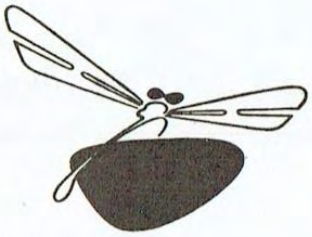


FLIGHT AND SERVICE MANUAL

for the Sailplane Type

GLASFLÜGEL STANDARD Libelle 201B

Translation of the German Manual
Issue: July 1972

This document should always be carried in the sailplane!

It belongs to the Sailplane

GLASFLÜGEL Standard- Libelle 201B Factory No. 587

Registration No.: N34GF

Manufacturer: GLASFLÜGEL Ing. Eugen Hänle,
7311 Schlattstall, Germany
Tel. 07026 / 855

Owner:

Confirmes with Data Sheet No. G 12 EU

TABLE OF CONTENTS

Amendments:

No.	Item	Page	Date	Signat.

1. WEIGHT and C.G. RANGES

Max. gross weight with water ballast..... 350 kg (770 lb)
Max. gross weight without water ballast.... 315 kg (695 lb)
Max. weight of the none-lifting parts..... 210 kg (462 lb)
Max. weight of instrument panel..... 10 kg (22 lb)

NOTE: Total weight of sailplane must not exceed 695 lb before water ballast is added. Sailplanes without water ballast bags installed therefore have a maximum gross weight limit of 695 lb.

The precise weight of the parts can be taken from the last inspection report.

Weighed on: (date)	10 OCT 1974				
by: (name)					
Empty weight (LB)	451.0				
with normal instrumentation	458.0				
with addit. instrumentation	463.5				
with radio equipment	467.5				
with oxygen equipment	481.5				
Empty weight C.G.-position (in. behind datum pt.)	22.3				
Max. payload	213.5				
Water-ballast at max. payload	75.0				

Empty weight C.G.:

After installing new equipment, after repairs, after new painting, or any other changes which might affect the weight of the Libelle it is advisable to take a look at the range of normal empty weight C.G., on page 6.
Please make up necessary weight by fixed ballast.

Flight C.G.:

The correct flight C.G. has a great influence on the flight characteristics and performance of your Standard- Libelle. This is under- estimated in many cases, but it is of utmost importance if maximum performance is to be achieved.
It is worthwile to calculate your own flight C.G.

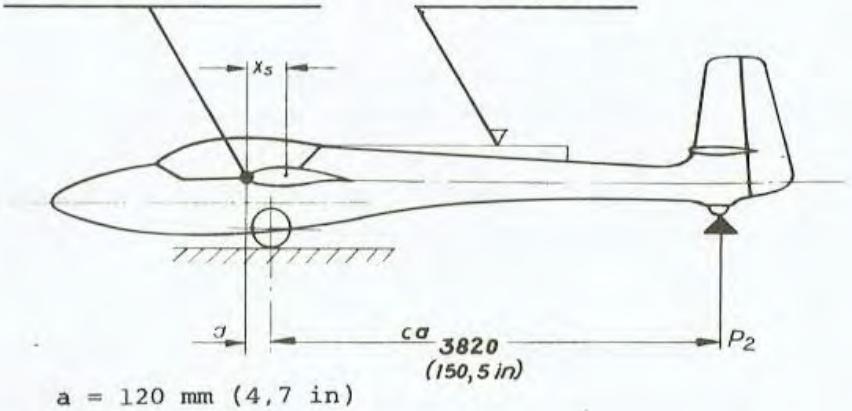
To balance your sailplane:

Datum point

leading edge of wing at y = 425 mm (16,7 in.) from center of fuselage

Datum line

Angular model 100:7 on fuselage back



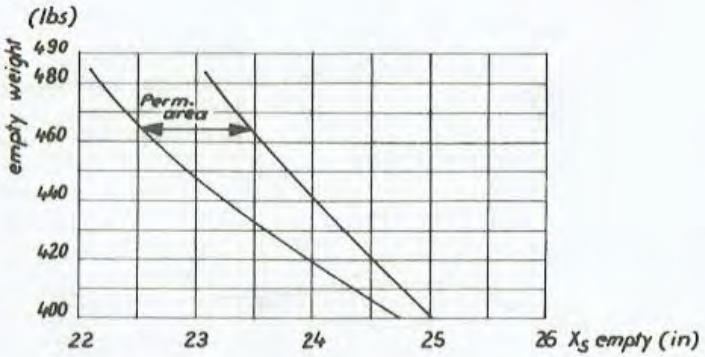
a = 120 mm (4,7 in)

The empty weight C.G. is always understood to be without pilot and parachute, but including all fixed accessoires, instruments, etc. Balancing of the sailplane must always be done with empty water bags.

