

TWIN STAR II



MULTIPLEX[®]

Kit Twinstar II

21 4210

Building instructions

D Sicherheitshinweise

- ☺ Prüfen Sie vor jedem Start den festen Sitz des Motors und der Luftschraube - insbesondere nach dem Transport, härteren Landungen sowie Abstürzen. Prüfen Sie ebenfalls vor jedem Start den festen Sitz und die richtige Position der Tragflächen auf dem Rumpf.
- ☺ Akku erst einstecken, wenn Ihr Sender eingeschaltet ist und Sie sicher sind, daß das Bedienelement für die Motorsteuerung auf "AUS" steht.
- ☺ Im startbereiten Zustand nicht in den Bereich der Luftschraube greifen. Vorsicht in der Luftschraubendrehebene - auch Zuschauer zur Seite bitten!
- ☺ Zwischen den Flügen die Motortemperatur durch vorsichtige Fingerprobe prüfen und vor einem Neustart den Motor ausreichend abkühlen lassen. Die Temperatur ist richtig, wenn Sie den Motor problemlos berühren können. Insbesondere bei hohen Außentemperaturen kann dieses bis zu 15 Minuten dauern.
- ☺ Denken Sie immer daran: Niemals auf Personen und Tiere zufliegen.

F Conseils de sécurité

- ☺ Avant chaque décollage, vérifiez la fixation du moteur et de l'hélice, notamment après le transport, après les atterrissages violents et après un "Crash". Vérifiez également, avant chaque décollage la fixation ainsi que le positionnement de l'aile par rapport au fuselage.
- ☺ Ne branchez l'accu de propulsion que si vous êtes sûr que votre émetteur est allumé et que l'élément de commande moteur est en position "ARRET".
- ☺ Ne mettez pas vos doigts dans l'hélice! Attention à la mise en marche, demandez également aux spectateurs de reculer.
- ☺ Entre deux vols, vérifiez en posant un doigt dessus, la température du moteur, laissezle refroidir suffisamment avant le prochain décollage. La température est correcte si vous pouvez maintenir votre doigt ou votre main sur le moteur. Le temps de refroidissement peut varier jusqu'à 15 minutes s'il fait particulièrement chaud.
- ☺ Pensez-y toujours: ne volez jamais vers ou au-dessus des personnes ou des animaux.

GB Safety notes

- ☺ Before every flight check that the motor and propeller are in place and secure - especially after transporting the model, and after hard landings and crashes. Check also that the wing is correctly located and firmly secured on the fuselage before each flight.
- ☺ Don't plug in the battery until you have switched on the transmitter, and you are sure that the motor control on the transmitter is set to "OFF".
- ☺ When the model is switched on, ready to fly, take care not to touch the propeller. Keep well clear of the propeller disc too, and ask spectators to stay back.
- ☺ Allow the motor to cool down after each flight. You can check this by carefully touching the motor case with your finger. The temperature is correct when you can hold your finger on the case without any problem. On hot days this may take up to 15 minutes.
- ☺ Please keep in mind at all times: don't fly towards people or animals.

I Note di sicurezza

- ☺ Prima di ogni decollo controllare che il motore e la eliche siano fissati stabilmente - specialmente dopo il trasporto, atterraggi duri e se il modello è precipitato. Controllare prima del decollo anche il fissaggio e la posizione corretta delle ali sulla fusoliera.
- ☺ Collegare la batteria solo quando la radio è inserita ed il comando del motore è sicuramente in posizione "SPENTO".
- ☺ Prima del decollo non avvicinarsi al campo di rotazione della eliche. Attenzione alla eliche in movimento - pregare che eventuali spettatori si portino alla dovuta distanza di sicurezza!
- ☺ Tra un volo e l'altro controllare cautamente con le dita la temperatura del motore e farli raffreddare sufficientemente prima di ogni nuovo decollo. La temperatura è giusta se si possono toccare senza problemi. Specialmente con una temperatura esterna alta questo può durare fino a 15 minuti.
- ☺ Fare attenzione: Non volare mai nella direzione di persone ed animali.

E Advertencias de seguridad

- ☺ Compruebe antes de cada despegue que el motor y la hélice estén fuertemente sujetados, sobretodo después de haberlo transportado, de aterrizajes más fuertes así como después de una caída. Compruebe igualmente antes de cada despegue que las alas estén bien sujetas y bien colocadas en el fuselaje.
- ☺ Conectar la batería, cuando la emisora esté encendida y Usted esté seguro que el elemento de mando para el motor esté en "OFF".
- ☺ No meter la mano en la zona inmediata a la hélice cuando el avión esté a punto de despegar. ¡Cuidado con la zona de la hélice! ¡Pedir a los espectadores que se aparten!
- ☺ Entre los vuelos hay que comprobar cuidadosamente la temperatura del motor con el dedo y dejar que el motor se enfríe antes de volver a despegar. La temperatura es correcta, si puede tocar el motor sin problemas. Sobretodo en el caso de temperaturas del ambiente muy altas, esto puede tardar unos 15 minutos.
- ☺ Recuerde: No volar nunca hacia personas o animales.

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Dekorbogen, Planche de décoration, Decal sheet, Decals, Láminas decorativas

1	Lámina decorativa	Lámina adhesiva impresa	350 x 700mm
1	Dekorbogen	bedruckte Klebefolie	350 x 700mm
1	Planche de décoration	Film autocollant	350 x 700mm
1	Decal sheet	Printed self-adhesive film	350 x 700 mm
1	Decals foglio	adesivo stampato	330 x 700mm

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Rumpfhälften und Bowdenzüge, Demi-aile et clé d'aile, Fuselage shells and snakes, Mitades del fuselaje y transmisiones, Gusci fusoliera e bowden

1	Rumpfhälfte links	Elapor geschäumt	Fertigteil
1	Rumpfhälfte rechts	Elapor geschäumt	Fertigteil
1	Stahldraht für HR m. Z.	Metall	Ø0.8
1	Stahldraht für SR m. Z.	Metall	Ø0.8
1	Bowdenzugaußenrohr HR	Kunststoff	Ø3/2
1	Bowdenzugaußenrohr SR	Kunststoff	Ø3/2
1	Bowdenzuginnenrohr HR	Kunststoff	Ø2/1
1	Bowdenzuginnenrohr SR	Kunststoff	Ø2/1
1	Bowdenzugaußenrohr Antenne	Kunststoff	Ø3/2
1	Demi fuselage gauche	mousse Elapor	Complet
1	Demi fuselage droit	mousse Elapor	Complet
1	Corde à piano pour prof. avec Z	Métal	Ø0.8
1	Corde à piano pour dérive avec Z	Métal	Ø0.8
1	Gaine extérieure pour profondeur	Plastique	Ø3/2
1	Gaine extérieure pour direction	Plastique	Ø3/2
1	Gaine intérieure pour profondeur	Plastique	Ø2/1
1	Gaine intérieure pour direction	Plastique	Ø2/1
1	Gaine pour antenne	Plastique	Ø3/2
1	L.H. fuselage shell	Moulded Elapor foam	Ready made
1	R.H. fuselage shell	Moulded Elapor foam	Ready made
1	Pre-formed steel elevator pushrod	Metal	0.8 Ø
1	Pre-formed steel rudder pushrod	Metal	0.8 Ø
1	Elevator snake outer sleeve	Plastic	3 / 2 Ø
1	Rudder snake outer sleeve	Plastic	3 / 2 Ø
1	Elevator snake inner sleeve	Plastic	2 / 1 Ø
1	Rudder snake inner sleeve	Plastic	2 / 1 Ø
1	Aerial sleeve	Plastic	3 / 2 Ø
1	Fuselaje (mitad izquierda)	Elapor	Pieza prefabricada
1	Fuselaje (mitad derecha)	Elapor	Pieza prefabricada
1	Varilla T. Prof. con "Z"	Metal	Ø0.8
1	Varilla T. Dirección con."Z"	Metal	Ø0.8
1	Funda exterior trans. T. Prof.	Plástico	Ø3/2
1	Funda exterior trans. T. Dirección	Plástico	Ø3/2
1	Funda interior trans. T. Prof.	Plástico	Ø2/1
1	Funda interior trans. T. Dirección	Plástico	Ø2/1
1	Tubo de antena	Plástico	Ø3/2
1	Semiala sinistra	espanso Elapor	finito
1	Semiala destra	espanso Elapor	finito
1	Rinvio per EL con "Z"	metallo	Ø 0,8
1	Rinvio per DI con "Z"	metallo	Ø 0,8
1	Guaina bowden EL	materiale plastico	Ø 3/2
1	Guaina bowden DI	materiale plastico	Ø 3/2
1	Tubo interno bowden EL	materiale plastico	Ø 2/1
1	Tubo interno bowden DI	materiale plastico	Ø 2/1
1	Guaina bowden per antenna	materiale plastico	Ø 3/2

22 4171

Kabinenhaube, Verrière, Canopy, Cabina, Capottina

1	Kabinenhaube	Elapor geschäumt	Fertigteil
1	Verrière	mousse Elapor	Complet
1	Canopy Moulded	Elapor foam	Ready made
1	Cabina	Elapor	Pieza prefabricada
1	Capottina	espanso Elapor	finito

22 4172

Tragflächen-Formteile, Aile en pièce injectée, Moulded wing components, Alas, Parti stampate per ali

1	Tragfläche links	Elapor geschäumt	Fertigteil
1	Tragfläche rechts	Elapor geschäumt	Fertigteil
1	Holmabdeckung links	Elapor geschäumt	Fertigteil
1	Holmabdeckung rechts	Elapor geschäumt	Fertigteil

1	Demi aile gauche	mousse Elapor	Complet
1	Demi aile droite	mousse Elapor	Complet
1	Capot de clé d'aile gauche	mousse Elapor	Complet
1	Capot de clé d'aile droit	mousse Elapor	Complet

parts - Twin Star II, Lista de repuestos del TwinStar II, Parti di ricambio TwinStar II

1	L.H. wing panel	Moulded Elapor foam	Ready made
1	R.H. wing panel	Moulded Elapor foam	Ready made
1	L.H. spar cover	Moulded Elapor foam	Ready made
1	R.H. spar cover	Moulded Elapor foam	Ready made
1	Ala izquierda	Elapor Pieza	prefabricada
1	Ala derecha	Elapor Pieza	prefabricada
1	Tapa izquierda larguero	Elapor Pieza	prefabricada
1	Tapa derecha larguero	Elapor Pieza	prefabricada
1	Semiala sinistra	espanso Elapor	finito
1	Semiala destra	espanso Elapor	finito
1	Coperchio baionetta sinistro	espanso Elapor	finito
1	Coperchio baionetta destro	espanso Elapor	finito

22 4173

Leitwerks-Formteile, Gouvernes en pièce injectée, Moulded tail panels, Timones, Parti stampate per piani di coda

