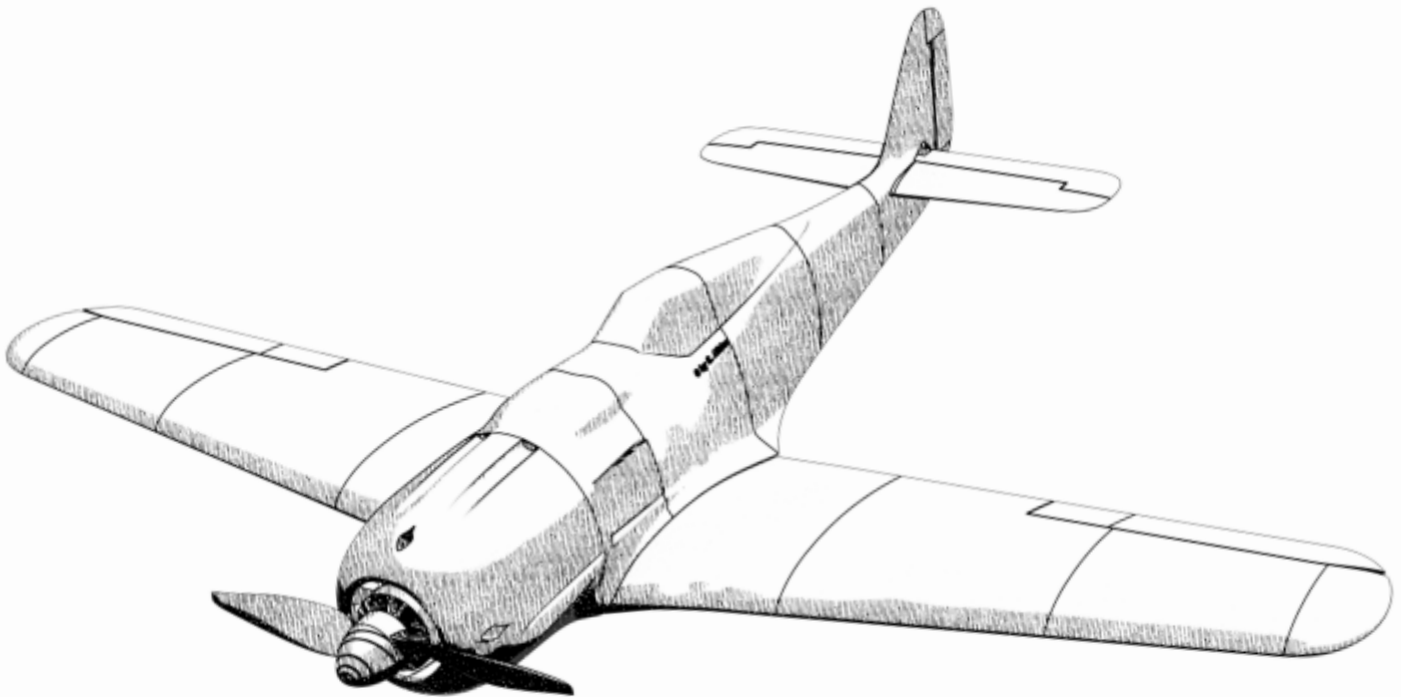


D. (Luft) T. 2190 3-D

Fw 190 3-D

Flugzeug-Handbuch

aircraft manual



190.001

July 2020

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I. Übersichtswerte *overview values*

A. Kennzeichnung *designation*

1. Verwendungszweck *intended use*

The model FW 190 is a scale model airplane with slight modifications for the air combat class ACES in the scale 1:12, which has good horizontal speed and good maneuverability.



Abb. 1: Gesamtansicht *overall view*

The aircraft can also be fitted with a landing gear, but this increases the take-off weight and is not recommended for aerial combat.

2. Bauform *Type*

Single motor, cantilever low-wing aircraft in complete 3D printed design with simple fin and electric drive.

3. Allgemeine Sicherheitshinweise

The 3D printed FW 190 is not a toy, please take care when assembling and operating it.

The model is a self-made according to plans, the pilot is fully responsible for his model, we assume no liability for any damage.

A corresponding liability insurance for model flying is obligatory. In addition, the model aircraft is subject to local regulations and laws for aircraft which must be strictly adhered to.

Experience in controlling model airplanes is assumed as it is a very agile model with a relatively high wing loading.

Building

Please take the necessary care when assembling the model as the strength and flight characteristics of the model depend on it.

- Please follow the instructions of your 3D printer manufacturer to avoid damage (maximum installation space, maximum temperatures, material compatibility, etc.).
- When handling sharp or hot tools, always take care of yourself to avoid injury (wear protective clothing such as gloves or goggles).
- The handling of superglue and activator should only be done in rooms with sufficient ventilation. We recommend using an old cotton cloth to remove excess adhesive.

Operation

The propeller has a high injury potential, avoid contact with the rotating propeller during tests or take-off, this can lead to serious injuries.

Always exercise caution when handling lithium polymer batteries and follow the battery and charger manufacturer's instructions.

The radio remote control must be installed according to the instructions of the remote control manufacturer.

Please carry out a range test before the first flight to ensure safe operation.

Do not expose the model to direct sunlight or elevated temperatures! The glass transition point of PLA starts at 45° C (usually 60°). Otherwise the model can become thermally deformed and unusable.

Flight

Before the flight, check all functions / rudder deflections and never fly with an aircraft that is damaged to avoid structural failure.

Always fly at a safe distance from persons or other obstacles. Avoid flying towards or over people! Always steer your model with a view to safety and avoid disturbing or endangering other persons and objects.

Do not fly near residential areas, public roads, high-voltage lines or obstacles with increased danger potential.

The first flight should take place on as large an open area as possible and in the presence of an experienced helper/pilot.

B. Daten und Leistungsangaben

1. Hauptmaße *main dimensions*

Abmessungen:

Spannweite.....	<i>wingspan</i>	911 mm	(35.87in)
Gesamtlängen.....	<i>length overall</i>	770 mm	(30.31in)
Gesamthöhe.....	<i>height overall</i>	171 mm	(6.73in)

Tragwerk:

Spannweite.....	<i>wingspan</i>	911 mm	(35.87in)
Größte Tiefe	<i>Maximum depth</i>	187 mm	(7.36in)
Flächeninhalt (Grundrißprojektion)	<i>surface area</i>	13,34 dm ²	(206.67 sq in)
Flächenbelastung.....	<i>wing loading</i>	73,5 g/dm ²	(73,2 grains / sq in)
Tragflächenprofil.....	<i>wing profile</i>	modifiziert für Luftkampf in) <i>aircombat modified</i>	

*propeller
engine
Electrical regulator
power supply*

2. Triebwerksanlage *power plant*

Luftschaube.....	Aeronaut ELP 9/6 oder APC 9/6 - 9/7.5
Motor (Bürstenloser Drehstrom)	AX-4008Q/620KV oder DYS D4215 650KV
Elektrischer Regler.....	KRALLE 25 der Firma Burg Anlagenbau
Stromversorgung	Dreher Kleinsttechnik LiPo 1300 mAh/6Zellen/22,2V 25C

*instead use
Castle Creations
TALON 2S
with a
Turnigy nanotech
1300mAh*

Maximal Drehzahl und Ampere (statisch).....	12.000 U/min - 19A
<i>Maximum speed and ampere (static)</i>	
Maximal Drehzahl und Ampere (im Geradeausflug).....	13.700 U/min - 12A
<i>Maximum speed and ampere (in straight flight)</i>	

3. Flugleistungen *flight performance*

The stated flight performances are valid for a flight weight of 1012g (with additional equipment for speed, position and climb power measurement).

üstung

Höchstgeschwindigkeit.....	<i>top speed</i>	150km/h	(93.2 mph)
Geradeausflug.....	<i>straight flight</i>	120 km/h	(74.6 mph)

Dienstgipfelhöhen sind der lokalen Verordnung zu entnehmen!

Service ceiling levels can be found in the local ordinance!

Steigleistung	<i>Climbing performance</i>	15m/s mit APC 9/6 (22 feet per second)
Steigzeiten	<i>climbing times</i>	(230 feet) 70m 4,7 sec
.....		(328 feet) 100m 6,7 sec
.....		(492 feet) 150m 10 sec

4. Gewichtsangaben

Gewicht XYZ-Druck.....	<i>weight 3D Print</i>	490 g	(17.28oz)
Leergewicht	<i>empty weight</i>	774 g	(27.3oz)
Startgewicht (mit seriellem 6 Zellen Akkumulator 1300 mAh LiPo)	<i>take off weight</i>	980 g	(34.57oz)

5. Flugzeugübersicht *aircraft overview*

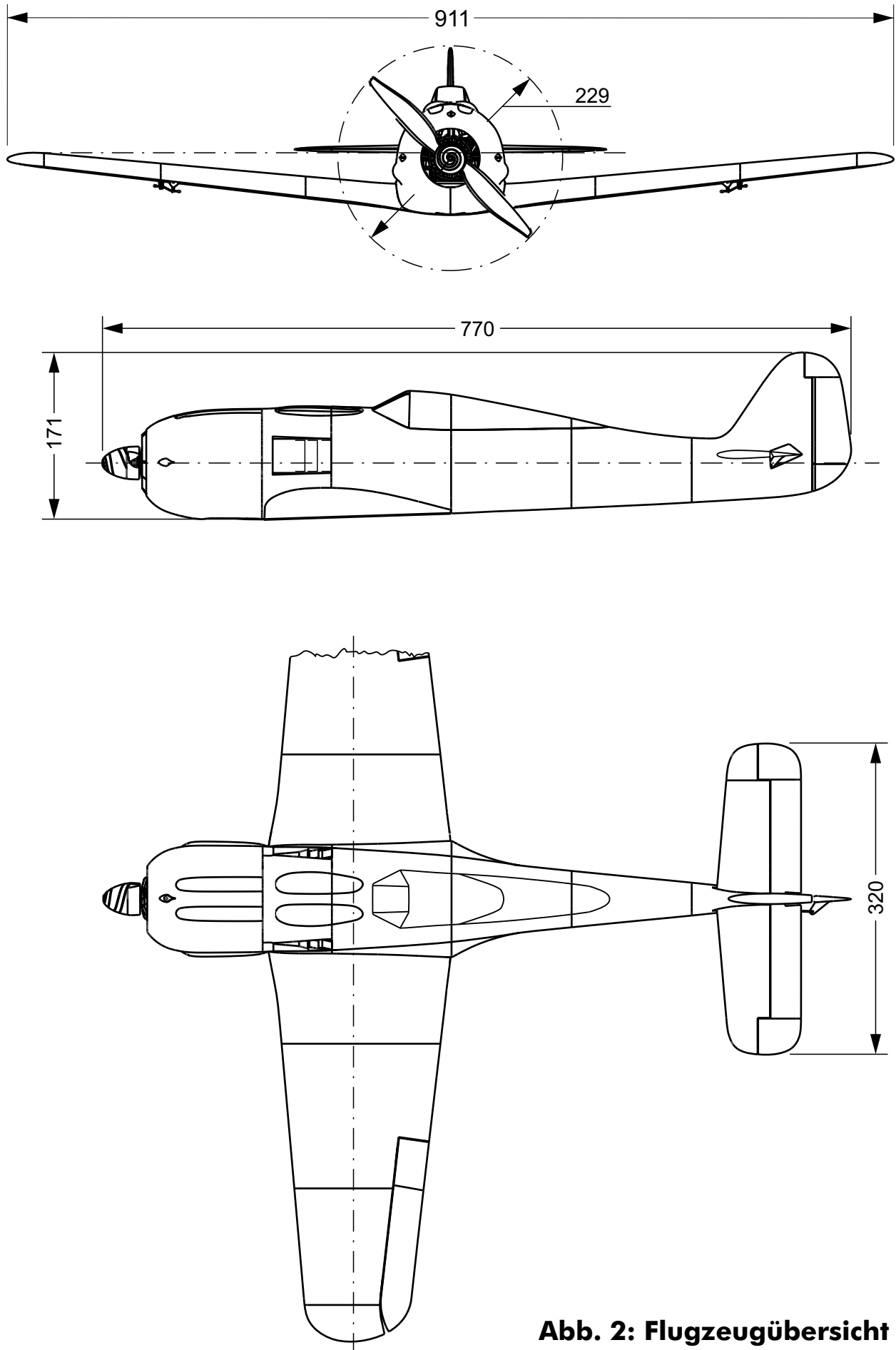


Abb. 2: Flugzeugübersicht

6. Schattenriß *silhouette*

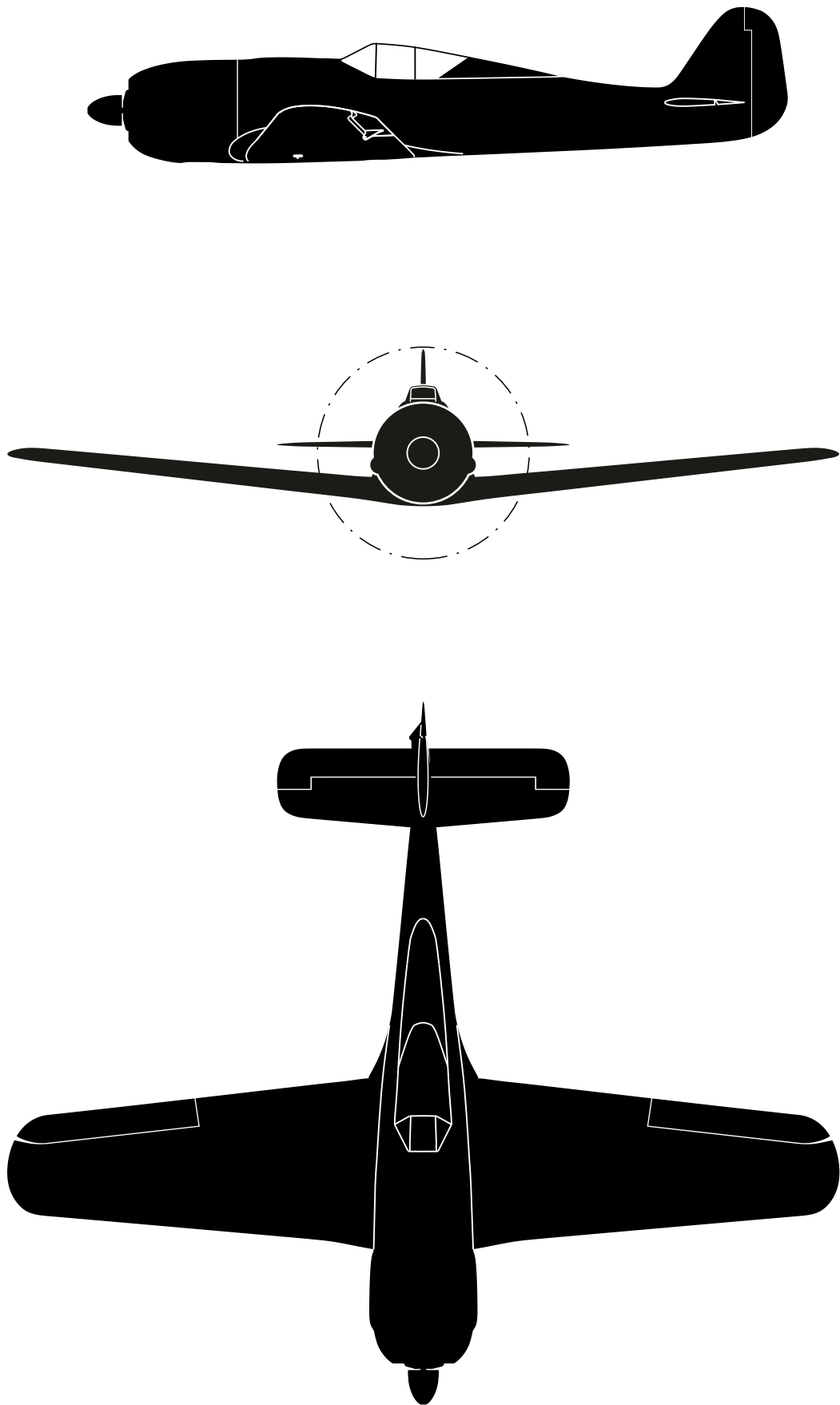


Abb. 3: Schattenriß

C. Aufbau des Flugzeuges *structure of the aircraft*

1. Bauteile und Gewicht *components and weight*

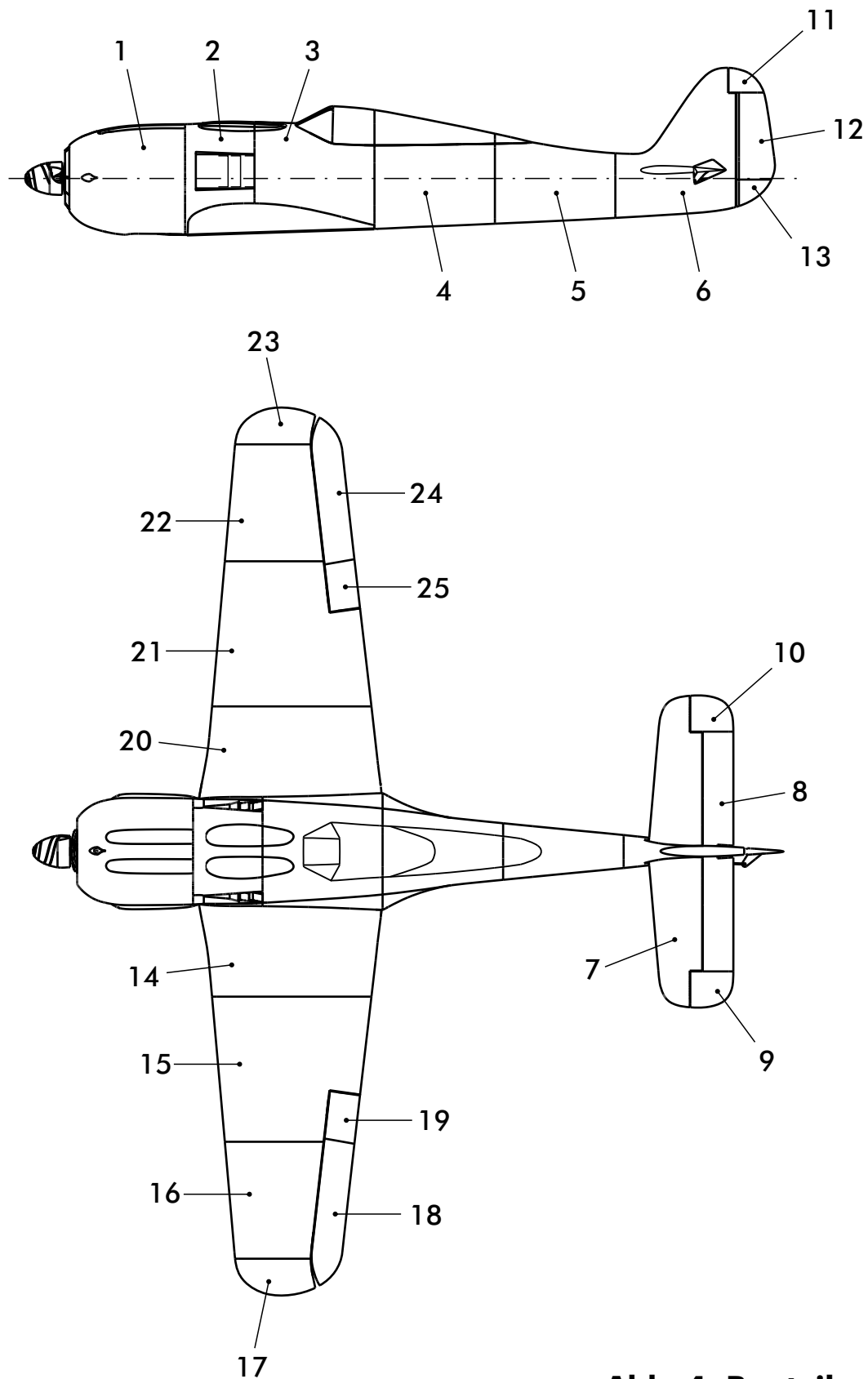


Abb. 4: Bauteile

2. Teil- und Gewichtsübersicht

part and weight overview

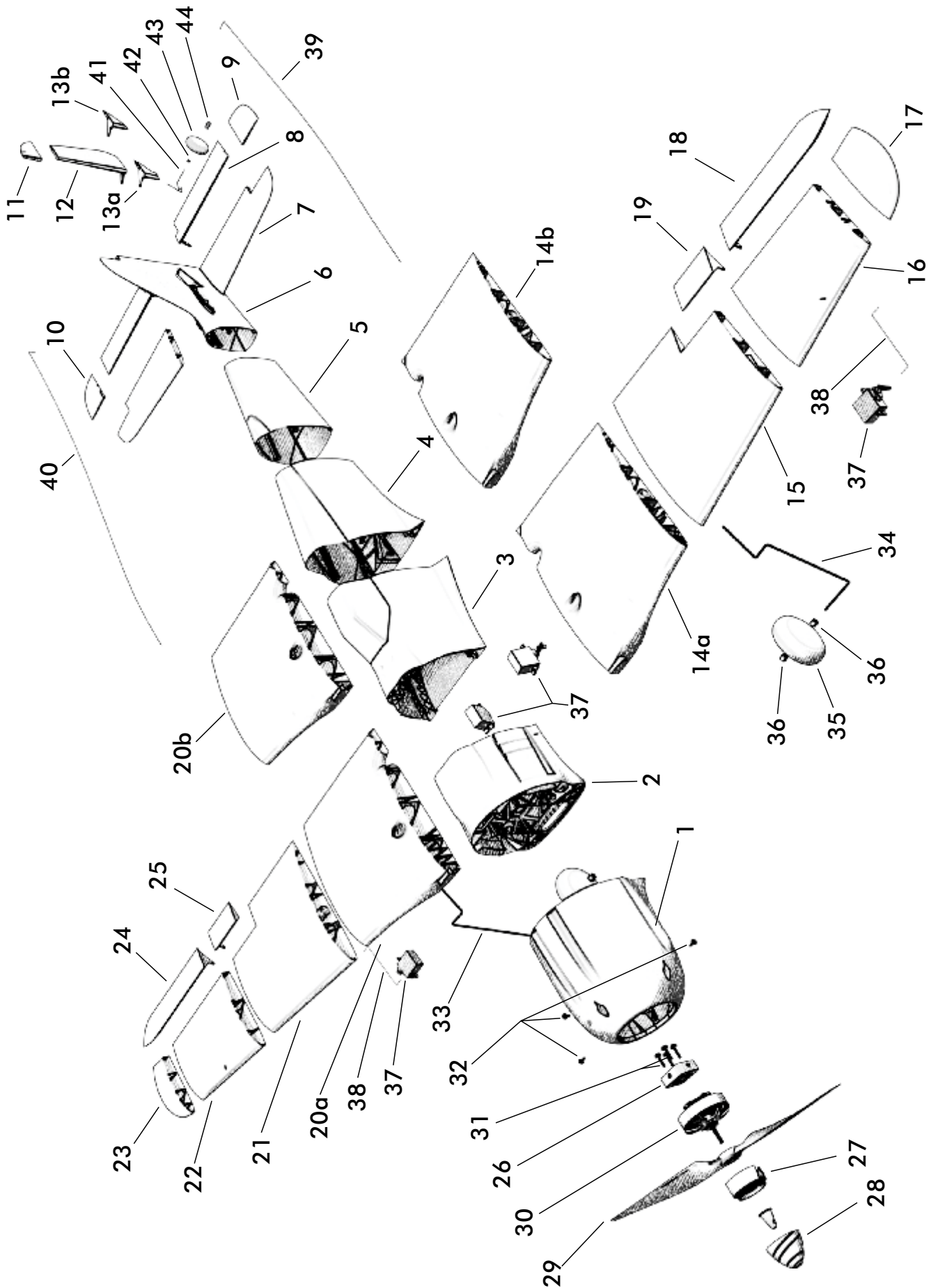


Abb. 5: Teil- und Gewichtsübersicht

2. Teil- und Gewichtsübersicht

number of

weight

or source

Nr.	Anzahl	Beschreibung <i>Description</i>	Dokumentenname <i>document name</i>	Gewicht in g (Sum)	Drucker Vorgabe oder Bezugsquelle
1	1	hood front part	Rumpf_01	78	Rumpf A
2	1	bonnet rear part	Rumpf_02	34	Rumpf B
3	1	fuselage forward section	Rumpf_03	48	Rumpf B
4	1	fuselage centre section	Rumpf_04	37	Rumpf B
5	1	fuselage rear section	Rumpf_05	23	Rumpf B
6	1	Tail fin	Rumpf_06	24	Rumpf B
7	1	horizontal tail fin	Rdr_HFls	20	Flgl A
8	1	Elevator	Rdr_HRud	10	Zub B
9	1	"Elevator cap L."	Rdr_HRudRd_L	1,8	Zub B
10	1	"Elevator rim cap R."	Rdr_HRudRd_R	1,8	Zub B
11	1	Rudder Top	Rdr_SRud_O	1,5	Zub B
12	1	Center rudder	Rdr_SRud_M	5	Zub B
13a	1	Rudder bottom with tail wheel holder	Rdr_SRud_U_FW	1,6	Zub B
13b	(1)	Rudder Bottom (Light)	Rdr_SRud_U	1,5	Zub B
14a	1	Wing w. landing gear L	FLGL_L_01_FW	65	Flgl A
14b	(1)	Wing (Light) L	FLGL_L_01	51	Flgl A
15	1	Center Wing L	FLGL_L_02	38	Flgl A
16	1	Outer Wing L	FLGL_L_03	17	Flgl A
17	1	rim cap L	FLGL_L_04	5	Flgl B
18	1	Outer Aileron L.	Rdr_QurA_L	7	Zub B
19	1	Inner Aileron L.	Rdr_Qurl_L	3	Zub B
20a	1	Wing w. landing gear R	FLGL_R_01_FW	65	Flgl A
20b	(1)	Wing (Light) R	FLGL_R_01	51	Flgl A
21	1	Center Wing R	FLGL_L_02	38	Flgl A
22	1	Outer Wing R	FLGL_L_03	17	Flgl A
23	1	rim cap R	FLGL_L_04	5	Flgl B
24	1	Outer Aileron R.	Rdr_QurA_R	7	Zub B
25	1	Inner Aileron R.	Rdr_Qurl_R	3	Zub B