The flight C.G. is always understood to include pilot and parachute and all accessories (also barograph, camera, cushions etc.)

$$x_{s\ empty} = \frac{P_{2\ empty} \cdot 150,5}{\text{total empty weight}} + a$$

$$x_{s\ flight} = \frac{P_{2\ flight} \cdot 150,5}{\text{total gross weight}} + a$$



The sailplane is prepared for a payload in the cockpit (pilot and parachute) of between 165 and 243 lb. If the weight of pilot and parachute should be insufficient, an equalizing ballast must be fastened securely in the seat.

The C.G. of the pilot ranges from - 11,8 inches to - 15,75 inches, depending upon his seating position.

The allowed range of flight C.G. $x_{S\ flight}$ is between 9,6 and 13,7 in.

2. FLYING OPERATIONS

Before every take-off be sure that the canopy and the airbrakes are locked.

Emergency release of canopy: 1. Push canopy lever all the way up; 2. Turn the grip on the lockbar 90 ° and push off canopy.

Winch tow: Max. tow speed 65 kts (74 mph), most agreeable 50 - 54 kts*(56 - 62 mph). Take-off is normal in all respects.

Aerotow: Max. tow speed 81 kts (93 mph); most agreeable 65 kts (74 mph), minimum 50 kts*(56 mph). When you reach a speed of 38 - 43 kts*(43 - 50 mph), the Standard- Libelle will be airborne.
For release pull the clutch handle fully and do not turn before loosing the cable definitely.

The yellow grip on the left of the stick operates both hooks, winch and aero.

Recommanded length of rope: 40 - 60 m (130-200 ft).

The cockpit- layout is not suitable for automatic parachutes.

Airbrakes
The airbrakes are actuated by the blue grip on the left.

* With waterballast increase these speeds by about 5,4 kts (6,2 mph).

Flight comfort:

A. The seating position is variable by

1. Seat back: Adjust by moving the grip on the right just below the canopy edge.

2. Knee cushions: Inflate or deflate by the two air balls (one for each side).

3. Rudder pedals: Adjust by pulling the black grip on the right of the stick; this unlocks the pedals. To move them forward, push by feet until the desired position is reached. To move the pedals backward, pull grip until desired notch is reached.

B. Cockpit ventilation: Lift up the handle on the conopy lock. Possible also in towing flight. Clear vision panel at left side of canopy. Adjustable nose- ventilation at both cockpit sides.

C. Trimming of elevator: Spring trim, with trim-lever on the stick. Adjust by pushing the green knob -

push for "nose- down",
pull for "nose- up " .

D. Wheel brake: Pull black grip on the stick.

Sit in the cockpit and check if you can reach all the controls easily. Check also if you have good visibility for both normal flight and tow.

Free Flight:

Stalling speed for total weight 550 lb = 33 kts (38 mph)
for total weight 695 lb = 38 kts (44 mph)
for total weight 770 lb = 40 kts (46 mph)
Minimum sink for total weight 550 lb = 38 kts (44 mph)
for total weight 695 lb = 43 kts (49 mph)
Best glide ratio f.total weight 550 lb = 46 kts (53 mph)
f.total weight 695 lb = 52 kts (60 mph)
Deployment of airbrakes increases stall speed by 6 kts (mph)
All datas are valid at ca. "optimum flight C.G. range".

Critical conditions:

During stalled flight the Libelle is easily stabilized by co-ordinated use of ailerons and rudder.
Too much rudder or skidding will possibly result in a spin.
Recovery from a spin: stick normal, rudder against rotation.
With the C.G. in forward position the sailplane has a tendency to a spiral-dive and builds up high speed; recover with caution between 75 and 92 kts (87 - 105 mph).
During high-speed-flight carefully watch the speed limits!
Carefully actuate the air-brakes during high-speed-flights!
In cloud-flying you should fly especially accurately.
Spinning is not permitted as a rescue measure!

