



ASTIR CS

FLIGHT MANUAL G102

The Manual belongs to ASTIR CS

Registration Number: _____ Serial Number: _____

Manufactured by: Burkhart Grob Flugzeugbau
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Owner:

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This manual should always be kept on board the glider


List of effective pages

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Addenda

Current number	Page	Reference	Date	Signature
Addenda for ASTIR CS				
9	all	Incorporation of all Service Bulletins, Changes and Editorial Revision	28.11.2005	<div style="text-align: right;"> <p>16. FEB. 2006</p>  </div>

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

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.

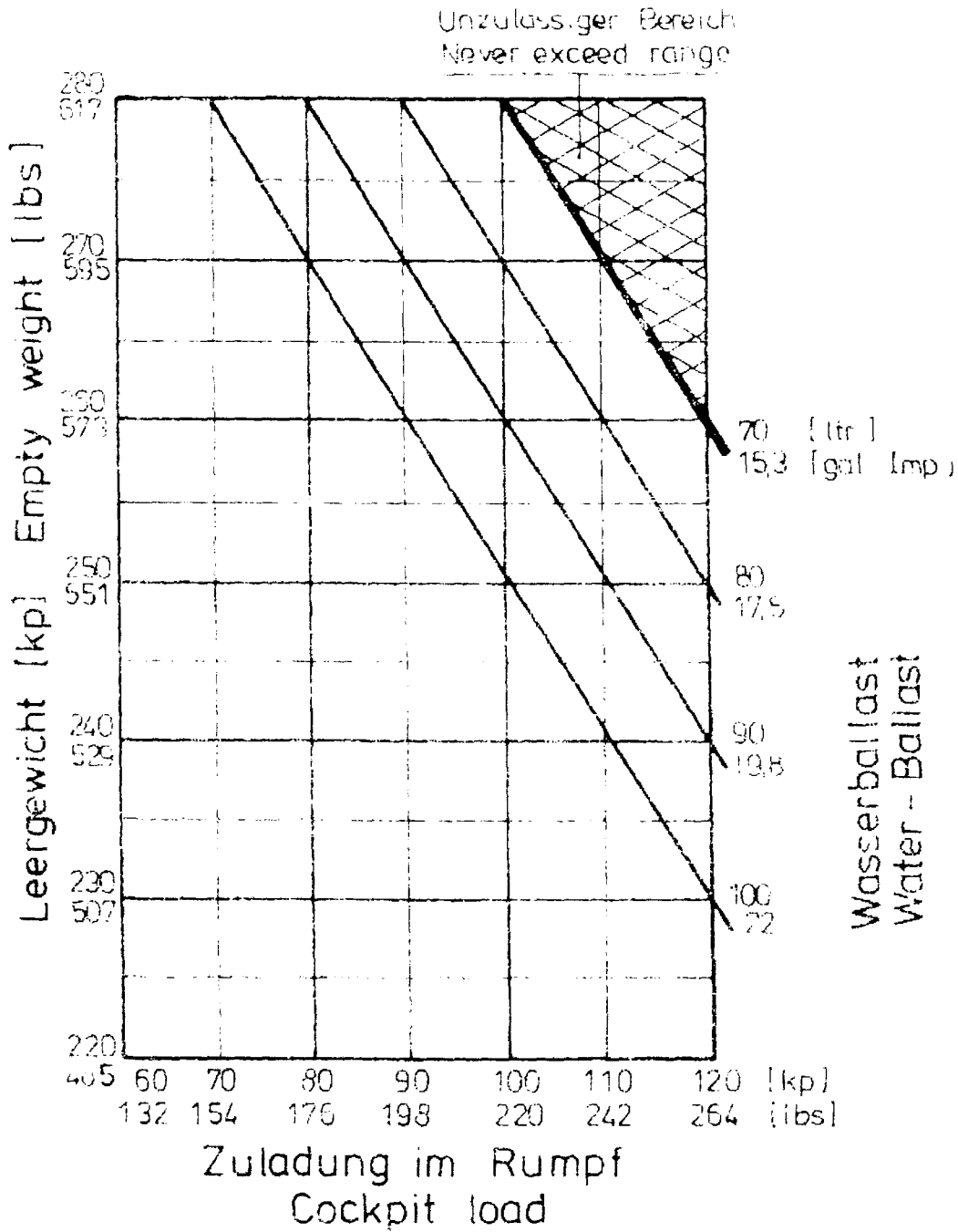
Weight deficiencies should be corrected by securing or removing some ballast in the seat.