part and weight overview
2. Teil- und Gewichtsübersicht

*preset for printing
or source*

<i>number of</i>		<i>weight</i>		<i>weight</i>	
Nr.	Anzahl	Beschreibung <i>Description</i>	Dokumentenname <i>document name</i>	Gewicht in g (Sum)	Drucker Vorgabe oder Bezugsquelle
26	1	Engine mount 1 Diag. 25x25mm)	M_Tragr_1_25	4	Solid A
	(1)	Engine mount 2 Diag. 19x16mm)	M_Tragr_2_19	4	Solid A
	(1)	Engine mount 3 (short)	M_Tragr_3_25	3,5	Solid A
27	1	Hub fairing base	NabVkd_B	2,5	Nab A
28	1	Hub fairing Cap	NabVkd_K	3	Nab A
29	1	propeller	APC 9x6	16,5	Hobby King
30	1	Brushless motor	AX-4008Q/620KV oder DYS D4215/21	105	
31	4	cylinder-head bolt DIN 912	M3 x 16	4,4	
32	3	Self-tapping scrw DIN 7981	2,9 x 9,5mm	2,5	
33	1	Monopod chassis R.	ø 3mm L=		
34	1	Monopod chassis L.	ø 3mm L=		
35	2	Foam Lightweight wheel	60 x 18,5mm	17,6	Hobby King
36	4	Adjusting ring with collar	8 x 3,1mm	4,7	Hobby King
37	4	Micro Servo 9g	21x12x22 mm	44	Hobby King
38	2	aileron rods	ø 0,8mm L=		
39	1	elevator rods	ø 0,8mm L=		
40	1	rudder linkage	ø 0,8mm L=		
41	1	rear undercarriage	ø1,2mm L=		
42	1	Star wheel Thrust ring	Sprn_AnRg		Solid A
43	1	Foam Superlight wheel	30 x 7mm	1,2	Hobby King
44	1	Star wheel end cap	Sprn_End		Solid A
45	4	Servo cable extension	150mm	14,4	Hobby King
46	1	Aileron adjustment gauge	L8-190.F52-50	2,7	Solid A
47	1	Adjusting your elevator	L8-190.F30-4	3,7	Solid A
48	1	gauge monopod chassis R	BgLehr_FW_R		Lehr B
49	1	gauge monopod chassis L	BgLehr_FW_L		Lehr B
50	1	gauge rear undercarriage	BgLehr_FW_H		Lehr B
51	1	Battery holder	Bat_Halt	5	Solid A

3. Kaufteile *purchased parts*

(teilweise ausgeleitet aus der Gesamtstückliste)

number of

Partially derived from the master bill of material)

*preset for printing
or source*

Nr.	An- zahl	Beschreibung <i>Description</i>	Dokumentenname <i>document name</i>	^{<i>weight</i>} Gewicht in g (Sum)	Drucker Vorgabe oder Bezugsquelle
29	1	propeller	APC 9x6	16,5	Hobby King
30	1	Brushless motor	AX-4008Q/620KV oder DYS D4215/21	105	
31	4	Cheese head screw DIN 912	M3 x 16	4,4	
32	3	Self-tapping scrw DIN 7981	2,9 x 9,5mm	2,5	
33	1	monopod chassis R	ø 3mm L= 215mm		
34	1	monopod chassis L	ø 3mm L= 215mm		
35	2	Foam lightweight wheel	60 x 18,5mm	17,6	Hobby King
36	4	Adjusting ring with collar	8 x 3,1mm	4,7	Hobby King
37	4	Micro Servo 9g	21x12x22 mm	44	Hobby King
38	2	aileron rods	ø 0,8mm L= 82mm		
39	1	elevator rods	ø 0,8mm L=448mm		
40	1	rudder linkage	ø 0,8mm L=488mm		
41	1	rear undercarriage	ø1,2mm L= 75mm		
43	1	Foam Superlight wheel	30 x 7mm	1,2	Hobby King
45	4	Servo cable extension	150mm	14,4	Hobby King
52	1	LiPo battery	6S(22.4V)1300mAh		Hobby King
53	1	Speed governor (ESC) Castle Creations Talon 25	6S (22.4V) 25A		
54	1	Connection Socket/Plug	XT 60		Hobby King
55	1	Glass fibre hinge for CA			Hobby King
56	1	Cyanoacrylate / Superglue	Mittelflüssig		Hobby King
57	1	Activator spray for CA			Hobby King
58	2	linkage connection	D1.2 - 2mm / M3		Hobby King
59	1	Radio Receiver	6 Kanal		
60	1	6-Channel Remote Control Transmitter	Programmierbar		

II. Druckeinstellungen

1. Tragfläche *airfoil*

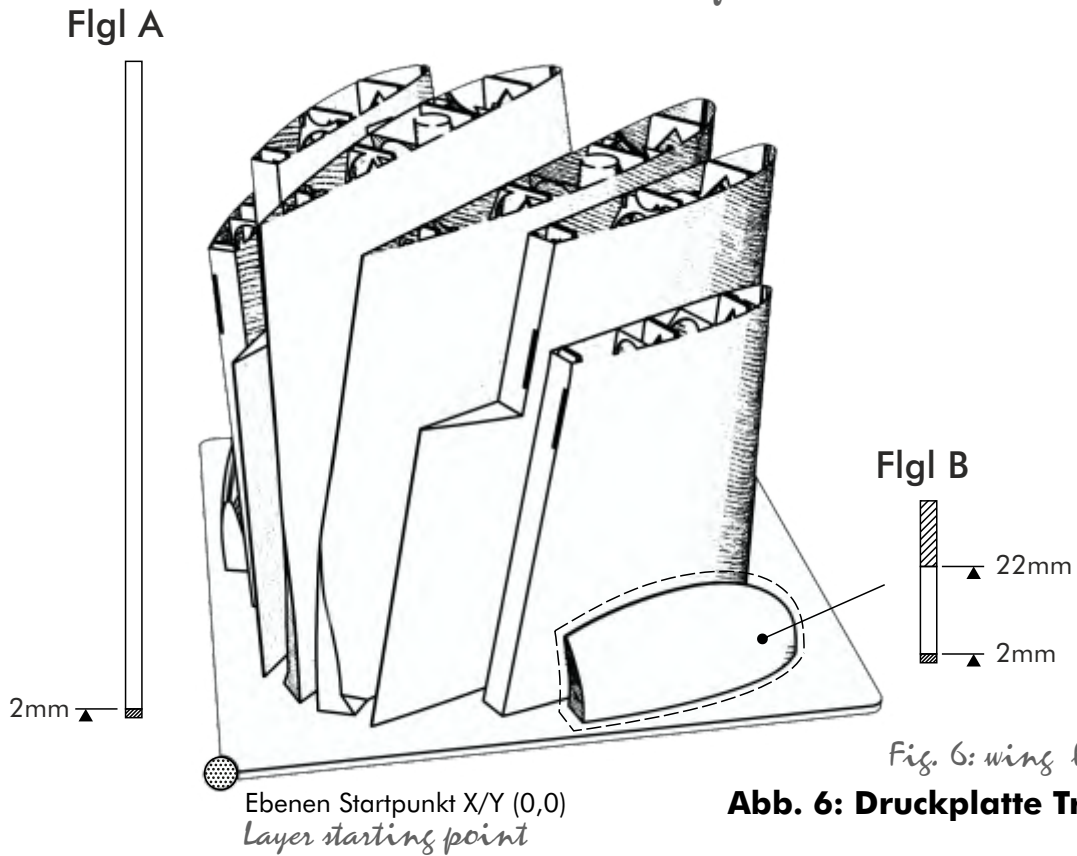


Fig. 6: wing build plate

Abb. 6: Druckplatte Tragfläche

Consistent parameters: Temperature: nozzle = 230, bed = 60, fan always on 0%.
 First layer: height 80%, width 100%, speed 40%.
 Speeds: standard 60mm/s, contours 70%, filling 80%, support material 80%,
 travel speed X/Y-axis 150mm/s, Z 16,7mm/s
 Minimum time for a layer 15 seconds at a minimum speed of 30%.
 Ooze control behavior: only wipe extruder for outer-most perimeters

Druckeinstellung Flgl A *Print setting Flgl A*

Prozess Nr.	Extrusionsbreite	E-Multiplikator	Schichthöhe	Oberste feste Schichten	Unterste feste Schichten	Umfangshüllen	Füllung in %	Füllmuster	Starthöhe	Stophöhe
1	0,42	1,04	0,25	-	-	2	0	-	0	2
2	0,42	1,02	0,25	-	-	1	0	-	2	-

extrusion width

layer height

Druckeinstellung Flgl B *Print setting Flgl B*

Prozess Nr.	Extrusionsbreite	E-Multiplikator	Schichthöhe	Oberste feste Schichten	Unterste feste Schichten	Umfangshüllen	Füllung in %	Füllmuster	Starthöhe	Stophöhe
1	0,42	1,04	0,25	-	-	2	0	-	0	2
2	0,42	1,02	0,25	-	-	1	0	-	2	22
3	0,42	1,02	0,15	3	-	2	0	-	22	-

top solid layers

bottom solid layers

outlines/perimeters

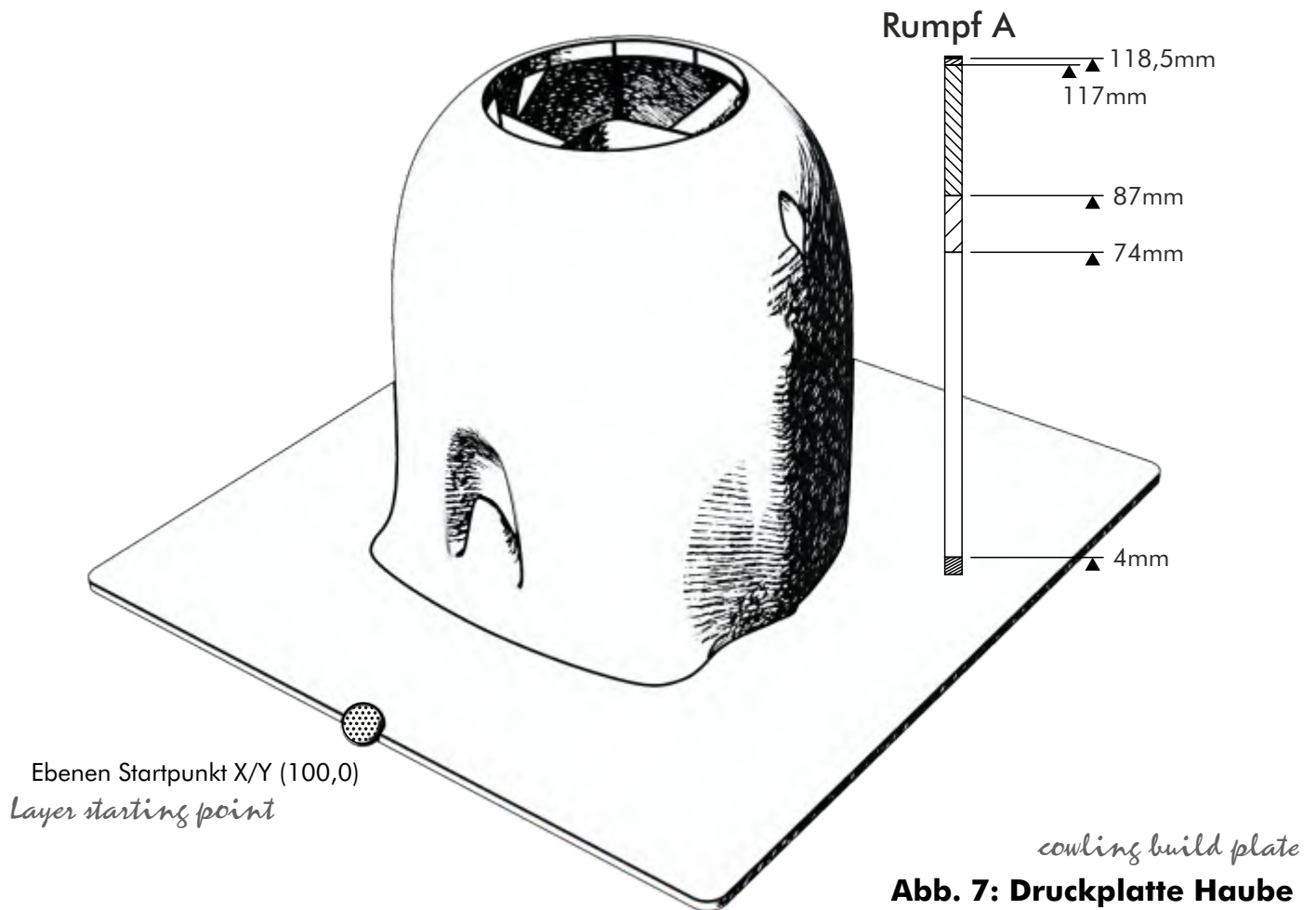
infill

infill pattern

starting print at height

II. Druckeinstellungen *printing settings*

2. Motorhaube *cowling*



Consistent parameters: Temperature: nozzle = 230, bed = 60, fan always on 0%.
 First layer: height 80%, width 100%, speed 40%.
 Speeds: standard 60mm/s, contours 70%, filling 80%, support material 80%,
 travel speed X/Y-axis 150mm/s, Z 16,7mm/s
 Minimum time for a layer 15 seconds at a minimum speed of 30%.
 Ooze control behavior: only wipe extruder for outer-most perimeters

Druckeinstellung Rumpf A *Print setting Rumpf A*

Prozess Nr.	Extrusionsbreite	E-Multiplikator	Schichthöhe	Oberste feste Schichten	Unterste feste Schichten	Umfangshüllen	Füllung in %	Füllmuster	Starthöhe	Stophöhe
1	0,42	1,04	0,25	-	-	2	0	-	0	4
2	0,42	1,02	0,25	-	-	1	0	-	4	74
3	0,42	1,02	0,2	-	-	1	0	-	74	87
4	0,42	1,02	0,2	-	-	2	0	-	87	117
5	0,44	0,98	0,2	4	-	2	25	<i>triangular</i> Dreieck	117	118,5
6	0,48	0,8	0,2	4	-	2	25	Rechteck <i>rectilinear</i>	118,5	-

II. Druckeinstellungen *printing settings*

3. Rumpf *hull*

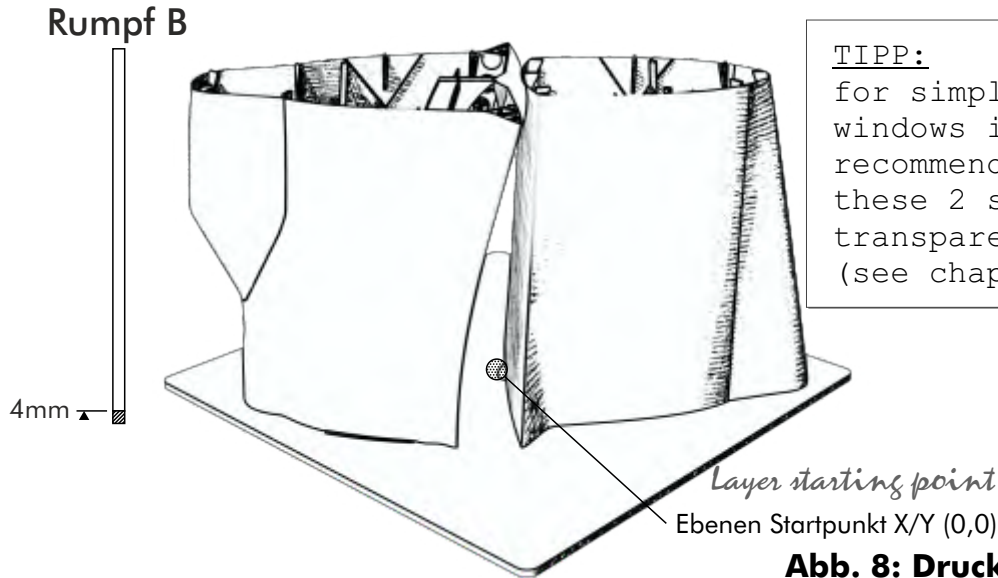


Abb. 8: Druckplatte Rumpf 1
hull 1 build plate

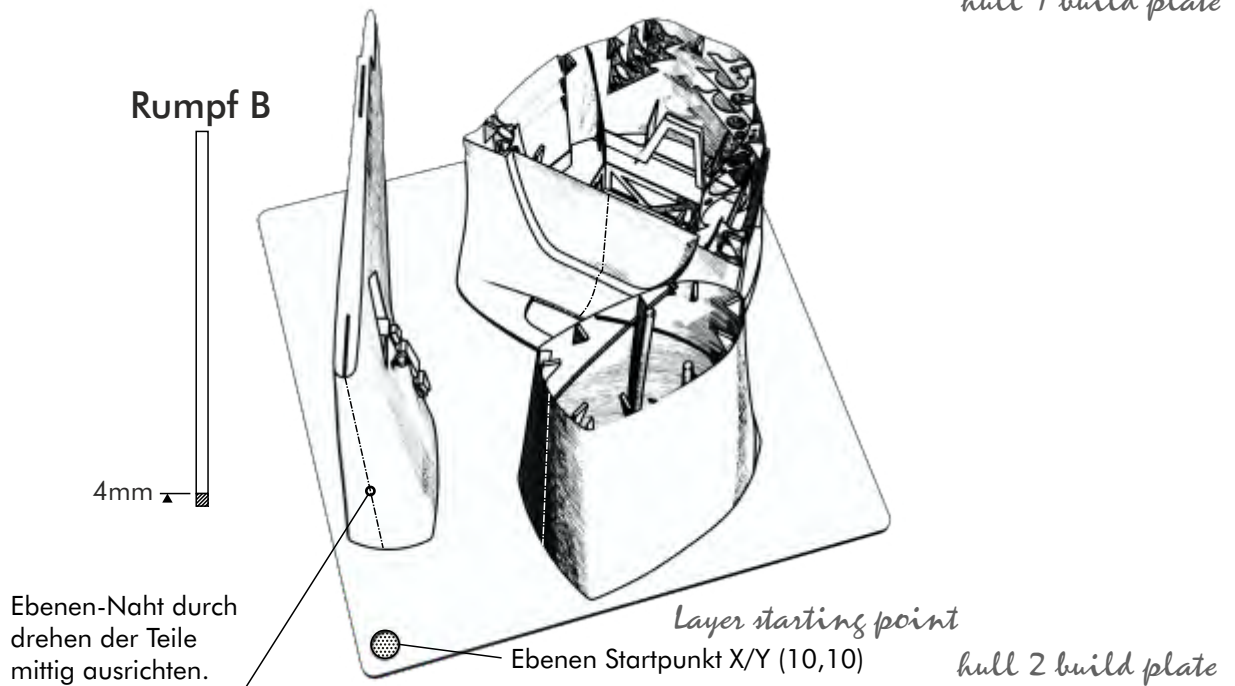


Abb. 9: Druckplatte Rumpf 2

Consistent parameters: Temperature: nozzle = 230, bed = 60, fan always on 0%.
First layer: height 80%, width 100%, speed 40%.
Speeds: standard 60mm/s, contours 70%, filling 80%, support material 80%,
travel speed X/Y-axis 150mm/s, Z 16,7mm/s
Minimum time for a layer 15 seconds at a minimum speed of 30%.
Ooze control behavior: only wipe extruder for outer-most perimeters

Druckeinstellung Rumpf B *Print setting Rumpf B*

Prozess Nr.	Extrusionsbreite	E-Multiplikator	Schichthöhe	Oberste feste Schichten	Unterste feste Schichten	Umfangshüllen	Füllung in %	Füllmuster	Starthöhe	Stophöhe
1	0,42	1,04	0,25	-	-	2	0	-	0	4
2	0,42	1,02	0,25	-	-	1	0	-	4	-