1	Höhenleitwerk	Elapor geschäumt	Fertigteil
1	Seitenleitwerk	Elapor geschäumt	Fertigteil
1	Profondeur	mousse Elapor	Complet
1	Dérive	mousse Elapor	Complet
1	Tailplane	Moulded Elapor foam	Ready made
1	Fin	Moulded Elapor foam	Ready made
1	Timón de profundidad	Elapor Pieza	prefabricada
1	Timón de dirección	Elapor Pieza	prefabricada
1	Piano di quota	espanso Elapor	finito
1	Direzionale	espanso Elapor	finito

22 4174

Kleinteilesatz, Petit nécessaire, Small items set, Pequeñas piezas, Minuteria

1	Kleinteilesatz
1	Petit nécessaire
1	Small items set
1	Conjunto de pequeñas piezas
1	Minuteria

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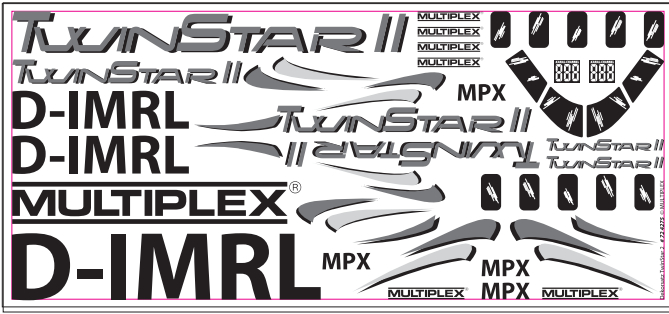
Holmverbinder, Clé d'aile, Wing joiner, Larguero, Baionetta

1	Holmverbinder	GFK-Rohr	Ø10 x 620mm
1	Clé d'aile	Fibre de verre	Ø10 x 620mm
1	Wing joiner	GRP tube	10 Ø x 620 mm
1	Larguero	Tubo fibra de vidrio	Ø10 x 620mm
1	Baionetta	tubo in vetroresina	Ø 10 x 620mm

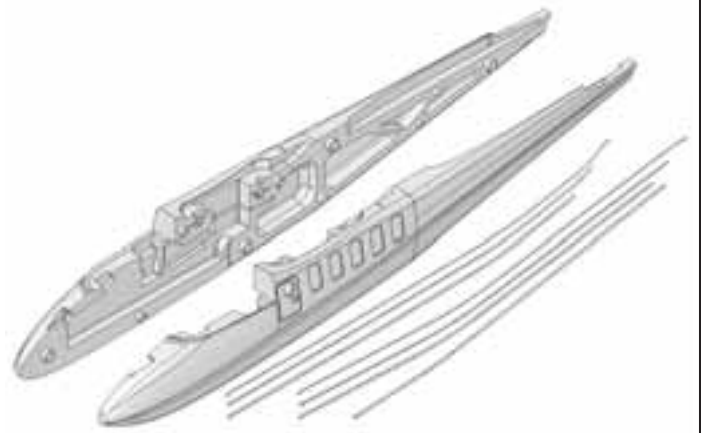
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Motorträger, Support moteur, Motor mount, Bancada, Supporto motore

1	Motorspant Kunststoff gespritzt	Fertigteil	
1	Motorspanthalter	Kunststoff gespritzt	Fertigteil
2	Schraube	Metall	M2,5 x 6mm
4	Schraube	Metall	2,2 x 13mm
1	Face avant	Plastique injecté	Complet
1	Support moteur	Plastique injecté	Complet
2	Vis	Métal	M2,5 x 4mm
4	Vis	Métal	2,2 x 13mm
1	Motor bulkhead	Inj. moulded plastic	Ready made
1	Motor bracket	Inj. moulded plastic	Ready made
2	Screw	Metal	M2.5 x 6 mm
4	Screw	Metal	2.2 x 13 mm
1	Cuaderna parallamas	Plástico inyectado	Pieza prefabricada
1	Soporte cuaderna	Plástico inyectado	Pieza prefabricada
2	Schraube Metal	M2,5 x 6mm	
4	Schraube Metal	2,2 x 13mm	
1	Ordinata motore	materiale plastico	finito
1	Supporto motore	materiale plastico	finito
2	Vite	metallo	M2,5 x 4mm
4	Vite	metallo	2,2 x 13mm



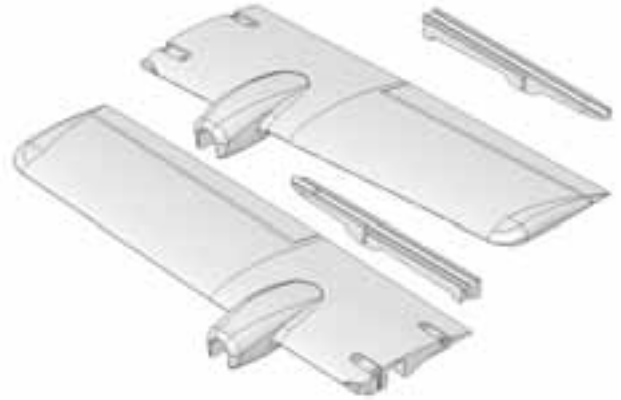
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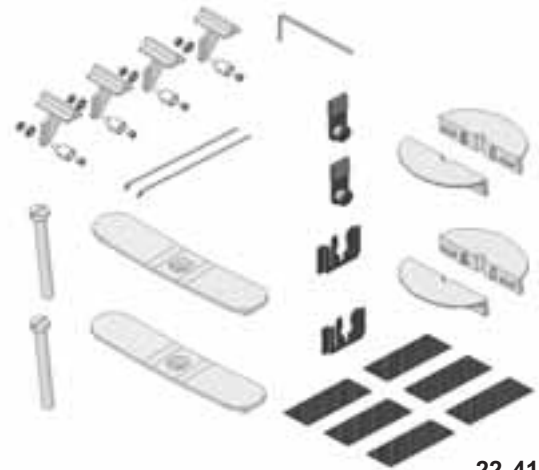
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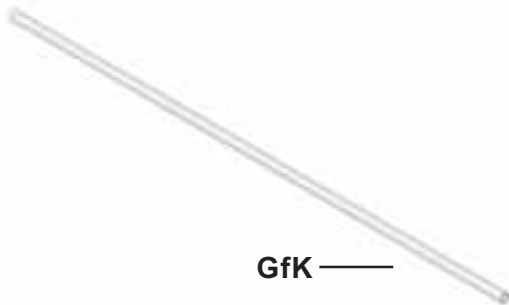
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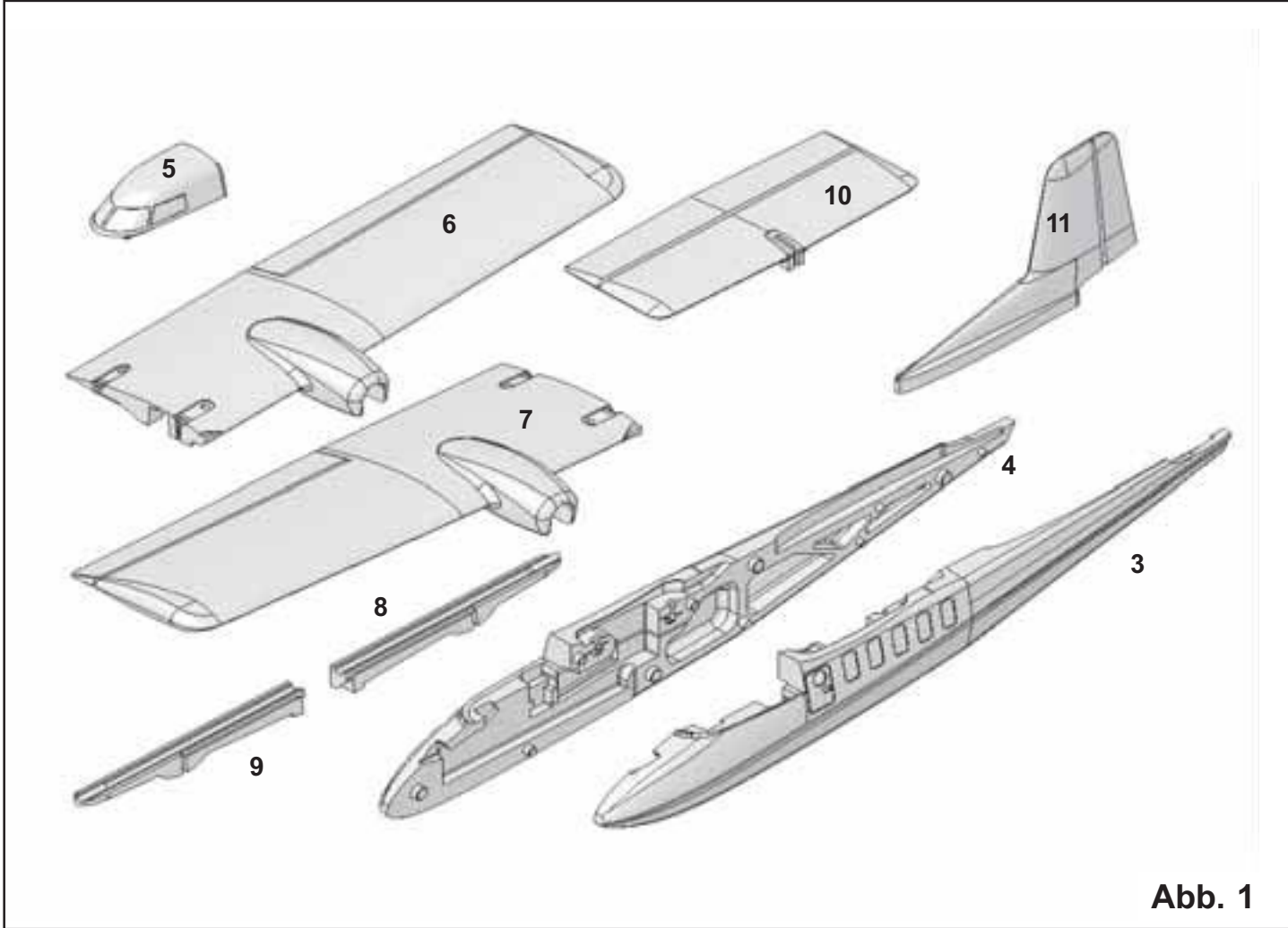