Landing:

1. Recommanded approach speed 46 kts (53 mph)
2. Extend air-brakes if needed
3. Side slip is possible with or without landing-aids
4. Take care that the aircraft is not stalled too soon during flare ont.

Before first take-off

Please study all the above tips and try the controls for free operation, after the sailplane is completely rigged.

Remarks - flying with water ballast

It is possible to carry waterballast after Technical Notes No. 201-10 or 201-12 are completed.
In both wings there are water bags with a capacity of 5,5 gallons each. The bags are connected by two flexible tubes to the dumping valve.The bag in the lower wing is filled through the elbow fitting at the root-rib, while the water-tap is closed. Be careful to fill each wing with the same quantity of water.
Filling the bags by a pressure hose is not permitted.
If the temperature is below 32° F the water may freeze, therefor be careful to dump the water in time.

Because of the higher wing-loading the stalling speed increases (see page 9), the efficiency of the ailerons decreases. Before landing, the water should be dumped. If this is not possible; the approach speed should be more than 50 kts (58 mph).

Max. weight of waterballast as shown in the following table:

Empty Weight	Payload	165	185	205	225 lb
400 lb	Water	110	110	110	110 lb
420 lb		110	110	110	110 lb
440 lb		110	110	110	105 lb
460 lb		110	110	105	* lb
480 lb		110	105	*	* lb

* Caution: With this payload the max. weight of the none-lifting parts may be already exceeded.

3. OPERATION DATA and LIMITATIONS

Airspeed limits:

Max. speed	135 kts (155 mph)
Maneuvering speed	81 kts (93 mph)
Aero-tow	81 kts (93 mph)
Winch launch	65 kts (74 mph)
Auto tow	65 kts (74 mph)

Up to maneuvering speed full deflections of aileron, rudder or elevator are permitted, but only 75 percent of the full deflection of rudder and elevator together is permitted. At higher speeds up to the maximum speed structural overloading is possible and therefore only one third of the full deflections is permitted at the maximum speed of 135 kts (155 mph).

Sailplane category: LFS (and FAR) Normal sailplane

Limitation: No acrobatic maneuvers, including spins,approved.

Minimum required equipment

LFS	FAR 21.23 + 23.1303
Air speed indicator range 27-143 kts(31-165 mph)	Air speed indicator range 27-143 kts (31-165 mph)
	Altimeter
	Magnetic direction indicator
4- piece safety belt	Approved safety belt
Parachute, as surrogate a cushion	Parachute, or a cushion with a thickness of 4 in. in compressed state
Technical data placard	Operating limitations placards
Trim plan	Current weight and balance report
Owner's flight and service manual	Owner's flight and service manual

For cloud-flying in addition to this:

Variometer

(Compass when LFS)

Turn and bank indicator

Altimeter

According to the experience gained up to now, the installed ASI system is usable for cloud-flying.
Safety-link in tow-cable:for winch and aero-tow 1100 lb
Pressure of the main wheel: 2,5 atm.= 37 psi for total weight up to 660 lb. 3,0 atm. = 44 psi for total weight up to 770 lb.

Dear friend of the Standard- Libelle,

now the official text is finished. Would you kindly also read some hints from the manufacturer:

Rigging:

1. Bolts and bores are cleaned and greased;
2. Insert left wing first;
3. Insert right wing. Make sure that air-brakes are retracted;
4. Insert wing horizontal bolt;
5. Connect control pins of the ailerons;
6. Insert elevator into fin, screw in the front safety bolt and fasten it.

   make sure that the connection studs are really into the elevator (move the elevator).

- - - - - ready!