II. Druckeinstellungen *printing settings*

4. Ruder und Zubehör *rudder & accessories*

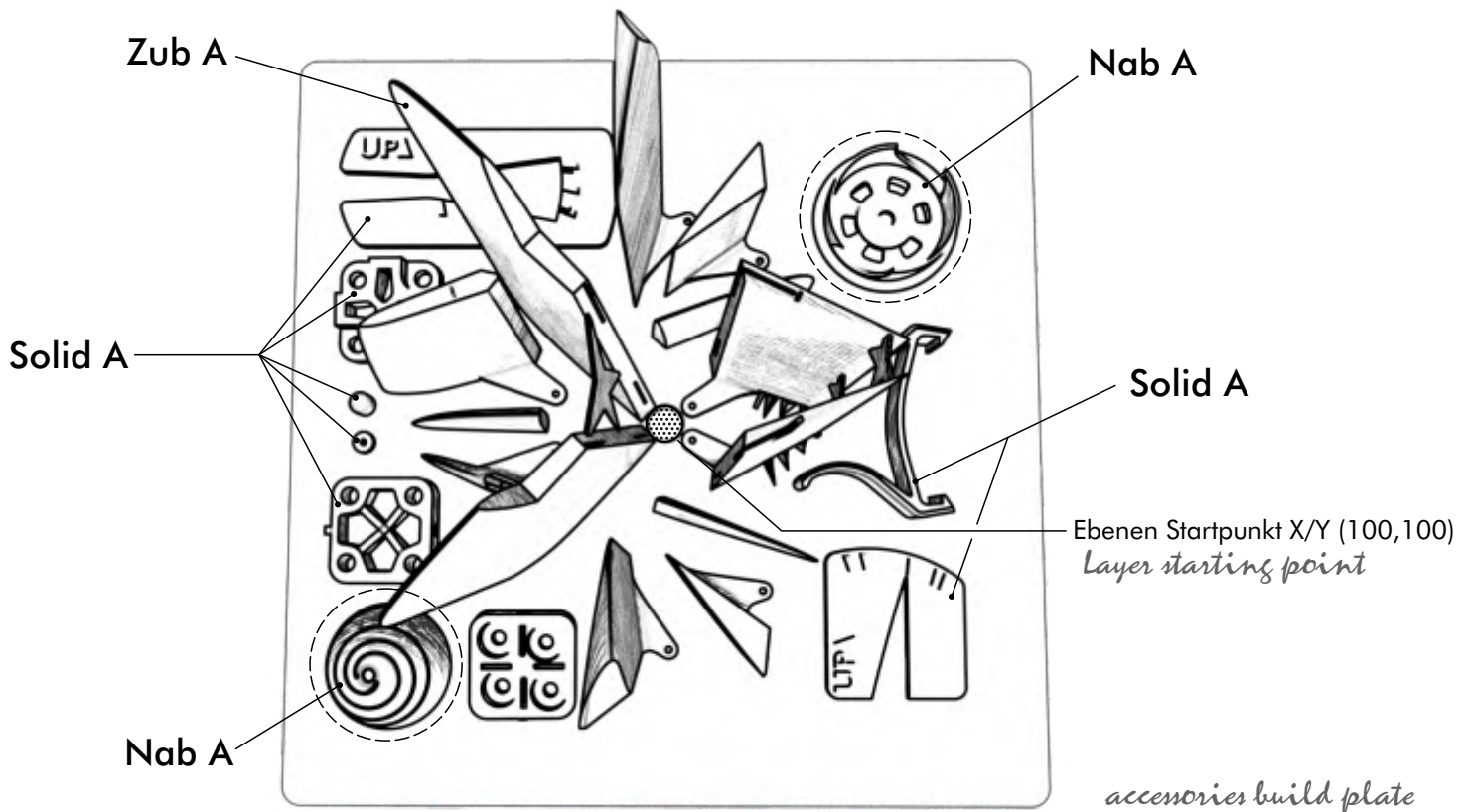


Abb. 10: Druckplatte Zubehör

!! For unmarked parts use Zub B settings

Nicht markierte Teile verwenden „Zub B“ Einstellungen

Consistent parameters: Temperature: nozzle = 230, bed = 60, fan always on 0%.
 First layer: height 80%, width 100%, speed 40%.
 Speeds: standard 60mm/s, contours 70%, filling 80%, support material 80%,
 travel speed X/Y-axis 150mm/s, Z 16,7mm/s
 Minimum time for a layer 15 seconds at a minimum speed of 30%.
 Ooze control behavior: only wipe extruder for outer-most perimeters

Druckeinstellung Zub A *Print setting Zub A*

Prozess Nr.	Extrusions-breite	E-Multiplikator	Schicht-höhe	Oberste feste Schichten	Unterste feste Schichten	Umfangshüllen	Füllung in %	Füllmuster	Starthöhe	Stophöhe
1	0,42	1,04	0,25	-	-	2	0	-	0	3
2	0,42	1,02	0,25	-	-	1	0	-	3	-

Druckeinstellung Zub B *Print setting Zub B*

Prozess Nr.	Extrusions-breite	E-Multiplikator	Schicht-höhe	Oberste feste Schichten	Unterste feste Schichten	Umfangshüllen	Füllung in %	Füllmuster	Starthöhe	Stophöhe
1	0,42	1,02	0,25	3	5	1	0	-	0	-

Druckeinstellung Solid A *Print setting Solid A*

Prozess Nr.	Extrusionsbreite	E-Multiplikator	Schichthöhe	Oberste feste Schichten	Unterste feste Schichten	Umfangshüllen	Füllung in %	Füllmuster	Starthöhe	Stophöhe
1	0,42	1,02	0,25	3	3	2	20	Rechteck	0	-

Druckeinstellung Nab A *Print setting Nab A*

Consistent parameters: Temperature: nozzle = 230, bed = 60, fan always on 0%.
 First layer: height 80%, width 100%, speed 40%.
 Speeds: standard 60mm/s, contours 70%, filling 80%, support material 80%,
 travel speed X/Y-axis 150mm/s, Z 16,7mm/s
 Minimum time for a layer 15 seconds at a minimum speed of 30%.
 Ooze control behavior: only wipe extruder for outer-most perimeters

Support material: support infill percentage 35%, base layers 2,
 Dense support layers 4, Dense infill percentage 90%. Max. Overhang angle 35°,
 support column resolution 1mm Upper and Lower Vertical Separation Layers: 1;
 Horizontal offset from part 0.5mm

Prozess Nr.	Extrusionsbreite	E-Multiplikator	Schichthöhe	Oberste feste Schichten	Unterste feste Schichten	Umfangshüllen	Füllung in %	Füllmuster	Starthöhe	Stophöhe
1	0,44	1,02	0,2	4	4	2	70	Rechteck	0	-

II. Druckeinstellungen *printing settings*

5. Biegelehren für Fahrwerk (optional) *bending gauge for undercarriage*

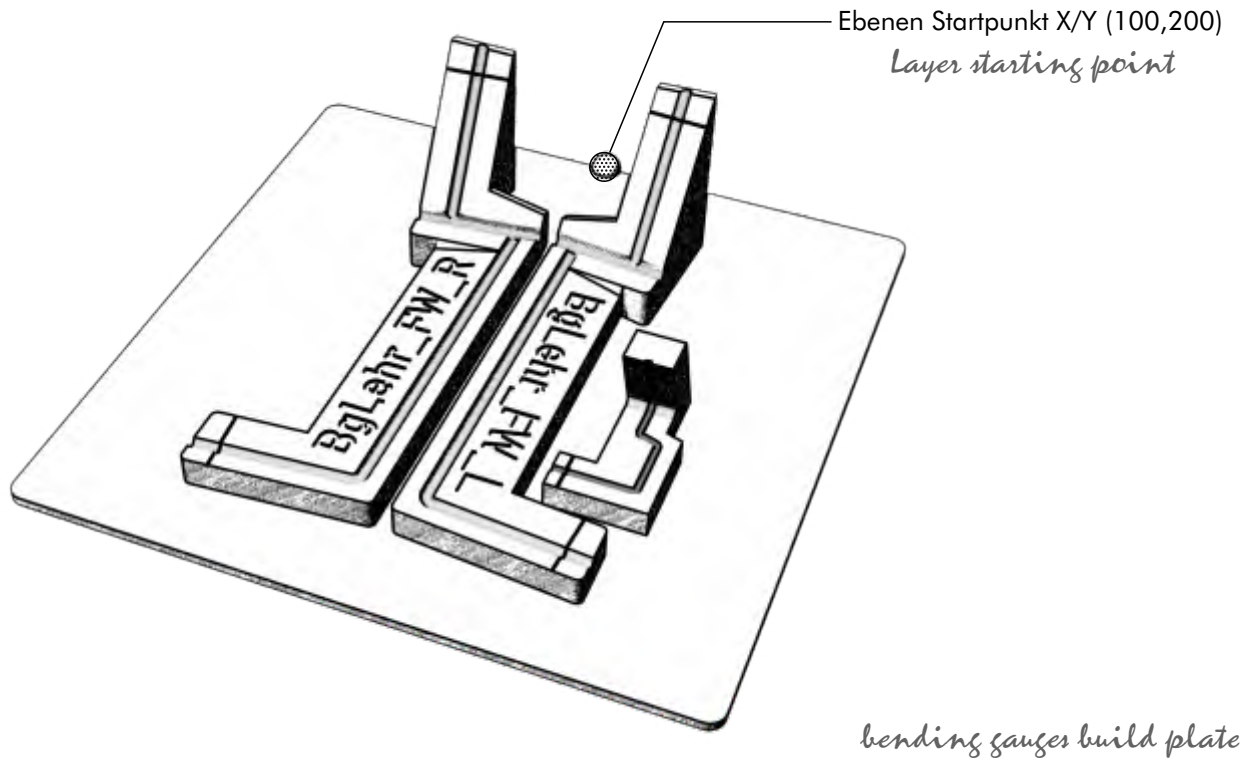


Abb. 11: Druckplatte Biegelehren

Consistent parameters: Temperature: nozzle = 230, bed = 60, fan always on 0%.
 First layer: height 80%, width 100%, speed 40%.
 Speeds: standard 60mm/s, contours 70%, filling 80%, support material 80%,
 travel speed X/Y-axis 150mm/s, Z 16,7mm/s
 Minimum time for a layer 15 seconds at a minimum speed of 30%.
 Ooze control behavior: only wipe extruder for outer-most perimeters

Druckeinstellung Lgst A *Print setting Lgst A*

Prozess Nr.	Extrusionsbreite	E-Multiplikator	Schichthöhe	Oberste feste Schichten	Unterste feste Schichten	Umfangshüllen	Füllung in %	Füllmuster	Starthöhe	Stophöhe
1	0,45	1,00	0,25	6	3	2	25	Rechteck	0	-

III. Zusammenbau *assembly instructions*

A. Allgemeine Hinweise *A. General information*

1. Vor dem Zusammenbau! *before the assembly!*

Please go through the steps before assembly to familiarize yourself with the procedure.

Make sure that you have all necessary parts at hand as corrections must be made quickly after using the superglue before it hardens.

It is recommended to have a cloth ready to wipe off any excess superglue.

2. Verwendete Symbole *used symbols*

Please note the symbols shown below which explain the aids and work steps required for the following construction steps.



Bonding with
superglue/
cyanoacrylate

then use
activator spray
to cure.



Schrauben-
sicherung
mittelfest
Loctite 243

*Screw locking
medium-strength
Loctite 243*



kein Klebstoff!
no glue!



Erhitzen
heat



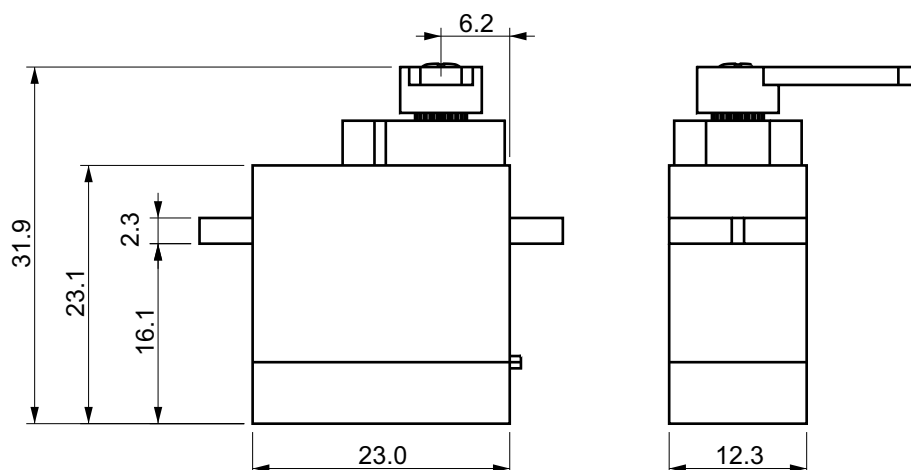
kleben mit
Heißkleber
*glue with
hot-glue*



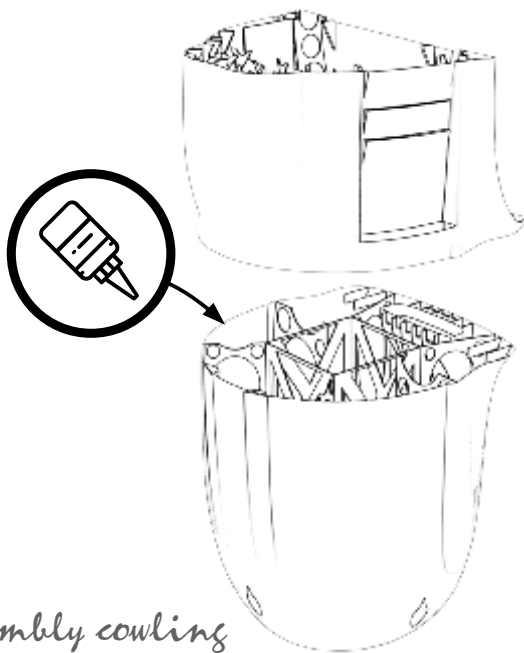
(heraus)trennen
cut(-out)

3. Verwendete Rudermaschinen *used servos*

All 4 electric steering machines of the FW 190 are of the same type and have the dimensions shown below to fit into the designated recesses.