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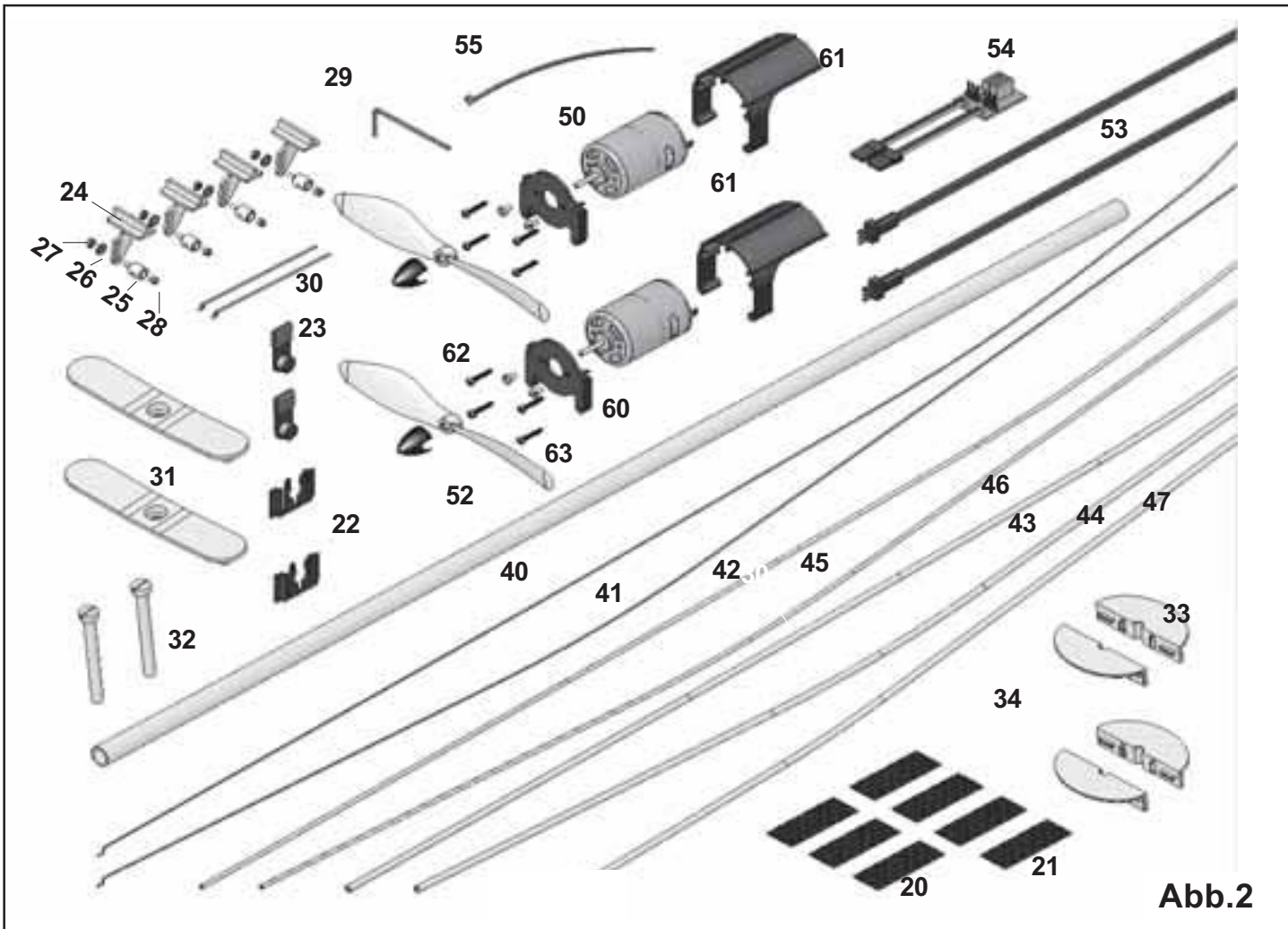


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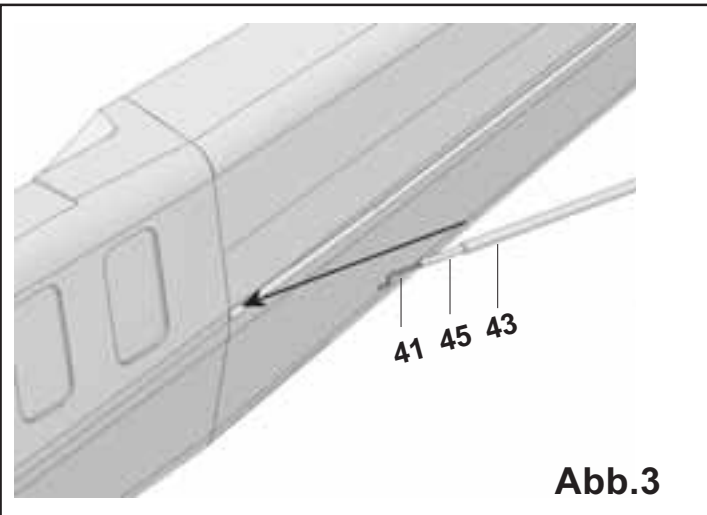


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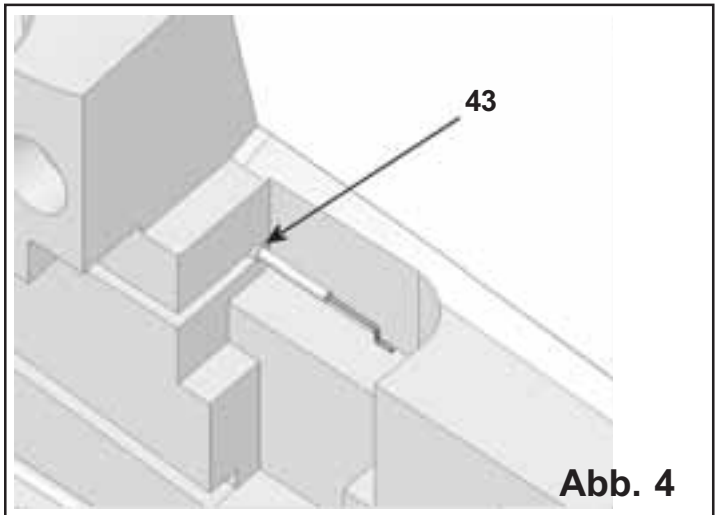


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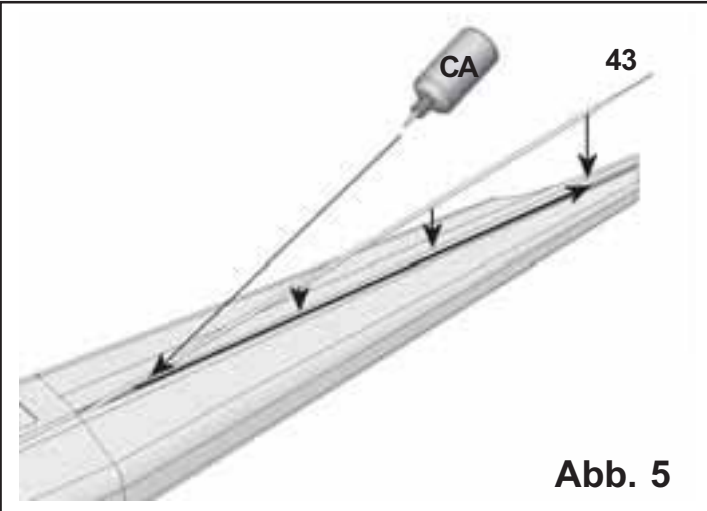


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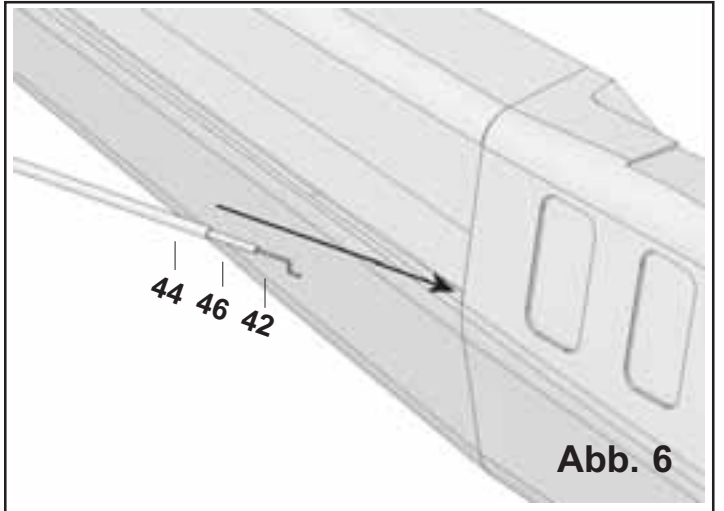


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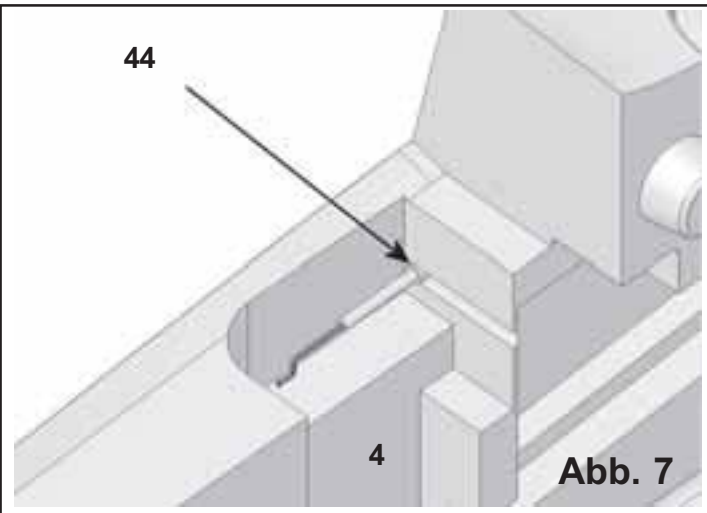


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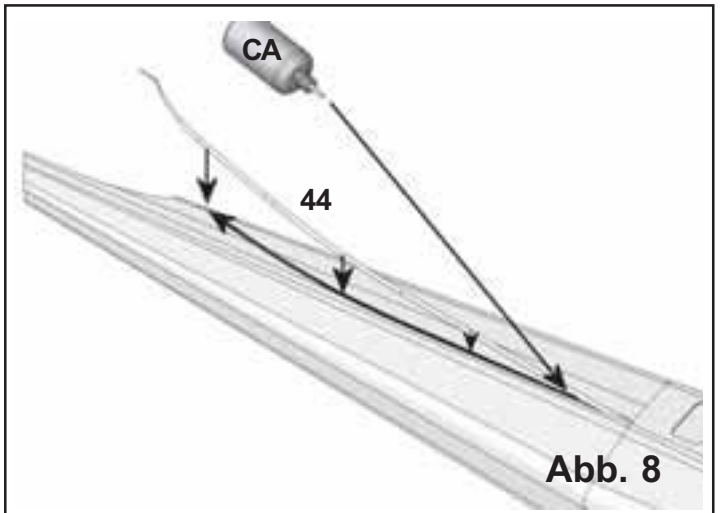


