

S/N 1524



**ASTIR CS**

## FLIGHT MANUAL G102

The Manual belongs to ASTIR CS

Registration Number: F-CEVA Serial Number: 1063

Manufactured by: Burkhart Grob Flugzeugbau  
86874 Tussenhausen - Mattsies  
Flugplatz Mindelheim - Mattsies  
Telephone: 08268-998-0  
e-mail: productsupport@grob-aerospace.de  
Germany

Owner:

Published: August 1975

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This manual should always be kept on board the glider

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## List of effective pages

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## Annexe 1



Cet intercalaire doit obligatoirement être inséré devant la page de garde d'un manuel de vol en langue anglaise

## AVERTISSEMENT

Le présent document en langue anglaise est le manuel de vol approuvé par l'Agence européenne de la sécurité aérienne.

En application des dispositions de l'arrêté du 24 juillet 1991 relatif aux conditions d'utilisation des aéronefs civils en aviation générale (« Un vol ne peut être entrepris que si, d'une part les membres d'équipage sont familiarisés avec l'aéronef et son équipement de bord, notamment le matériel de sécurité-sauvetage et les systèmes spéciaux, et d'autre part ont une connaissance pratique de son manuel de vol ou des documents acceptés comme équivalents. »),

**Nul ne peut utiliser l'aéronef avec ce seul document s'il n'a pas une connaissance suffisante de la langue anglaise.**

A défaut, il appartient au propriétaire ou à l'exploitant de l'aéronef de se procurer une traduction de ce document sous sa responsabilité.


Référence : Instruction du 13/11/2009 relative à la langue des manuels de vol

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**Addenda**

Current number	Page	Reference	Date	Signature
<b>Addenda for ASTIR CS</b>				
9	all	<b>Incorporation of all Service Bulletins, Changes and Editorial Revision</b>	28.11.2005	 16. FEB. 2006

**Flying Limitations**

Airspeed Limits (I.A.S.)	km/h	mph	kts
Never exceed ( $V_{NE}$ )	250	155	135
in rough air ( $V_B$ )	250	155	135
Maneuvering ( $V_A$ )	170	105	92
On aero tow ( $V_T$ )	170	105	92
On winch tow ( $V_W$ )	120	74	64
Airbrakes	250	155	135
Gear extended	250	155	135

**A.S.I. Colour Code**

33 - 92 kts	Green Border - 60-170 km/h
92 - 135 kts	Yellow Border - 170-250 km/h
At 135 kts	Red Strip - bei 250 km/h

**Weights**

	lbs	kp
Empty Weight	circa 560	255
Maximum permitted weight without water-ballast	836	380
with water-ballast	990	450
Maximum permitted weight of non-supporting ports	528	240

**Weak Link on Winch cable**

Maximum Load	1100	500
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**Cloud Flying and simple Aerobatics**

Permitted if water-ballast is not being carried: See pages 12 - 14



**Classification Group**

Standard Class (German N)

**Centre of Gravity positions**

Leveling means with a 1000:40 Incidence Board set up horizontal on the top of the rear fuselage.

Datum Line (D, L.) Front edge) of wing at root

Serial-No. 1002 – 1437:  
 Maximum forward position of C. of G. 250 mm behind D. L. (9.84 in)  
 Maximum rearward position 425 mm behind D. L. (16.73 in)

Serial-No. 1438 – 1536:  
 Maximum forward position of C. of G. 310 mm behind D. L. (12,20 in)  
 Maximum rearward position 480 mm behind D. L. (18,90 in)

**Loading Limitations ASTIR CS**

Empty weight of glider and maximum cockpit load, see page 7.  
 Minimum cockpit load: 154 lbs (70 kp)  
 The permissible all up weight must NEVER be exceeded.

**Maximum all up weight**

without water-ballast 836 lbs (380 kp)  
 with water-ballast 990 lbs (450 kp)

The weight of water-ballast is dependent on the cockpit weight (Pilot with parachute and luggage). See page 7.