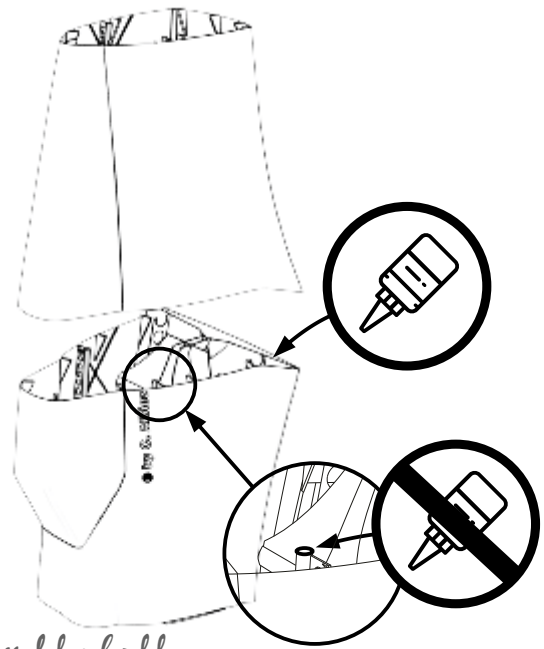
1



assembly cowling

Abb. 12: Montage Haube

2



assembly hull

Abb. 13: Montage Rumpf 1

3

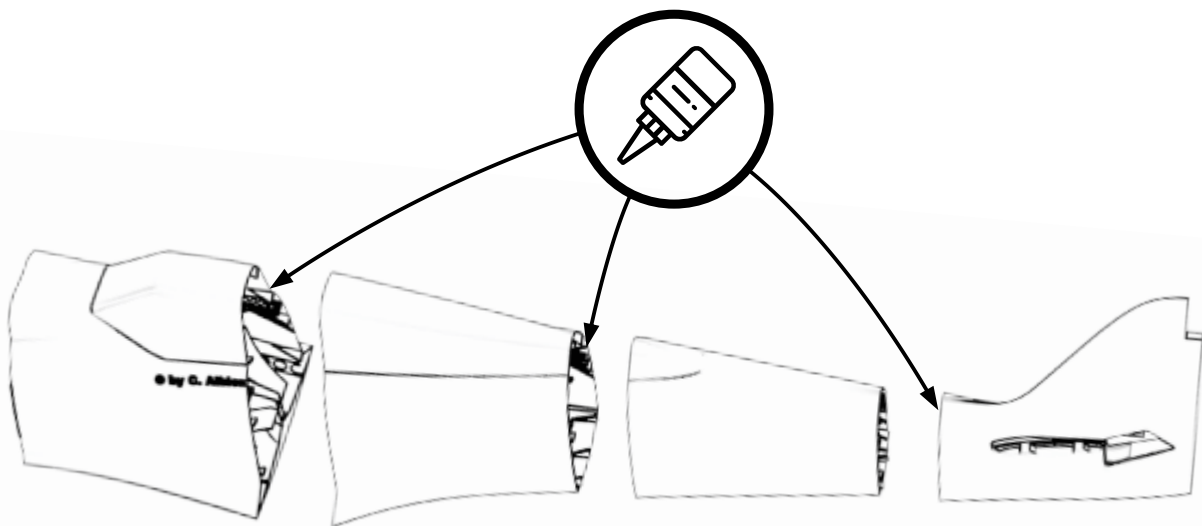


Abb. 14: Montage Rumpf 2

4

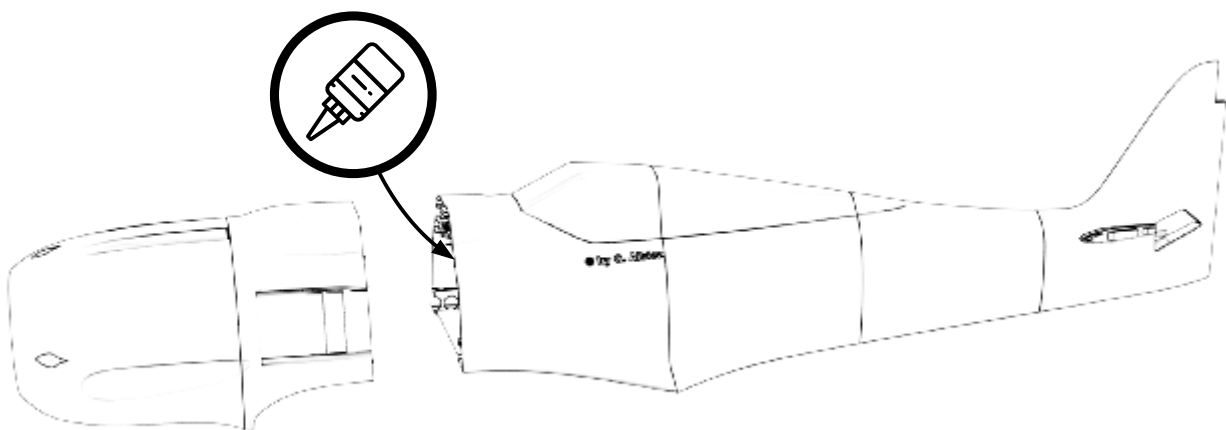


Abb. 15: Montage Rumpf 3

5

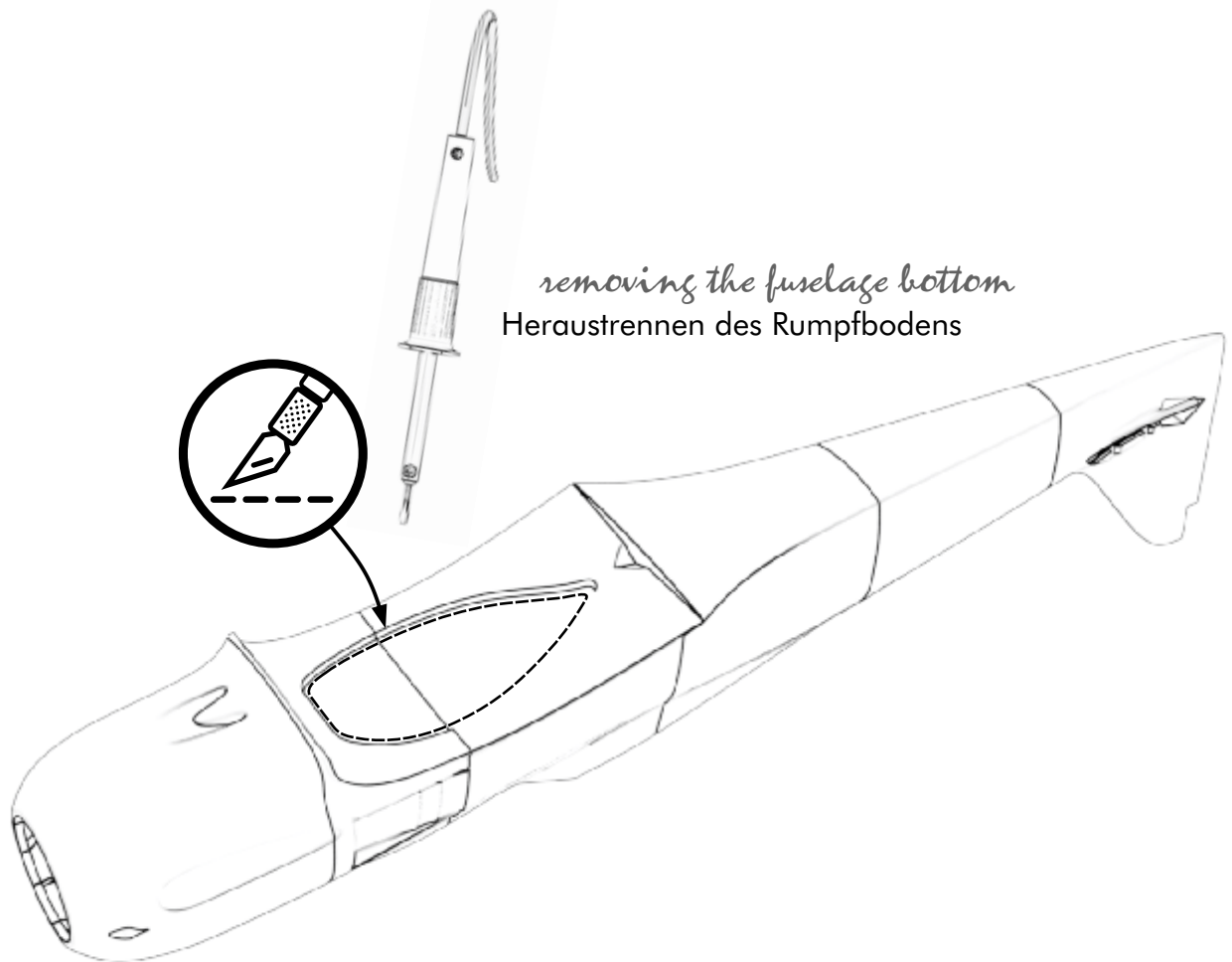


Abb. 16: Montage Rumpf 4

6

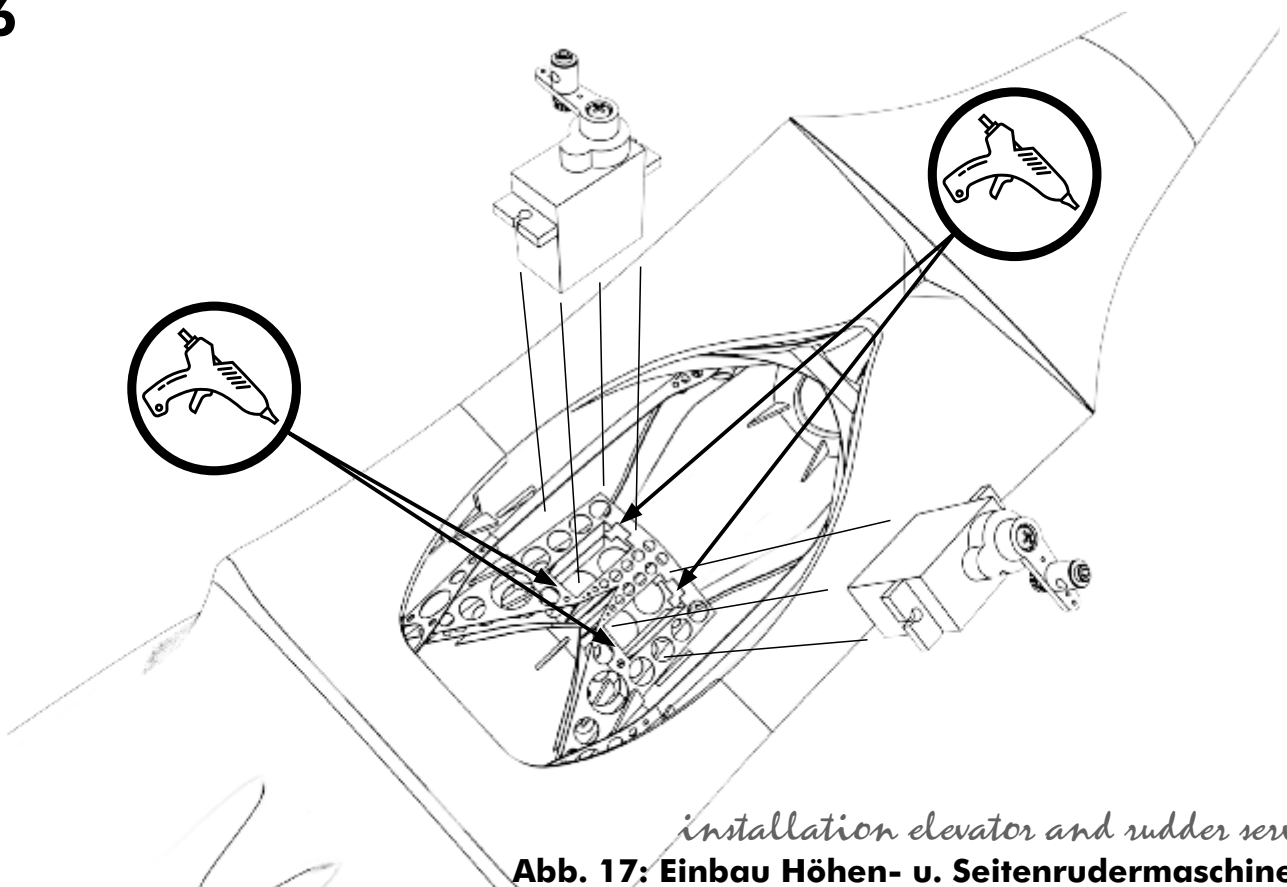
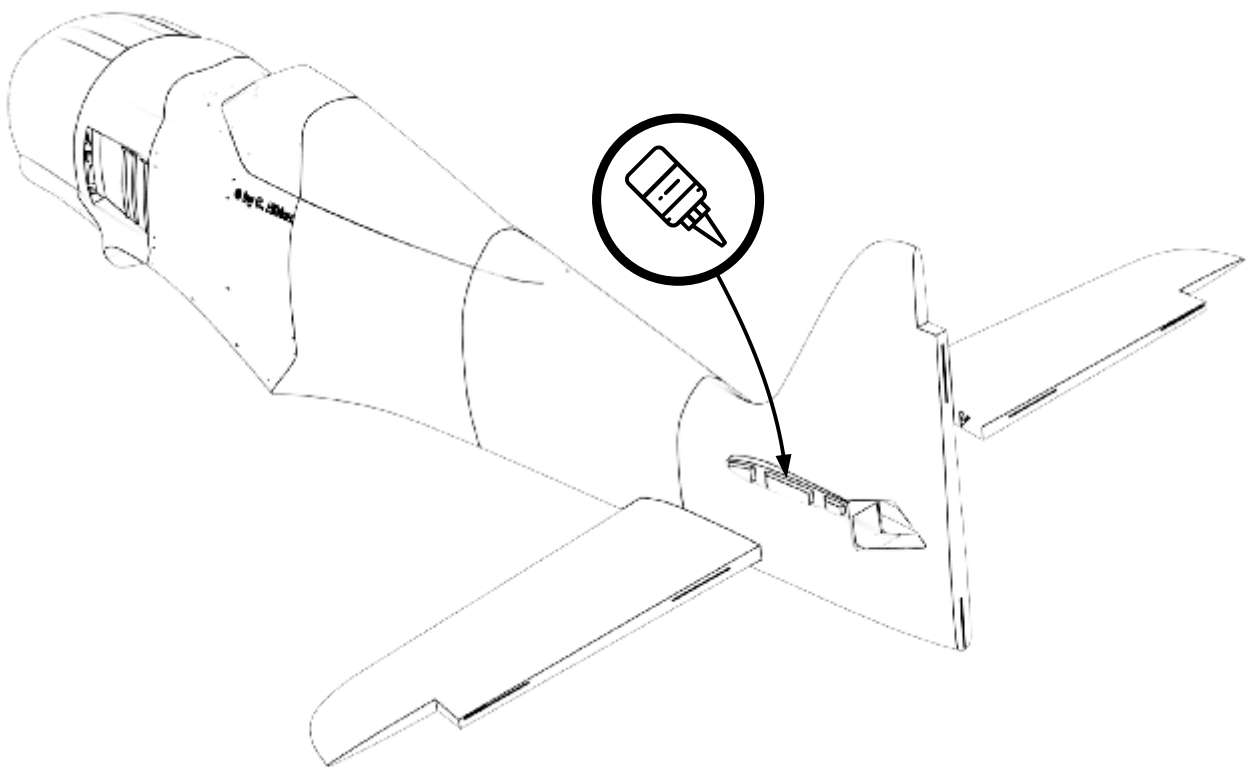


Abb. 17: Einbau Höhen- u. Seitenrudermaschinen

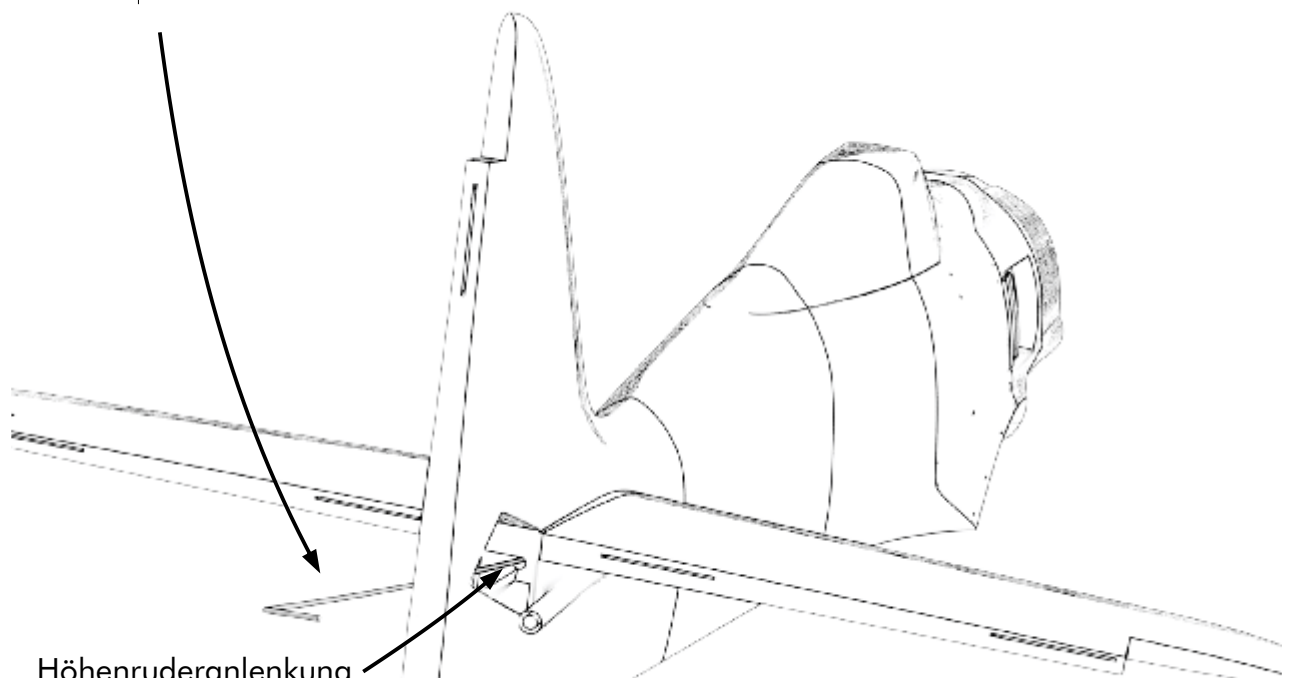
7



assembly height stabilizer

Abb. 18: Montage Höhenstabilisator

8



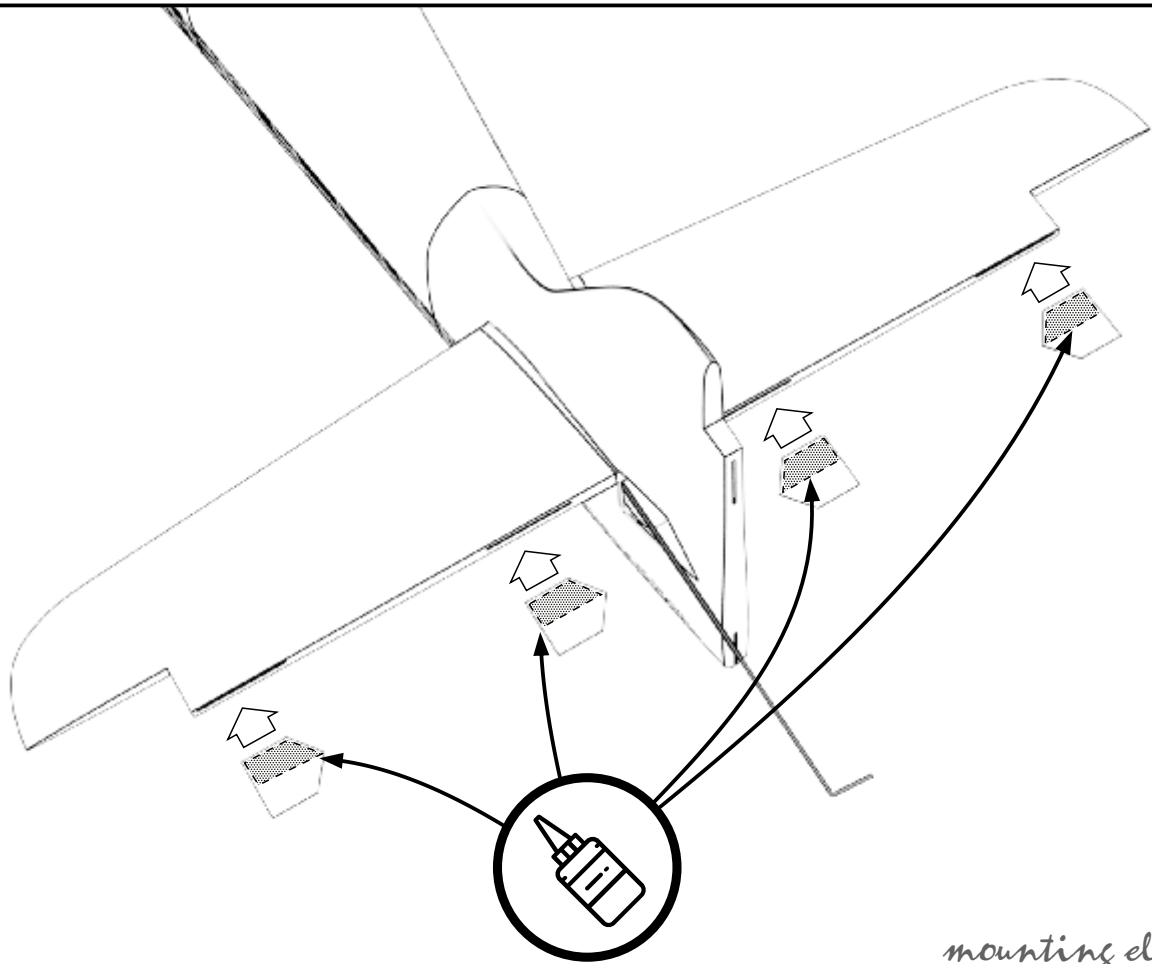
Höhenrudernanlenkung
innen einführen

insert elevator control inside

mounting elevator control system

Abb. 19: Montage Höhenrudernanlenkung

9



mounting elevator

Abb. 20: Montage Höhenruder 1

10

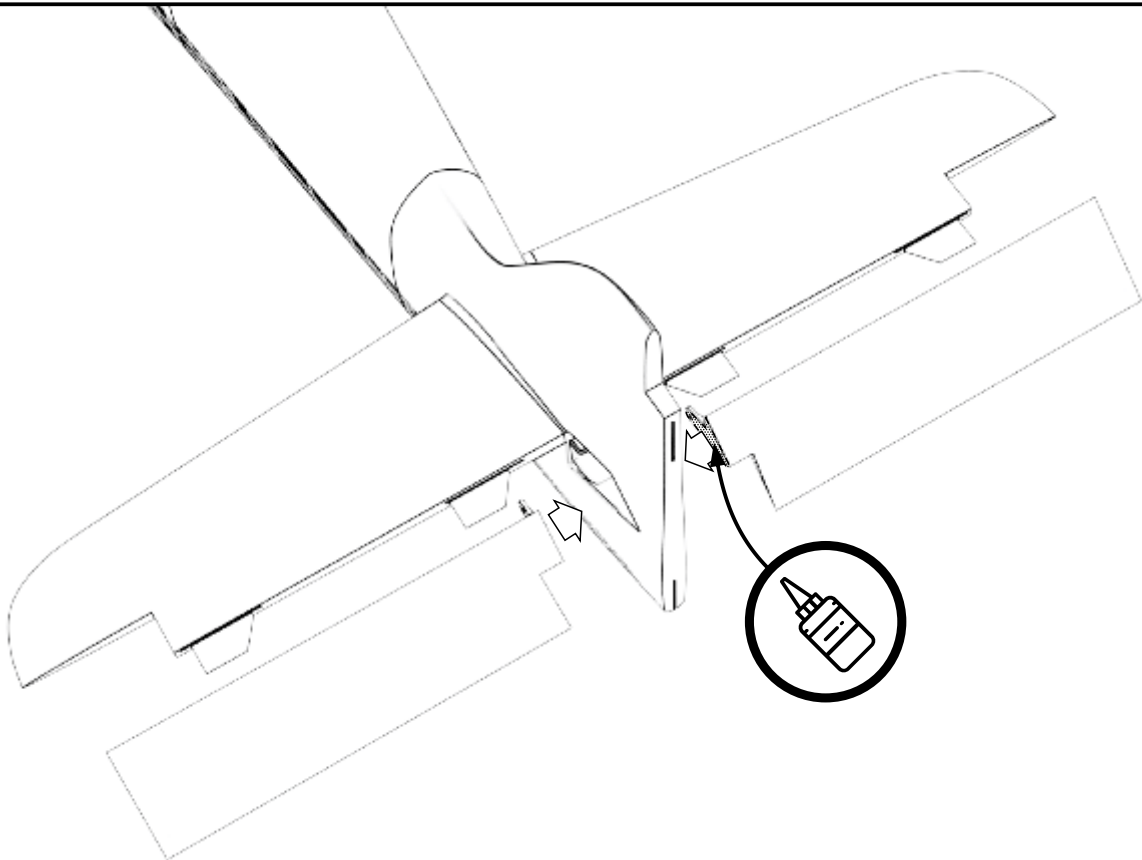
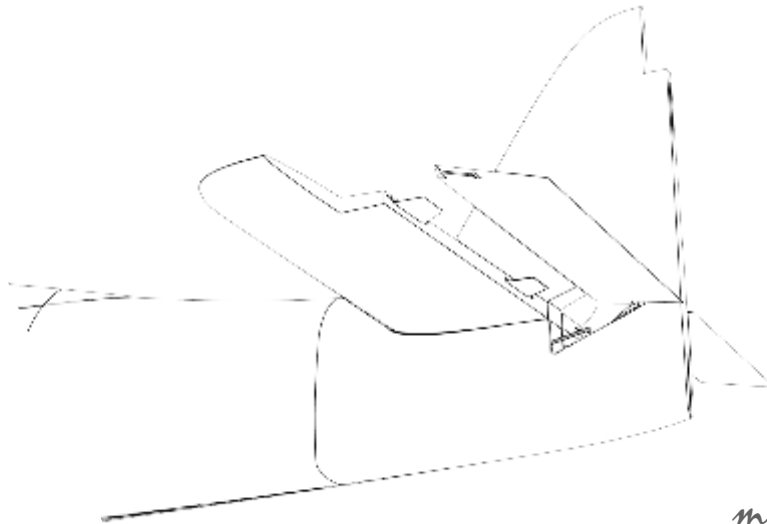


Abb. 21: Montage Höhenruder 2

11



mounting elevator

Abb. 22: Montage Höhenruder 3

12

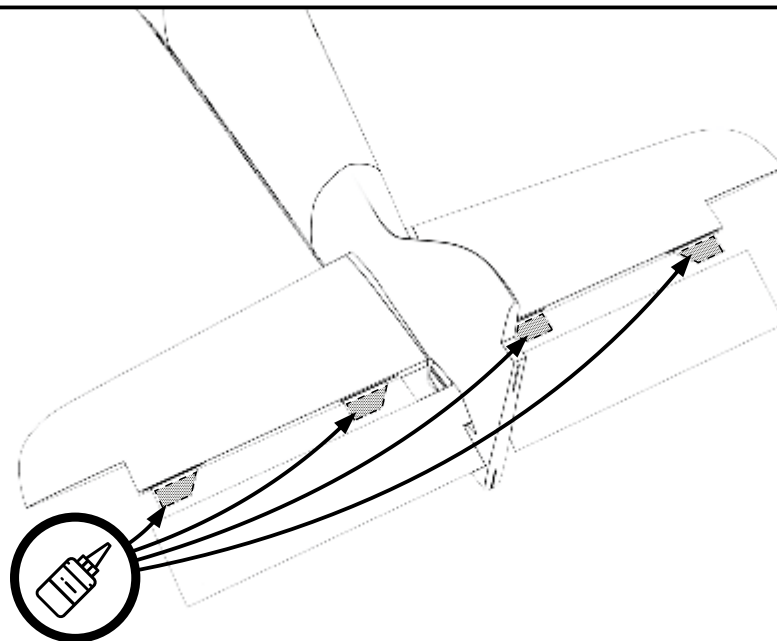


Abb. 23: Montage Höhenruder 4

13

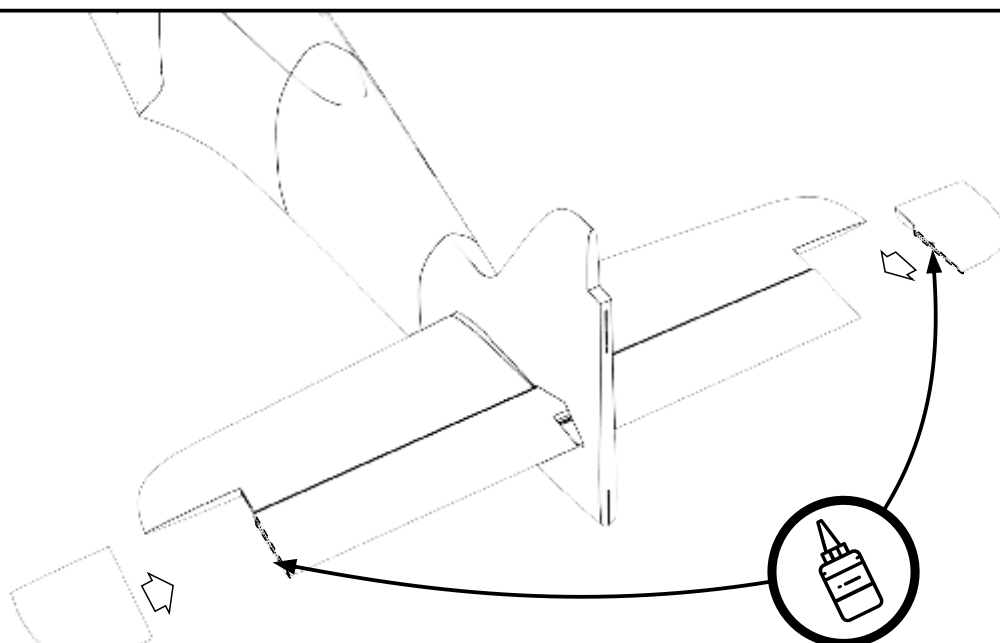
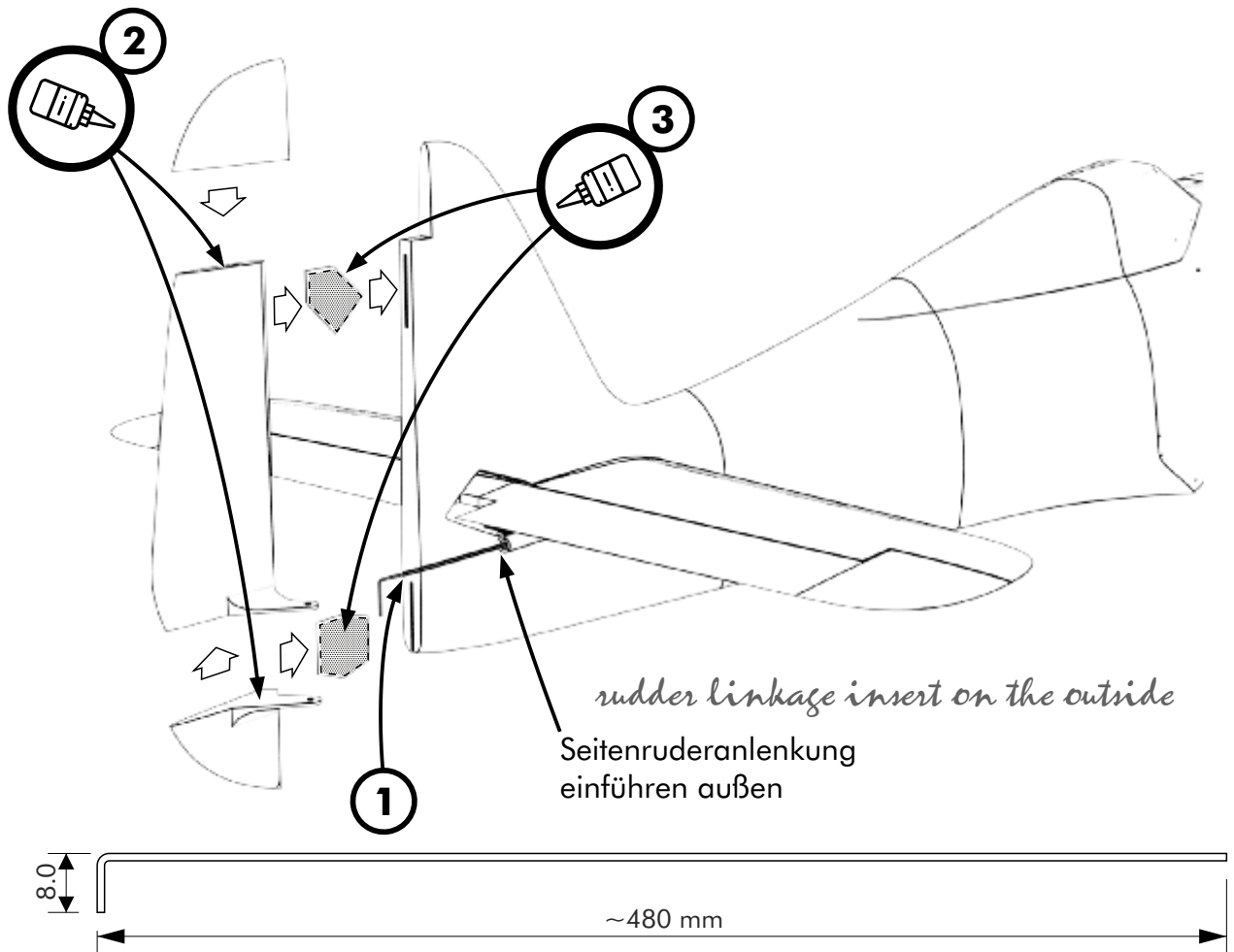


