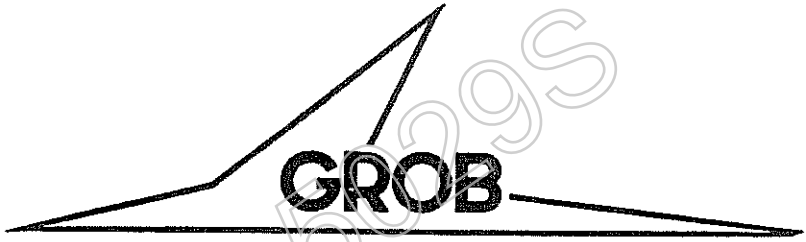

SN 5829S

Burkhart Grob Flugzeugbau GmbH & Co. KG
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FLIGHT HANDBOOK

CLUB-ASTIR II

STANDARD-ASTIR II

This handbook is to be kept on board the aircraft at all times.

Registration: Factory Serial Number:

Owner: _____

_____

_____

German edition of operating instructions are approved under
§ 12 (1) 2. of LuftGerPO.

Published February 1980

Approval of translation has been done to our best knowledge and judgement. In any case the original text in German language is authoritative.

SN 5029S

I. 1 **Updates:**

Current number	Page	Reference	Date	Signature
1	23	Control of tailplane	1.10.80	
2	1, 14a	Inspection of the airbrake locking levers	25.03.85	
3	1	MSB 306-37	13.06.03	03. JUL. 2003
	11, 12, 13	Canopy jettison and exit	13.06.03	

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I. 2 **Contents** Page

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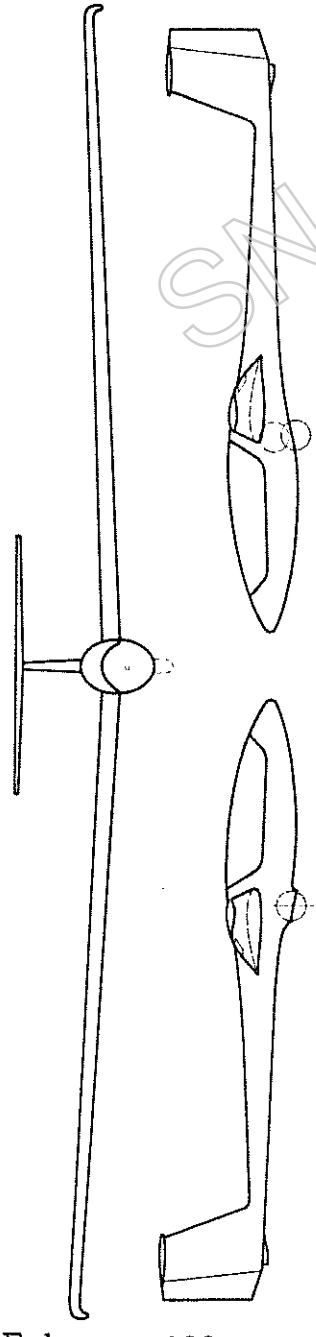
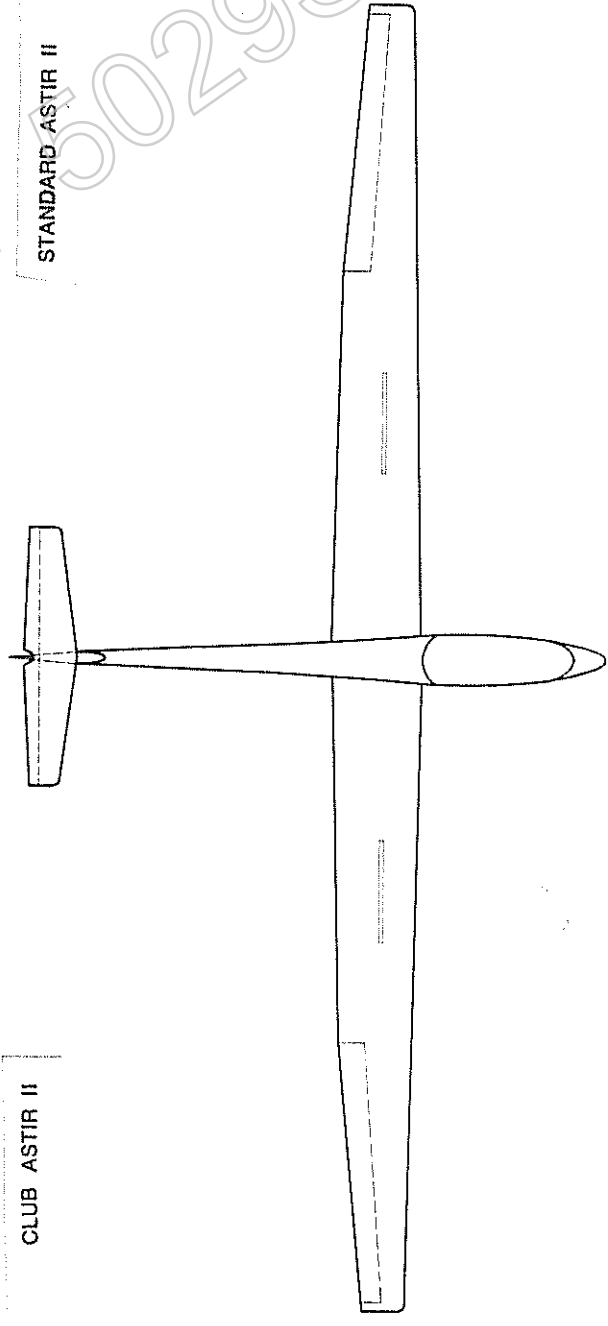


CLUB ASTIR II



STANDARD ASTIR II

SN 5029S

I. 5 **Description**

The CLUB ASTIR II is a single seat performance glider for the club class, with a T-tail and air-brakes on the upper wing surface.
The STANDARD ASTIR II is the equivalent high performance glider for the standard class, with retracting undercarriage and ballast tanks in the wings.
The glider incorporates the most modern fibre reinforced plastic technology. The fuselage belts are fabricated from Carbon fibre; all other surfaces and shells are glassfibre.

Technical Data

Wingspan	15,0 m
Length	6,8 m
Height	1,3 m
Aspect ratio	18,2
Wing area	12,4 m sq.
Maximum flying weight with waterballast 450 kg without waterballast (380 kg)	
Maximum wing loading	36,3 kg / sq. m (30,6 kg / sq. m)

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II. Operating limits

II. 1 Airworthiness group

(U, Utility, LFS)
The edition of the "Airworthiness requirements for gliders" (LFS) which was published in February 1966 is the basis for the certification of this model.

II. 2 Operational restrictions

This aircraft is cleared for:

1. Flights under VFR (daytime)
2. Simple aerobatics (loop, stall turn, lazy eight, chandelle, spin)
3. Cloud flying (with suitable instruments - see II. 3)

III. 3 Minimum equipment

1. Air speed indicator reading to 300 km/h (162 knots, 187 mph)
2. Altimeter
3. Four part safety harness
4. Back cushion of at least 3" depth when compressed, or parachute
5. Loading limit placard
6. Flight limits placard
7. Flight Handbook

Cloud flying equipment

For cloud flying the following must also be installed:

1. Variometer
2. Turn and slip indicator
3. Magnetic compass (compensated for the aircraft)
4. Radio ready for use

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II. 4 **Airspeeds**

Never exceed	VNE	250 km/h (135 kts, 155 mph)
Maximum Rough Air	VB	250 km/h (135 kts, 155 mph)
Manoeuvring speed	VM	170 km/h (92 kts, 105 mph)
Maximum on winch launch	VW	120 km/h (65 kts, 74 mph)
Maximum on aerotow	VT	170 km/h (92 kts, 105 mph)

"Rough air" includes the turbulence likely to be encountered in wave rotors, clouds, whirlwinds, and while flying over mountain ridges.

The manoeuvring speed is the maximum speed at which full control deflections are permissable. At VNE only one third of the available movements may be used. True airspeed is higher than Indicated airspeed at altitude. VNE decreases according to following table.