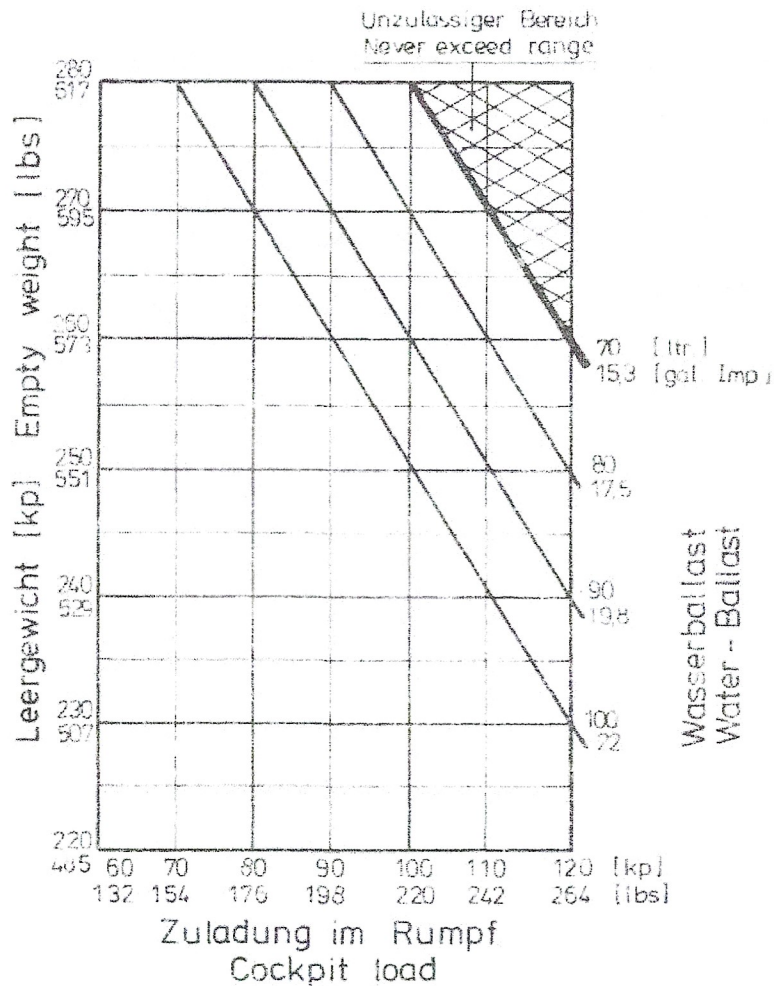
Weight deficiencies should be corrected by securing or removing some ballast in the seat.

The C. of G. of the pilot with a parachute on lies 475 mm in front of the Datum Line.

**Record of weight alterations and weighing**

ASTIR CS Works Number:

Date of weight alteration: Weighing by	List of accessories (Date):	Empty Weight (lbs):	Empty Weight C. of G. position behind D.L. (mm)	Maximum Cockpit Weight (lbs)



Placards to be displayed in the cockpit

Maximum weight	kp	lbs	
without water ballast:	380	836	
with water ballast:	450	990	
Airspeed limits	km/h	m.p.h.	knots
Never exceed	250	155	135
in rough air	250	155	135
Manoeuvring	170	105	92
On aero tow	170	105	92
On winch tow	120	74	64
Airbrakes	250	155	135
Gear extended	250	155	135

Payload (pilot and parachute)  
The maximum weight must not be exceeded.  
Minimum payload: 70 kp, 154 lbs.  
Less weight must be compensated with ballast in the seat.

Placard to be displayed near undercarriage

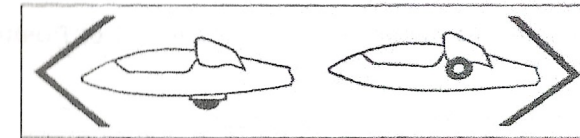
Weak links for towing  
500 kp, 1100 lbs. max.  
Tire: 2,5 bar, 36 psi

**Ballast Weight**

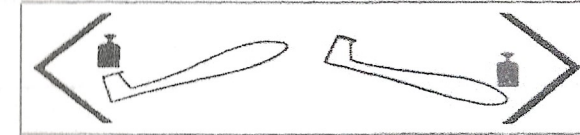
Pilot Weight Incl. Parachute		Quantity (Total)
kg	lbs	
55	120	6
60	130	4
65	145	2
70 - 100	155 - 220	0

Cover of the container has to be closed tight.