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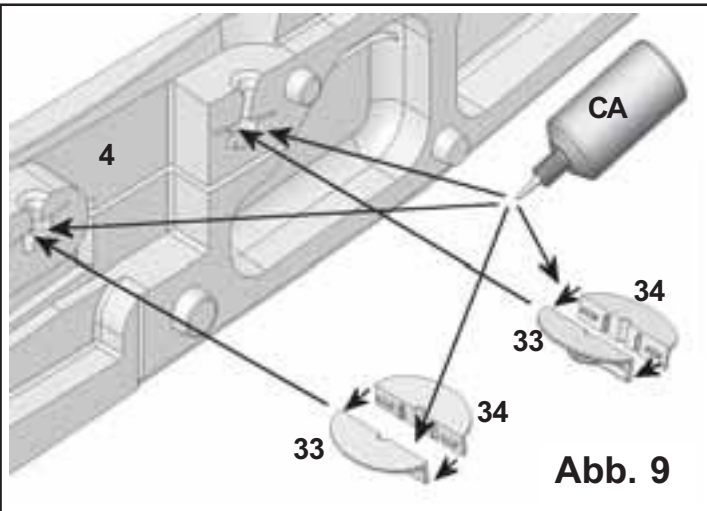


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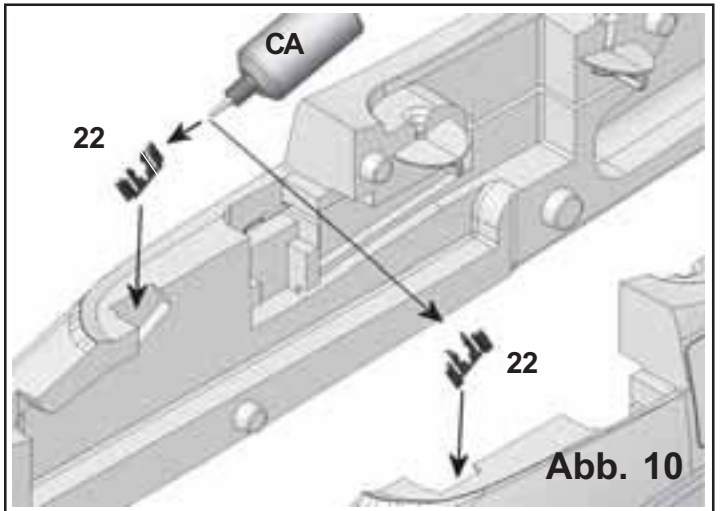


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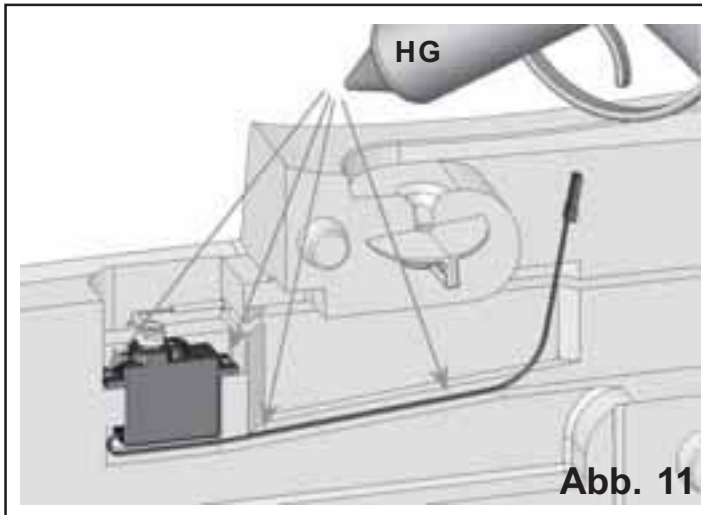


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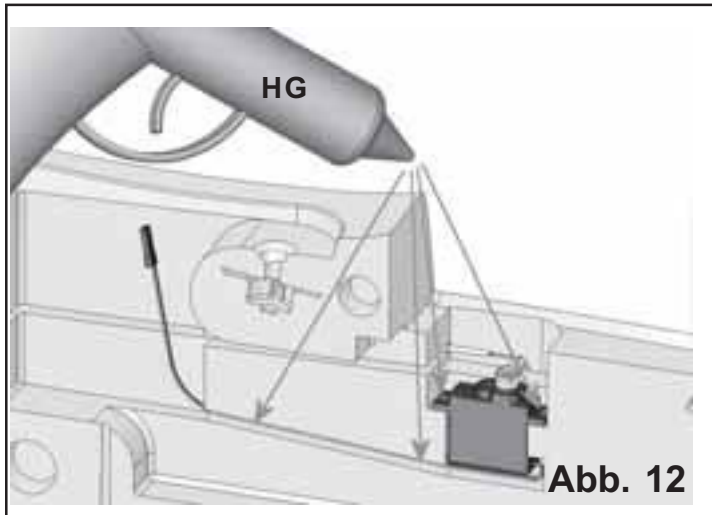


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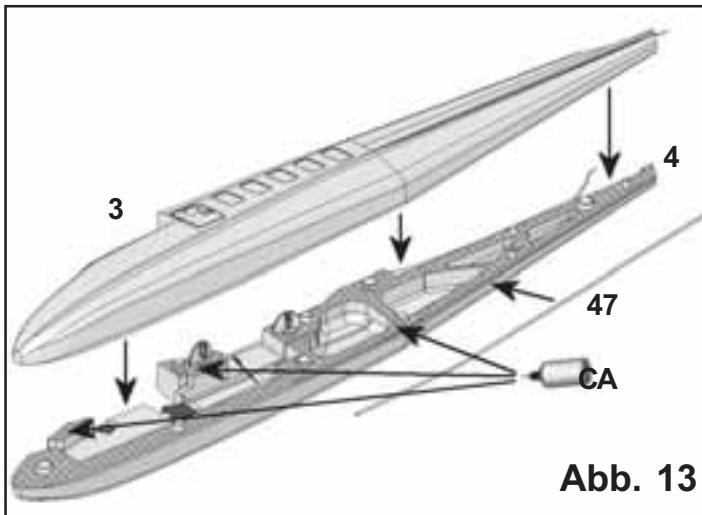


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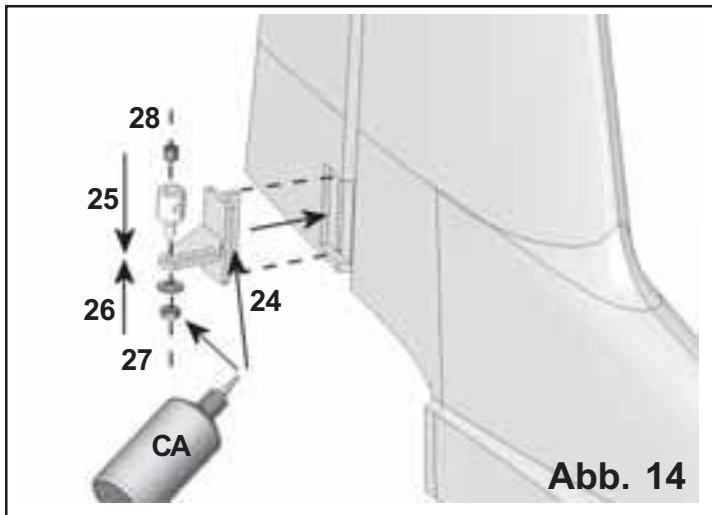


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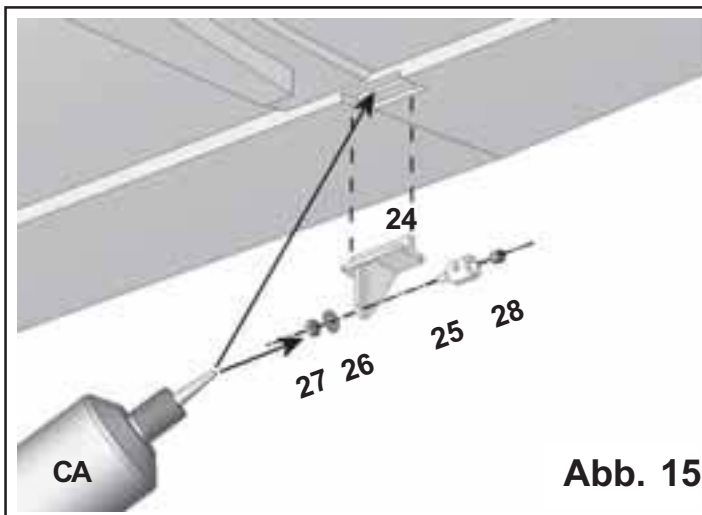


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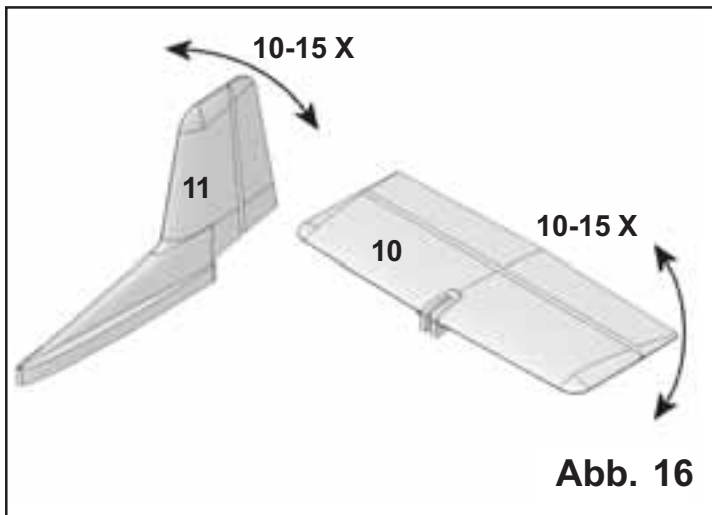


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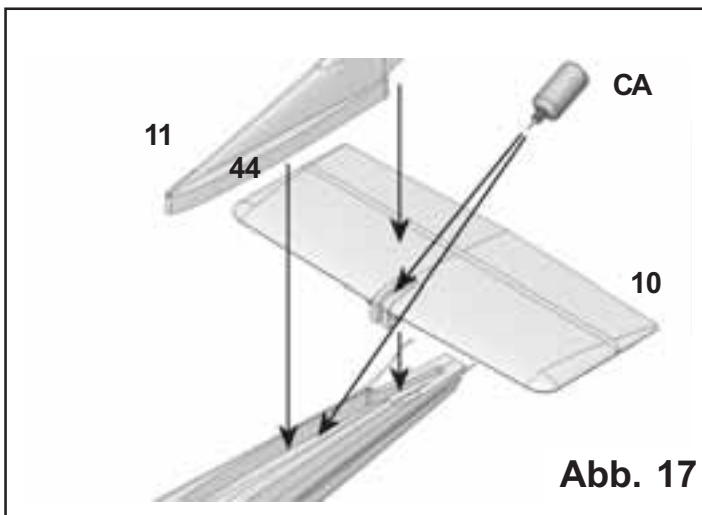