Altitude (ft)	0-6500	10000	13000	16500	19000
VNE (indicated knots)	135	128	121	115	109
(indicated km/h)	250	237	225	213	202

Air speed indicator markings

72-170 km/h	39-92 kts	45-106mph	Green bow
170-250 km/h	92-135 kts	106-155mph	Yellow bow
At 250 km/h	135 kts	155 mph	Red line
At 90 km/h	49 kts	56 mph	Yellow triangle (minimum approach speed at max. flying weight)

II. 5 **Flight envelope**

The following g-loads must not be exceeded.

At VM (Airbrakes closed)	+ 5.3	− 2.65	At VNE	+ 4.0	− 1.5

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II. 6 **Weights**

Empty weight	appr. 270 kg(595 lbs)
Max. permissible without waterballast	380 kg(838 lbs)
Max. permissible with waterballast St. Astir II	450 kg(992 lbs)
Maximum permissible weight of non lifting parts	240 kg(529 lbs)

II. 7 **Center of gravity position**

Permitted center of gravity positions in flight lie in the range

from 310 mm (12,20 inches) to

460 mm (18,11 inches)

behind the datum line, equivalent to 29% to 46% of the M.A.C. of the wing.

A/c attitude: incidence board of 600:26 angle horizontal on the back of the fuselage.

The datum line is the wing root leading edge.

The permitted center of gravity range will not be exceeded if the loading is carried out according to the loading plan in section II. 8.

II. 8 **Loading limitations**

Minimum weight in the seat	70 kg	(154 lbs)
Maximum weight in the luggage space	10 kg	(22 lbs)
Maximum weight in the seat	110 kg	(242 lbs)

Pilot weights lower than 70 kg (153 lbs) must be compensated by ballast carried in the seat. A ballast bag which can be attached using the lap straps can be obtained from the manufacturer or his agents. If a ballast box is built in according to TM 102-11it can be used to carry ballast weights.

The maximum flying weight of380 (838 lbs)must not be exceeded. Water ballast can only be loaded until this maximum weight is reached (see diagram on side 9a).

Water ballast can not be used to compensate lacking weight in the seat.

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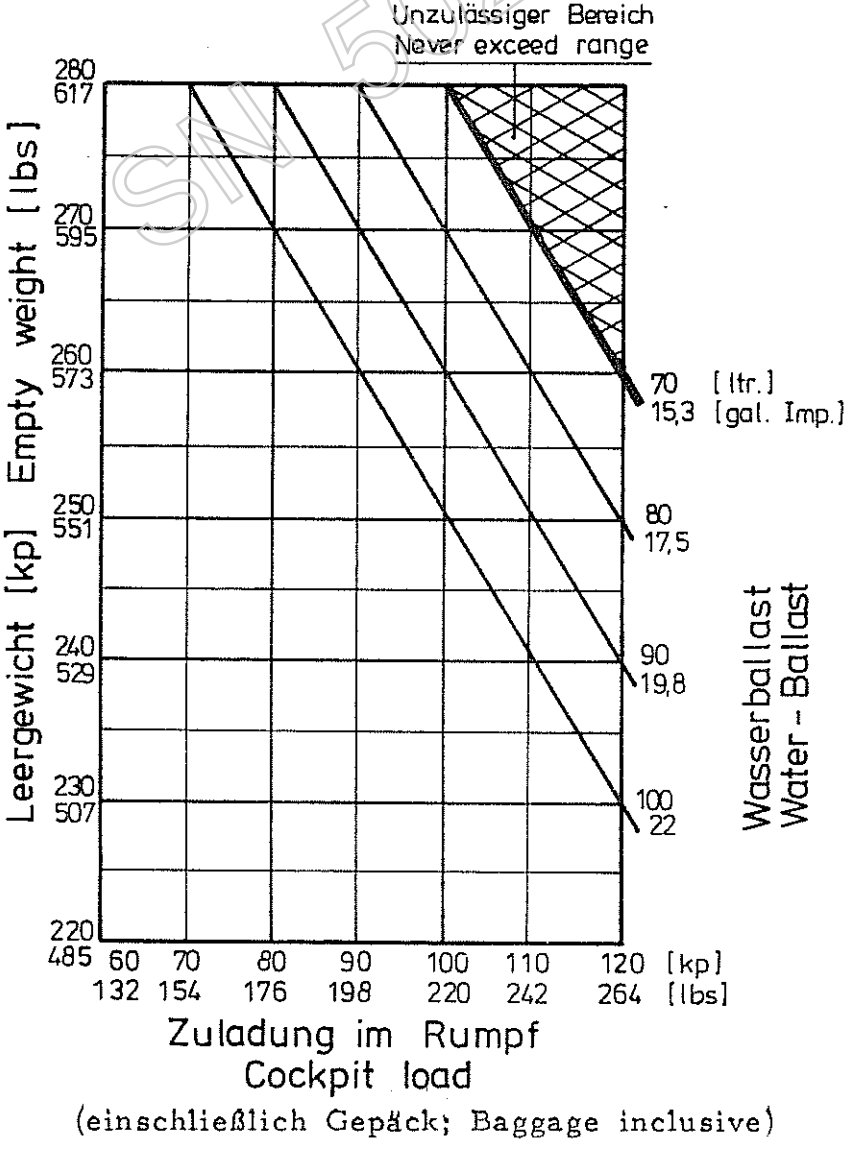
Waterballast chart (only Standard Astir II)



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Modifications of loading plan

Registration: Serial Number:

Date of weighing carried out by:	Record of fitting-out. Date:	Empty weight kg (lbs)	Empty C of G (mm behind datum)	Max. Payload

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II. 9 **Tow hooks**

For Aerotow: Optional nose hook E 75 with modification 1-79.
For Aerotow and winch launch: Europa G 73 safety hook.

II. 10 **Weak link in launching cable**

Aerotow and winch launch..... 500 kg(1100 lbs) ± 10%
(e. g. Weak link no 5, colour code white)

II. 11 **Tire**

Tire size Club Astir II: 5.00-5 / Tire pressure 2,5 bar
Tire size Standard Astir II: 4.00-4 / Tire pressure 3,5 bar

II. 12 **Crosswinds**

According to the specifications for the type, the maximum crosswind component for take off and landing has been established at 20 km/h (11 knots, 12 mph).

III. **Emergency procedures**

III. 1 **Spin recovery**

Exit from spin can be accomplished by the standard recovery procedure:

- Full opposite Rudder
- Neutralise stick
- Ailerons should be central
- when rotation stops centralise rudder and pull out gently.

III. 2 **Canopy jettison and exit**

In the event of having to bail out, follow the procedure:
(The point to fix the parachute is the red ring on the central tube behind the seatback)

a) Open the canopy,
pull red canopy handles and turn 90° inwards !

b) release the Canopy,
lift up the canopy with red handles to release canopy!

c) unbuckle seat harness

d) EXIT over left or right side

e) Wait 1-3 seconds before pulling the rip cord
(with manual parachute only)

Note: The canopy can be removed for maintenance purposes by operating the red ball knob at the canopy joint.
For readjusting set the two lining-up bolts in position and press the canopy against the springs, until the fixing bolt may be inserted.

Caution: The canopy hinge is springloaded and will, with jettisoned canopy, turn up very quickly after a slight touch. Danger of injury.

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III. 3 Landing with the undercarriage retracted

It is possible to land on soft and hard surface without risk of nosing over. Approach normally and align in 2 point attitude. Avoid a high round out.

III. 4 Miscellaneous

Flying in rain

No noticeable deterioration of flying characteristics is caused by wet or lightly iced wings.
A heavy deposit on the wing raises the speed at which breakaway occurs by about 3 knots: Raise approach speed by 6 knots.
The characteristic during lift-off and touch down remains the same.

Wing dropping

If the wing drops in a turn or straight flight, leave the stick central and apply rudder against the direction of rotation.

Ground looping

The aircraft is not prone to ground loop on take off. If one wing touches the ground or the aircraft changes direction by more than 15 degrees, release immediately.