**Ballast weight  
red**



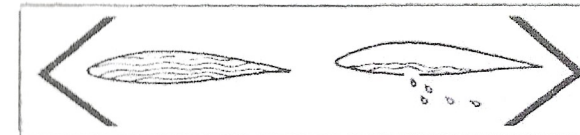
**DOWN Under-carriage UP**  
Handle moves in  
Slot on right of  
cockpit



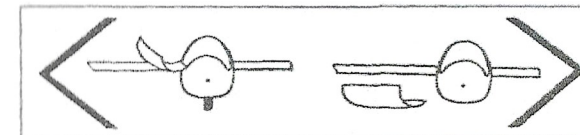
**Trimmer**  
On left of cockpit.  
GREEN lever



**Air-brakes**  
On the left-hand  
Side of the cockpit  
BLUE handle



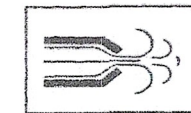
**Water-ballast  
Jettison**  
On the right of the  
Cockpit.  
WHITE lever



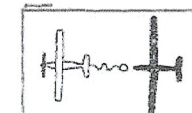
**Canopy**  
Round RED knobs.  
Left of canopy-frame  
OPEN.  
Right of canopy-  
Frame JETTISON



**Pedal  
Adjustment**  
Small BLACK  
knob  
On the top of the  
Instrument panel  
(right hand)



**Air-vent**  
Small BLACK  
knob  
On the top of the  
instrument panel.  
(left hand)

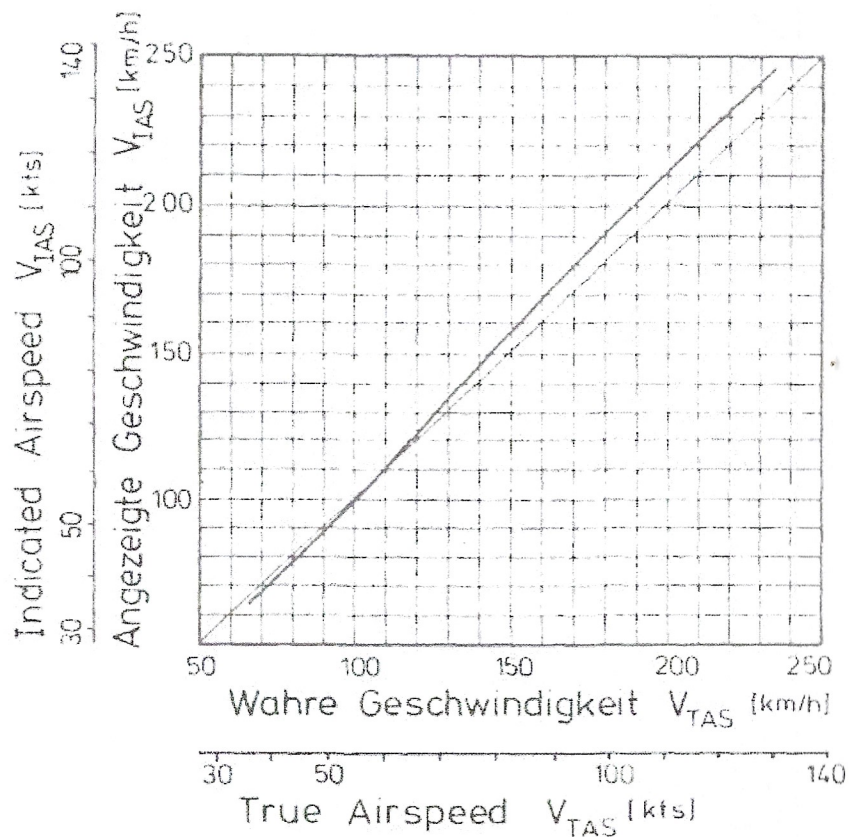


**Cable Release**  
In front of the stick  
on the left.  
YELLOW knob



**Graph of True v. Indicated Airspeed, showing the effect of Position Errors.**

When the A.S.I. is connected to the following pressure sources:  
 A.S.I. - Pitot head in tail fin static vents side of the fuselage before the wing root.



**Notes on Flying the Glider**

**Winch/Auto-tow-Launch**

Maximum permitted launch speed: 64 kts  
 The glider has a belly-hook in the undercarriage well in front of the wheel. A cable launch presents no difficulties with any C. of G. positions or weight configurations. The glider has no tendency to balloon and is very stable on the launch. Up to a height of 300ft the nose should be held down if the launch is fast.

**Aero tow**

Maximum permitted towing speed: 92 kts  
 The gliders C. of G. position allows the aero tow to be carried out using either the nose — or belly-hook. During the whole of the time on tow, the glider can be easily controlled with rudder and aileron, full movements of which can be used if necessary. Even in strong cross-winds the glider shows no tendency to wander around. At 32 kts the glider can be lifted off: with 37 — 40 kts indicated, the glider climbs on its own. The undercarriage can be retracted whilst still on tow. The yellow release knob is positioned on the left in front of the stick, and should be pulled fully back when releasing the tow-ropes.