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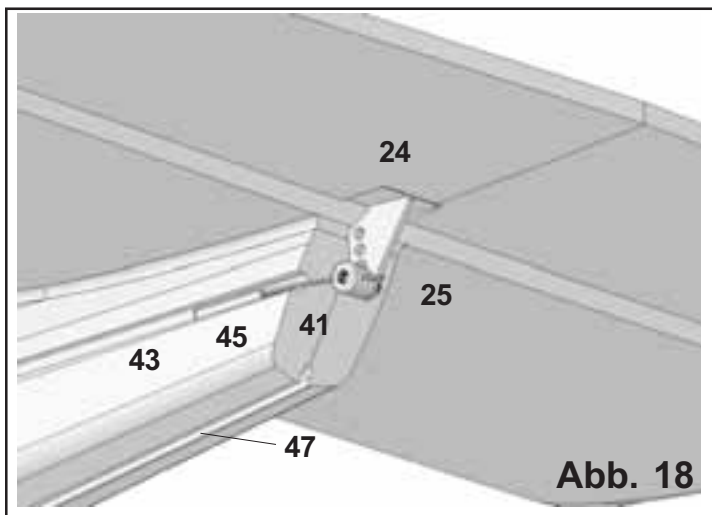


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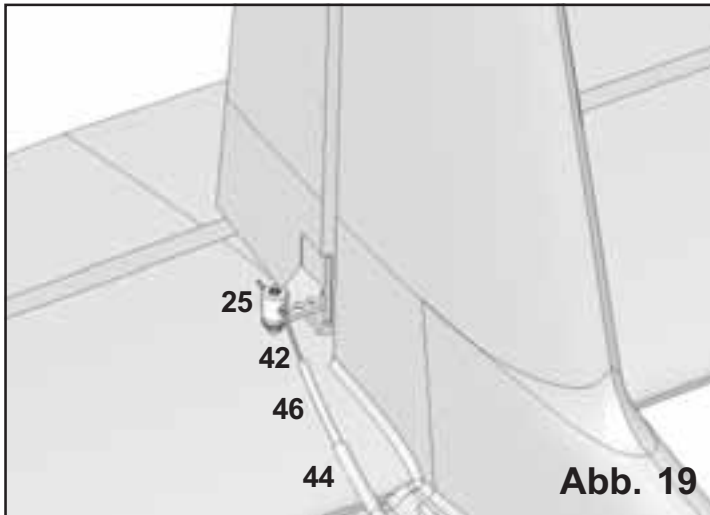


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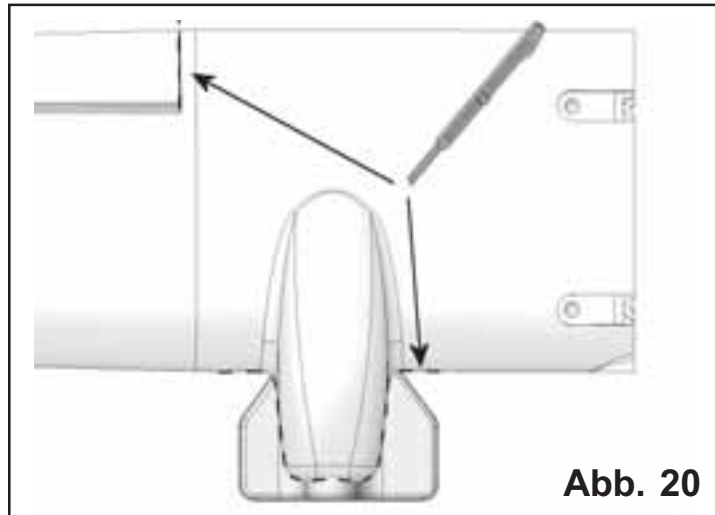


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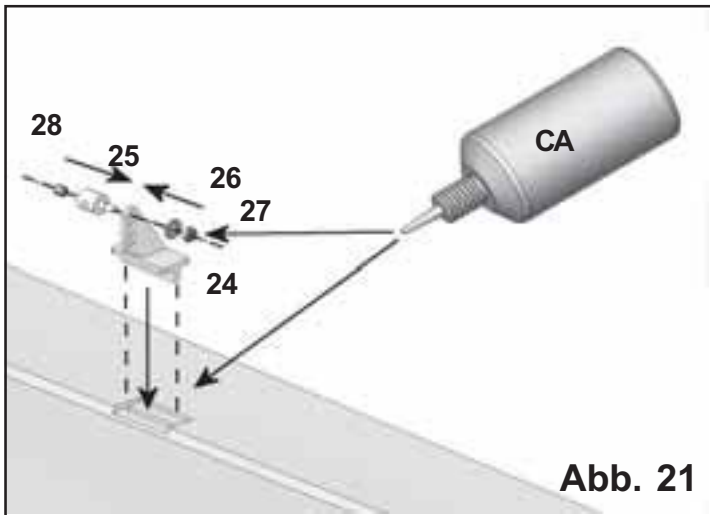


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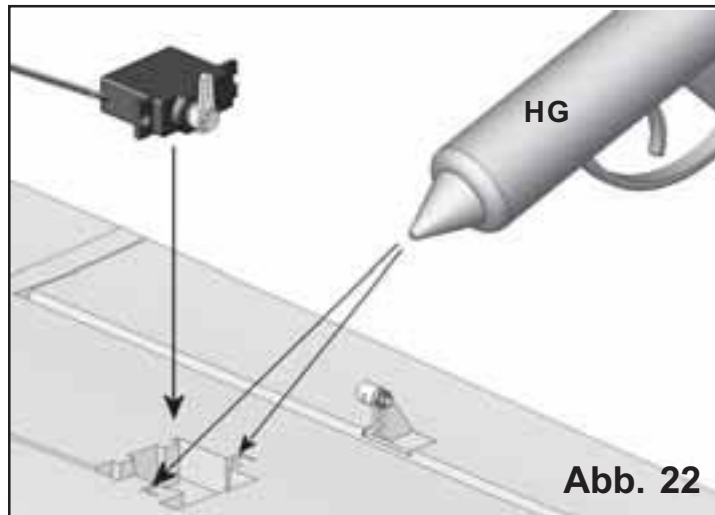


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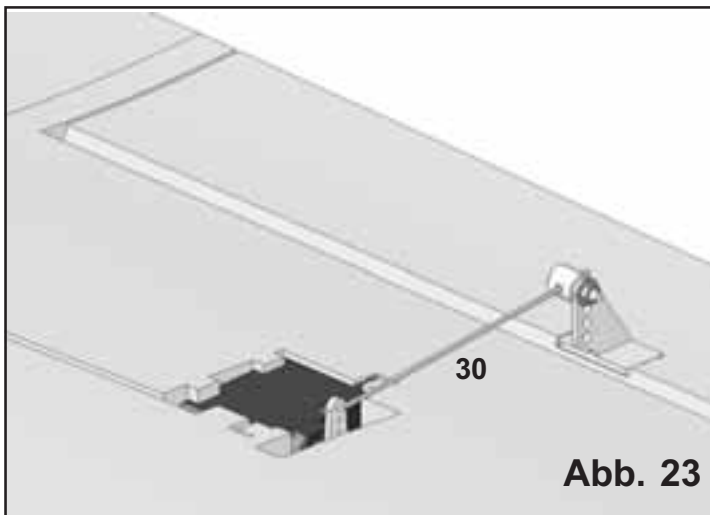


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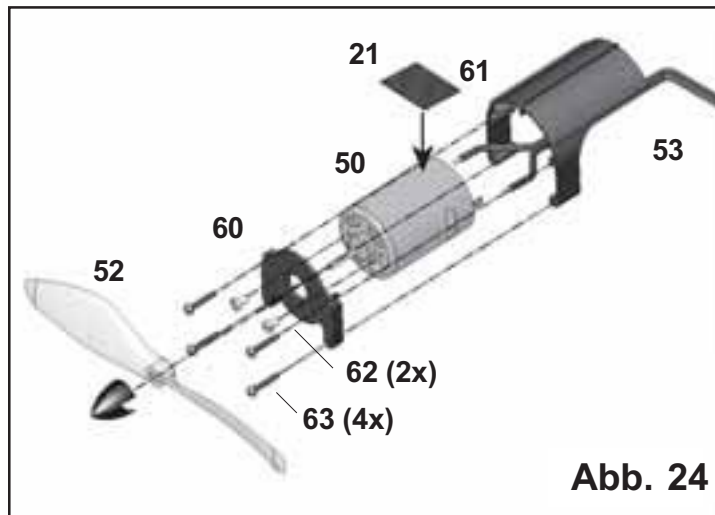


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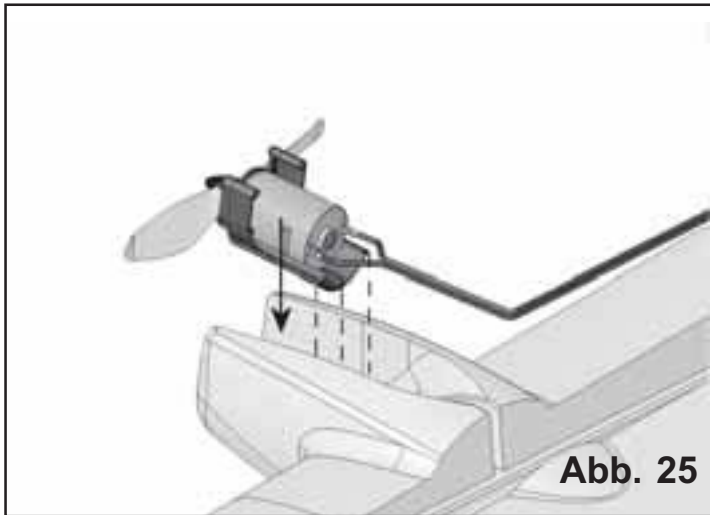


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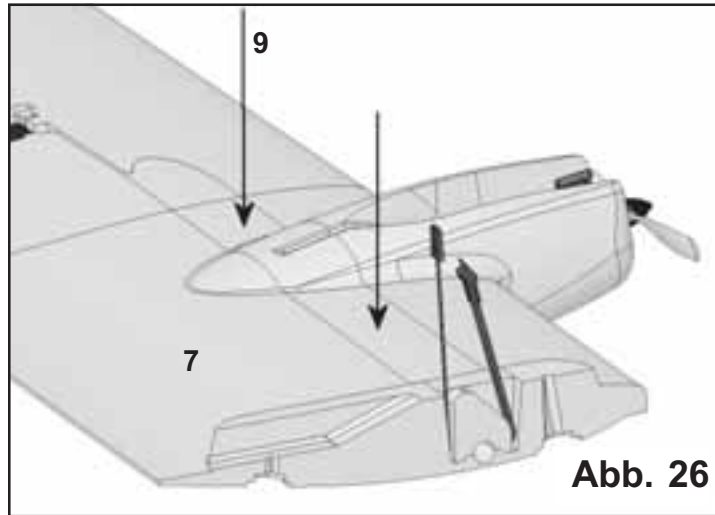