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	rn.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

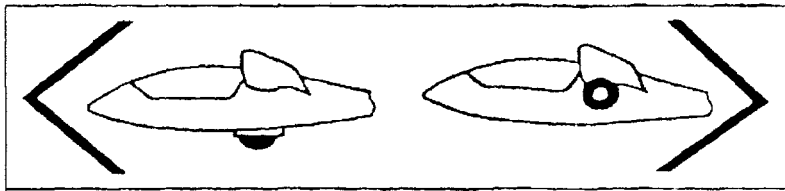
Weak links for towing
 500 kp, 1100 lbs. max.
 Tire: 2,5 bar, 36 psi

Ballast Weight

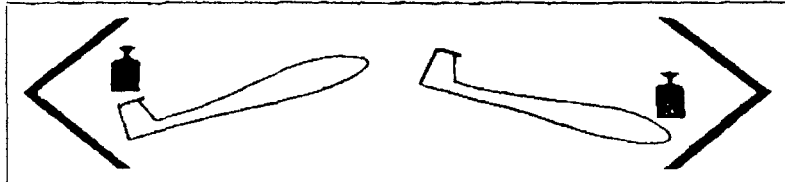
Pilot Weight Incl. Parachute		Quantity (Total)
kg	lbs	
55	120	6
60	130	4
65	145	2
70 - 100	155 - 220	0

Cover of the container has to be closed tight.

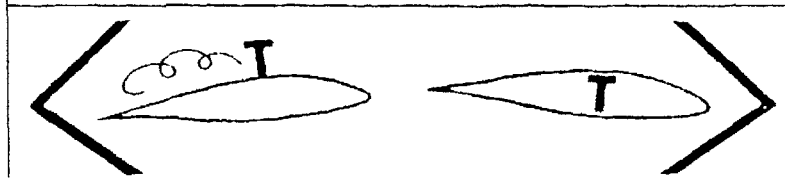
**Ballast weight
red**



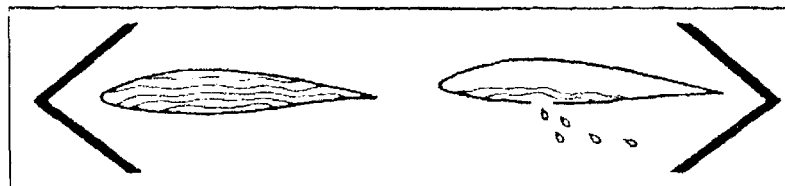
DOWN Under-carriage UP
 Handle moves in
 Slot on right of
 cockpit



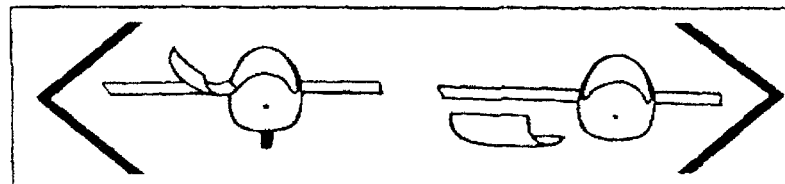
Trimmer
 On left of cockpit.
 GREEN lever



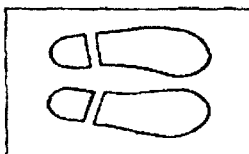
Air-brakes
 On the left-hand
 Side of the cockpit
 BLUE handle



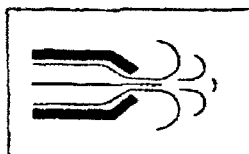
**Water-ballast
 Jettison**
 On the right of the
 Cockpit.
 WHITE lever



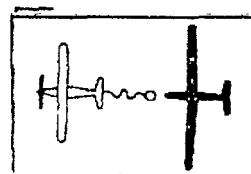
Canopy
 Round RED knobs.
 Left of canopy-frame
 OPEN.
 Right of canopy-
 Frame JETTISON