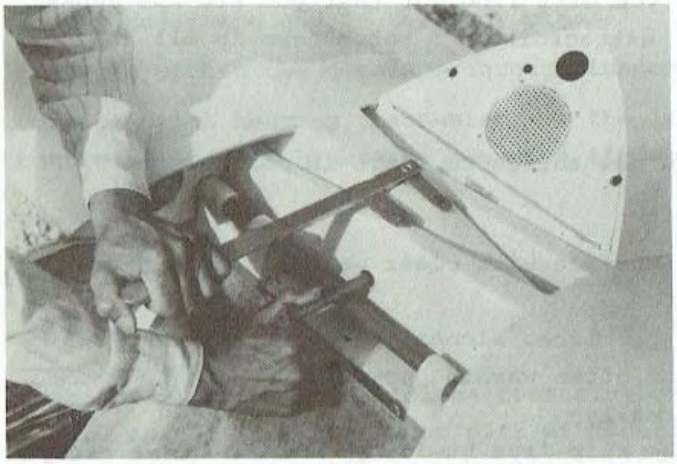
Derigging:

1. Loosen safety screw of elevator and pull it out. Remove elevator;
2. Disconnect control pins of ailerons;
3. Pull out main bolt;
4. Remove right wing first, then left wing.

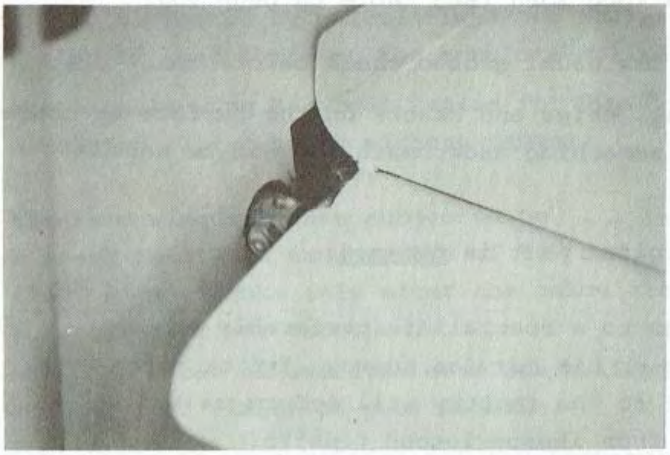
Please look at the pictures in this manual before the first rigging!

Check list before take- off:

Check list is fixed in the cockpit. Never forget to use it in every case before take-off!



This is the correct connection of the wings!



... and this is the connection of the elevator.

Maintenance and Care

You have chosen to have a fiberglass sailplane, and in a short time you will find out that you are the owner of a bird of extraordinary robustness in all its daintiness.

There are few new things to learn in caring for fiberglass:

- Clean the surface with clear water, sponge and a chamois;
- never use gasoline, alcohol, lacqer thinner etc.;
- and not too often washing powder;
- polish normally;
- protect the ship from humidity as with other sailplanes;
- and from over exposure to intense heating and intense strong load (see table on page 15);

- and make the usual ground check before take- off.

Look for small chips and cracks on the surface as these signal that something underneath may not be sound.

When a fiberglass part is damaged:

you should go to a specialist, preferably to the manufacturer or his service agency. Two or three photos, sent to the factory will inform us and protect you from inexperienced repairs.

Fiberglass parts are neither expensive nor difficult to repair - but different from other sailplanes. One needs to know the correct procedure.

From time to time it is necessary to inspect your sailplane more closely , and to clean and grease all bearing joints and connecting points. They are as follows:

- Controls within the wings through inspection plates on the underside and in the root rib;
- Controls within the fuselage through inspection plates;
- Control stick bearing, mechanism for the landing gear, controls, and air brakes by removing the seat panel.

Appendix:

Something about PLASTICS.

The use of plastics in sailplane construction is not a new concept, and in fact the major part of modern glues used for wood and metal structures are plastics.
The Libelle, however, is the first production sailplane to not only be tested by calculations and small sample parts, but also by load tests on the complete sailplane structures:

- the Libelle wing has been tested for 9000 simulated flying hours without damage.

- the same wing was then subjected to a break test at a temperature of 54° C (130° F) and broke only after the calculated safety factor was exceeded.

GLASFLÜGEL after exhaustive tests can tell you exactly the practical load limits of your Libelle.

In the table the sun-heating for the structure is the value for a white-colored surface. It is calculated for an air temperature of 38° C, a sun-heating temperature of 12° C and a security factor of 4° C. Other colours may develop higher temperatures and for this reason all loaded parts of the Libelle must be white.