**Weak Link in tow-cable**

Maximum load 1100 lbs

**Rudder-pedal Adjustment**

To adjust the rudder pedals, push lightly forward on them with the heels and disconnect the locking device by pulling the handle on the instrument panel. The pedals move towards the pilot by themselves: to adjust them forward you have to push them against the pressure of the springs with your heels. The pedals will lock themselves in the position required when the handle is released.

**Canopy**

The single-piece perspex canopy has a clear-vision panel and ventilation port, and is fitted on hinges. The handle for opening it is located on the left-hand side of the canopy surround: that for jettisoning is on the right-hand fuselage side. To jettison the canopy, pull both handles back and push it up and away with the left hand.

**Retractable Undercarriage**

The undercarriage control lever is located on the right of the cockpit. When retracted or lowered, the wheel should be locked in place by pushing the control lever in towards the fuselage side.

**Air-brakes**

The lever for the air-brakes is situated on the left-hand side of the cockpit. Before beginning a launch, check that the air-brakes are closed and locked. One should avoid trying to land with full brake out, since the effectiveness of the brakes means that the glider is descending fast.

**Wheel brake**

The lever for the wheel brake is located on the stick.

**Trim**

The built-in trimmer can be progressively adjusted. The control lever for it is positioned on the left-hand side of the cockpit behind the airbrake lever. Trim range from 32 kts — 97 kts.

**Flight with water-ballast**

The glider has the same all up weight as a standard 2 seat glider, when loaded with water-ballast and a full cockpit load. The slow flight and stalling characteristics of the fully loaded glider are a little different from one flown without water-ballast. The stalling speed will be increased to 38 kts. Also larger control movements will be necessary. The glider will spin cleanly but will recover immediately spin recovery action is taken. The pilot is advised to have extra height when slow flying or approaching to land while carrying water-ballast.

**Use of Water-ballast**

The water-ballast tanks are situated in the front part of the wings, from the root outwards. Each wing can hold 50 litres. The tanks are filled through an opening in the top surface of the wing. This is covered by a plug, which can be removed by screwing in a bolt. The water is drained off through an opening in the underside of the fuselage behind the wheel-box. To open the valves of the tanks, the control lever on the right-hand side of the cockpit should be pulled backwards. It takes about 3 minutes for the tanks to empty themselves.

Air from the tanks escapes through the overflow pipe that runs down to a point on the underside of the wing near the root. When flying with water-ballast the connecting-tape that covers the gap between fuselage and wings, should be folded back on the underside in the region of the spar, so that any excess water which may appear runs out rather than down into the fuselage.

During long flights at an air temperature of 0 ° C (32 ° F) the water-ballast must be jettisoned because there is danger of collapse of the ballast tanks. When a field landing is to be made the water-ballast must be jettisoned.

The glider must not be parked over-night with water-ballast on board. If the glider has to be towed for a long way on the ground with water-ballast on board, the tanks should be emptied.

When de-rigging the water-ballast tanks will empty themselves through the wing root connecting pipes.

**Stalling Characteristics**

Warning of the stall occurs at a speed of 32-35 kts (depending on wing loading), when the top of the tail unit begins to shudder. If the stick is pulled back even further, the glider "mushes" but, remains controllable, it being possible to make turns up to an angle of bank of 20° without the wing dropping away. If the stick is released the glider returns immediately to the normal flying attitude. If the stick is pulled back quickly, the nose will drop away but any tendency for a wing to fall can be controlled by the rudder.

**Aerobatics**

Permitted maneuvers and speeds at which they should be initiated:

Loop .....	92 kts
Chandelle .....	92 kts
Steep turn .....	65 kts
Lazy eight .....	65 kts

Spins:

From the fully stalled position, put on full aileron and rudder (crossed). Keep the stick back. To stop the spin centralize or release one of the controls. Height lost per rotation is approximately 220 ft. The speed reached when leveling out is about 86 kts.

Maximal positive g loading + 5,3.

Manoeuvres that involve negative g loads are prohibited.