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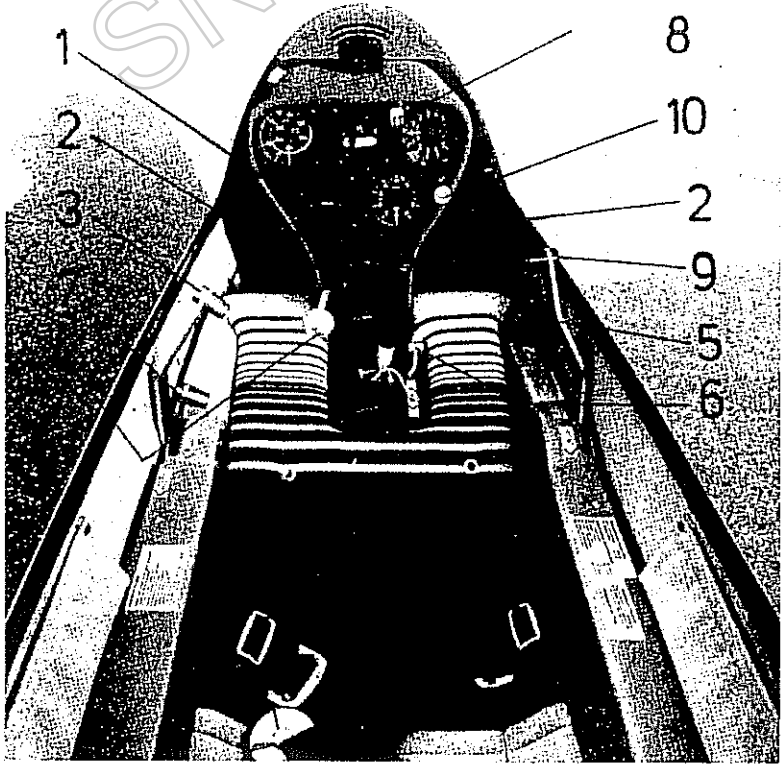
IV. Normal operating procedures

IV. 1 Cockpit and cockpit layout

The seatback is adjustable.



1 Controlsitck with wheelbrake
2 Rudder pedals
3 Airbrakes
4 Cable release knob
5 dropped with MSB 306-37
(Canopy jettison)
6 Rudder pedal adjustment
7 Trim control
8 Ventilation
9 Undercarriage retract
10 Waterballast jettison

(Item 9 and 10 are not appilcable to CLUB ASTIR II)

BRD 5029S

IV. 2 **Daily Inspection**

Complete check round aircraft

1. a) Open canopy
   b) Check the 4 wing to fuselage quick locks are secure
   c) Visual check of all control mountings and linkages in cockpit area
   d) Check for loose objects (also throught the access door for the main control linkages)
   e) Check full and free movement of all controls
   f) Check tire pressure (2, 5 respectively 3, 5 bar)
   g) Check condition of towhooks
   h) Check operation of towhooks and wheelbrake

2. a) Check upper and lower wing surfaces for damage
   b) Aileron (Check condition, free movement, play)

   c) Airbrakes (Check condition, fit and lock)

NB: The elastic flap hinges will give a slight play at upward and downward deflection of aileron.

3. Check fuselage for damage, particularly on underside
4. Check tailplane for correct mounting and security
5. Check tailskid, pitot and venturi
6. Check static holes are free of obstructions
7. See "2"
8. Check static holes

The aircraft should be checked particularly thoroughly after heavy landings or excessive demands have been placed on it in flight. Remove the wings and tailplane. If damage is discovered an inspector should be called in. The aircraft should not under any circumstances be flown until the damage has been repaired.

LUFTFAHRT-BUNDESAMT BRAUNSCHWEIG

24. Juni 1981

SIN 5029S

Inspection of the airbrake locking lever

At the daily check the right- and lefthand airbrake locking levers have to be checked through the inspection openings in the wing underside.
The lever are made of aluminium 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 plexiglass-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 righthand no. 102-4123/4124 of aluminium casting for such of aluminium sheet (see TM 306-26) is required.
If the aluminium sheet's are installed, the daily check ist not longer applicable.

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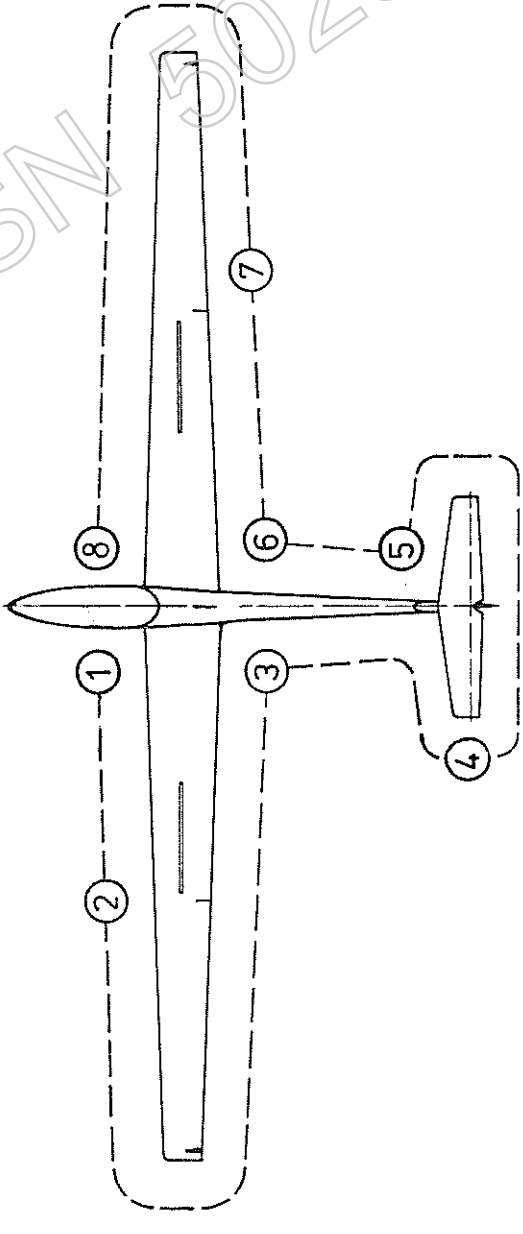
Complete check round the aircraft (cf IV. 2)



IV. 3 Pre flight check

1. Wing and T-tail attachments secured?
2. Parachute and safety straps secured?
3. Pedals adjusted?
4. Undercarriage lever locked in fully forward position?
5. Brakes closed and locked?
6. ~~Flaps set for take off?~~
7. Full and free controll movement?
8. Trim set to neutral
9. Altimeter set to zero or to field elevation?
10. Radio switched on an set to the correct base frequency?
11. Canopy locked?
12. Cable on correct hook?

Beware:-Crosswind-Cable break!

If you close the canopy pull the fasteners forward for stretching the canopy down.

If the canopy shrinks in result of very low temperature pull the canopy fasteners once more forward.

IV. 4 TAKE OFF

TRIM

The trimmer is on the left-hand side of the cockpit and can be progressively adjusted.

Winch launch

Trimmer central or nose heavy if the pilot is light.

~~Flaps to + 5 degrees.~~

Maximum winch launch speed is 120 km/h (65 knots, 74 mph).

The glider has a release hook in front of the wheel.

Winch launches cause no difficulties at all allowed centre of gravity positions and wing loadings.

The plane has no tendency to balloon up or to swing on the ground.

One should push forward slightly on the stick below about 100 metres (330 ft.) in the case of fast launches from a powerful winch. When the cable slackens pull the release firmly to its limit.

Aerotow launch

Recommended line length is 40 – 60 m (140 – 200 ft).

Trimmer neutral

~~Flaps 0 degrees~~.

Max aerotow speed 170 km/h (92 knots, 105 mph).

Use the nose hook for aerotow if it is installed.

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Aerotow from the belly hook presents no problems to experienced pilots. In this case the undercarriage of the Standard Astir II can not be retracted during the aerotow.. The aircraft can be controlled during the whole ground run by means of aileron and rudder, using full deflections if required. There is no inclination to ground loop, even in a strong cross wind. The aircraft can be lifted off at an IAS of 35 kts;it takes off on its own, with the stick held neutral at an IAS of 38-40 kts.

The yellow release knob is mounted on the instrument panel and must be pulled right back to release.

IV. 5 **Normal flight**

The aircraft can be flown in all configurations throughout the permitted speed range. Full aileron and rudder movements ~~and positive flap settings~~ are only permitted up to the manoeuvring speed of 102 knots (190 km/h). At higher speeds the controls are to be used with corresponding care.For the elevator movements only the ~~Note: see G-loads II. 5.~~ g-loads II. 5 are appropriate.