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



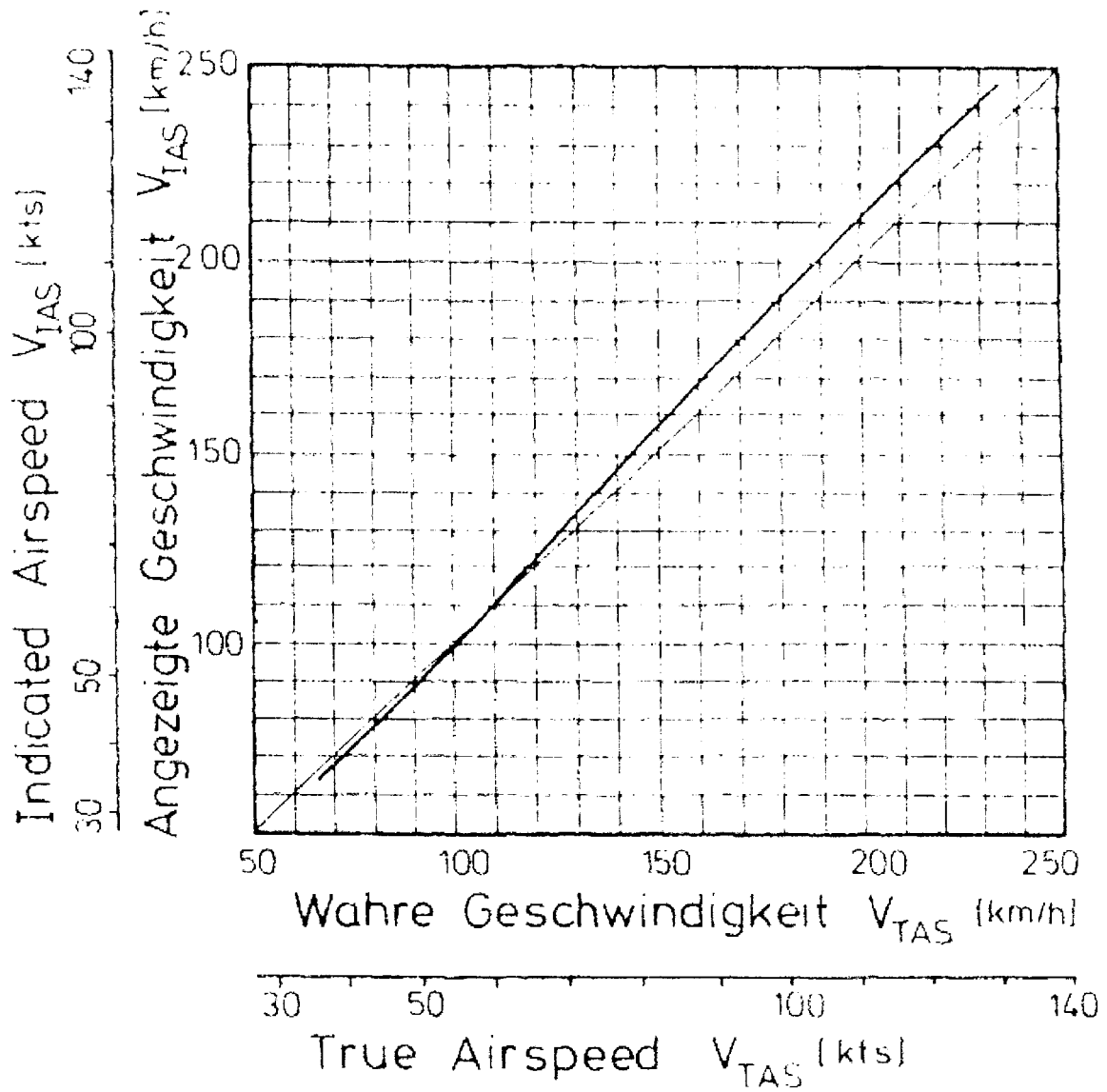
Air-vent
 Small BLACK
 knob
 On the top of the
 instrument panel.
 (left hand)



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-rope.

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

Spinning

With the Center of Gravity between 415 mm and 480 mm behind the Datum Line, it is possible to put the glider into a spin from the stalled position. To do so the stick has to be pulled fully back, and the rudder and aileron controls be fully crossed. The nose will then drop in the direction in which rudder is being applied, and with a rearward C of G. position the glider will rotate in a slow, flat spin.