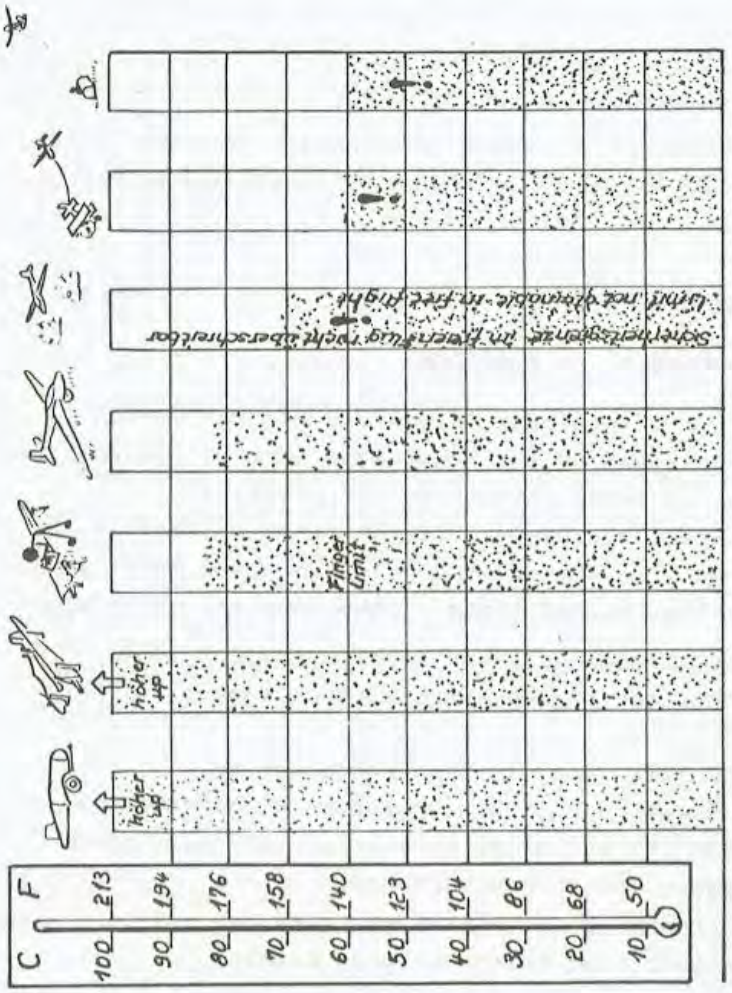


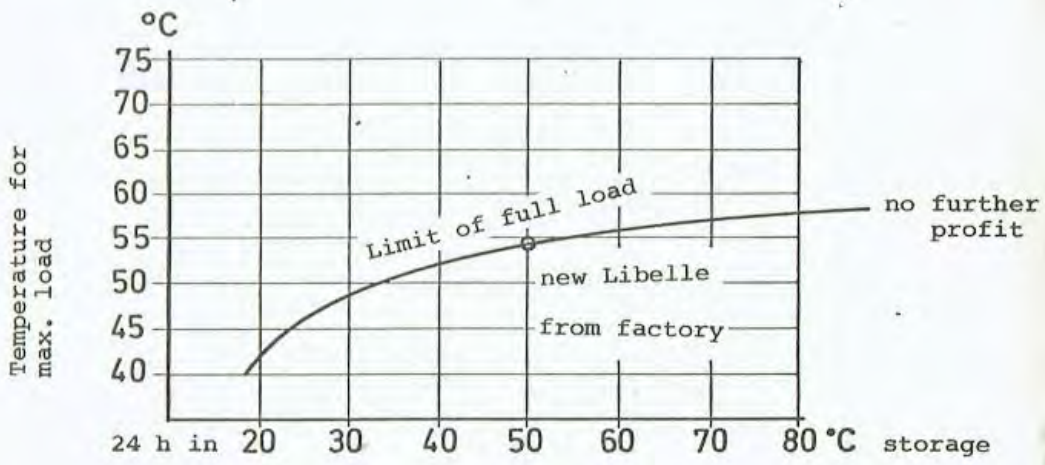
Table is for white coloured surface

valid for the factory-new sailplane

This is what you can expect of your Libelle

Hot trailers:

Do not be afraid that the Libelle will soften therein, or will get distorted leading edges or interior tensions. This is not possible in this type of structure and is its big advantage. To the contrary: an even warming during a tensionless storage (this is the case in every good trailer) is like a tempering action: the limit of full load will always go a little higher:

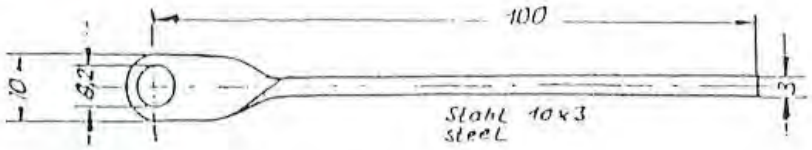


But like any fine sailplane do not roast now your Libelle intentionally! A repeat of the warming will not get a profit.
You may be assured that the Libelle, following you to a hot country, will adjust itself to the circumstances of its new life without difficulty or damage.

Evaluation of control surface mass and static moment in case of repair or repaint

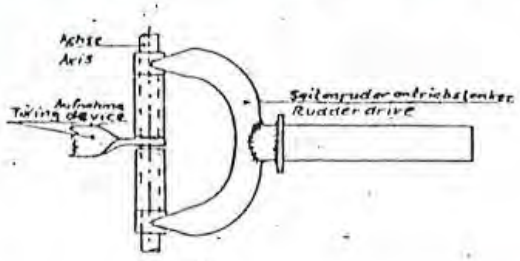
First check whether control surfaces already had been repaired or painted since manufacturing. Then balance control surfaces (rudder possibly including brake chute).

For balancing the static moments two fixing devices with holes ϕ6.2 mm are needed (see sketch).



Choose spanwise position of the devices suspension points in a way that avoids extreme bending of the control surfaces. Then the trailing edge weight is evaluated with a suitable scale at the attachment point which has maximum flap chord. For correct measurement of the static moments make sure horizontal level of flap bearing and trailing edge.

To measure static moment of the rudder the fuselage sided part of the rudder control in the tail must be dismantled. For balancing first attach the rudder drive to the fixing device according to sketch and then fit the rudder.



Now evaluate the weight at the trailing edge with a scale as mentioned above.