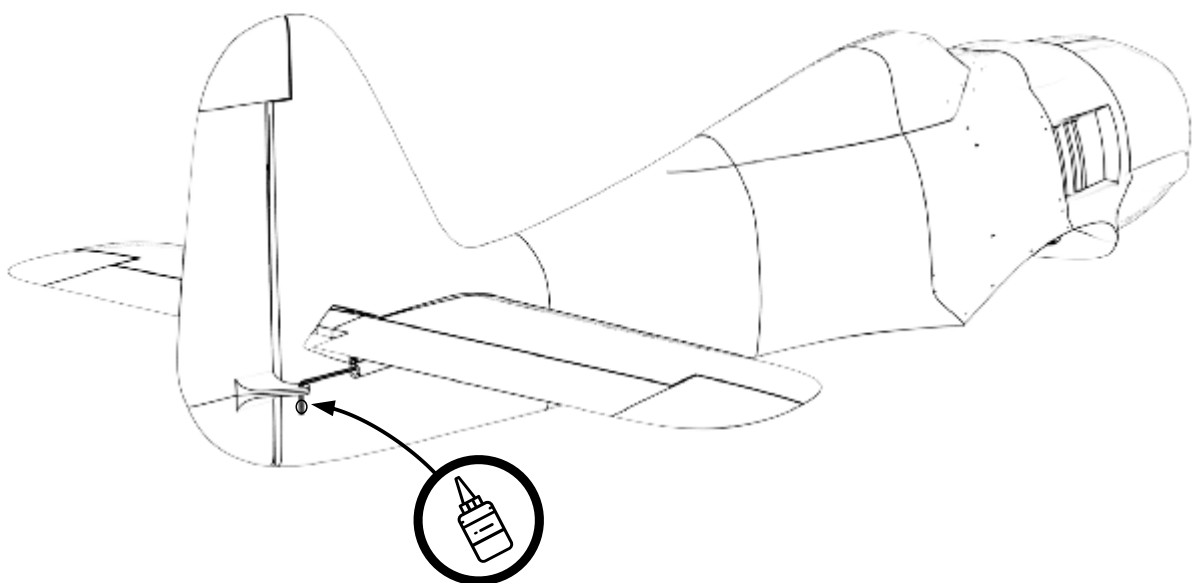
Abb. 24: Montage Höhenruder 5

14

Abb. 25: Montage Seitenruder 1



15



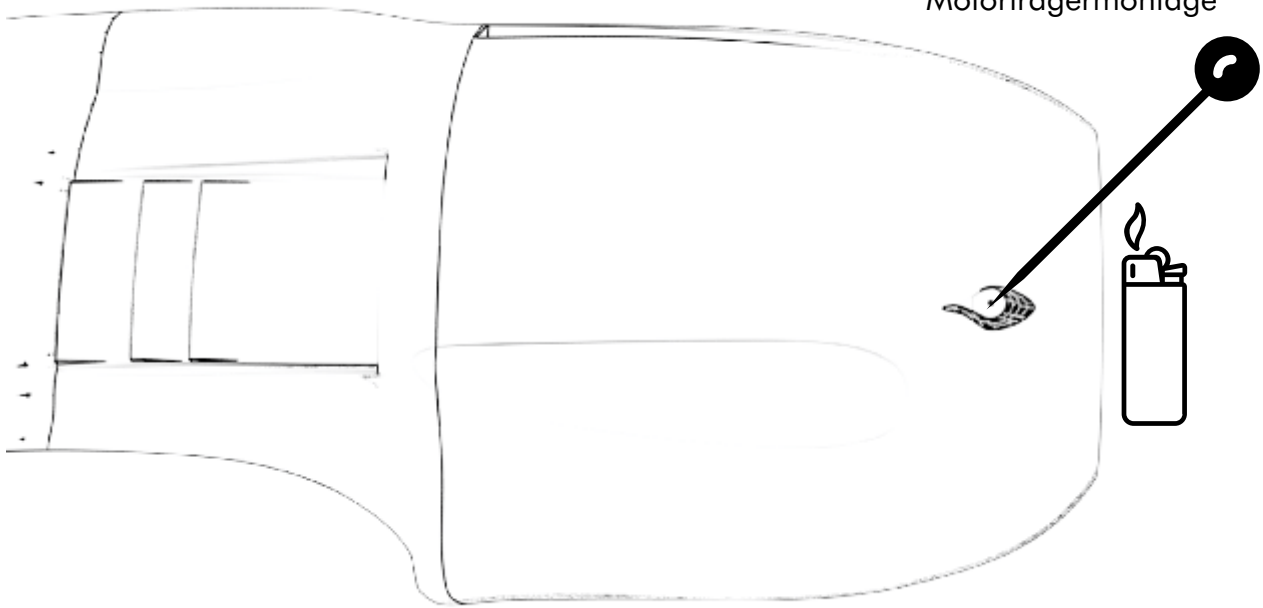
mounting rudder

Abb. 26: Montage Seitenruder 2

16

*Use a hot wire or needle for stinging the
Through-holes for engine mount assembly*

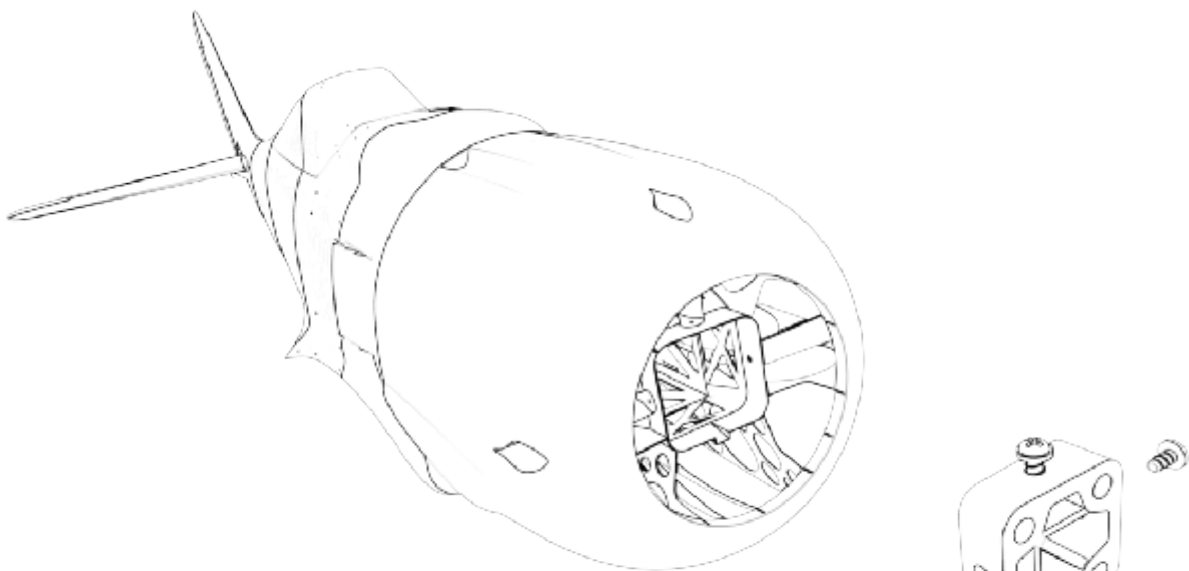
Heißer Draht oder Nadel
zum stechen der
Durchgangsbohrungen für
Motorträgermontage



preparation engine mount assembly

Abb. 27: Vorbereitung Montage Motorträger

17



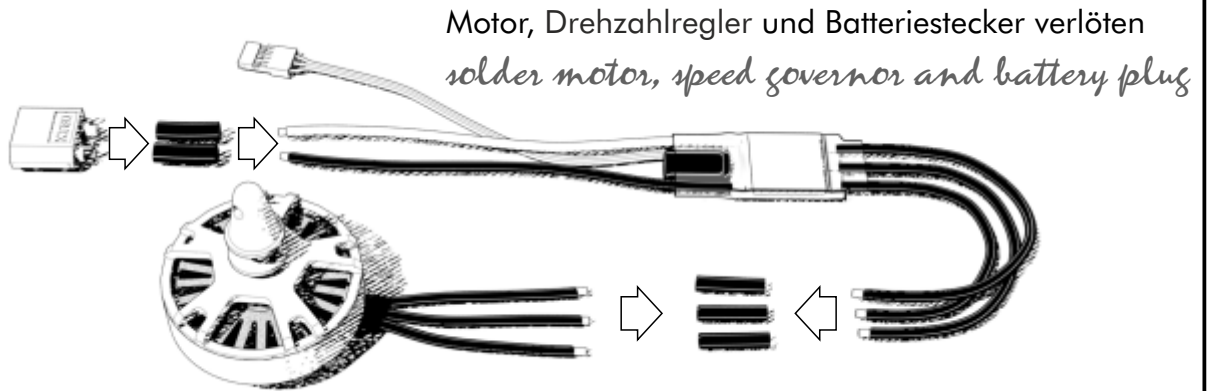
*Screw in screws lightly,
then warm up the screws
before you completely
screw them in
to create a thread.*

Schrauben leicht einschrauben
dann erwärmen und fertig
einschrauben um einen
Gewindegang zu erzeugen.



Abb. 28: Vorbereitung Motorträger

18

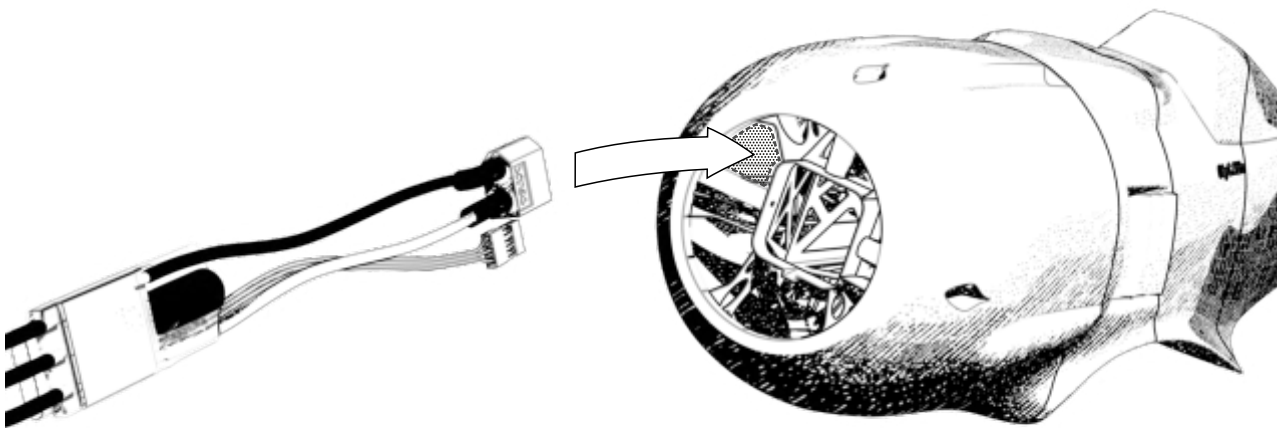


Do not forget shrink tubing
over solder joints!

Schrumpfschlauch über Lötstellen nicht vergessen!

Abb. 29: Montage Motor und Drehzahlregler

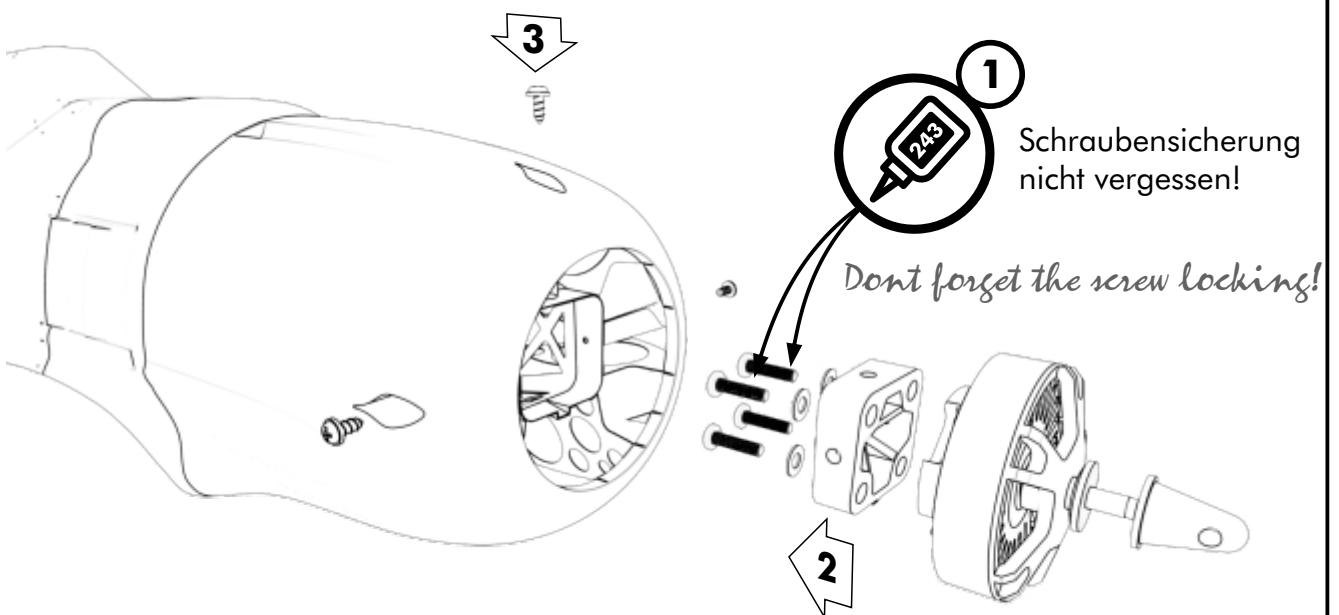
19 Thread the regulator with the battery plug first through the upper left opening.
Regler mit Batteriestecker voran durch linke obere Öffnung einfädeln



installation speed governor

Abb. 30: Einbau Drehzahlregler

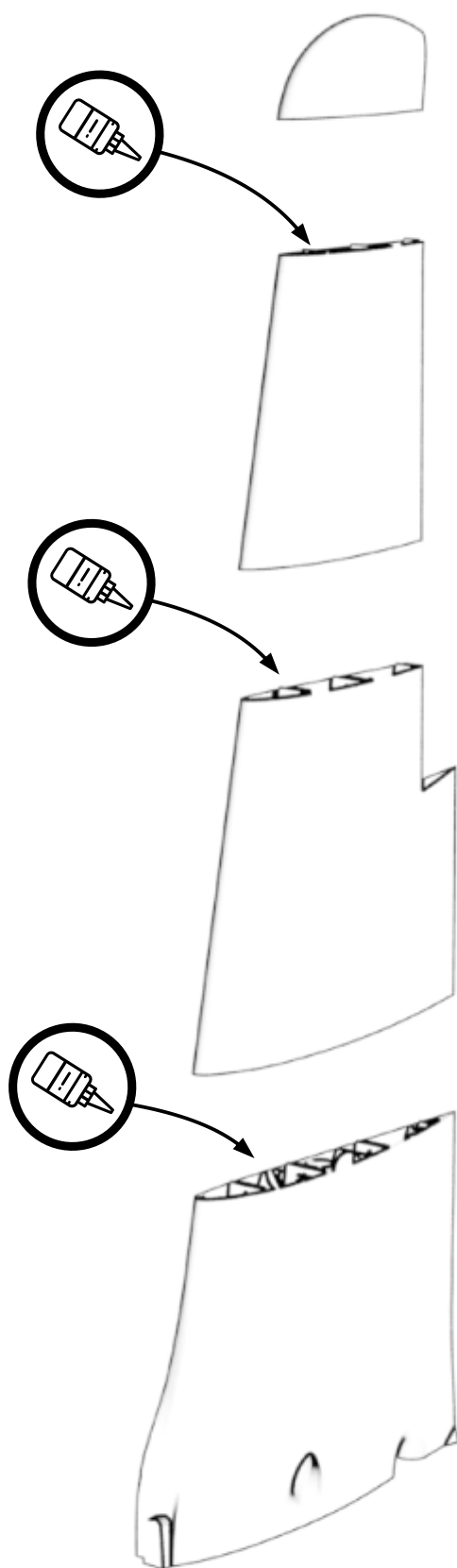
20



engine installation

Abb. 31: Einbau Motor

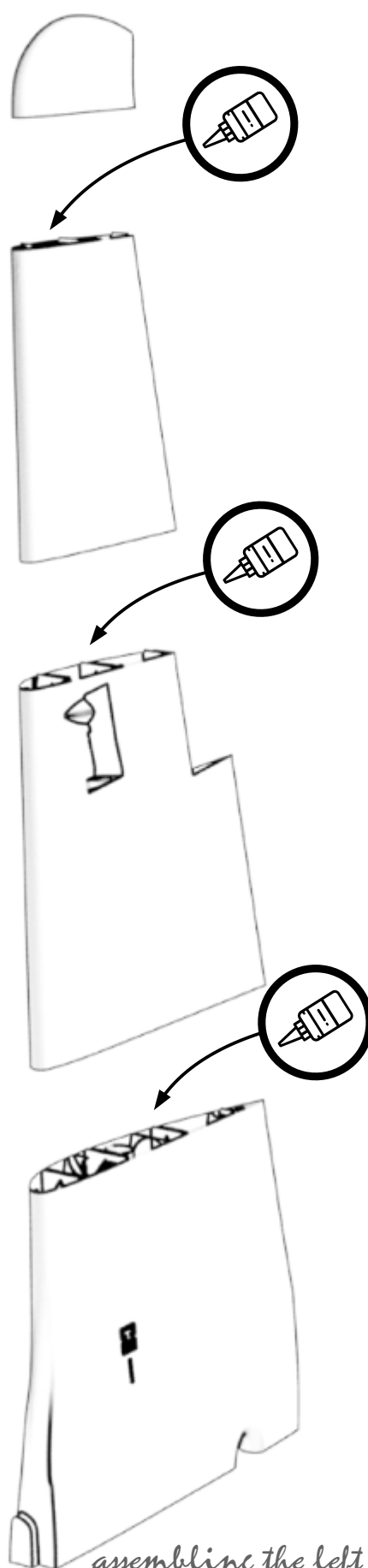
20



assembling the right wing

Abb. 32: Montage rechte Tragfläche

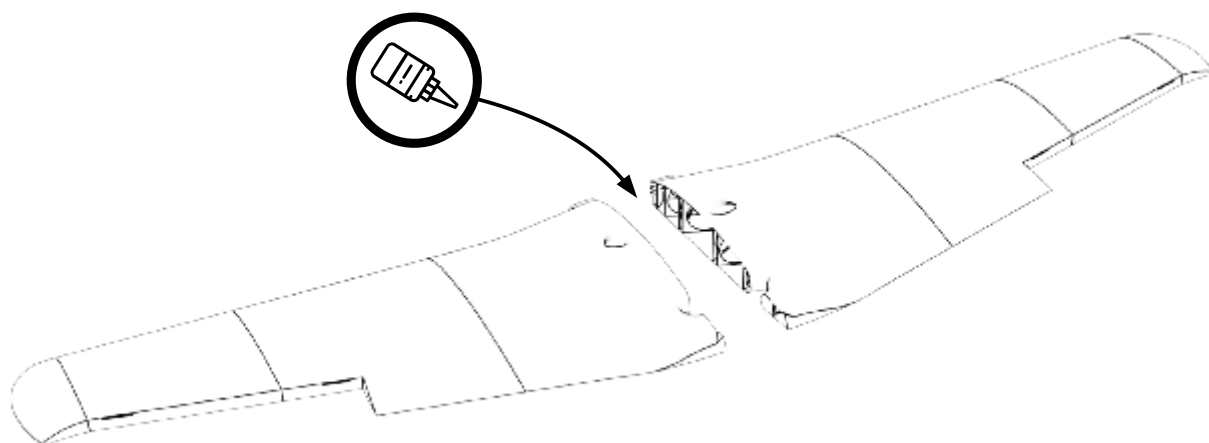
21



assembling the left wing

Abb. 33: Montage linke Tragfläche

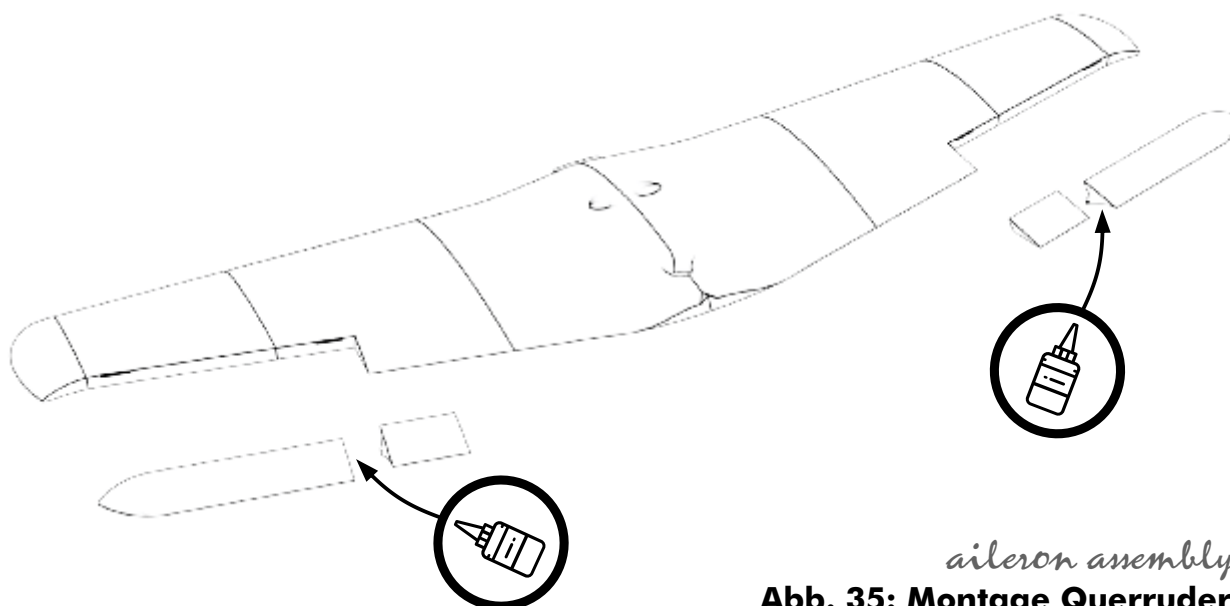
22



wing assembly

Abb. 34: Montage Tragfläche

23



aileron assembly

Abb. 35: Montage Querruder 1

24

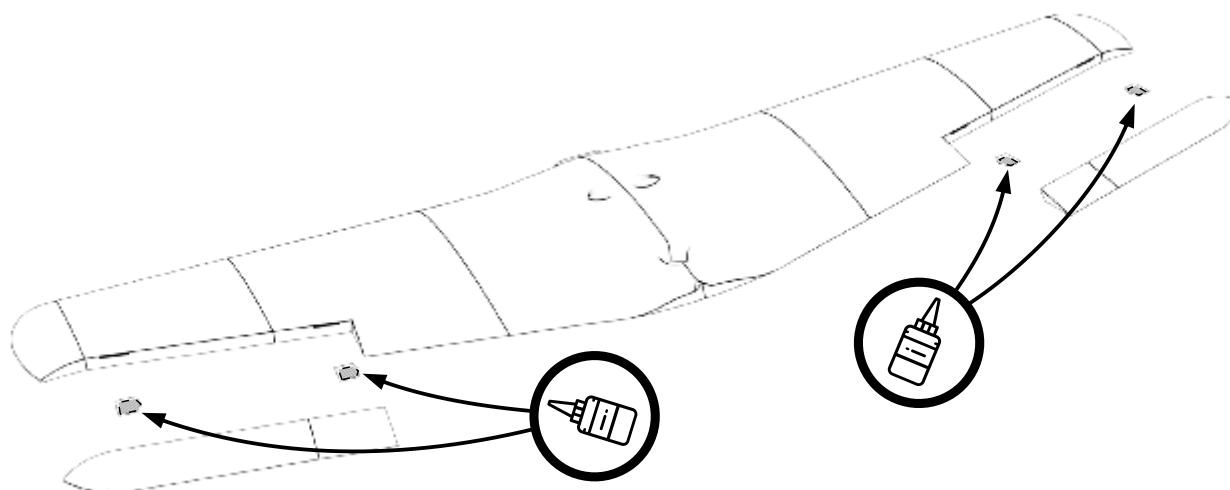
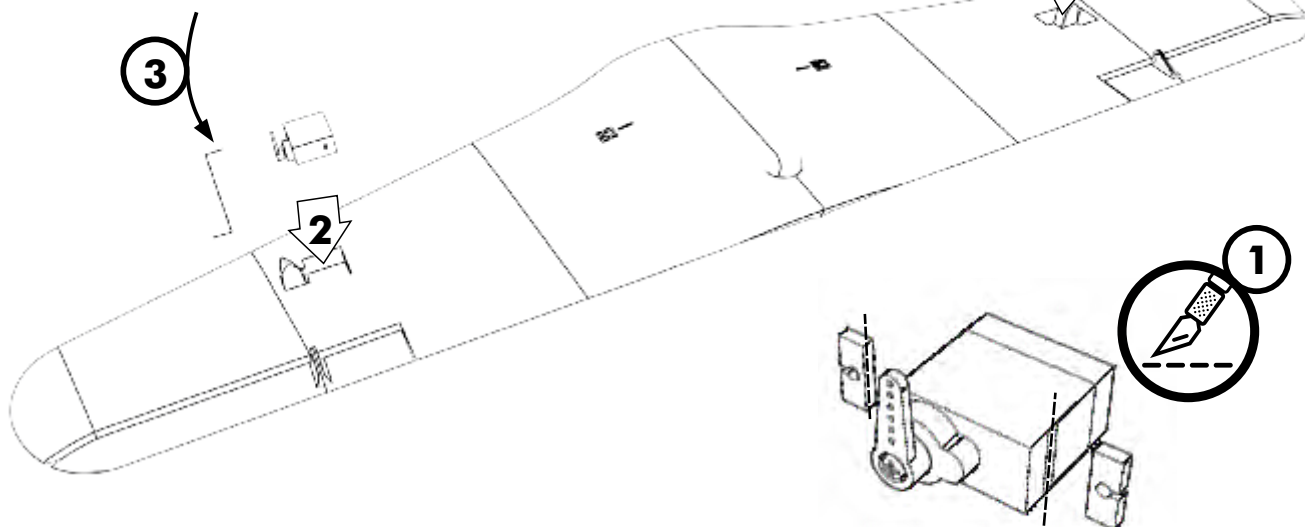