Recovery from the spin can be effected in any way you choose. With almost all C. of G. positions and wing loadings all that is required is for one of the controls to be released or returned to its normal position. The quickest recovery (without overstressing the glider) can be brought about by centralizing all of the controls. The height lost in returning to the normal flying position after a single-rotation spin, is about 220 ft,

If the glider fails to stop spinning immediately the controls have been centralized, then the standard method of spin recovery should be employed at once:

1. Full opposite rudder
2. Pause
3. Stick steadily forward
4. When spin stops, centralize controls and resume normal flight

Speed Flying

In speed flying it is quite possible to exceed the maximum permitted speed. At very high air speeds, care should be taken to use only small control movements so as not to overstress the glider:

Emergency Procedures

Escape Procedure

In the event of a bail out, the following procedure should be followed:

1. Pull both red knobs back on right and left of canopy surround and with left hand push canopy upwards and backwards.
2. Unbuckle seat harness.
3. EXIT over left or right side
4. Wait only 1 — 3 seconds before pulling the rip cord

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

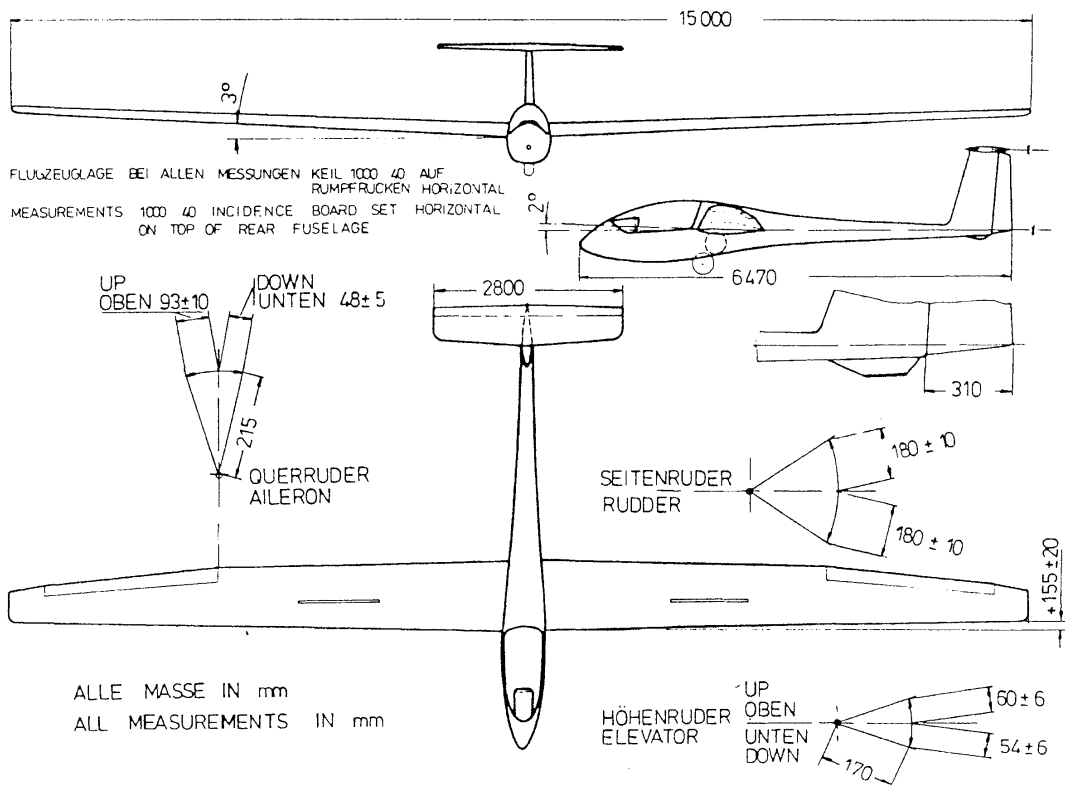
Serial-No. 1438 - 1536

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		

