position.



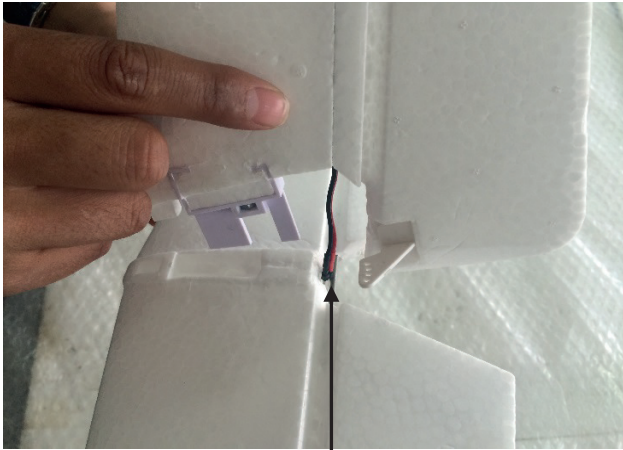
Manual of LED wire connection

Note: The assembly method of aircraft refers to the other manual included. This manual is only for the connection of LED wires. Please also read the aircraft assembly manual prior to connecting the LEDs.

1. Assemble the vertical stabilizer and horizontal stabilizer

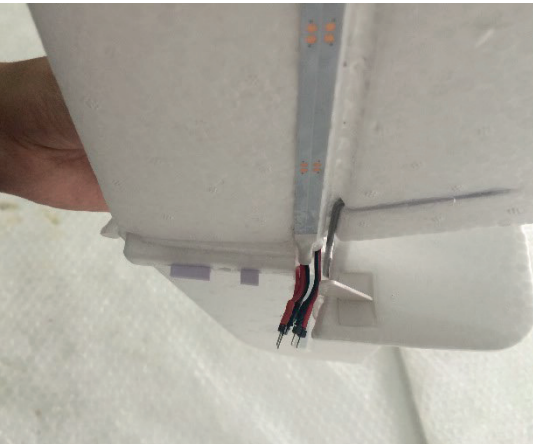
Guide the LED wire of the vertical stabilizer thru the spacing between the steel wire and foam part, as shown in Fig. 1. And assemble the vertical stabilizer and horizontal stabilizer. Please see Fig. 2 for the assembled part (tail).

Fig. 1



Guide the wire thru the spacing

Fig. 2



2. Assemble the tail to the fuselage

Connect the LED wire of the tail to the connector on the fuselage, as shown in Fig. 3 and 4. Please note the polarity of the LED wire, red to red, and black to black. Otherwise, it won't be lighted.

Fig. 3

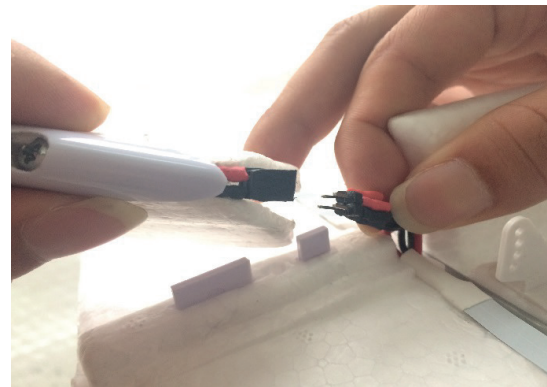
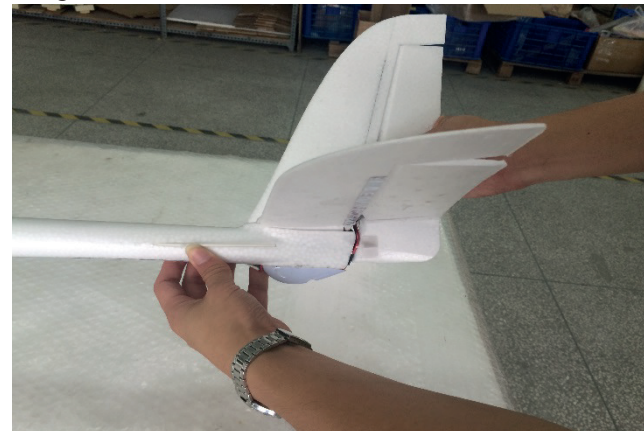


Fig. 4



Fig. 5



After connecting the wire, please carefully assemble the tail to the fuselage. And tighten the tail with the included screw from the bottom.

3. Assemble the wings

Guide the LED wire of the wing and servo wire thru the hole in the fuselage to the cabin, as shown in Fig. 6 and 7.

Fig. 6

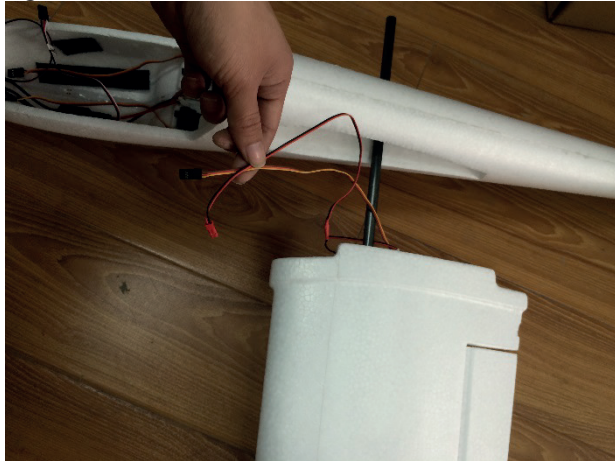


Fig. 7



4. Connect all LED wires

Connect all LED wires and ESC to the adapter connector, and power the LED, as shown below.

Fig. 8

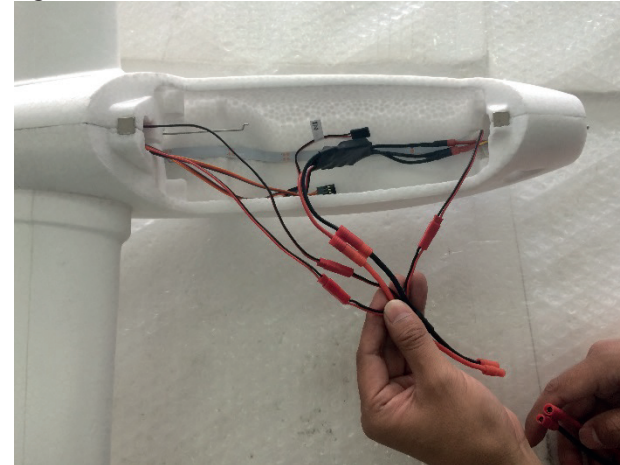
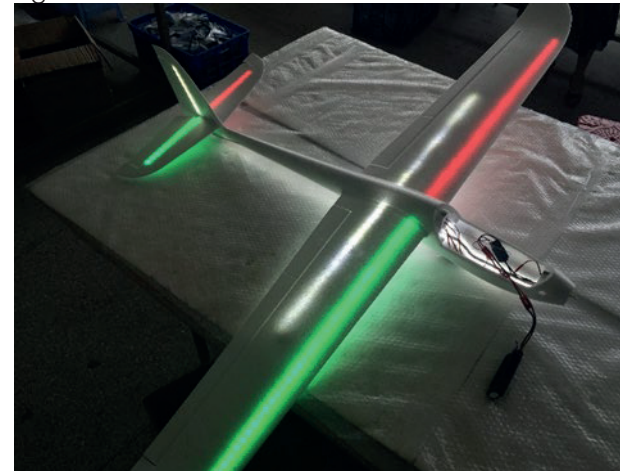


Fig. 9



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