Unorthodox manoeuvres are likewise prohibited





**Minimum equipment**

1. 160kts. A.S.I
2. Altimeter
3. Vertical speed indicator
4. Four piece safety harness
5. Weighted seat cushion at least 2 3/4", thick, or parachute
6. Loading limitations chart
7. Flying limitations placard
8. Flight manual

**Weight and center of gravity positions**

If new Instruments are added and other changes in the weight of the glider are made, the empty weight C. of G. position should be checked. If the limits of the empty weight C. of G. positions and the Loading Limitations Chart are adhered to, then the C. of G. of the loaded glider will lie within the permitted range.

Serial-No. 1001- 1437

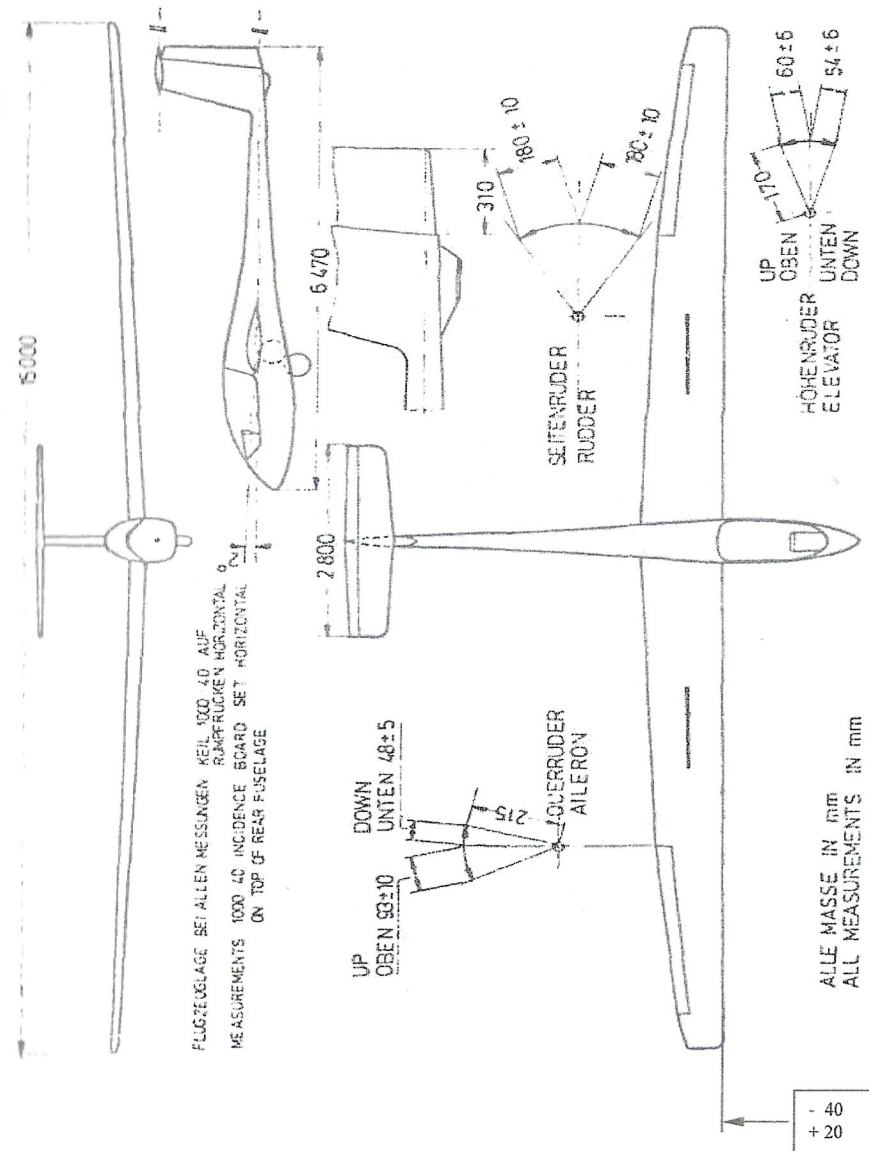
Serial-No. 1438 - 1536

Empty Weight (lbs)	C. of G. position (mm behind Datum Line)	Empty Weight (lbs)	C. of G. position (mm behind Datum Line)
506	606 — 693	539	696 — 753
517	598 — 693	550	688 — 747
528	591 — 637	561	681 — 742
539	534 — 682	572	673 — 737
550	577 — 677	583	652 — 732
561	557 — 672	594	631 — 728
572	537 — 667	605	611 — 723
583	518 — 662	616	591 — 719
594	499 — 658	527	573 — 715
605	481 — 654		