Abb. 36: Montage Querruder 2

25

aileron linkage
2x Querruderanlenkung



Remove the mounting tabs on both sides of the servo (e.g. with a saw)

Montagelaschen des Rudermaschinen zuvor beidseitig entfernen (z.B. mit Säge)

aileron linkage assembly **Abb. 37: Montage Querruderanlenkung 1**

26

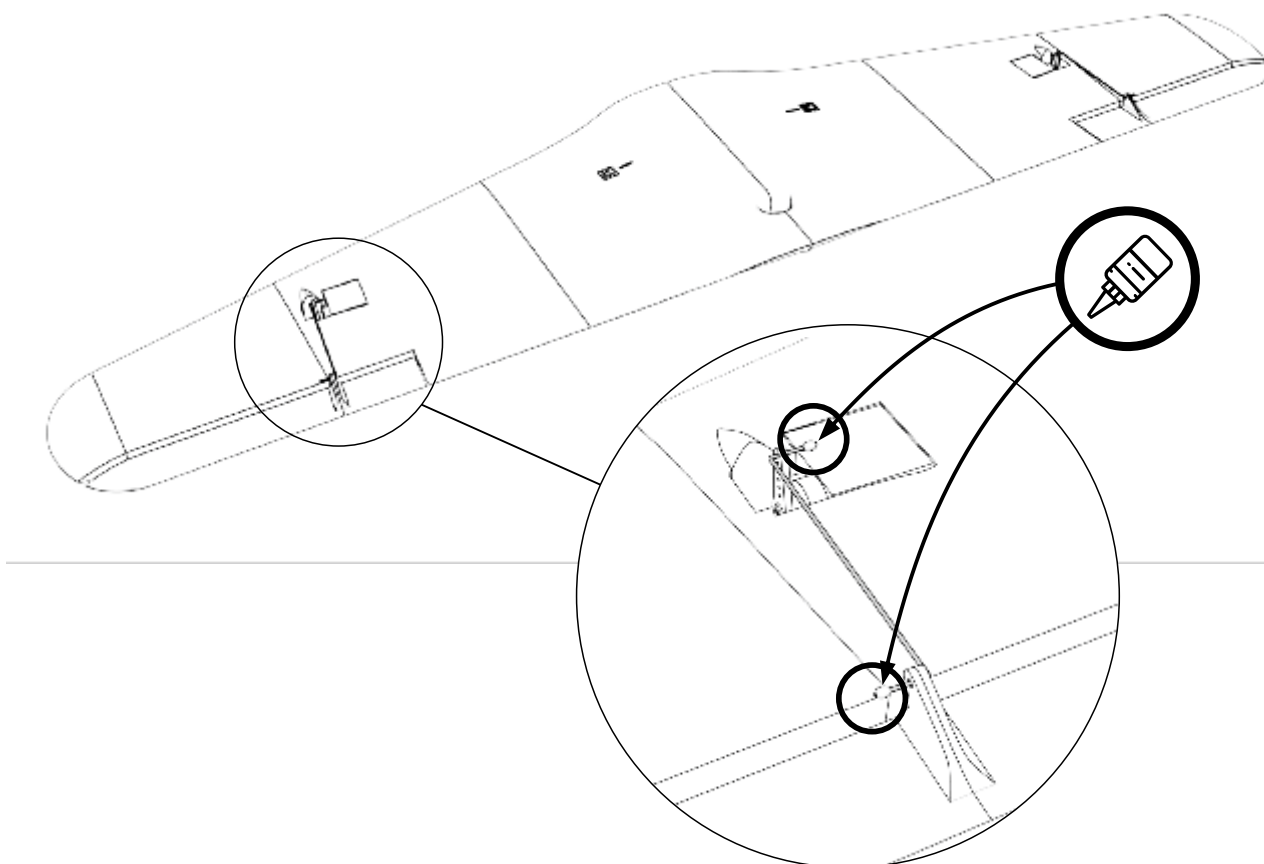


Abb. 38: Montage Querruderanlenkung 2

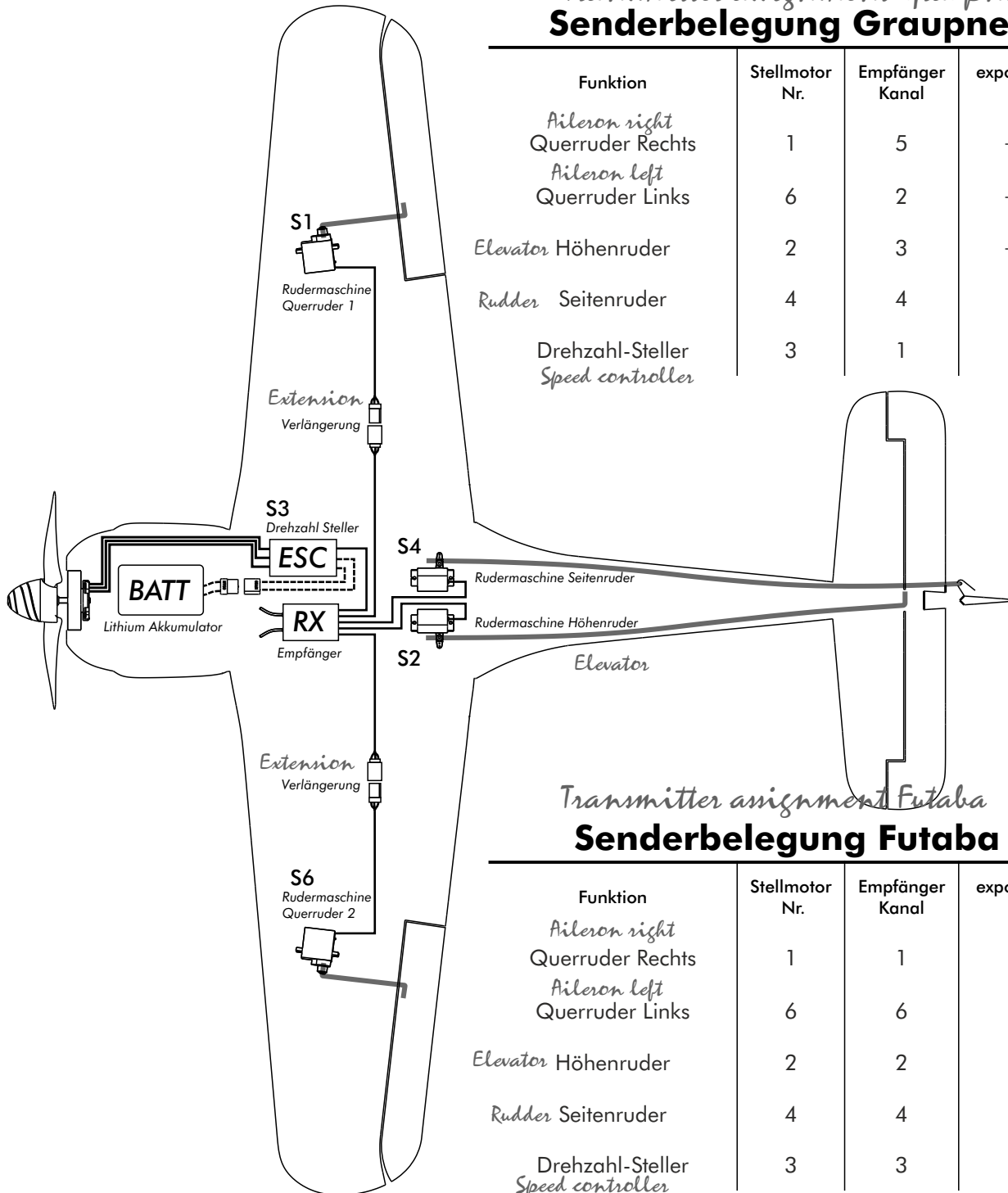
circuit diagram on-board electronics

IV. Schaltplan Bord-Elektronik

Due to the risk of injury, adjustments to the electronic components should only be made with the propeller removed!
 The following channel assignments depend on the remote control system used. It is recommended to consult the manufacturer's manual for the exact assignment.

Transmitter assignment Graupner Senderbelegung Graupner

Funktion	Stellmotor Nr.	Empfänger Kanal	exponentieller Anteil
<i>Aileron right</i> Querruder Rechts	1	5	+50%
<i>Aileron left</i> Querruder Links	6	2	+50%
<i>Elevator</i> Höhenruder	2	3	+50%
<i>Rudder</i> Seitenruder	4	4	-
<i>Drehzahl-Steller</i> Speed controller	3	1	-



Transmitter assignment Futaba Senderbelegung Futaba

Funktion	Stellmotor Nr.	Empfänger Kanal	exponentieller Anteil
<i>Aileron right</i> Querruder Rechts	1	1	-50%
<i>Aileron left</i> Querruder Links	6	6	-50%
<i>Elevator</i> Höhenruder	2	2	-50%
<i>Rudder</i> Seitenruder	4	4	-
<i>Drehzahl-Steller</i> Speed controller	3	3	-

Bemerkung: Ansicht von Oben auf das Flugzeug
 Remark: Top view of the aircraft

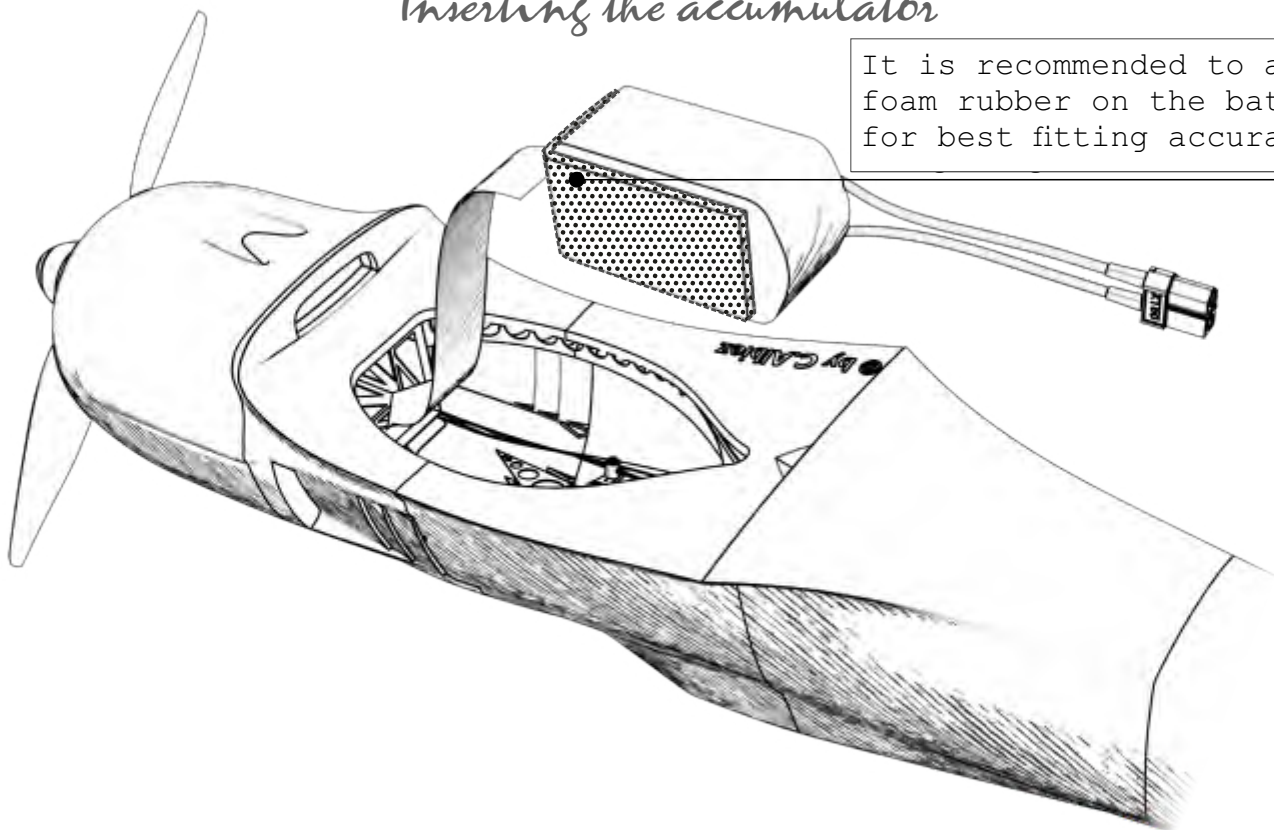
Abb. 39: Übersichtsschaltplan
 Overview circuit diagram

Configure the motor controller so that the brake function is activated sufficiently to prevent the propeller from freewheeling (windmill effect). A free-running propeller increases air resistance unnecessarily and will most likely cause propeller breakage or damage to the model when landing.

V. Flugvorbereitungen

1. Einsetzen des Akkumulators

Inserting the accumulator

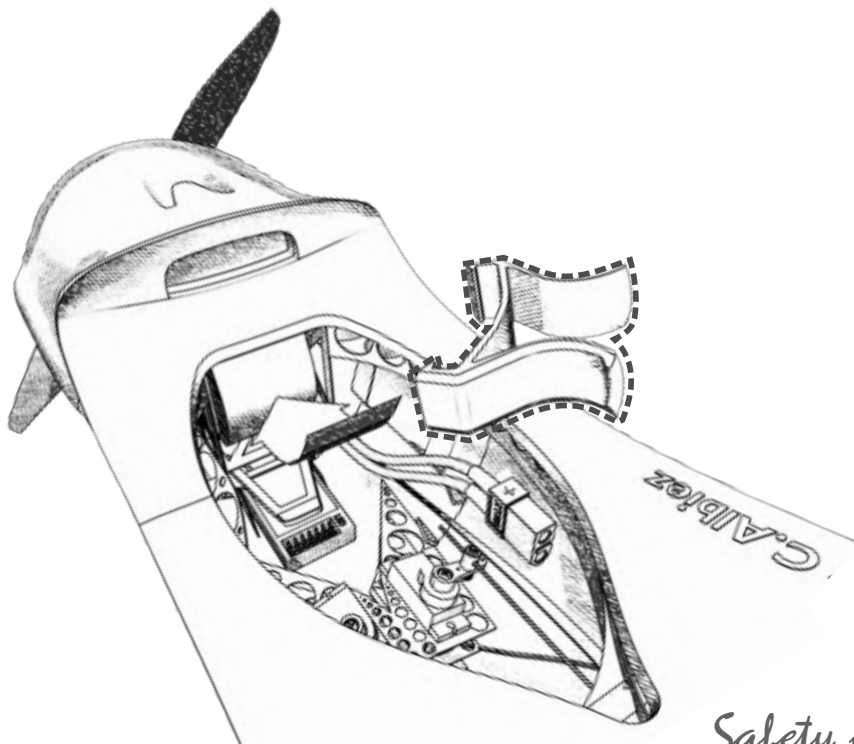


It is recommended to apply foam rubber on the battery for best fitting accuracy.

Abb. 40: Einsetzen der Batterie

Inserting the battery

! The accumulator must be secured against slipping as a change of the centre of gravity will lead to a safe fall.



Safety clip for accumulator

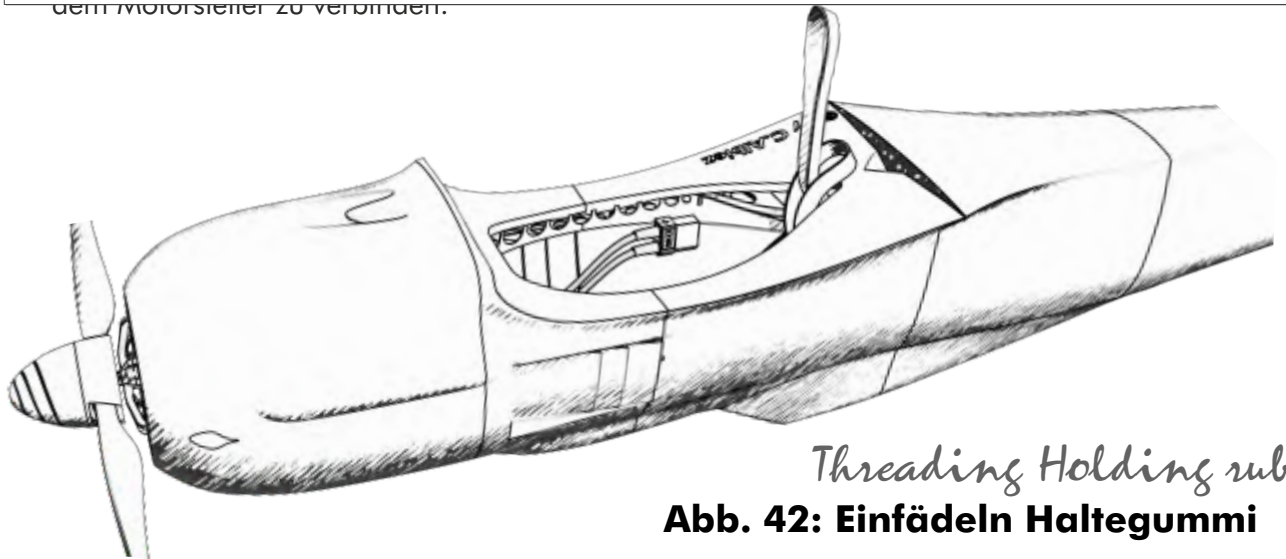
Abb. 41: Sicherungsklammer für Akkumulator

V. Flugvorbereitungen

2. Anbringen der Tragfläche *Attaching the Wing*

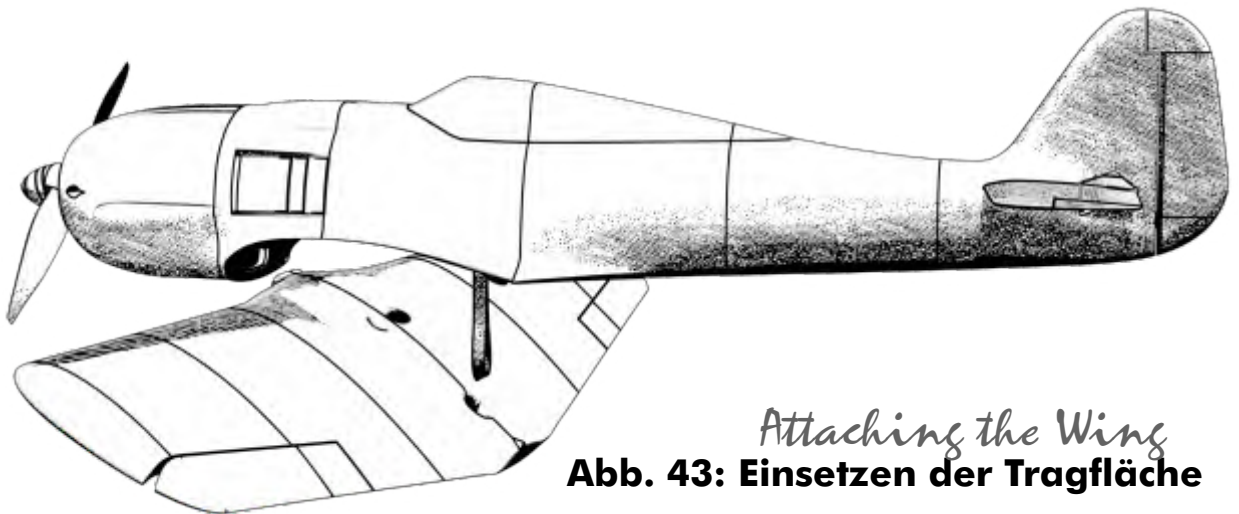
The wing is tensioned against the fuselage by a rubber band, follow the steps below to assemble the wing. Don't forget to connect the receiver to the servomotors in the wings first, and to connect the drive battery to the motor controller.

dem Motorsteuer zu verbinden.