IV. 6 **Slow flying and stalling**

The stall warning is given by a noticeable buffeting of the tailplane. The stalling speed depends on the configuration and weight of the aircraft. The following standard values are appropriated to:

	Weight	Without brakes	With brakes
Without water ballast	380 kg	60 km/h	65 km/h
	838 lbs	32 kts	35 kts
With water ballast	450 kg	70 km/h	75 km/h
	992 lbs	38 kts	40 kts

Regard the increasing stalling speed in relation to the bank angle.

On further rearward movement of the stick the aircraft goes into a controllable "mush", which can be controlled with ailerons and rudder. On forward movement of the stick the aircraft at once returns to its normal flying attitude. A swift backward movement of the stick will produce a nose drop; the ailerons will provide lateral control.

SN 80295

IV. 7 **High speed flight**

The aircraft has no flutter problems in the permitted speed range. Above 170 km/h (92 kts) the controls must be moved no more than one third of the available movement. VNE is not exceeded in a 45 degrees dive with the airbrakes fully extended even at maximum all up weight.

IV. 8 **Cloud flying**

The minimum equipment for cloud flying is an Air speed indicator, Altimeter, Variometer, Compass, Turn and slip and Radio. Flight test to date have shown that the ASI system built in is not sensitive to icing. If G forces over 2 g are encountered or if the speed rises above 170 km/h (92 kts), extend the airbrakes to avoid overstressing. Spinning should not be contemplated as a recovery manoeuvre. In emergency extend the airbrakes and leave the cloud at 170 km/h (92 kts).

Cloud flying should only be carried out by pilots who have the necessary permission. The legal demands of airspace and instrumentation should be observed.

IV. 9 Simple aerobatics

Aerobatics should only be carried out by pilots who have the necessary permission.

Aerobatics may only be carried out without water ballast.

The following aerobatics are permitted:

1. Inside loop

Entry speed	180 km/h (97 kts)
G load	ca. 2 g
Exit speed	180 km/h (97 kts)

2. Stall turn

Entry speed 180 km/h (97 kts)

At 70 knots (130 km/h) slowly apply rudder. Shortly before the stall assist with aileron. In the case of an unintentional hammerhead stall hold the controls firmly central.

3. Spins

Reduce speed slowly to70 km/h(38 kts): pull the stick back and give full rudder. The aircraft spins slowly at one turn every 5 seconds. The height loss is 220 ft. per turn.

Recovery: opposite rudder, pause, stick forward till rotation stops, recover gently at about 160 km/h (86 kts).

4. Chandelle

Entry speed 150 km/h (81 kts)

Pull up to fly turn with 90 degrees bank. During turn decrease speed and exit from turn with rudder and aileron. The chandelle should be complete heading in the opposite direction at minimum speed.

5. Lazy eight 120 km/h (65 kts)

Manoeuvres that involve negative g loads are prohibited. Unorthodox manoeuvres are likewise prohibited.

SAL 50295

IV. 10 **Approach and landing**

The approach may be carried out at 90 km/h (49 kts). The brakes are powerful enough to carry out steep approaches. They cause a slight nose down trim change, so that the aircraft maintains the chosen airspeed automatically. Fully extending the airbrakes increases the stalling speed: do not extend the brakes fully during the roundout, to avoid heavy landings.

The side-slip is quite controllable and, if needed, this manoeuvre can be used to help land the glider. But the side-slip is only effective by using a large angle of side-slip and should be finished in a safe hight.

IV. 11 **Flight with water ballast**

A flight with maximum disposable load additional full amount of water ballast is comparable with a standard two-seat-glider. Therefore the flight characteristics of slow flying and stalling are different with water ballasted flights to flights without water ballast. The stalling speed increases to about 70 km/h(38 kts). Greater control defflections are needed to correct the attitude. The entry to the spin is more abrupt than without, water ballast, but it will be recovered by the standard procedure immediately. Slow flying and stalling with maximum gross weight should be practised at a safe height.

SN 50295

The water ballast tanks are situated in the wing leading edge and contain approximately 50 litres per wing. They are filled through the plugs on the top surface of the wings, which can be removed with a rod.

Built in baffles ensure that no noticeable movement of the water occurs in flight, when the tanks are partially filled.

The water has to be poured in and not filled in under the pressure of the water-pipe.

Equal amounts of water must be put in each tank to make up the required amount, so that lateral stability is not impaired.

Water ballast is dumped through an opening under the fuselage behind the wheel-box. The valve is opened by pulling the black knob at the right side of the instrument panel. Dumping of full water ballast takes about 3 minutes.

Air from the tanks escapes through an overflow pipe that runs down to a point at the underside of the wing near the root. The apertures are not allowed to be covered by adhesive tape. When flying with water ballast the connecting adhesive 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.

Before longer flights at temperatures around 0° C (32° F) the water must be jettisoned because of the danger of freezing.

It is strongly recommended that water ballast is jettison before landing.

The glider has to be parked over-night without water ballast due to the danger of freezing.
When de-rigging the water ballast tanks will empty themselves through the wing root connecting pipes.
If the glider has to be towed for a long way on a bumpy ground, the water tanks should be emptied to take care of the wing suspensions.

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V. Rigging and derigging

V. 1 Rigging

The fuselage must be held firmly in an upright position when rigging. It is recommended that a fuselage stand or the trailer fittings are used. The glider can be rigged by 3 people.

1. Wings

Unlock the 4 main wing fittings in the fuselage (a). Unlock the air-brakes on the wings. . Guide the right wing into the fuselage. The safety catches on the fuselage fittings should now be released ,and on gently moving the wing to and fro will be heard to snap into place (b). Next guide the left wing into the fuselage. Move the wings tips up or down so that the pin on the end of the spar stub is lined up with the appropriate hole in the opposite wing root and slide into place. Next release the safety catches on the left hand fuse-lage fittings and by gently moving the wing tip forwards and backwards they too can be made to snap into place (b).

To lock the fuselage fittings turn so that the pins are engaged in the slots. A slow but firm fore and aft movement of the wing tip will allow the collar to be turned sufficiently. They should not however reach the end of the slot (c).

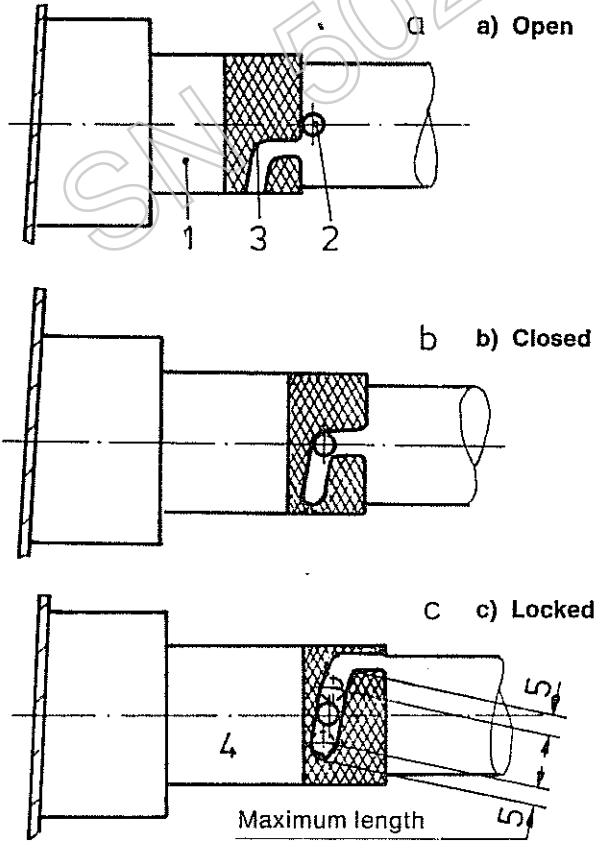
Check – The red rings on the fuselage sides must be covered by the rotating collars. The collars should be finger tight.

In the closed but not secured position (b) the wings cannot be with-drawn.

2. The aileron and airbrake connections are behind the spar

The connecting rods can be connected by means of the quick lock fasteners through the inspection cover. If necessary the aileron has to be moved up and down to get the linkages into the right position.

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.

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Having engaged the quick locks check that the safety pin cannot be moved without pressing it down. If it cannot be slid without pressing down the controls are properly connected.