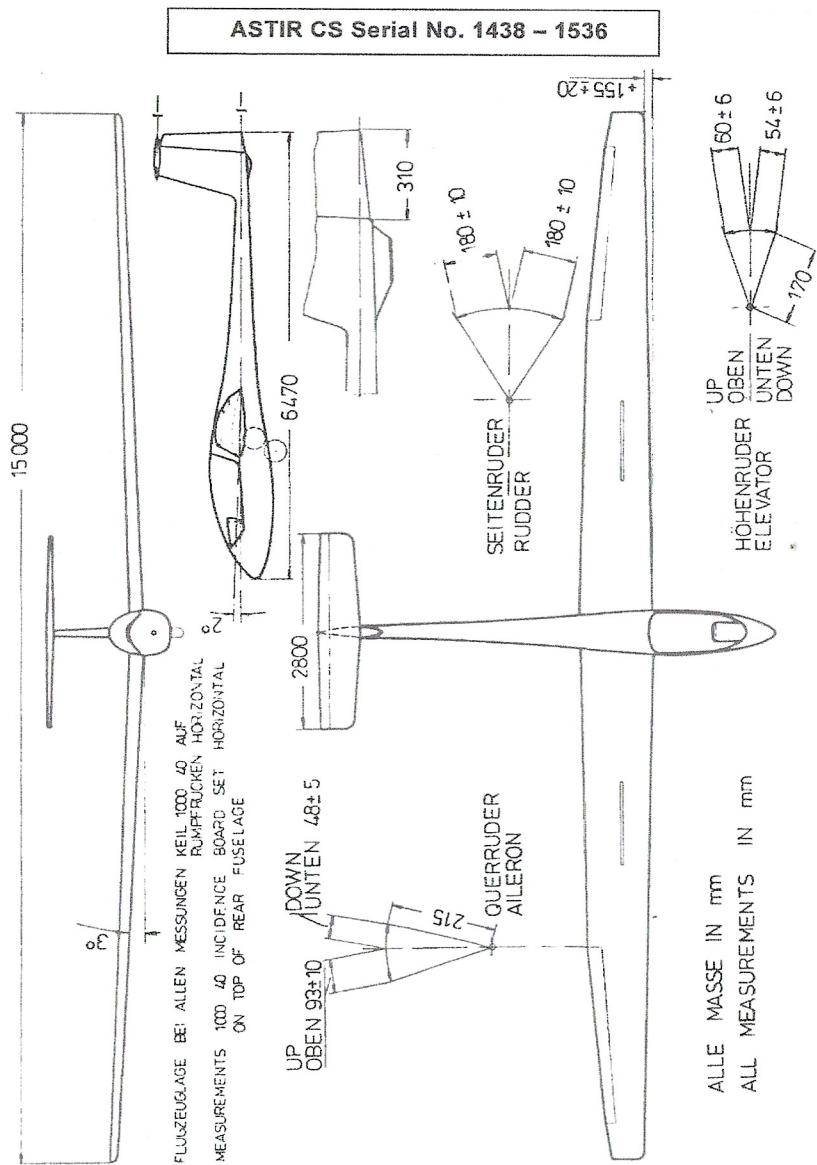
**Measurements**

Position of the glider whilst taking all measurements:  
with a 1000:40 Incidence Board set up horizontal on the top of the rear fuselage.