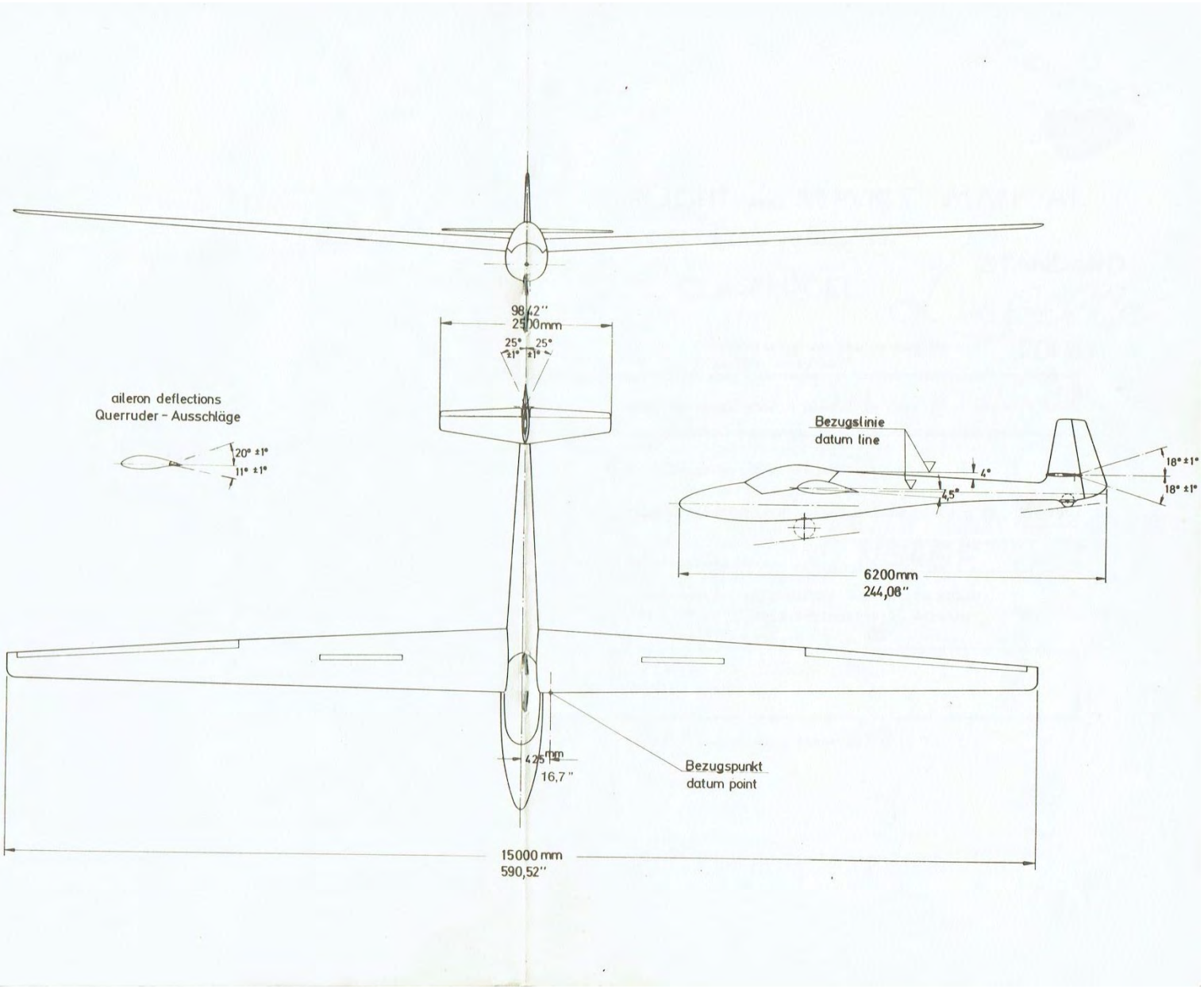
When repair and/or paint was done control surface balancing according to this procedure must be repeated. Neither the weight nor the static moments may differ from the original data more than ± 2%!

Each time control surface weight and static moment measurement is done due to repair and/or paint the data must be filled in the table on the next page.

ADDED 6-18-97 TO COMPLY WITH A.D. NOTE 97-03-02
Cobra Aero AMP 1439442 IA.

Mass and static moment of the control surfaces:

Control surface	Date of repair or repainting	Mass [kg] GRAMS	Static moment [kg*cm]
	ORIGINAL WT.		
Aileron-right	6-18-97	403 G	
Aileron-left	6-18-97	428 G	
Elevator-right	6-18-97	227 G	
Elevator-left	6-18-97	181 G	
Rudder	6-18-97	557 G	
Aileron-right			
Aileron-left			
Elevator-right			
Elevator-left			
Rudder			
Aileron-right			
Aileron-left			
Elevator-right			
Elevator-left			
Rudder			
Aileron-right			
Aileron-left			
Elevator-right			
Elevator-left			
Rudder			


98,42"
2500mm
25° ±1°
25° ±1°
aileron deflections
Querruder - Ausschläge
20° ±1°
11° ±1°
Bezugslinie
datum line
4°
4,5°
18° ±1°
18° ±1°
6200mm
244,08"
425 mm
16,7"
Bezugspunkt
datum point
15000 mm
590,52"