3. Tailplane

Before assembly is commenced the front cover must be opened and the rotating wing bolt pulled out to the limit. **It is important to ensure, that the larger opening of the conical crillings in the inner rings of the horizontal stabilizer spar bearings fall to the rear.** The tailplane can best be positioned by standing behind the rudder. The tailplane can be rested on top of the fin with the elevator angled upwards so that the quick lock on the elevator push rod can be attached to the bearing on the elevator horn. The front of the tailplane can then be pushed back on to the three pins. It is then necessary to tighten the wing bolt clockwise to secure the tailplane. The assembly is complete when the wing bolt is sufficiently tight for there to be no play in any direction. The cover provides a safety measure as it can only be attached with the wing bolt horizontal. If necessary the wing bolt has to be turned a quarter turn to suit. Derigging is carried out in the opposite order and the wing bolt is unscrewed anticlockwise and pulled fully out.

To control the correct mounting of the horizontal stabilizer it is important to ensure that the peaks of the mark-arrows at fin and elevator tabs face each other.

Checks to be made after rigging.

1. Check that the four collars in the fuselage are engaged and secure.
2. Check that the aileron, airbrake and flap connections are engaged.
3. Check the towhooks for correct function and operating forces.
4. Test the operation of the wheel brake and the tire pressure.
5. Check that the tailplane is securely seated, control the 4 markings.
6. Check the elevator is coupled correctly through the clear panel.
7. Check sense and full and free movement of controls with an observer.

Derigging

Derigging is carried out in the reverse order and in this case it does not matter which wing is removed first. Excessive fore and aft rocking of the wing tips should be avoided.

V. 2 Parking

When the glider is stored the canopy should be locked. Use the canopy cover to protect the instrumentation against overheating. Pickets may be attached to the wing tip skids. The rotating tail dolly wheel should be used for ground handling.

Caution: The canopy in opened position may beam the sunlight and cause burns on head rest or luggage space.

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V. 3 **Transport**

We recommend the use of a closed trailer for transporting the glider. The parts must be carefully supported and secured so they cannot slide.

1. Fuselage

   A fuselage trolley moulded to the shape of the fuselage and positioned in front of the main wheel. The minimum length of the trolley should be 400 mm and it can be attached to the wing fittings if required. The tail skid should be secured so that it cannot slide sideways.

2. Wings

   The minimum length for the spar support should be 200 mm and should start at the face of the root rib. The mounting must be padded well with foam rubber or felt.

   The mounting under the aileron inboard end should be a shaped mounting block with a minimum length of 300 mm and height of 400 mm. The mounting must be padded with felt.

3. Tailplane

   Either horizontal on padded supports with the upper surface downwards and secured with straps or vertical supported on the leading edge in shaped mounting blocks.

   Profile drawings are available for the manufacture of fuselage, wing and tailplane fittings.

V. 4 **Maintenance of the glider**

The entire surface of the glider is coated with weather resistant white polyester gelcoat.

The greatest care should be taken in maintaining the fibre glass surface of the glider. Luke warm water should be used to wash off dust, grease, dead flies and other dirty marks. More resistant dirt should be removed by using a mild cleaning agent. Only special silicon-free preparations should be used in maintaining the painted surfaces. (1 Z-Spezialreiniger – D 2, Fa. W. Sauer and Co., 5060 Bensberg or Reinigungspolish Fa. Lesonal).

SN 5099

Although very resistant the glider should be protected as much as possible against rain and dampness. Water that has seeped in should be dealt with by storing the glider in a dry place, frequently turning over the dismantled parts.

The most effective way to clean the canopy is to use a special perspex cleaner but if necessary luke warm water can be used. A soft, clean cloth or chamois-leather should be employed to wipe the canopy down. Never rub perspex with anything dry.

The Safety harness should be regularly checked for damage and general wear. The metal parts of the harness should be frequently checked for corrosion.

Because of its position, the winch launch hook is susceptible to getting very grimy and muddy. It must therefore be frequently inspected for damage, cleaned and greased. When the seat-well is removed the hook can easily be taken out. Remove the connecting wire from the lever and take out the retaining screws. For reconditioning, the tow hook should be sent with the record card to the tow hook manufacturer, Tost. For further details the manufacturers manuals should be consulted.

The cables and pulley for the nose and belly hooks should be checked for wear during the yearly inspection.

The main wheel tyre pressure should be kept at 3,5 atmospheres (49.8 psi) for Stand. A. /2,5atm. (36psi) for Club Astir II.

The wheelbrake is of the drum type. If required the point at which the brake begins to drag can be adjusted. The adjustment is carried out by moving the Bowden cable at the drum end.

When the main wheel is being taken off for the purpose of cleaning, greasing or changing the tire, the Bowden cable should be disconnected from the brake-lever. Remove the screw cover on one side of the axle and take out the screws and the spindle. Remove the screws that hold the brake-lever in place. Take the wheel out by pulling it downwards. Clean all the parts and before reassembly smear all of them with grease.

Before assembling the glider the pins and sockets at the joints between wings and fuselage, and tailplane and fuselage, should be cleaned and greased.

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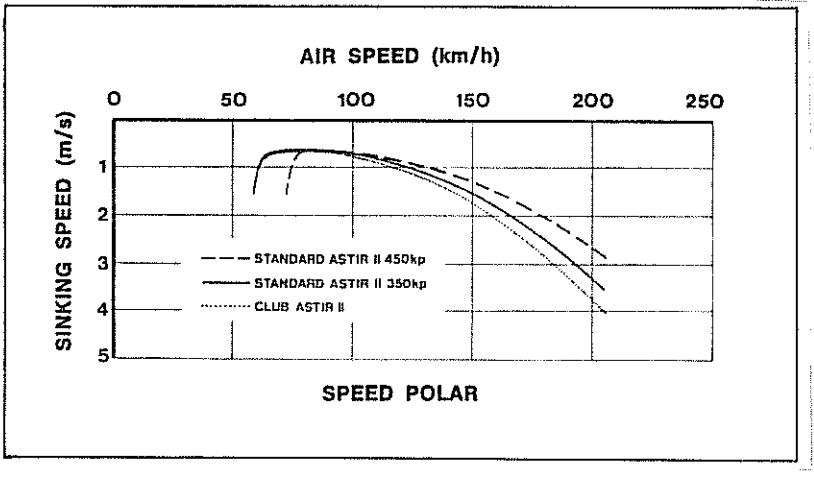
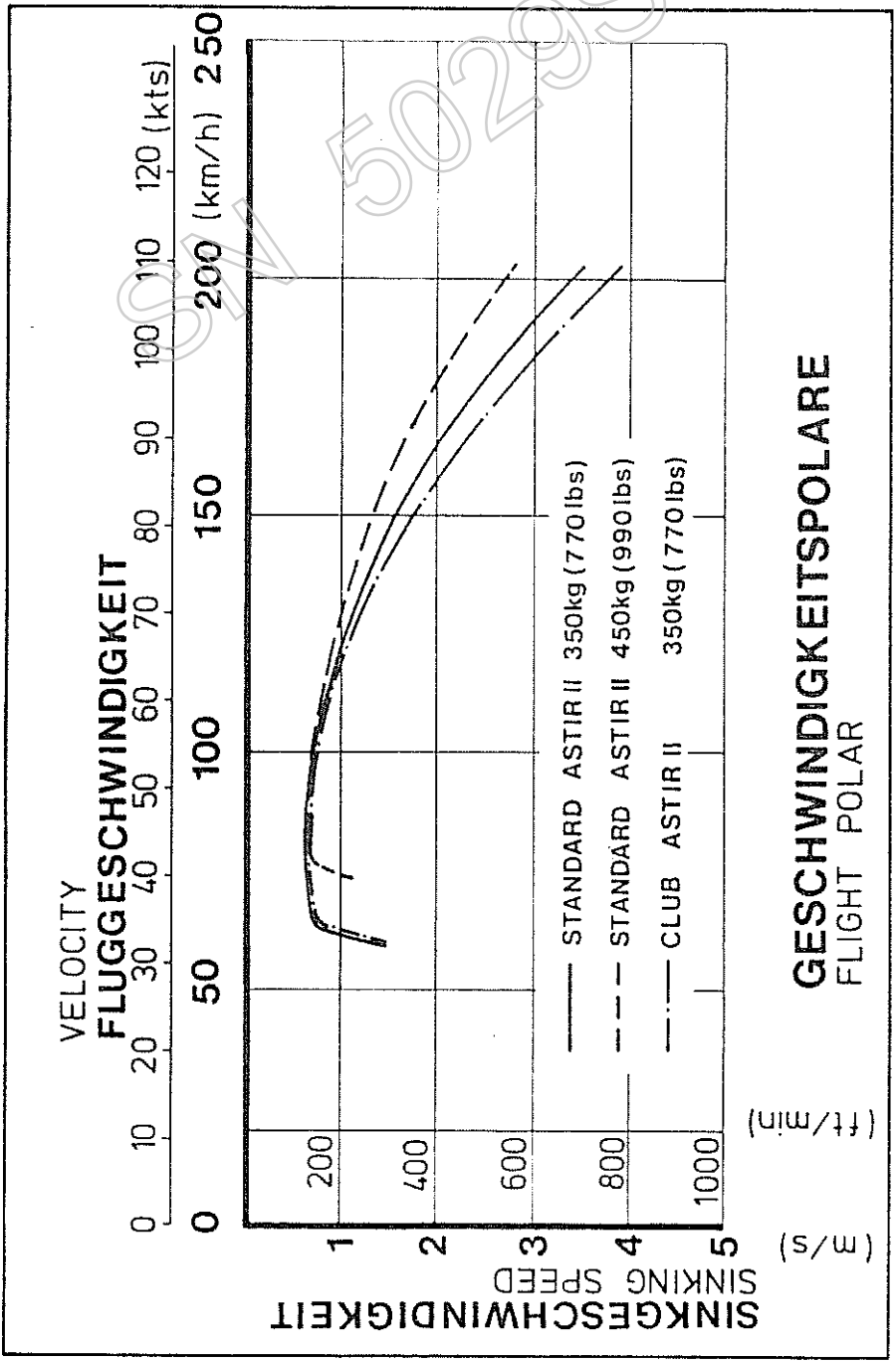
VI. **Appendices**