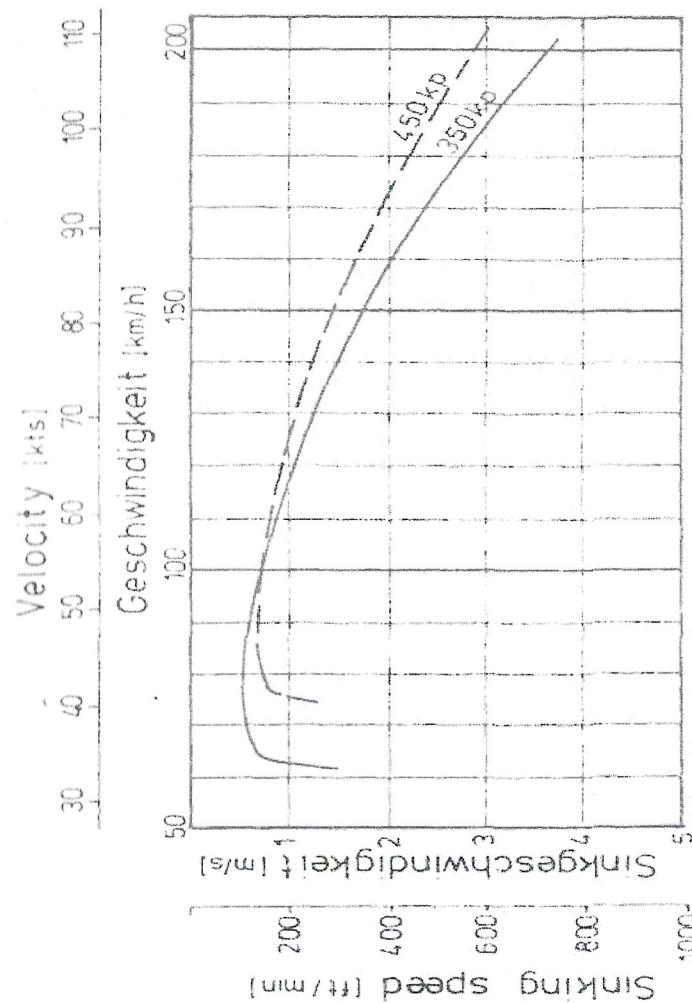
ASTIR CS Werk - Nr. 1002 - 1437



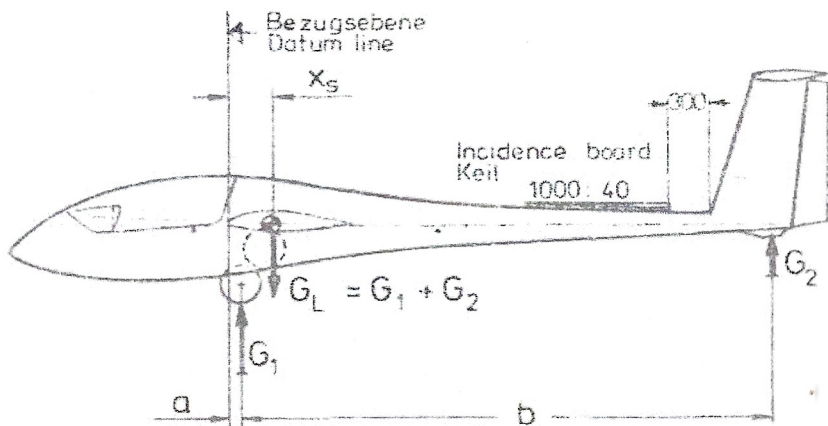




Performance	350 kp	450 kp
Best Glide Angle	37,3 - 95	38 - 105km/h
Minimum Sink (m/sec)	0,6 - 75	0,7 - 85 km/h
Circling speed	80 - 85	90 - 95 km/h



**Weights**



Datum Line: Front edge of the wing at the root.

Leveling means: With a 1000:40 Incidence Board set up horizontal on the top of the rear fuselage.

Weight on main-wheel	$G_1 =$	lbs
Weight on tail-skid	$G_2 =$	lbs
Empty Weight	$G_L = G_1 + G_2 =$	lbs
Displacement of main-wheel	$a =$	mm
Displacement of tail-skid	$b =$	mm

Empty Weight C. of G.

$$X = \frac{G_2 \times b}{G_L} + a = \quad + \quad = \quad \text{mm behind Datum Line}$$

$$\text{Maximum Load } G = 836 - G_L = \quad \text{lbs}$$

The measurements of determine the empty weight, the empty weight C. of G. and the loading limitations should always be taken with the glider empty of water ballast

**Weights and moments of the control surfaces**

After painting, partial painting or repairs the weights and moments and must not exceed. Procedure and limits see: Maintenance Manual ASTIR CS and SB 306-34, latest revision.

**Assembly**

It is possible to rig the glider with three people.

**1. Wings:**

Open the 4 main wing fittings in the fuselage. Unlock the air-brakes on the wings. Guide the right wing into the fuselage. The safety catches on the fuselage sockets will be released, and on gently moving the wing to and fro will be heard to snap into place. Next guide the left wing into the fuselage. Move the wing tips up and down so that the pin on each spar stub is located in the appropriate hole in the opposite wing root. Next the catches on the left-hand fuselage sockets should be released, and by moving the wing back-forwards and forwards they too can be made to snap into place. To ensure that the wing-fuselage joint is safely secured, turn the socket catches towards the bayonets until they drop into place.