Libelle Assembly

1) Unlatch and open the trailer top.
2) Open the rear fold down door. The latch is on the left side and you may need to put slight pressure on the door to make the latch easer to operate.
3) Slide out the fuselage ramp. Assure that it is fully extended. Pump the hydraulic jack 25 times.
4) Rotate the tail wheel track into position. If it catches on the carpet at the back of the trailer the fuselage ramp is not fully extended.
5) Remove the tail wheel ramp extension from the left side of the trailer. Use care not to scratch the wing. Place the extension on the fuselage ramp assuring the locking pin is engaged.
6) Remove safety pin from left side of fuselage ramp.
7) Remove aft fuselage strap.
8) Slowly roll the fuselage out of the trailer. **DO NOT** lift or pull on the rudder. Lift at the stabilizer cutout and hold the vertical stabilizer tip.
9) Remove the canopy.
10) Reach through the side window and move the latch handle (white tip) from up and forward down and aft to raise the canopy front edge. Rotate the pink lever to unlatch the canopy. Lift the forward edge and pull forward to disengage the aft pins.
11) Loosen (do not remove) the hold down strap and place it forward of the forward wing pins.
12) Clean and lubricate the four lift pins.
13) Prior to removing the wings from the trailer, clean and lubricate the wing pins. Also clean the bearings in the wing roots. NOTE: Only a thin film of grease is required.
14) Remove the left-wing aileron lock and the tip cover. There is no good location to put the tip cover, assure the bungee does not foul the root dolly.
15) With a helper on the tip, roll the wing out of the trailer. The person on the tip needs to watch and not trip on the hydraulic peddle. Also take care not to scrape the wing on the fuselage pins.
16) The wing dolly will stop prior to coming out of the trailer, the aft wheels will be on the carpet.
17) Lift the wing root and proceed aft. Then the helper on the tip will proceed to a point in line with the fuselage lift pins while the wing root walker holds the wing at the fuselage lift points. Then carefully rotate the wing flat. Use caution and brace the wing stubs on your leg. Be very carful not to drop the wing. (In windy conditions the wing can be rotated at an earlier time to make handling easier.)
18) While holding the spar stubs the wing is lifted and inserted into the fuselage slot. The wing can now rest on the fuselage. The person on the root can now lift the wing by the leading and trailing and inserted on the lift pins. Alternately a helper can lift at the training edge.
19) Push the wing in while guiding the tip helper to adjust the wing parallel to the fuselage. On this aircraft the left wing often goes on hard. Keep the tip as high as posable without having the spar stub put an undue load on the top of the fuselage. Wiggle the wing tip (fore – aft and up – down) while pushing inboard. The wing is not on until the bearings bottom on the lift pins.
20) Remove the right wing as you did the left and rotate it into position. When inserting the right wing you must align the spar pins. Have the person on the right wing tip move it fore and aft to align the right wing spar pin in the left wing root rib. If there is a person on the left wing direct

them to mov e the tip to align the left wing spar pins with the right root rib. If there is not a helper on the left wing, not the direction the wing tip must be moved and go to the tip and make the necessary corrections while pushing inboard.

21) When alignment is achieved the wing will slide in place. If the wing has more than one wing pin diameter to go for full engagement, keep wiggling and pushing.
22) Now use the assembly tool to fully seat the wing and insert the wing pin. **DO NOT** use the tool to move the wing more than the diameter of the wing pin. Doing so can induce excessive wear on the pins and bearings.
23) The spoilers will hookup automatically when the wing is inserted.
24) The aileron attachment is accessed by lowering the panel in the upper fuselage behind the wing. The ailerons are hooked up by placing the bearing in the capture and raising the pin knob. Assure that the bearing seats fully and then lower the pin knob.
25) The horizontal tail is accessed by walking in the trailer.
26) The horizontal tail is released by pushing the latch on the left side of the aft former. This will allow the lower section to hand free.
27) Remove the horizontal tail by sliding aft. Thake care to properly support the tail during removal. The weight of the tail can catch you by surprise when the tip is removed from the forward former.
28) The horizontal tail is installed by placing it in the slot in the vertical stabilizer and sliding aft. Allow the tail to rest on the bottom of the slot. You may need to move the elevator to assist engagement of the pins. This is a tight fit, but when positioned correctly the horizontal will slide on easily.
29) The horizontal is locked on by a screw at the leading edge. The fastener required a 5mm allen wrench. Tighten until snug, do not over tighten.
30) Remove the tail wheel track extension from the ramp.
31) Lower the gear and verify it is locked.
32) Press on the lever forward of the hydraulic cylinder pump peddle. The fuselage should lower slowly. If you pumped the ramp higher than required you will have trouble lower the ramp. In this case press down on the end of the ramp, it will eventually go down. Assure the wing is stable during this procedure.
33) Now push the aircraft back from the fuselage dolly.