VI. 1 **Performance**

All up weight	350	450	kg
Wing loading	28,0	36,3	kg/sq. m.
Best glide angle	37,3	38,0	
at flying speed	95	105	km/h
Minimum sink	0, 6	0, 7	m/sec
at flying speed	75	85	km/h




GESCHWINDIGKEITSPOLARE
FLIGHT POLAR
STANDARD ASTIR II 350kg (770 lbs)
STANDARD ASTIR II 450kg (990 lbs)
CLUB ASTIR II 350kg (770 lbs)
SINKGESCHWINDIGKEIT
SINKING SPEED
(m/s)
(ft/min)
VELOCITY
FLUGGESCHWINDIGKEIT
(km/h)
(kts)

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VI. 2 **Service and Maintenance Instructions**

Regular service.

The following schedule of service should be carried out every 100 hours or at the annual inspection, which occurs first.

1. The entire glider should be checked for cracks, holes and bumps.
2. All fittings should be inspected for satisfactory condition (play, scores and corrosion).
3. All metal parts should be examined for corrosion, cracks, deformation and if necessary reconditioned and freshly protected.
4. Check that there is no play in the wing and tailplane to fuselage fittings.
5. The control linkages (Bearings, stops, fittings, hinges and control cables) should be inspected and replaced if there is evidence of bending or corrosion.
6. The controls including the brakes should be submitted to a functional test and the control deflections checked.
7. If the controls do not move freely throughout their range, search for the cause and correct.
8. The undercarriage should be inspected and the wheel and brake checked to be in good condition.
9. The tow hooks should be treated in accordance with their appropriate maintenance manual.
10. Check the pitot for the ASI is clear and that the tubing to all instruments is in good condition and free of leaks or kinks.
11. The condition and calibration of all instruments should be checked and any other equipment inspected.
12. Equipment and instruments should be checked against the equipment list.
13. Check markings and placards.
14. After repair or change of equipment, the weight table should be updated with the new empty weight and Center of Gravity by weighing or calculation.

After extended storage check accordingly to regular service pos. 1 to 11 and inspect for evidence of rodents and birds.

VI. 3 **Reference to Repairs**

The attached repair instructions give information for the execution of minor repairs.

Major repairs, in accordance with the glider information sheet are only permitted to be carried out by an authorised aircraft works. Grob will name a company with the appropriate qualifications in any individual case.

VI. 4 **Installation, maintenance and examination of the release hooks**

One is bound by the Maintenance Manuals for the nose hooks 'E 72' and 'E 75' published in May 1975 and the Maintenance Manual for the belly hooks 'Europa G 72' and 'Europa G 73' published in May 1975.

VI. 5 **Determination of the Center of Gravity**

The determination of the center of gravity is made with the undercarriage lowered and the glider supported on two scales at heights such that an incidence board of 600 : 26 angle is set horizontal on the back of the fuselage.

The reference plane lies at the front of the wing at the root. The distances a and b are measured with the help of a plumb line. The empty weight is the sum of the two weights G_1 and G_2.

The Center of Gravity of the pilot is located 633 mm in front of the datum line.

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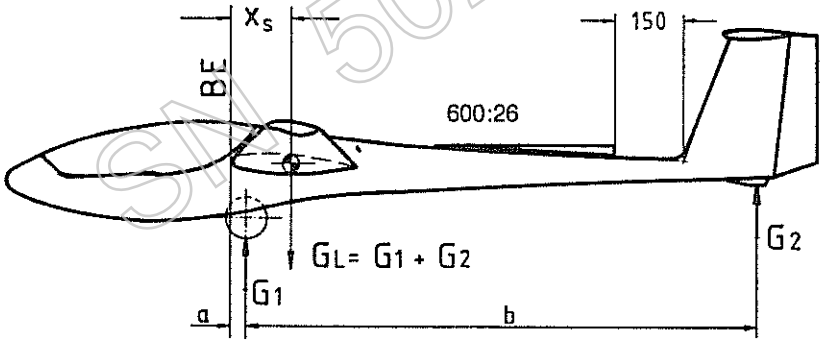
Measurement of Center of Gravity position



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

Level Means: With a 600 : 26 Incidence Board set up horizontal on top of the rear fuselage.

Weight on main-wheel		G_1 =	kg/lbs
Weight on tail-skid		G_2 =	kg/lbs
Empty Weight	$G_L = G_1 + G_2$ =		kg/lbs
Distance to main-wheel		a =	mm/inches
Distance to tail-skid		b =	mm/inches

Empty weight C. of G.

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

The measurements to determine the empty weight, the empty weight C. of G., and the loading limitations should always be taken with the glider empty of waterballast and without removable trimming weights.

Conversion:	from	to	multiply by
	kg	lbs	2,2
	mm	inches	0,0394

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If the limits of the empty weight C. of G. positions and the loading limitations chart are adhered to the C. of G. of the loaded cylinder will be within permitted range.

Empty Weight kg	Range of C. of G. behind Datum (mm)	
	Forward	Aft
250	723	766
255	715	760
260	707	754
265	700	749
270	693	743
275	669	738
280	646	733
285	623	728
290	601	724

LUFTFAHRT-BUNDESAMT BRAUNSCHWEIG
24. Juni 1981

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It should be noted that to make use of the maximum load the maximum admissable load for non-lifting parts must not be exceeded.

The weight of the non-lifting parts is the sum of the fuselage, tailplane and maximum load in the fuselage and must not exceed 240 kg (529 lbs) or the maximum load permitted in the fuselage must be correspondingly decreased.
This refers to the load of the fuselage.
The Center of Gravity should be rechecked after repair, repainting, the installation of additional equipment or when a period of 4 years has elapsed after the last weighing.

The empty weight, empty weight C. of G. position and maximum load, should be recorded after each weighing on page 10 of the Flight Handbook.

To find out the Center of Gravity of the loaded sailplane:
-C. of G. of the pilot is located 633 mm in front of the datum line
-C. of G. of the water ballast is located 315 mm behind the datum line

SN 5829S

GROB FLUGZEUGBAU
8939 Mattsies
Flugplatz Mindelheim-Mattsies
Telefon 0 82 68 / 411
Telex 539 623

Maintenance Handbook

CLUB-ASTIR II

STANDARD-ASTIR II

This handbook is to be kept on board the aircraft at all times.

It refers to the Standard and Club Astir II Sailplane.

Registration: Factory Serial Number:

Owner: _____

_____

_____

German edition of operating instructions are approved under § 12 (1) 2. of Luft GerPO.

Published February 1980

Approval of translation has been done to our best knowledge and judgement. In any case the original text in German language is authoritative.