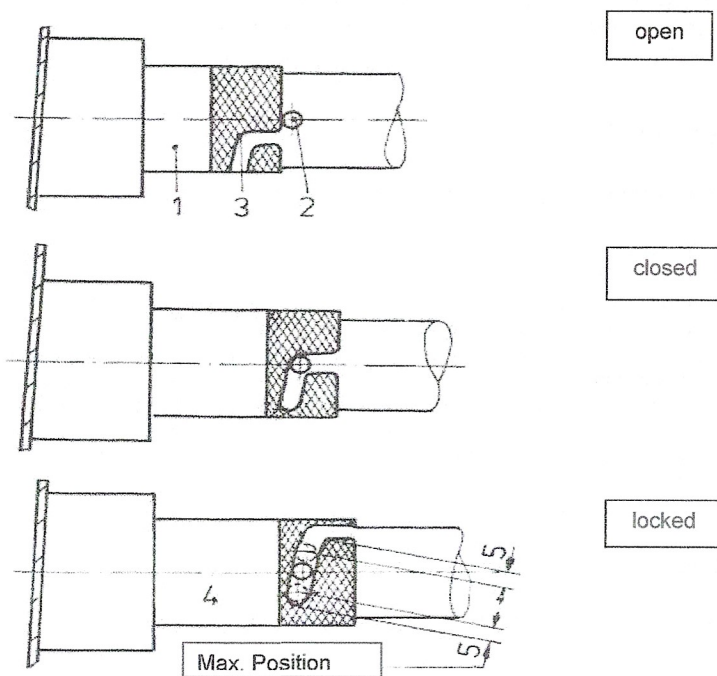
**Checks**

The red circles on the fuselage sides must be covered by the rotated sockets.

**2. Aileron and air - brake-connections:**

The short connecting rods in the fuselage are fitted with quick-action locks which must be coupled up to the knobs of the push-rods that move inside the wings. To fasten the quick action locks, a special tool is provided which guarantees that the knobs are correctly located in the locks. After rigging, the connecting rods should be examined to check that pins are properly inserted, and project some mm out of the locks. After coupling the quick action locks, check that the ball can not be extracted, by twisting the lock back and forth. Do this gently with not more than 10 lbs pull. Check all control connecting rods and locks in a methodical order.

After rigging the following check must be carried out to check the connections are secure:



After connecting the quick lock couplings make a visual check that the collar is extended forward over the bearing far enough for the safety pin to engage.

### 3. Tail plane

The tail plane can be fixed in place by a single person. Stand in front of the fin. Rest the elevator on the rudder and point the tailplane upwards at an angle of about 45° with the fin. Next couple the elevator push-rod to the knob on the elevator by means of the quick-action lock. Now drop the tailplane down so that the two retaining pins on the fuselage disappear up into the cavity in the tailplane. One can now let go of the tailplane.

To continue with the rigging push the front of the tailplane down. This will activate the locking bolt and cause the metal pin that projects out of the front of the fin to move down its slot. When the front of the tailplane has reached its lowest position against the pressure of the locking mechanism, push the whole unit back with both and into the two fuselage bolts. The unit is then locked in place when the metal pin in the front of the fin springs upwards and covers the long narrow slot.

#### Checks to be made after assembly

- 1 Check that the 4 main wing fittings are locked.
- 2 Check that aileron and brake quick-action locks are properly located on the knobs.
- 3 Ensure that the tow hook is functioning correctly.
- 4 Test the operation of the wheel brake and the pressure of the air in the tire.
- 5 Check that the tailplane is securely seated and that the elevator push-rod is connected.
- 8 Rudder movement.

#### Pre-Launch checks

- 1 Do all the controls move freely?
- 2 Are the air-brakes locked?
- 3 Is the undercarriage control lever in the most forward position and is it pushed in flush with the fuselage-wall?
- 4 Is the trimmer set at neutral?
- 5 Is the canopy locked?
- 6 Are the parachute and seat straps drawn in tight and secured?
- 7 Is the altimeter set to ZERO or the height of the airfield?
- 8 Is the radio turned on and set to the frequency being used by the airfield control?



### Inspection of the airbrake locking lever

At the daily check the right and left hand airbrake locking levers have to be checked through the inspection openings in the wing underside. The lever are made of aluminum casting and have a facilitating hole. The following instruction has to be carried out:

Inspection of the airbrake locking levers for cracks in one of the 3 legs. For a better inspection the Plexiglas pane can be removed for easier access. The use of a magnifying glass is recommended.

If cracks are found, the exchange of the locking levers left and right hand No. 102-4123/4124 of aluminum casting for such of aluminum sheet (see TM 306-26) is required. If the aluminum sheet's are installed, the daily check is not longer applicable.