Threading Holding rubber

Abb. 42: Einfädeln Haltegummi



Attaching the Wing

Abb. 43: Einsetzen der Tragfläche

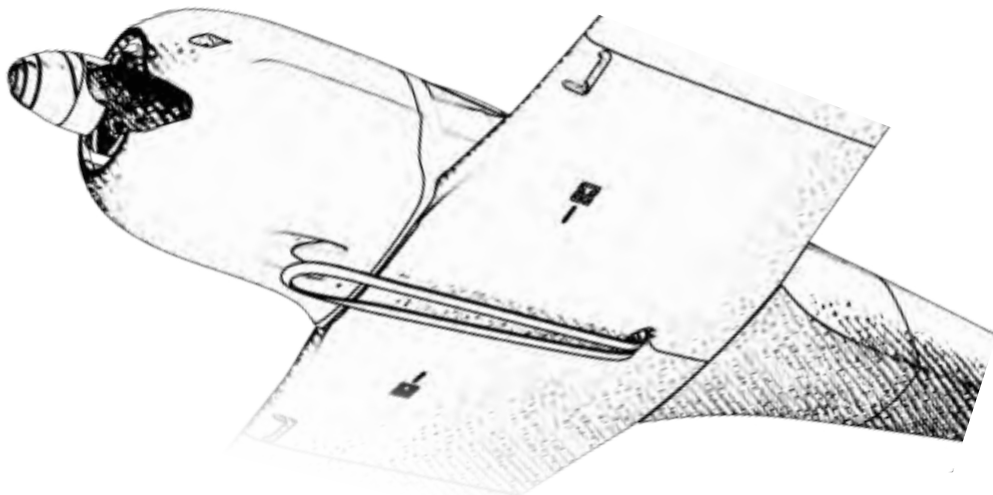


Abb. 44: Sichern der Tragfläche

Attaching the Wing

V. Flugvorbereitungen

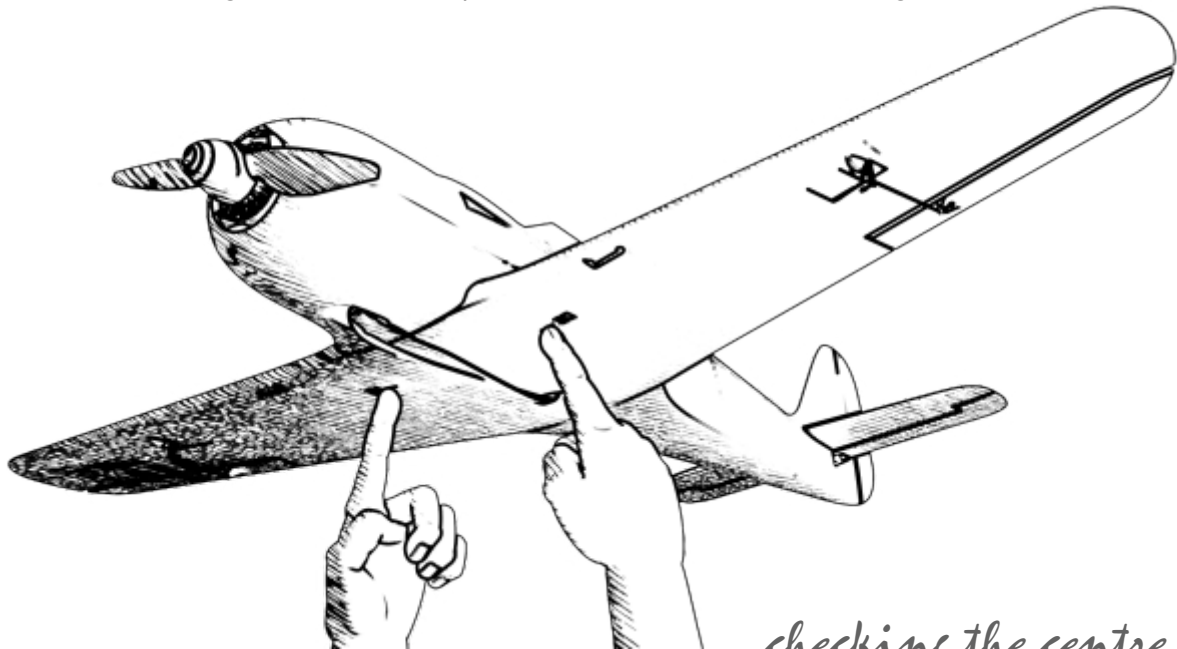
3. Überprüfen des Schwerpunktes

checking the centre of gravity

DON'T FAIL TO CHECK CG

The centre of gravity of the glider must under no circumstances be behind the position marked on the wings and must be checked before the first flight!

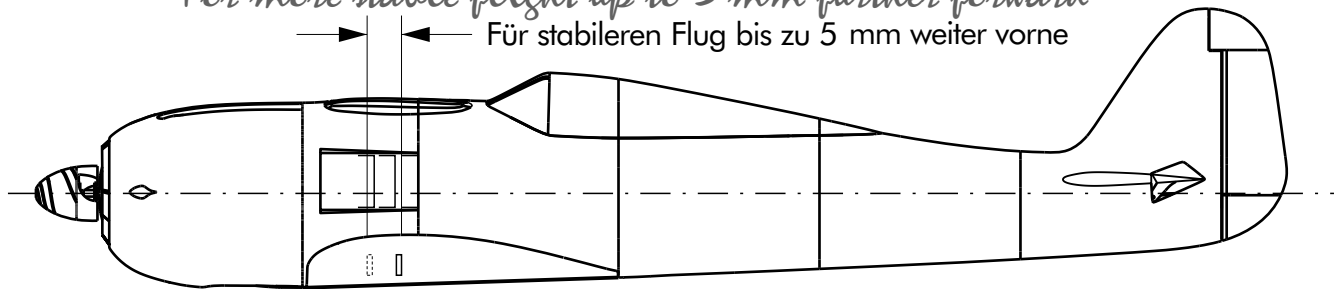
For a more stable flight the centre of gravity may be up to 5mm



checking the centre of gravity

Abb. 45: Schwerpunktkontrolle

For more stable flight up to 5 mm further forward
Für stabileren Flug bis zu 5 mm weiter vorne



centre of gravity

Schwerpunkt

position of the centre of gravity

Abb. 46: Lage des Schwerpunktes

RC and Mixers

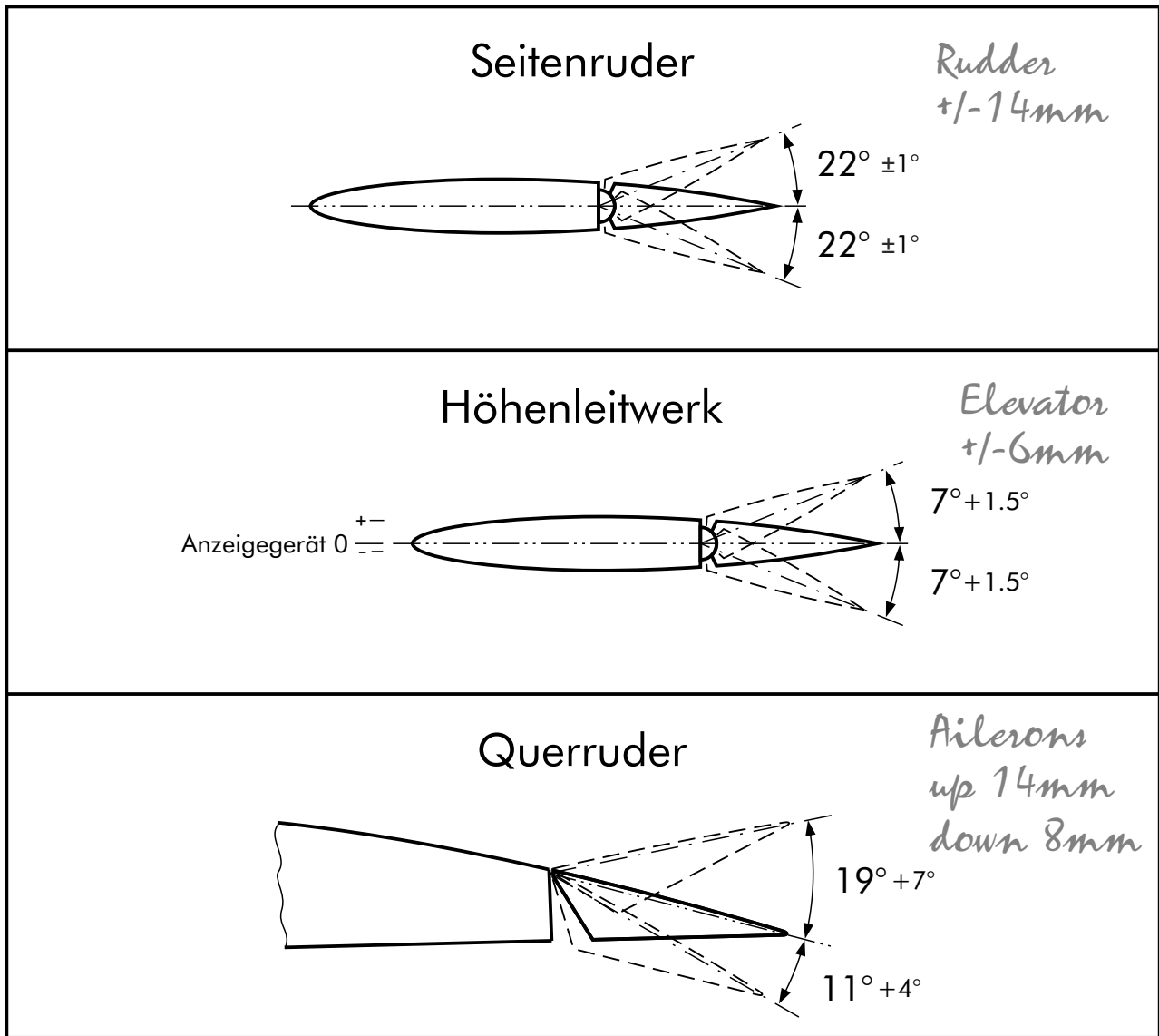
Control throws

4. Einstellung der Fernsteuerung, Mischer und Ruderwege

For the control of the model a remote control with at least 5 channels is necessary because the ailerons are controlled by their own servo motors. Please refer to your remote control unit for the channel assignment, and bring this into line with the circuit diagram of the on-board electronics in Chapter 4, where the exponential function for the rudder functions can also be found (50% for aileron and elevator).

The rudder travel must be set up in accordance with the setting plan on the following page.

CAUTION: The control surface travel is given as angles (degrees).



Ruderausschläge			Control throws			
			nach oben <i>up</i>		nach unten <i>down</i>	
<i>Elevator</i> Höhenruder		Soll <i>target</i>	L 7°	R 7°	L 7°	R 7°
		Ist <i>actual</i>				
	Ab- weichg. <i>deviation</i>					
		kann <i>can</i>	+1,5°	+1,5°	+1,5°	+1,5°
<i>Ailerons</i> Querruder		Soll	L 19°	R 19°	L 11°	R 11°
		Ist				
	Ab- weichg.					
		kann	+7°	+7°	+4°	+4°
<i>Rudder</i> Seitenruder		Soll	nach links 22° <i>left</i>		nach rechts 22° <i>right</i>	
		Ist				
	Ab- weichg.					
		kann	$\pm 1^\circ$		$\pm 1^\circ$	

landing gear

VI. FAHRWERK

(Optional)

1. Biegen des Haupt-Fahrwerks

*bending of the
main landing gear*

Base material are two steel wires with $\varnothing 3\text{mm}$ and a length of 215mm. According to the steps shown below using the bending gauges (48 and 49) to bend the wire into shape.

in form biegen.

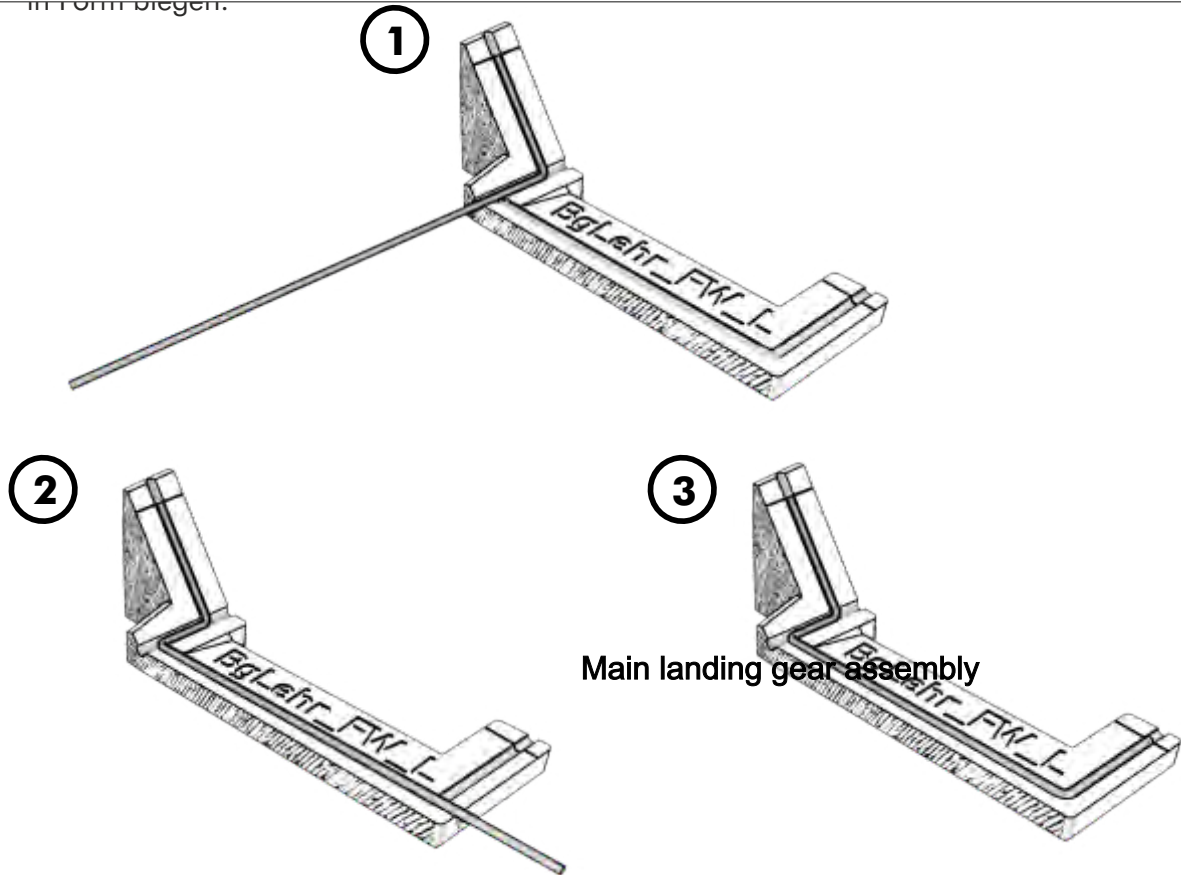


Abb. 47: Biegen des Hauptfahrwerks

forming the main landing gear

Before further assembly of the undercarriage, deburr the ends to prevent damage to the wheel bushings (35). Then thread the parts as shown below and fix them in place. It is recommended that the set screws of the set collars (36) be secured with "medium" threadlocker.

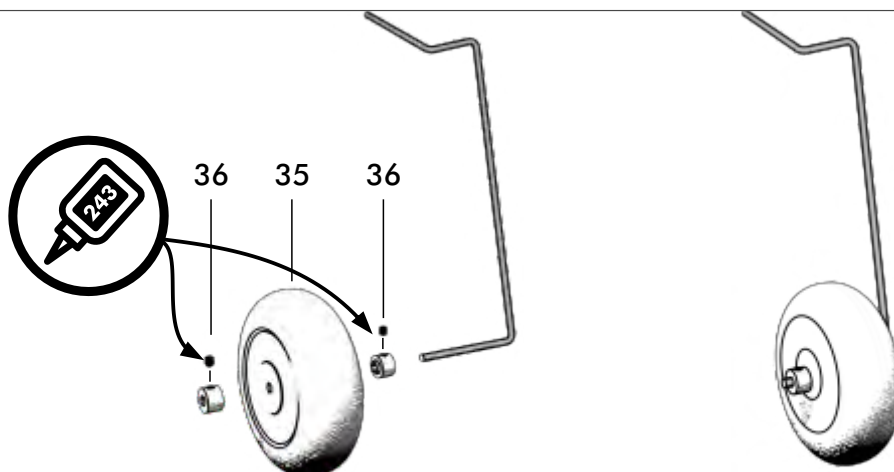


Abb. 48: Unterbaugruppe Hauptfahrwerk

Main landing gear subassembly

landing gear
VI. FAHRWERK
(Optional)

2. Einsetzen des Haupt-Fahrwerks
inserting the main landing gear

Finally, insert the landing gear from the front into the wing in the openings provided for it, fold it outwards at the end and fix it permanently with super glue.

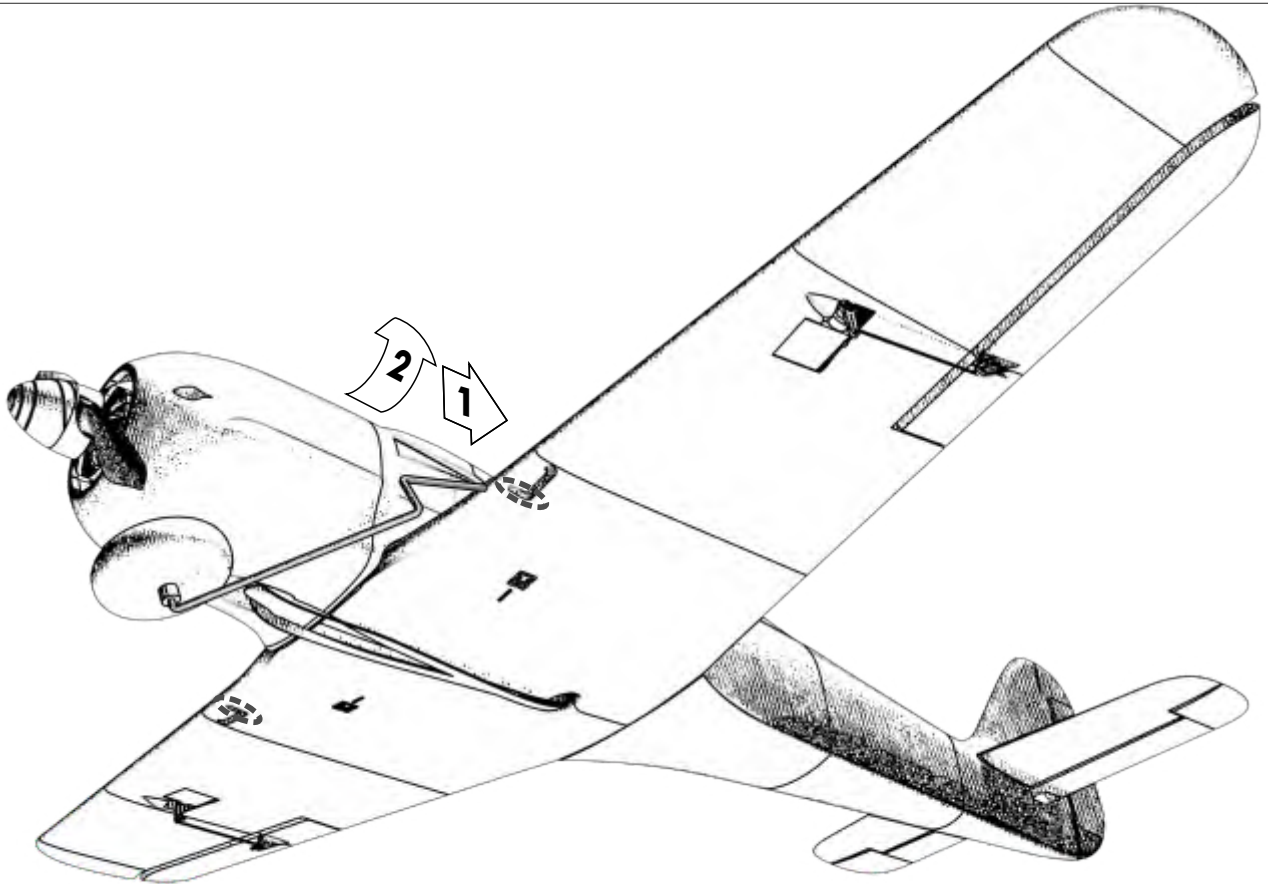


Abb. 49: Montage Hauptfahrwerkes
Main landing gear assembly

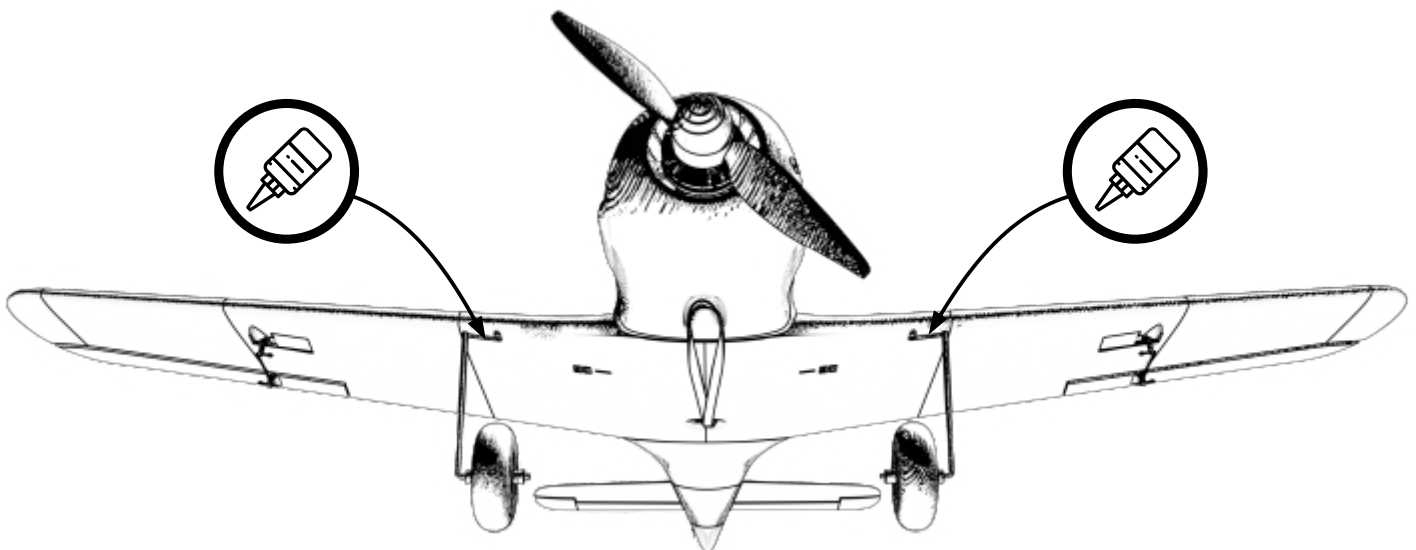


Abb. 50: Hauptfahrwerk Ansicht von Vorne
Main landing gear Front view

landing gear

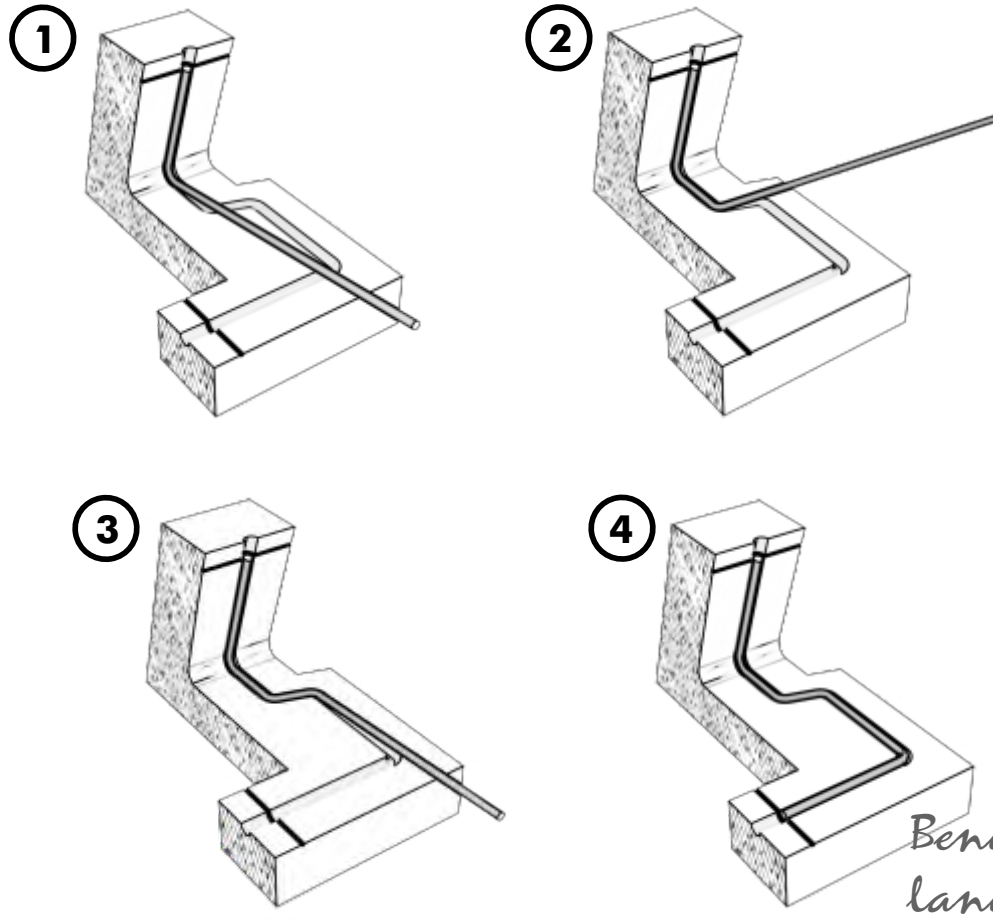
VI. FAHRWERK

(Optional)

3. Biegen des Sporn-Fahrwerks

*bending of the
tail landing gear*

Base material is a steel wire with $\varnothing 1.2\text{mm}$ and a length of 75mm. According to the steps shown below with the aid of the bending gauge (50) bend into shape.