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Index page

Technical Advice and Airworthiness notes are to be kept behind this page.

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Updates:

Current number	Page	Reference	Date	Signature
1	2	MSB 306-37	13.06.03	03. JUL. 2003
	23, 24, 25	Canopy jettison and exit	13.06.03	

SN 5029S

1. Technical Data

Wings

Profile Eppler		E 603	
Span	b	15.0 m	49.2 ft
Area	F	12,4 m²	133,5 sq.ft
Aspect Ratio		18,2	

Ailerons

Span	bQR	2,96 m	9,7 ft
Chord inner	tI	0,17 m	0,56 ft
outer	ta	0,14 m	0,46 ft
Area	FQR	0,9 m²	9,69 sq.ft
% of chord		20 % -27%	

Fuselage

Length (SPEED II B)	l	6.80 m	22.3 ft
Width, of cockpit	b	0.60 m	1.97 ft
Height of cockpit	h	0.82 m	2.69 ft
Height of tailplane	h	1.26 m	4.13 ft
Surface area about	F	8,2 m²	88,3 sq.ft

Fin

Height	h	1.10 m	3.61 ft
Area	F	0.98 m²	10.5 sq.ft
Aspect ratio		1.21	
Chord bottom	tu	1.10 m	3.61 ft
top	to	0.70 m	2.30 ft

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Rudder

Area	F	0.29 m²	3.12 sq.ft
% of fin		30 %	

Tailplane

Span	b	3.00 m	9.84 ft
Area	F	1.44 m²	15.5 sq.ft
Aspect ratio		6.25	
Chord inner	ti	0.62 m	2.03 ft
outer	ta	0.34 m	1.12 ft

Elevator

Area	F	0.40 m²	4.31 sq.ft
% of tailplane		27.5 %	

Brakes (Grob system)

Area (both)	FBK	0.40 m²	4.31 sq.ft
Span	b	1,2 m	3,9 ft
Height	h	0,14 m	0,46 ft

Weights

Empty	ca.	260 kg	570 lbs
Max load with water ballast		195 kg	429,9 lbs
Crew max.		110 kg	243 lbs
Baggage max.		10 kg	22 lbs
Ballast max.		90 kg	198,4 lbs
Minimum cockpit load		70 kg	154 lbs
Max. AUW without water ballast		380 kg	837,7 lbs
Max. AUW with water ballast		450 kg	992,1 lbs
Loading in percent AUW		43%	
Wing loading		26,2-36,3 kg/m²	5,4-7,4 lbs/sq.ft
Max weight of non lifting parts		240 kg	529,1 lbs

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2. Description of Components

2.1 Control Linkages

The flying controls of the aircraft are based on a push rod system. The control levers and sticks are made of Aluminium and the push rods are of aluminium tube, riveted to the connectors.

Elevator

The control stick force is transfered from the control stick via the mounting frame to the elevator push rods. A single elevator push rod leads from the join at the wheel box to the elevator horn at the bottom of the fin. A vertical push rod with quick connector drives the horn in the elevator. All the components of the elevator system in the fuselage can be dismantled. The elevator horn is laminated into the elevator. Stops for the elevator are on the stick under the seat.

Aileron controls

Lateral control movements are transfered from the control stick via a short connecting rod to the aileron control bellcrank on the side of the fuselage. Push rods lead from there to the arm on the control spider in the middle of the fuselage via an intermediate bellcrank at the wheel box. The aileron horns on the spider and the push rods in the wing are moved by intermediate connectors. The outboard aileron control differential bell crank in the wing drives the aileron directly via a short push rod. All components of the aileron linkage in the fuselage may be dismantled. The aileron control differential bell crank and the push rods in the wing may only be dismantled through an opening made in the fibreglass skin. Stops for the aileron linkage are mounted on the stick.

Rudder linkage

The pedals are designed for cable control and are adjusttable without preset positions. The cables are on the inside of the pedals and are routed under the seat to the bell crank just behind the seat.

The rudder is reached from there by the main push rod in the back of the fuselage via an intermediate bellcrank at the base of the fin with a short push rod to the horn on the rudder. The whole of the rudder control system may be dismantled. The stops for the rudder are mounted on the main bellcrank on the wheel box.

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Airbrakes

Movements of the airbrake lever on the left of the cockpit are carried by control rods with an intermediate bell crank at the wheel box to the lower horn of the control spider. The push rods in the wing are driven by the inner drive shaft of the spider and the upper horns. An inverting bell crank is mounted inboard in the wing. from which push rods drive the two pivoted arms in the airbrake box which carry both brake plates. All parts of the airbrake control system in the fuselage can be removed. The inverting and transfer bell cranks and the internal push rods in the wing can only be reached by opening the skin of the wing.

Undercarriage of Standard Astir II

Movements of the undercarriage lever on the right of the cockpit are carried by a control rod to the locking gear below the seat. Another control rod carries to the transfer bellcrank at the knee joint of the undercarriage.

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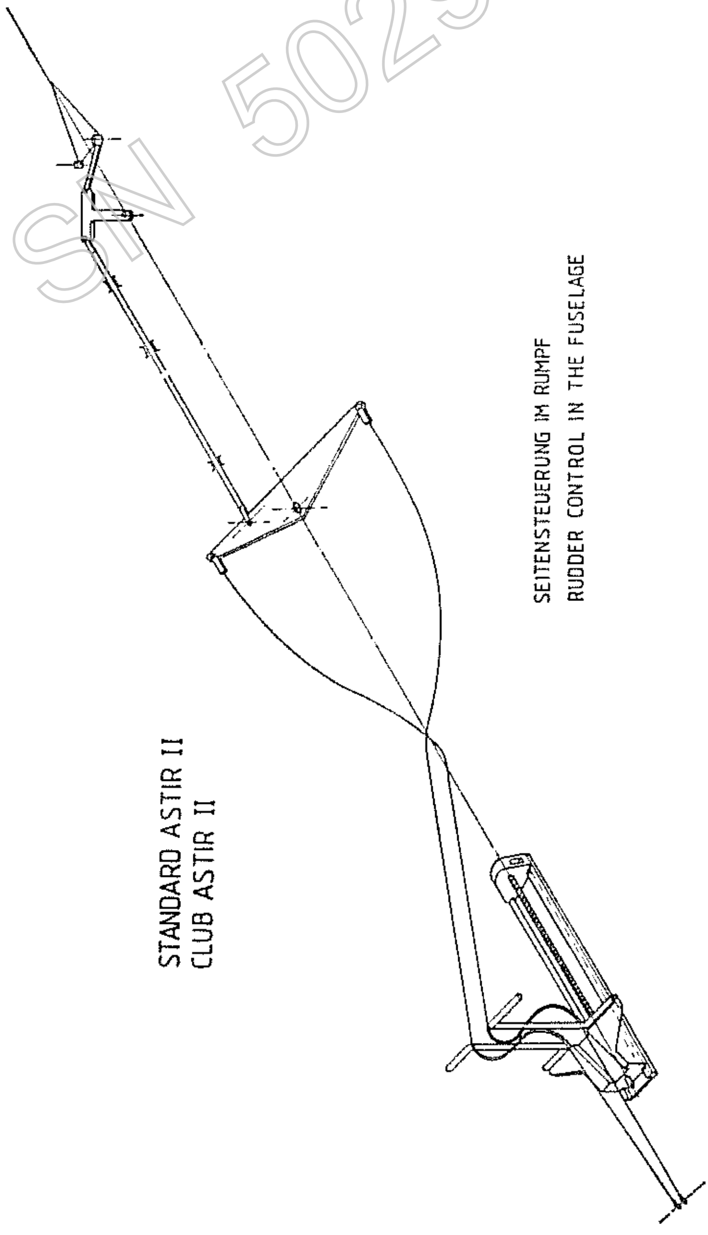
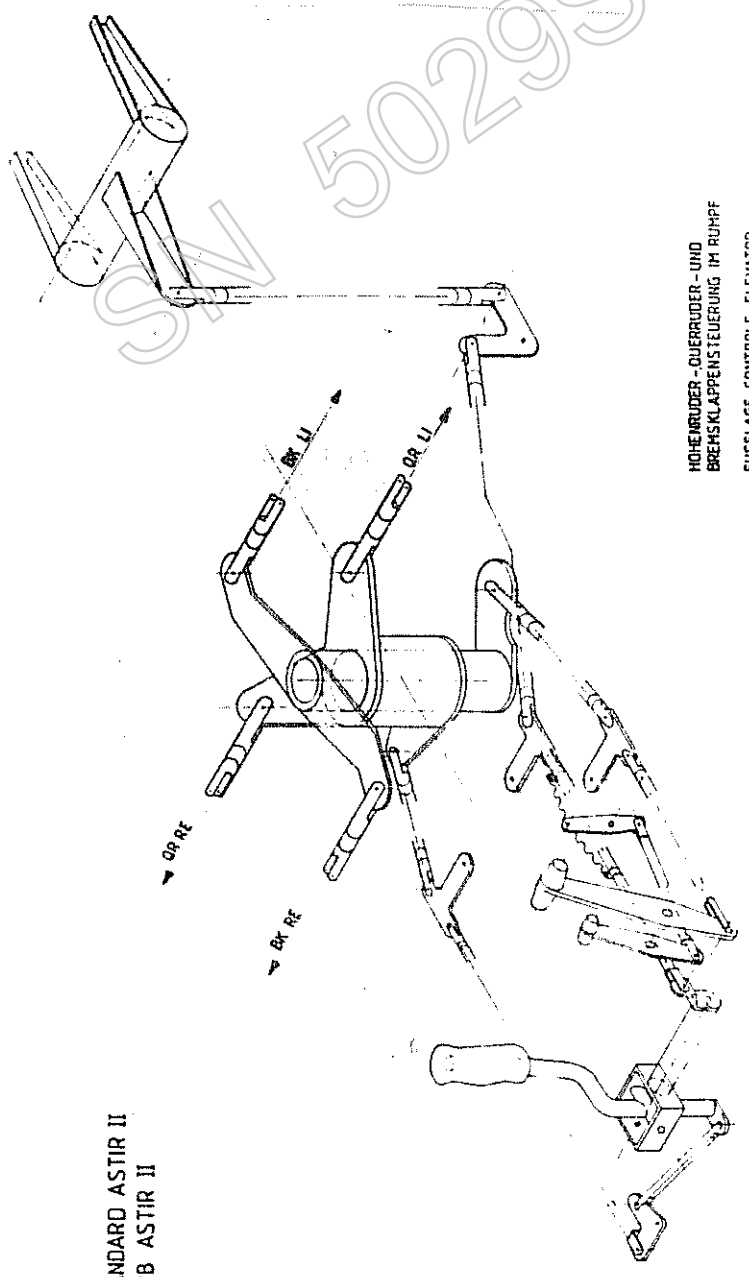