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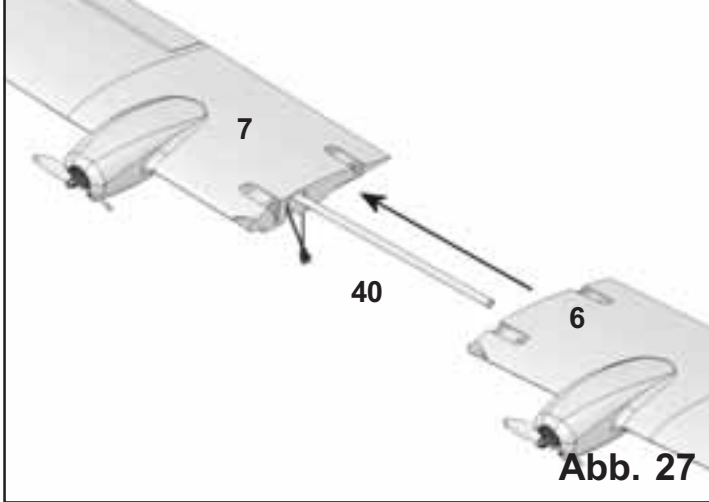


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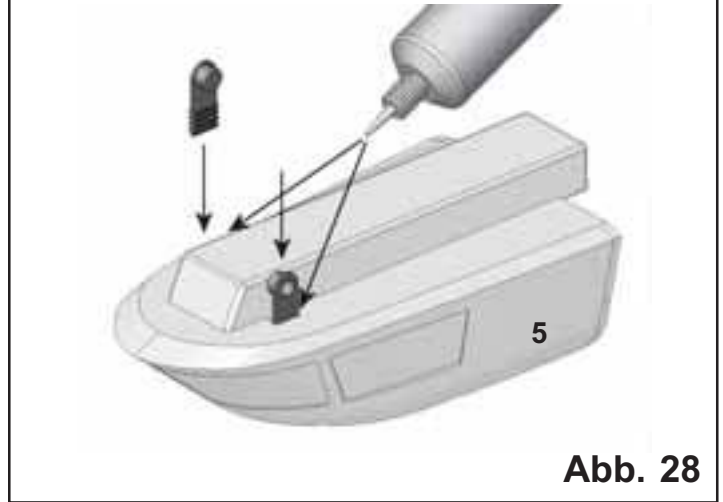


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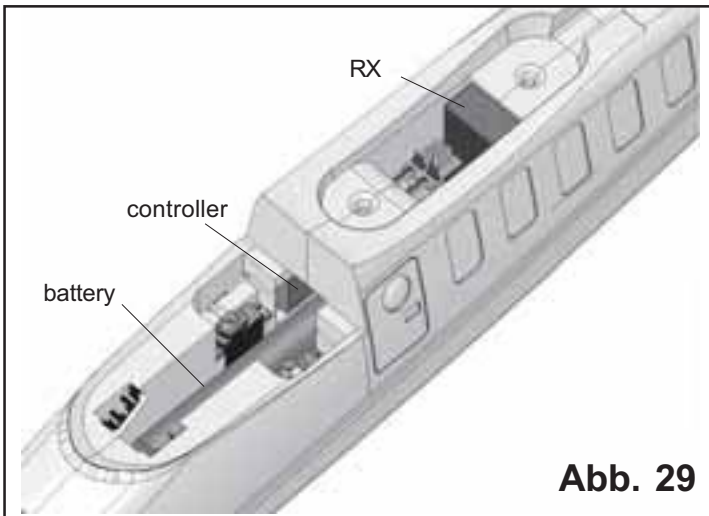


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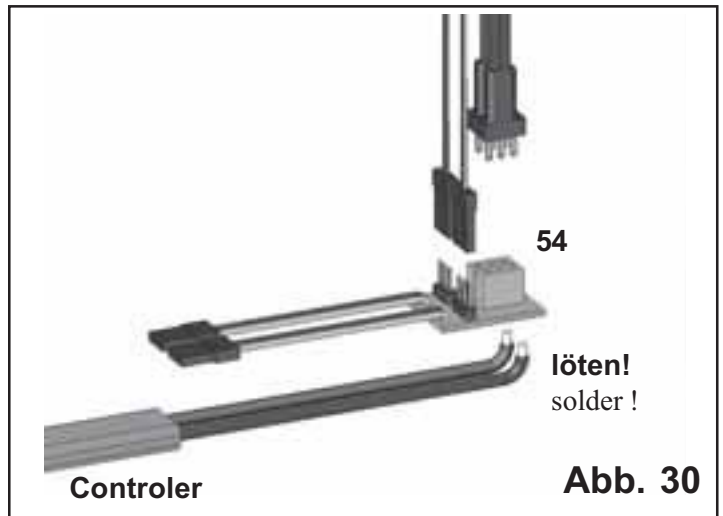


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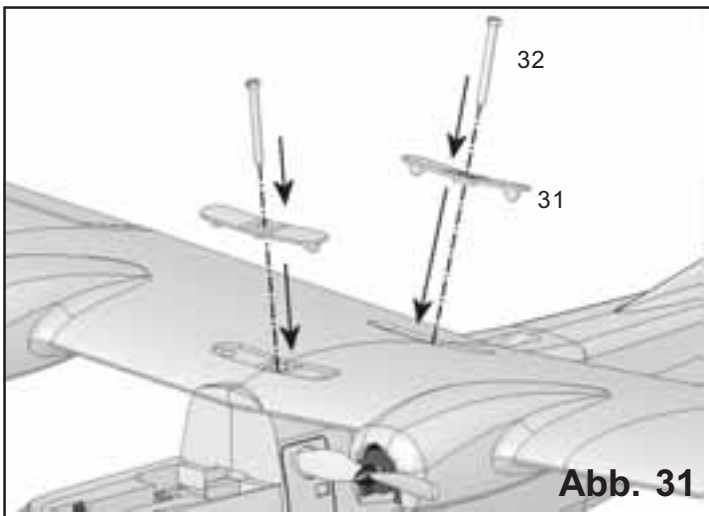


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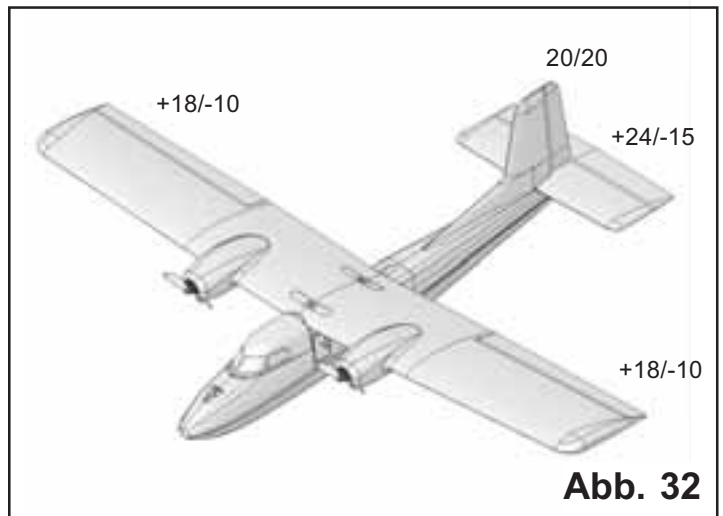


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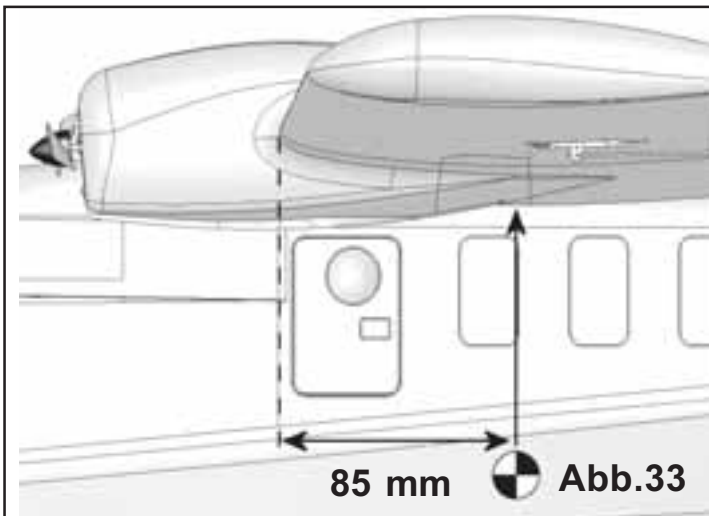


Abb.33



Examine your kit carefully!

MULTIPLEX model kits are subject to constant quality checks throughout the production process, and we sincerely hope that you are completely satisfied with the contents of your kit. However, we would ask you to check all the parts **before** you start construction, as **we cannot exchange components which you have already worked on**. If you find any part is not acceptable for any reason, we will readily correct or exchange it. Just send the component to our Model Department. Please be **sure** to include the purchase receipt and a brief description of the fault.

We are constantly working on improving our models, and for this reason we must reserve the right to change the kit contents in terms of shape or dimensions of parts, technology, materials and fittings, without prior notification. Please understand that we cannot entertain claims against us if the kit contents do not agree in every respect with the instructions and the illustrations.

Caution!

Radio-controlled models, and especially model aircraft, are by no means playthings. Building and operating them safely requires a certain level of technical competence and manual skill, together with discipline and a responsible attitude at the flying field. Errors and carelessness in building and flying the model can result in serious personal injury and damage to property. Since we, as manufacturers, have no control over the construction, maintenance and operation of our products, all we can do is expressly point out these hazards.

Additional items required for the TwinStar II:**Adhesives and activator:**

Use medium-viscosity cyano-acrylate glue ("**cyano**") and matching activator ("kicker") - do not use styrofoam cyano. Epoxy adhesives produce what initially appears to be a sound joint, but the bond is only superficial, and the hard resin breaks away from the parts under load.

Hot-melt adhesive (from a glue gun) is a useful alternative.

MULTIPLEX receiving system components:

MULTIPLEX <i>Micro IPD</i> UNI receiver	35 MHz A-band	Order No. 5 5971
alternatively:	40 MHz band	Order No. 5 5972
<i>Tiny-S</i> UNI servo (four required)	Ele. / rud. / 2 x ail.	Order No. 6 5121
300 mm extension lead, UNI	Aileron servo x 2	Order No. 8 5031
Optional: 200 mm separation filter lead, UNI	Aileron servo x 2	Order No. 8 5035

Battery charger:

MULTIcharger 5008 DC (charge current 100 mA ... 5 A), for use with 12 V, e.g. car battery	1-8 NiCd / NiMH cells	Order No. 9 2525
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MULTIcont M-32 UNI	Speed controller	Order No. 7 2279
MULTIPLEX Permabatt NiMH flight battery	7 / 3000 mAh	Order No. 15 6026
or		
MULTIPLEX Permabatt NiMH flight battery	8 / 3000 mAh	Order No. 15 6027

Tools:

Scissors, balsa knife, side-cutters, 8 mm screwdriver, soldering iron.