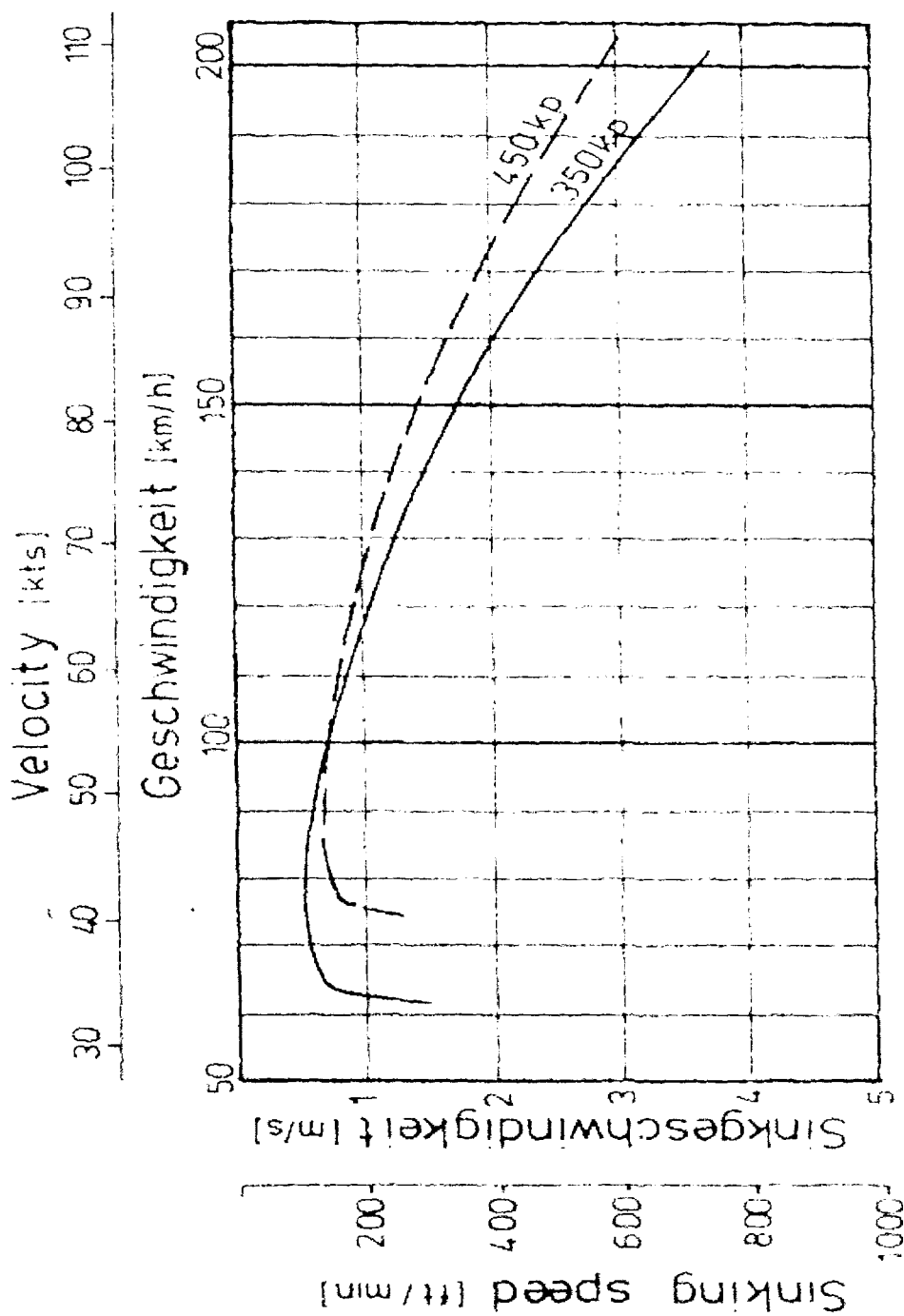
Measurements

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 Serial No. 1438 - 1536

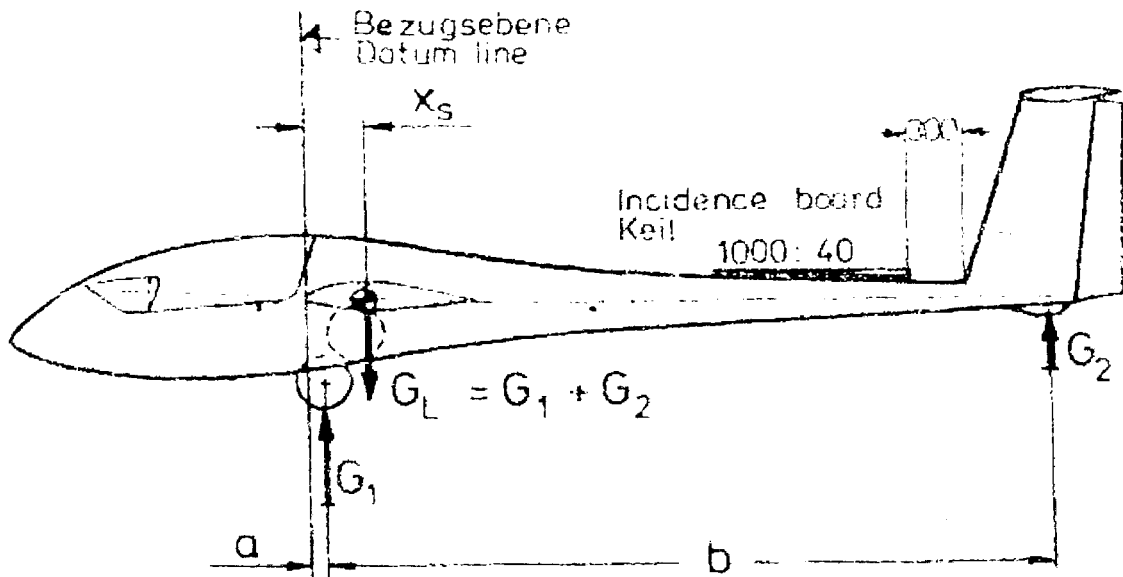


Performance	350 kp	450 kp
Best Glide Angle	37,3 - 95	38 - 105km/h
Minimum Sink (m/sec)	0,6 -75	0,7 - 85 km/h
Circling speed	80 - 85	90 - 95 km/h



Geschwindigkeitspolare ASTIR CS
Flight Polar

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-wards 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:

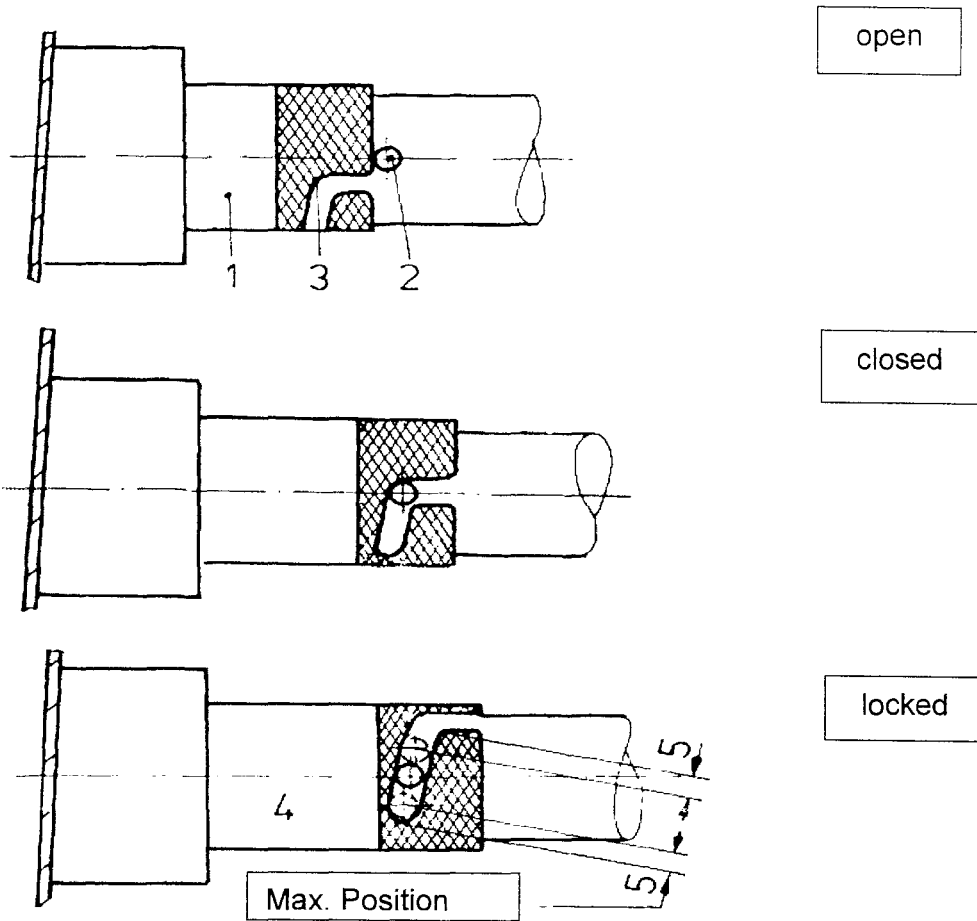
The short connecting rods in the fuselage are fitted with quick-action locks which must be coupled up to the knobs of the push-rods that move inside the wings.

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.