*Bending the tail
landing gear*

Abb. 51: Biegen des Spornfahrwerks

Before further assembly of the undercarriage, deburr the ends to prevent damage to the wheel bushing (43). Then thread the parts as shown below, fixing the tailwheel end cap (44) and the tailwheel thrust ring (42) with a drop of superglue if necessary, taking care that no glue gets into the wheel bushing and makes it stick.

gerührt und dieses fest setzt.

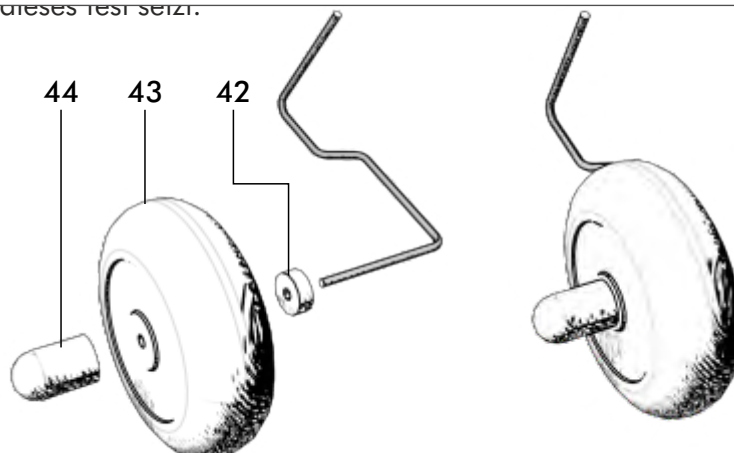


Abb. 52: Unterbaugruppe Spornfahrwerk

Tail landing gear subassembly

landing gear
VI. FAHRWERK
(Optional)

4. Einsetzen des Sporn-Fahrwerks
inserting the tail landing gear

Finally insert the landing gear into the openings provided for it in the tailplane and fix it finally with super glue.

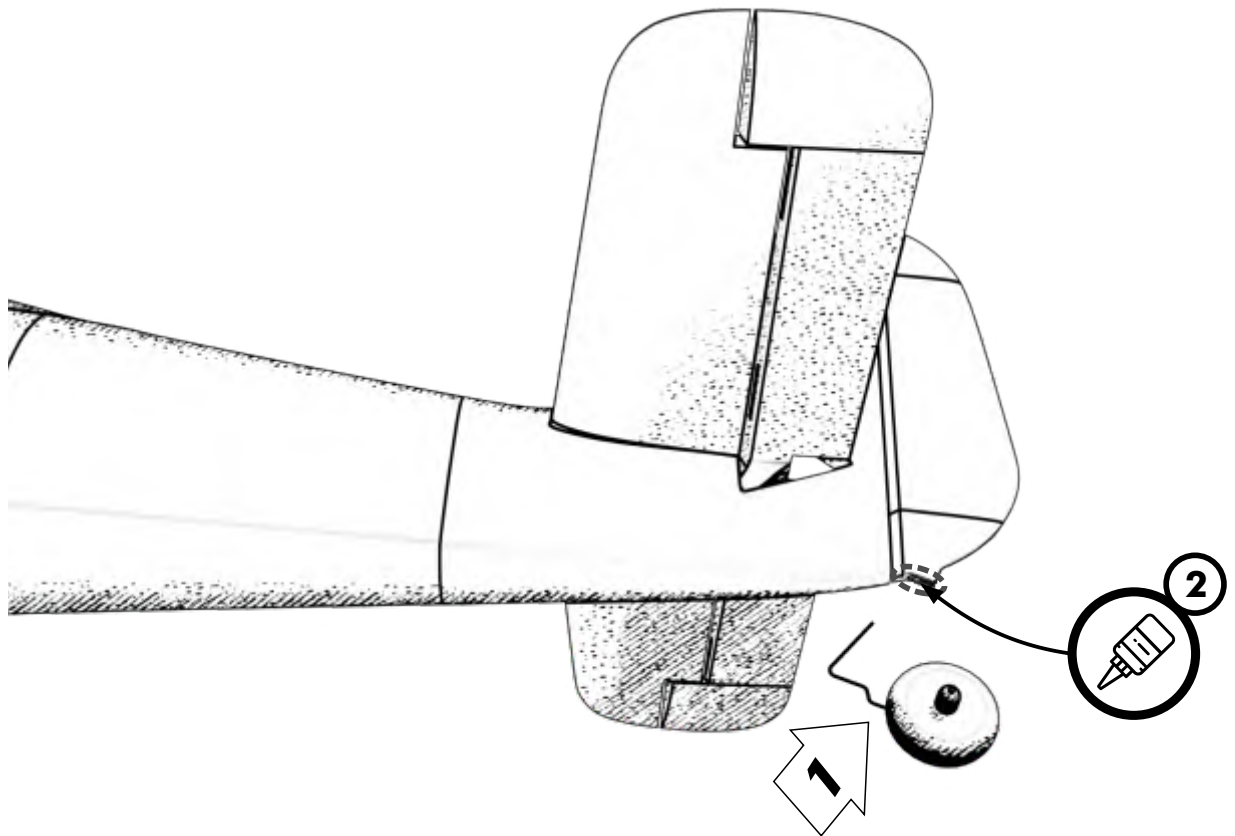
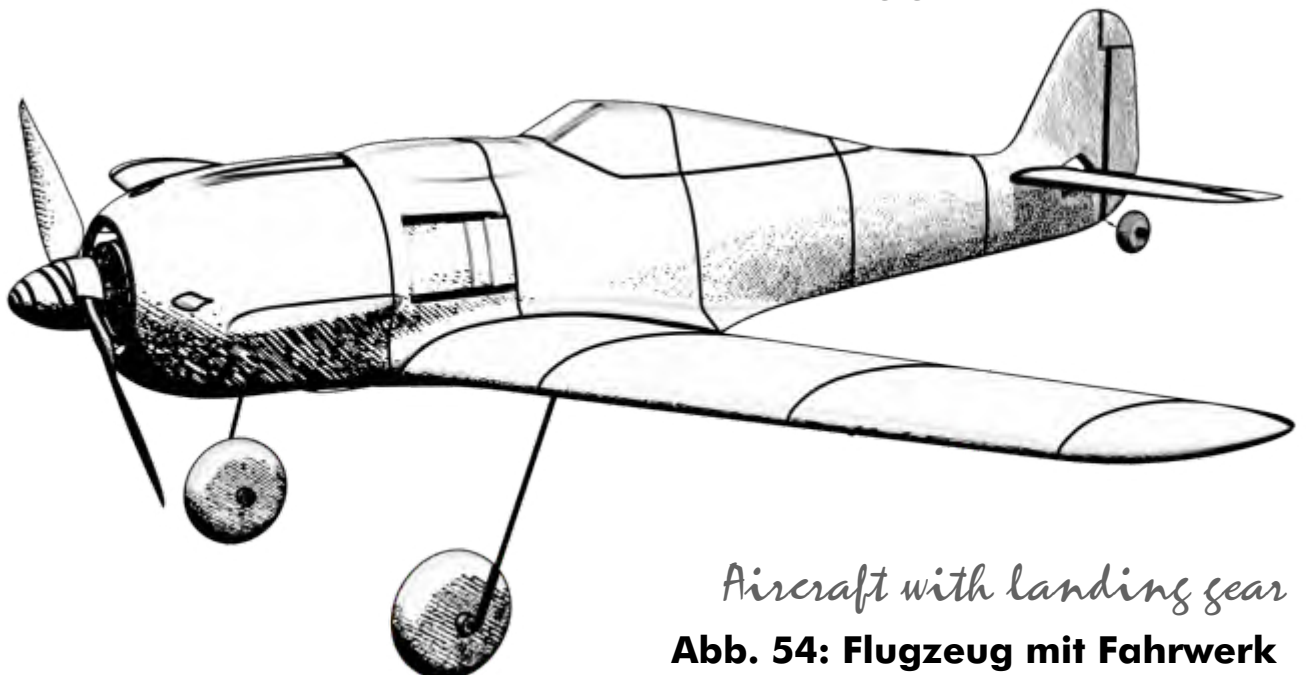


Abb. 53: Montage Spornfahrwerk
Tail landing gear assembly



Aircraft with landing gear
Abb. 54: Flugzeug mit Fahrwerk

paint scheme **VII. Farbprofile**

In the following you will find examples of colour profiles, the necessary graphics can be found on the attached documents for vinyl film and water sliding film.

Spray can paints from automotive accessories have proven to be well suited, but it is recommended to test this in advance on a sample for compatibility and durability (abrasion resistance). Depending on the paint used, a plastic primer must be used before painting

1. Vor dem Lackieren! *before painting!*

It is recommended to remove the motor before painting and to protect all moving parts such as actuators by masking them with masking tape.

2. Abkleben der Fenster *masking the windows*

TIP: If the segments 3 and 4 of the fuselage are printed in transparent plastic, you can create the windows by simply masking and painting. To do this, mask off the areas of the windows that will later remain transparent.

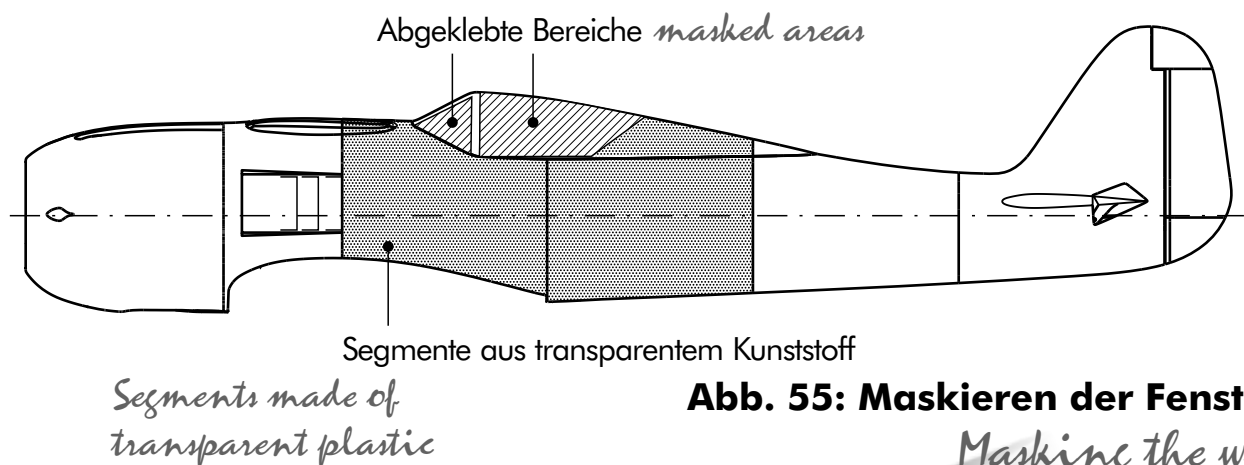
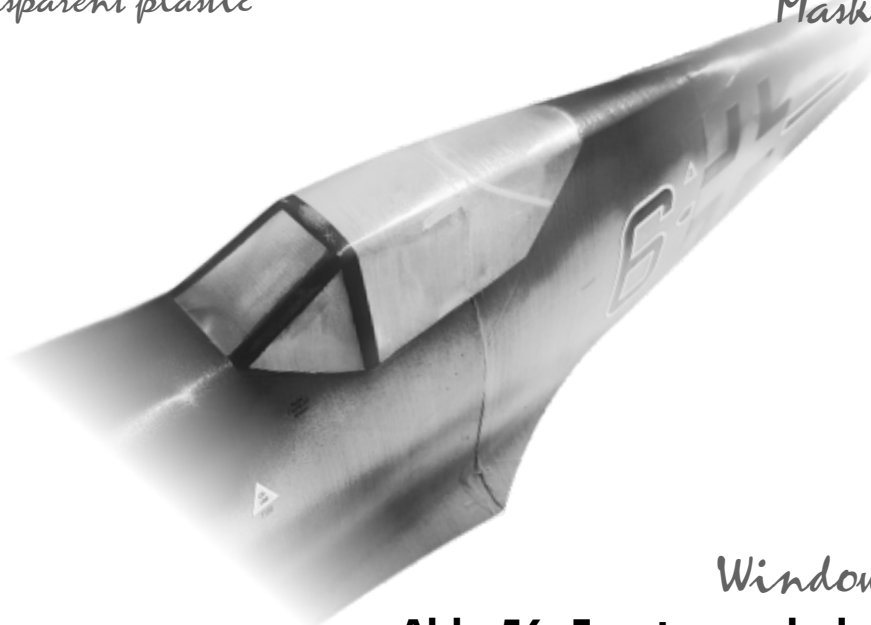


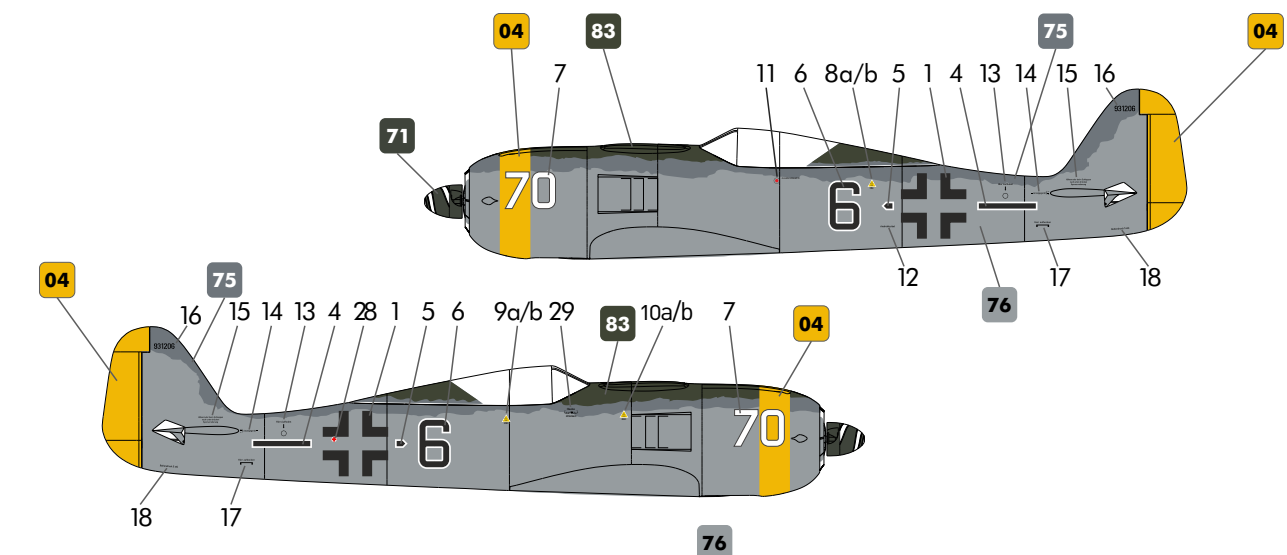
Abb. 55: Maskieren der Fenster

Masking the windows



Window after painting

Abb. 56: Fenster nach dem Lackieren



Focke Wulf FW 190 F-8/R1
Stab SG 10
Budweis, Mai 1945

RLM 04	04	RAL 1004
RLM 83	83	RAL 6022
RLM 71	71	RAL 6006
RLM 75	75	RAL 7040
RLM 76	76	RAL 7045

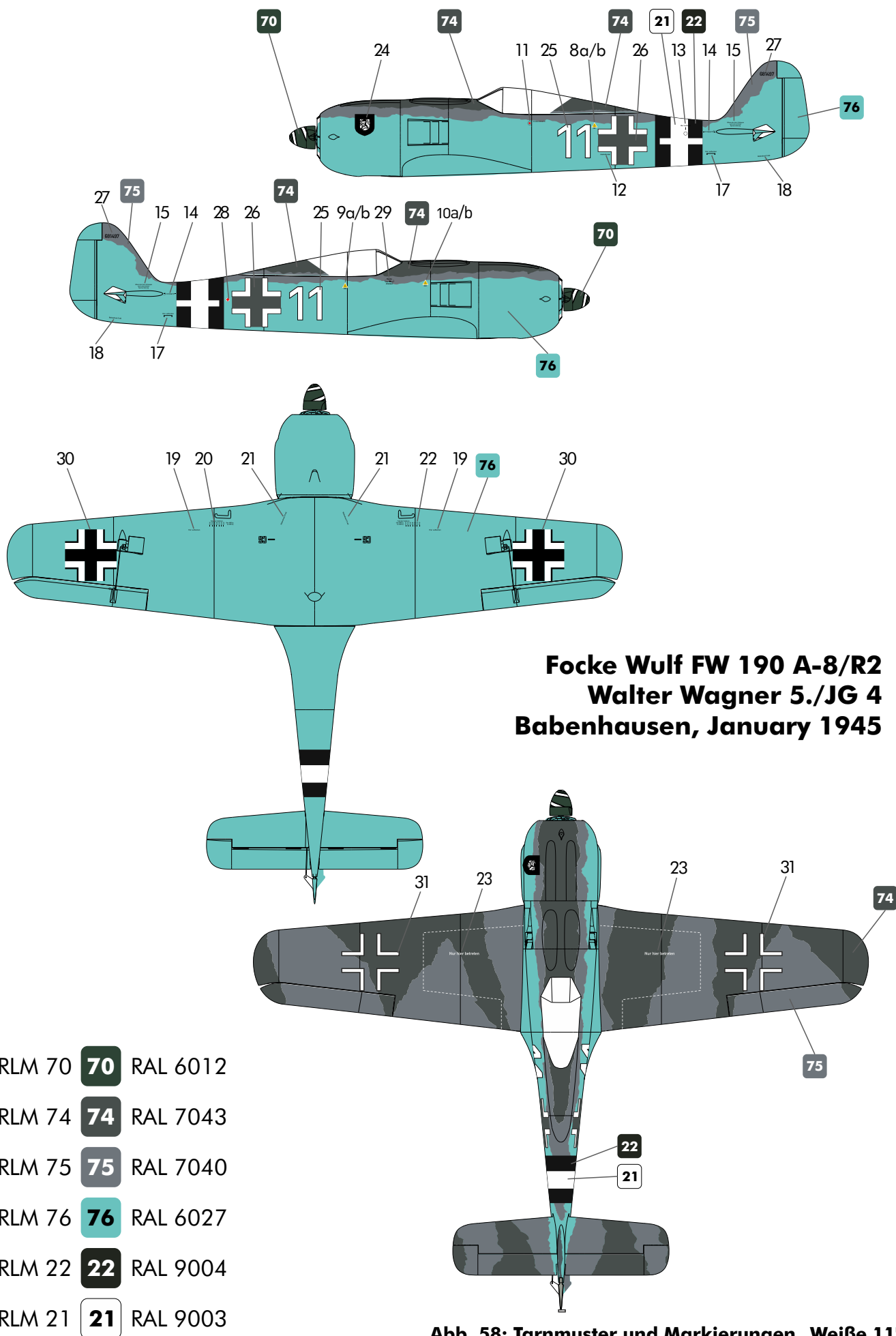
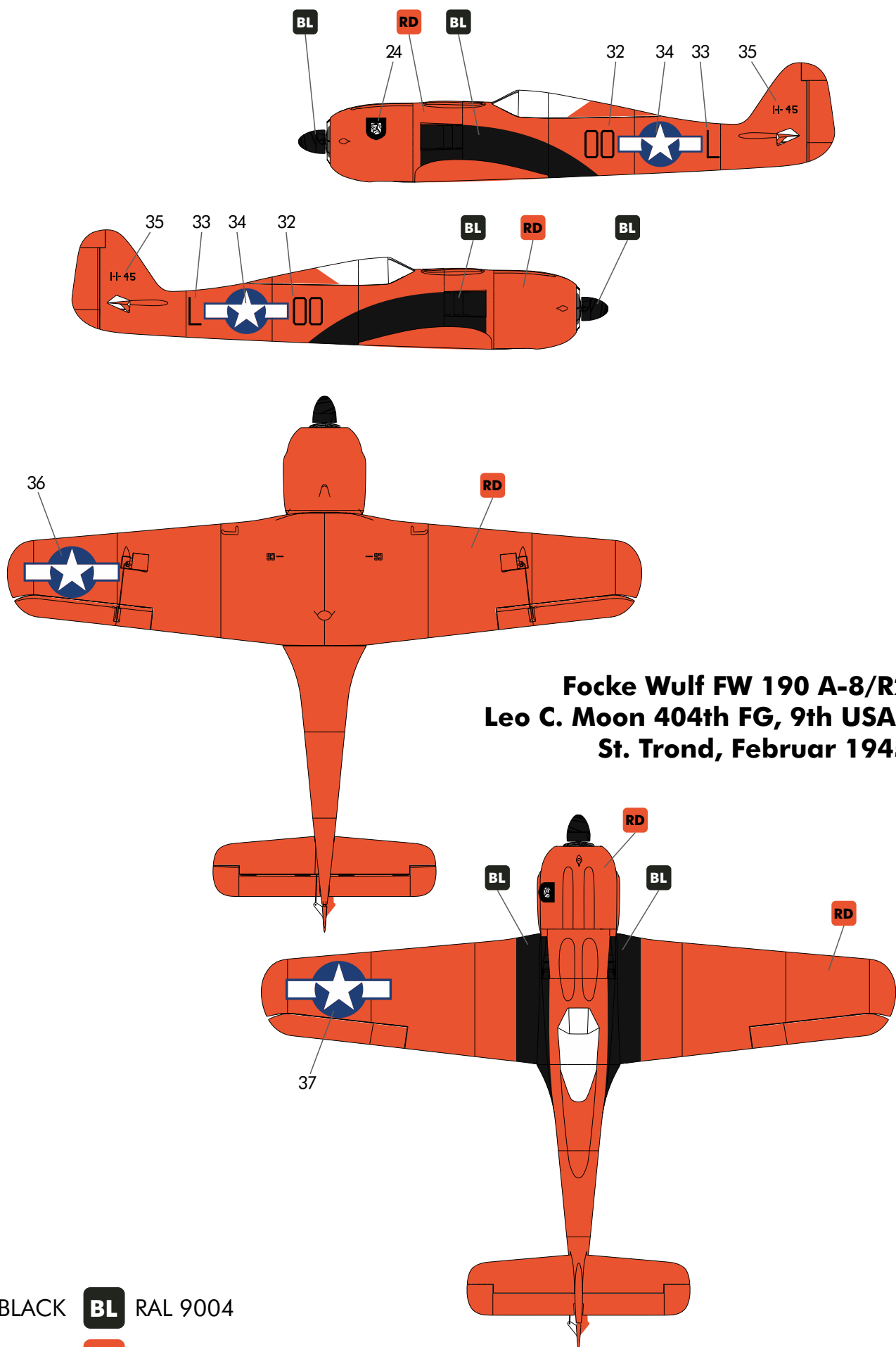


Abb. 58: Tarnmuster und Markierungen „Weiße 11“



Focke Wulf FW 190 A-8/R2
Leo C. Moon 404th FG, 9th USAF
St. Trond, Februar 1945

BLACK **BL** RAL 9004
 RED **RD** RAL 3024

Abb. 59: Signalmuster und Markierungen „Ehemalige Weiße 11“