Note: please remove the illustration pages from the centre of these instructions.

Specification:**TWINSTAR II**

Wingspan	1420 mm	56 in
Fuselage length	1085 mm	43 in
Wing area (FAI) approx.	43 dm ²	4.7 sq. ft
Weight approx.	1500 g	53 oz
Wing loading	35 g / dm ²	11.5 oz/sq.ft
Power system	2 x Permax 400 6 V	
Receiver power supply	BEC	
RC functions	Aileron, elevator, rudder, throttle	

Important note

This model is not made of styrofoam™, and it is not possible to glue the material using white glue or epoxy. Please be sure to use cyano-acrylate glue exclusively, preferably in conjunction with cyano activator (kicker). We recommend medium-viscosity cyano. This is the procedure: spray cyano activator on one face of the Elapor®; allow it to air-dry for about two minutes, then apply cyano adhesive to the other face. Join the parts, and immediately position them accurately.

Assembling the model:

1. Before you start

Check the contents of your kit.

You will find **Figs. 1 + 2** and the Parts List helpful here.

Completing the fuselage and tail panels

2. Preparing the control "snakes"

The snake outer sleeves 3/2 are supplied 700 mm long. The first step is to cut them to the following lengths:

Elevator	43	3 / 2 Ø x 700 mm
Rudder	44	3 / 2 Ø x 670 mm
Aerial	47	2 / 1 Ø x 600 mm

The inner tubes 2/1 are supplied 730 mm long. Shorten the rudder inner to 705 mm.

Elevator	45	2 / 1 Ø x 730 mm
Rudder	46	2 / 1 Ø x 705 mm

3. Installing the snake outers in the fuselage shells

Note: we strongly recommend that you glue the snake outer sleeves **43** and **44**, and the aerial sleeve **47**, to the fuselage over their full length, as the sleeves increase the stiffness of the tail boom substantially.

Ensure that the control systems move freely and smoothly, and that no glue gets inside the snake outer sleeves.

Left-hand fuselage shell:

Fit the elevator snake **41**, **45**, **43** (steel rod length: 770 mm) in the left-hand fuselage shell, with the pre-formed end of the steel rod at the nose.

Fig. 3

Position the snake outer **43** flush with the front part of the fuselage, as shown in **Fig. 4**. Lay the shell down flat, and glue the outer sleeve **43** in the channel over its full length using cyano.

Fig. 5

Right-hand fuselage shell:

Fit the rudder snake **42**, **46**, **44** (steel rod length: 720 mm) in the right-hand fuselage shell, with the pre-formed end of the steel rod at the nose.

Fig. 6

Position the snake outer **44** flush with the front part of the fuselage, as shown in **Fig. 7**. Lay the shell down flat, and glue the outer sleeve **44** in the channel over its full length using cyano.

Fig. 8

4. Installing the wing retainer screw plates

Glue the wing screw plates **33 + 34** together using a little glue, and install these parts in the moulded recesses in the fuselage shell **4**, again using glue sparingly.

Fig. 9

5. Installing the canopy latch system

The Canopy-Lock latches **22** must be fitted in such a way that the latch tongues **23** can be engaged between the latches **22** and the fuselage sides. Spray activator in the latch recesses in the fuselage, and allow it to air-dry. Apply thick cyano to the joint surfaces of the latches, and place them immediately in the correct position. Apply more glue afterwards if necessary.

Fig. 10

6. Installing the servos in the fuselage

Set the servos to neutral (centre) from the transmitter and fit the output levers on them with the arms at 90° to the long case sides. Trial-fit the servos in the sides of the fuselage as shown in the illustrations; you may need to make minor adjustments to suit the servos you are using. Route the servo leads along the appropriate

channels towards the rear. Fix the leads in place with a drop of hot-melt glue, or use 5-minute epoxy. Fix the servos in place in the same way, using a drop of hot-melt glue on the mounting lugs.

Figs. 11 + 12

7. Joining the fuselage shells

The best adhesive for this stage is medium or thick cyano.

Offer up the left and right fuselage shells **3 / 4** to each other, so that you can check that they mate together fully: carry out any minor trimming required to obtain a close fit.

Once you are sure that everything fits properly, apply activator to the joint surfaces of one fuselage shell, and allow it to air-dry for about **two minutes**. Spread out the activator evenly with a rag if necessary.

Glue the aerial sleeve **47** in the right-hand fuselage shell, taking care to avoid bending the fuselage.

Apply cyano to the joint surfaces of the second fuselage shell. Working quickly and carefully, bring the fuselage halves together and align them immediately. Note that the fuselage joint line must be straight; there should be no trace of a curve.

Fig. 13

8. Attaching the horn to the rudder

Fit the pushrod connector **25** in the outer hole of the rudder horn **24**, and secure it with the washer **26** and nut **27**.

Caution: note the correct orientation! Tighten the nut carefully: just to the point where the connector revolves smoothly, but without wobbling. When you are sure, apply a tiny drop of cyano to the nut (best applied on the point of a pin). Fit the socket-head grub screw **28** in the pushrod connector **25** using the allen key **29**.

Apply activator to the horn recess in the rudder, then apply cyano to the horn **24** and place it in the recess, with the row of holes at the leading edge, facing the hinge pivot line.

Fig. 14

9. Attaching the horn to the elevator

Fit the pushrod connector **25** in the outer hole of the rudder horn **24**, and secure it with the washer **26** and nut **27**. **Caution:** note the correct orientation! Tighten the nut carefully: just to the point where the connector revolves smoothly, but without wobbling. When you are sure, apply a tiny drop of cyano to the nut (best applied on the point of a pin). Fit the socket-head grub screw **28** in the pushrod connector **25** using the allen key **29**.

Apply activator to the horn recess in the rudder, then apply cyano to the horn **24** and place it in the recess, with the row of holes at the leading edge, facing the hinge pivot line.

Fig. 15

10. Releasing the elevator and rudder

Gently move the rudder and elevator to and fro at the hinge lines to "ease" the hinges, i.e. to allow them to deflect freely. **Do not separate the control surfaces.**

Fig. 16

11. Gluing the tail panels to the fuselage

Offer up the tailplane and fin to the fuselage "dry" (no glue), and check that they fit correctly. Ensure in particular that the tailplane **10** is a snug fit on the fuselage (no gaps), and is parallel to the wing saddle at the front of the fuselage. You can check this by temporarily fixing the tubular wing joiner **40** to the wing saddle using masking tape. Now sight along the fuselage from the nose and check that the wing joiner is parallel to the tailplane. When you are confident that you can align both panels correctly, the tailplane and fin can be glued permanently to the fuselage; note that the fin must be set exactly at 90° to the tailplane. Check alignment and the accuracy of the fit once more before reaching for the glue. If these parts are mis-aligned, you will regret it for the whole of the model's life.

Fig. 17

12. Completing the elevator and rudder linkages

Slip the tail end of the steel inner pushrods **41** and **42** through the pushrod connectors **25**. Set the control surfaces to neutral (centre) and tighten the socket-head grub screws **28** to secure the pushrods. Check that the control surfaces work in the appropriate "sense" (correct direction relative to stick movement).

Figs. 18 + 19

Completing the wings

13. Preparing the wing panels

Cut through the ailerons on the wing panels **3** and **4** at the inboard end to leave a gap 1 mm wide. Flex the control surfaces repeatedly up and down in order to free up the hinge lines. **Caution: do not separate the ailerons from the wing.**

The production process leaves superfluous "stub wings" attached to the motor pods. Carefully remove these using a very sharp knife.

Fig. 20

14. Attaching the horns to the ailerons

Fit the pushrod connectors **25** in the outermost holes of the aileron horns **24**. Secure the connectors using the washers **26** and nuts **27**.

Caution: make a handed pair: one right, one left! Tighten the nuts carefully: just to the point where the connectors revolve smoothly, but without wobbling. When you are sure, apply a tiny drop of cyano to the nut (best applied on the point of a pin). Fit the socket-head grub screws **28** in the pushrod connectors **25** using the allen key **29**.

Apply activator to the horn recesses in the ailerons, then apply cyano to the horns **24** and place them in the recess, with the row of holes at the leading edge, facing the hinge pivot line.

Fig. 21

15. Installing the aileron servos

Set the aileron servos to neutral (centre) from the transmitter. Mount the output arms on the servos at 90° to the long servo sides. Prepare a handed pair: one left, one right.

Trial-fit the servos in the recesses in the wing panels **6** and **7**. You may need to make minor adjustments here, depending on the type of servo you are using. Glue the servos in place by applying a drop of hot-melt glue to the slots in the wings for the servo mounting lugs, and immediately press the servo into the recess. Apply another drop of glue afterwards if necessary.

Fig. 22

16. Installing the aileron pushrods

Connect the pre-formed end of the aileron pushrods **30** to the outermost hole in the servo output arms, and slip the other end through the pushrod connectors **25**. Set the aileron and servo to centre, and tighten the grub screw **28** to secure the pushrod.

Fig. 23

17. Preparing the motors and motor mounts

Fix the motor bulkheads **60** to the motor brackets **61** using four screws **63** each. Solder the power cables **53** to the motor terminals **50**.

Be sure to maintain correct polarity: positive (+) to red, negative (-) to black.

The motors supplied in the kit are fitted with internal suppressors. This level of suppression is adequate if you are using the MULTicont M-32 speed controller, # 7 2279.

If you wish to use a different controller, we recommend that you fit additional suppressors, just to be on the safe side. The suppressor set, # 8 5020, is included for this purpose. Solder two 47 nF capacitors between the motor terminals and the case, and the third 47 nF capacitor across the motor terminals to form a bridge.

Fix the motors **50** to the motor bulkheads **60** using the screws **62**.

Attach the propellers **52** to the motor shafts using 5-minute epoxy or UHU Endfest 300 (slow-setting epoxy).

Don't use cyano for this!

Cyano makes the material brittle, and the spinner will come loose!

Apply a little glue to the bore of the plastic spinner using the point of a pin, and push the propeller onto the motor shaft. Push the pin through the rear of the spinner to allow trapped air to escape.

Fig. 24

18. Installing the motors, deploying the motor and aileron servo cables

Glue the motor assemblies, including the motor brackets **61**, in the wing-mounted motor pods using cyano. The screw fixings make it possible to remove the motors at any time. Run the motor power cables **53** from the motors **50** to the wing root along the spar channel, and tack them in place using cyano.

Note: if the motors vibrate severely (resonate) in use, check the balance of the propellers and / or stick half a piece of hook-and-loop tape **21** between the motor **50** and the motor bracket **61**.

Deploy the servo leads towards the wing joiner channels, and extend them at that point using the 300 mm extension leads supplied. Cut a recess in the spar covers **8 / 9** to clear this connection; alternatively the cable joints can be soldered. Now deploy the cables in a straight line along the front edge of the spar channel, standing the wires upright (on edge), and glue them in place using cyano. Note that the cables must project at the wing root by about **100 mm**, so that they reach the connector board **54** in the fuselage when the model is assembled; the wing-mounted cables are plugged into the connector board.

Fig. 26

29. Gluing the spar covers in place

Carefully trim the spar covers **8** and **9** to fit snugly in the appropriate recesses in the wing panels **6** and **7**. If necessary, cut away a little material to clear the connector of the servo extension lead. Don't glue the spar covers in place until they fit absolutely flush with the surface of the wing. Attach the covers using cyano, taking great care to avoid adhesive running onto the surfaces which will later make contact with the wing joiner **40**. The next step is to trial-fit the wing joiner **40**, but please do not do this until you are absolutely certain that there is no active glue inside the joiner sockets. If you are not sure of this, spray a little activator inside, and wait for about five minutes. If you neglect to do this, you run the risk of producing a one-piece wing which can never be dismantled again.

Figs. 26 + 27

20. Completing the canopy

Locate the slots in the canopy **5** for the latch tongues **23**, fill them with cyano, align the latch tongues with the fixed latches and push them in as far as they will go. If necessary, spray activator on the joints to force the adhesive to cure.

Fig. 28

21. General notes on installing the receiving system

When positioning the flight battery it is important to keep the stated

Centre of gravity position in mind; it will nearly always be possible to correct the CG by re-positioning the battery. If not, a little lead ballast may be needed (caution: lead is toxic).

Hook-and-loop tape **20 + 21** is supplied in the kit for mounting the RC system components. Note that the adhesive on the tape is generally not strong enough for this application; it is always better to glue the tape to the fuselage using cyano.

Install the receiver in the centre of the fuselage, under the wing, using hook-and-loop tape. Thread the aerial wire into the plastic sleeve **47**, which you installed earlier. The easiest method is to file a point on the end of a length of thin steel rod and slip it through the sleeve **47** from the tail end; push the pointed tip into the end of the aerial insulation, secure it with a drop of cyano, and pull the aerial through from the tail.

Fig. 29

22. Installing the speed controller

Locate the output cables attached to the speed controller, and solder them to the connector board **54**, taking care to maintain correct polarity (it is printed on the board). The connector board is used as a terminal for the motor power leads, and at the same time the aileron servos can be plugged into it; this makes it much easier to assemble the model at the flying field.

Fig. 30

Fix the speed controller to the fuselage side adjacent to the flight battery, again using hook-and-loop tape. Solder the matching battery connector to the battery leads (if not already fitted), and insulate each soldered joint with a piece of heat-shrink sleeve.

Fix the flight battery in its compartment in the fuselage using hook-and-loop tape. The exact position is established later when you check and correct the model's balance point.

Fig. 31

23. Checking the model's working systems

Switch on the transmitter first. Set the throttle control to OFF. Install the fully charged flight battery in the model, connect it to the speed controller, and connect the controller to the receiver. It is essential that the speed controller is what is known as a BEC type (receiver power supply from the flight battery).

Hold the model securely, and remove any loose objects from the area behind the model. Switch on the motors briefly, and check the direction of rotation of the propellers.

Caution: even small motors and propellers are capable of causing unpleasant injuries.

24. Setting the control surface travels

The control surface travels must be set correctly to ensure that the model has a harmonious, well-balanced control response. Always measure the control surface travels at the widest part of the surface:

Elevator		
up	- stick back -	+ 24 mm
down	- stick forward -	- 15 mm
Rudder		
left and right		approx. 20 mm each side
Ailerons		
up		approx. + 18 mm
down		approx. - 10 mm

Fig. 32

Note: for a right-hand turn the right aileron (as seen from behind the model) must deflect up, the left aileron down.

If your radio control system does not allow you to set these precise

travels, you may have to re-position the appropriate pushrod connector, i.e. mount it in a different hole in the control surface horn.

25. Gilding the lily - applying the decals

The kit is supplied with a multi-colour decal sheet. Cut out the individual name placards and emblems and apply them to the model in the position shown in the kit box illustration, or in an alternative arrangement which you find pleasing.

26. Balancing

The Twin Star II, like any other aircraft, must be balanced at a particular point in order to achieve stable flying characteristics. Assemble your model completely, ready to fly, and install the flight battery. You can move the flight battery forward or aft to correct the balance point. If this is not sufficient, fix lead ballast at the nose or tail.

The **Centre of Gravity (CG)** should be **85 mm** from the wing leading edge at the root, measured at the fuselage. Mark this point on both sides of the fuselage using a waterproof felt-tip pen.

Support the model at this point on two fingertips and it should balance level. Adjust the position of the flight battery to balance the model as described. Once you have established the correct position, mark the location of the battery inside the model to ensure that it is always replaced in the same position.

Fig. 33

27. Preparing for the first flight

For the first flight wait for a day with as little breeze as possible. The early evening is often a good time.

Be sure to carry out a range check before the first flight.

Just before the flight, charge up the transmitter battery and the flight pack using the recommended procedures. Ensure that "your" channel is not already in use before you switch on the transmitter. Ask your assistant to walk away from the model, holding the transmitter. The aerial should be fitted but completely collapsed. Your assistant should operate one of the functions constantly while you watch the servos. The non-controlled servo should stay motionless up to a range of about 60 m, and the controlled one should follow the stick movements smoothly and without any delay. Please note that this check can only give reliable results if the radio band is clear of interference, and if no other radio control transmitters are in use - even on different channels. If the range check is successful, repeat it **with the motors running**. There should be only a very slight reduction in effective radio range with the motors turning.

The first flight ...

Do not attempt to hand-glide this model!

The TwinStar II is designed for hand-launching only - always launch it directly into wind.

If you are a beginner to model flying we strongly recommend that you ask an experienced model pilot to help you for the first few flights.

Allow the aeroplane to climb to a safe altitude, then adjust the trims on the transmitter so that the model flies straight and level without any assistance from you.

While the TwinStar II is still at a safe altitude, switch off the motors and try out the controls on the glide. Carry out a "dry run" of the landing approach at a safe height so that you are prepared for the real landing when the battery gives up the ghost.

Don't try any tight turns at first, and especially not on the landing

approach at low altitude. It is always better to land safely at some distance from you, than to force the model back to your feet and risk a heavy landing.

28. Safety

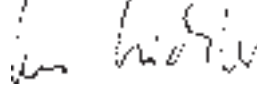
Safety is the First Commandment when flying any model aircraft. Third party insurance should be considered a basic essential. If you join a model club suitable cover will usually be available through the organisation. It is your personal responsibility to ensure that your insurance is adequate (i.e. that its cover includes powered model aircraft).

Make it your job to keep your models and your radio control system in perfect order at all times. Check the correct charging procedure for the batteries you are using. Make use of all sensible safety systems and precautions which are advised for your system. An excellent source of practical accessories is the MULTIPLEX main catalogue, as our products are designed and manufactured exclusively by practising modellers for other practising modellers.

Always fly with a responsible attitude. You may think that flying low over other people's heads is proof of your piloting skill; others know better: the real expert does not need to prove himself in such childish ways. Let other pilots know that this is what you think too. Always fly in such a way that you do not endanger yourself or others. Bear in mind that even the best RC system in the world is subject to outside interference. No matter how many years of accident-free flying you have under your belt, you have no idea what will happen in the next minute.

We - the MULTIPLEX team - hope you have many hours of pleasure building and flying your new model.

MULTIPLEX Modellsport GmbH & Co. KG
Product development and maintenance

A handwritten signature in black ink, appearing to read 'J. H. H. H.', is written over the printed text of the company name and department.



Parts list for the Twin Star II

Part No.	No. off	Description	Material	Dimensions
1	1	Building instructions	Paper, 80 g / m ²	A4
2	1	Decal set	Printed adhesive film	330 x 700 mm
3	1	L.H. fuselage shell	Moulded Elapor foam	Ready made
4	1	R.H. fuselage shell	Moulded Elapor foam	Ready made
5	1	Canopy	Moulded Elapor foam	Ready made
6	1	L.H. wing panel	Moulded Elapor foam	Ready made
7	1	R.H. wing panel	Moulded Elapor foam	Ready made
8	1	L.H. spar cover	Moulded Elapor foam	Ready made
9	1	R.H. spar cover	Moulded Elapor foam	Ready made
10	1	Tailplane	Moulded Elapor foam	Ready made
11	1	Fin	Moulded Elapor foam	Ready made
Small items set				
20	3	Hook-and-loop tape, hook	Plastic	25 x 60 mm
21	4	Hook-and-loop tape, loop	Plastic	25 x 60 mm
22	2	Canopy-Lock latch	Inj. moulded plastic	Ready made
23	2	Canopy-Lock latch tongue	Inj. moulded plastic	Ready made
24	4	Glue-fitting horn	Inj. moulded plastic	Ready made
25	4	Pushrod connector	Metal	Ready made, 6 mm Ø
26	4	Washer	Metal	M2
27	4	Nut	Metal	M2
28	4	Socket-head grub screw	Metal	M3 x 3 mm
29	1	Allen key	Metal	1.5 mm A/F
30	2	Pre-formed aileron pushrod	Metal	1 Ø x 70 mm
31	2	Wing retainer	Inj. moulded plastic	Ready made
32	2	Screw	Plastic	M5 x 50 mm
33	2	Wing retainer screw plate, A	Inj. moulded plastic	Ready made, M5
34	2	Wing retainer screw plate, B	Inj. moulded plastic	Ready made, M5
Wire and rod set				
40	1	Wing joiner tube	GRP tube	10 Ø x 620 mm
41	1	Steel elevator pushrod, pre-formed end	Metal	0.8 Ø x 770 mm
42	1	Steel rudder pushrod, pre-formed end	Metal	0.8 Ø x 720 mm
43	1	Elevator snake outer sleeve	Plastic	3 / 2 Ø x 700 mm
44	1	Rudder snake outer sleeve	Plastic	3 / 2 Ø x 700 mm
45	1	Elevator snake inner sleeve	Plastic	2 / 1 Ø x 730 mm
46	1	Rudder snake inner sleeve	Plastic	2 / 1 Ø x 730 mm
47	1	Aerial sleeve	Plastic	3 / 2 Ø x 700 mm
Power system set				
60-63	2	Permax 400 motor mount (1 off)	Plastic	Ready made
50	2	Motor	Permax 400 6V	Ready made
52	2	Propeller	Plastic	125 x 110 mm
53	2	Motor power leads and plug		370 mm, 0.75 mm ²
54	1	Wiring board and cables	Ready made	
55	1	Cable tie	Plastic	98 x 2.5 mm
Permax 400 motor mount (1 off), 2-part incl. screws				
60	1	Motor bulkhead	Inj. moulded plastic	Ready made
61	1	Motor bracket	Inj. moulded plastic	Ready made
62	2	Screw	Metal	M2.5 x 4 mm
63	4	Screw	Metal	2.2 x 13 mm