SEITENSTEUERUNG IM RUMPF
RUDDER CONTROL IN THE FUSELAGE
STANDARD ASTIR II
CLUB ASTIR II



STANDARD ASTIR II
CLUB ASTIR II

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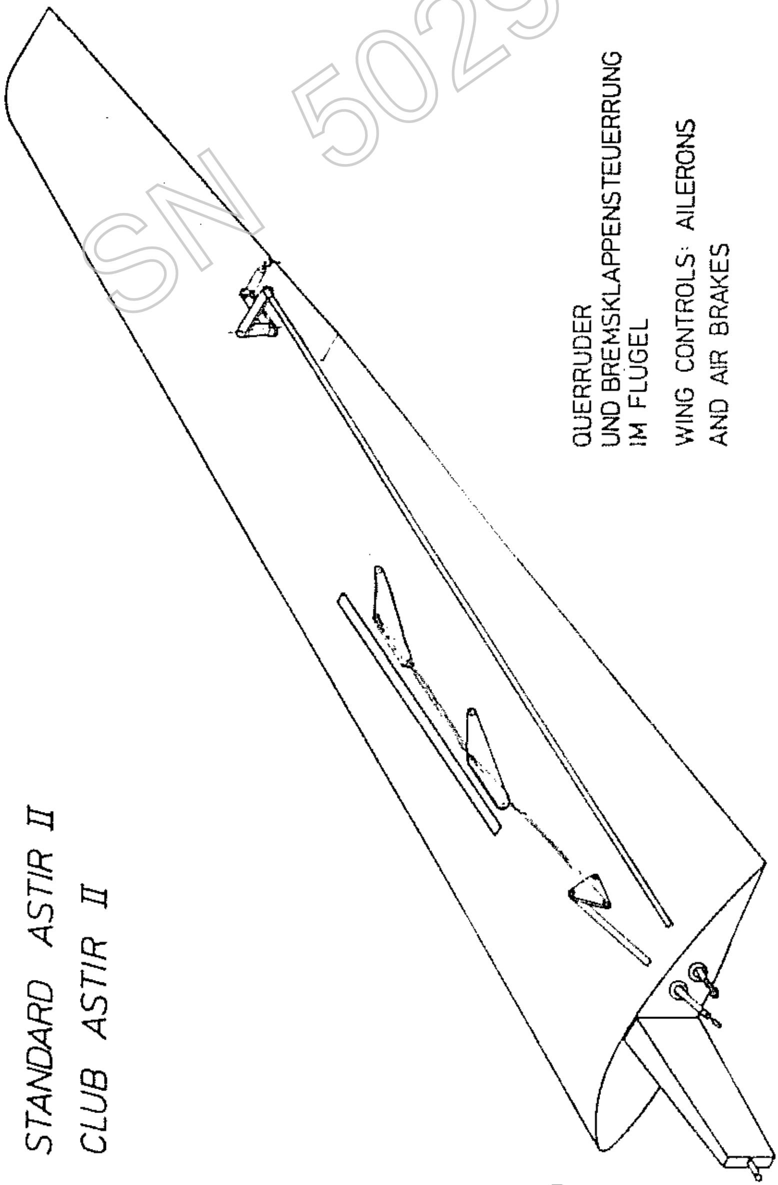
QUERRUDER
UND BREMSKLAPPENSTEUERRUNG
IM FLÜGEL
WING CONTROLS: AILERONS
AND AIR BRAKES
STANDARD ASTIR II
CLUB ASTIR II

SHG 00295

2.2 Installation of Radio

The instrument panel may be obtained in two layouts which can accomodate rectangular instruments of 60 x 80 mm. and 146 x 47 mm. The speaker should be mounted in the baggage compartment. A "Swan neck" microphone boom can be attached to the cockpit frame to the right of the pilot. Batteries can be mounted on the shelf of the baggage compartment. Drawings for installation of the radio unit can be obtained by request from the manufacturer or his agents.

2.3 Installation of Oxygen equipment

An Oxygen cylinder may be mounted at the top of the baggage area. Drawings for installation of Oxygen equipment may be obtained from the manufacturer or his agents on request.

At every additional mounting of equipment, which influences the centre of gravity, a new weighing has to be carried out, to guarantee, that the centre of gravity is within the allowed range.

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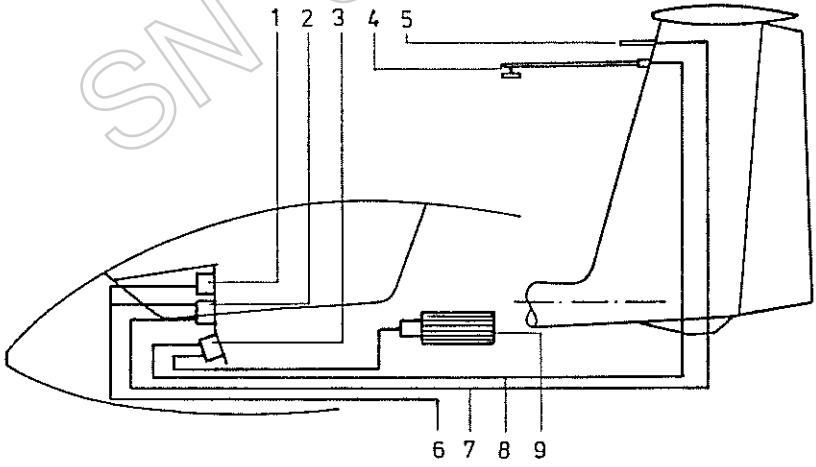
2.4 Pressure tubing and connections to the instruments



1. Altimeter
2. Air speed indicator
3. Variometer
4. Total energy tube
5. Pitot tube
6. Static pressure (colourless)
7. Pitot pressure (green)
8. Total energy (red)
9. Flask (blue)

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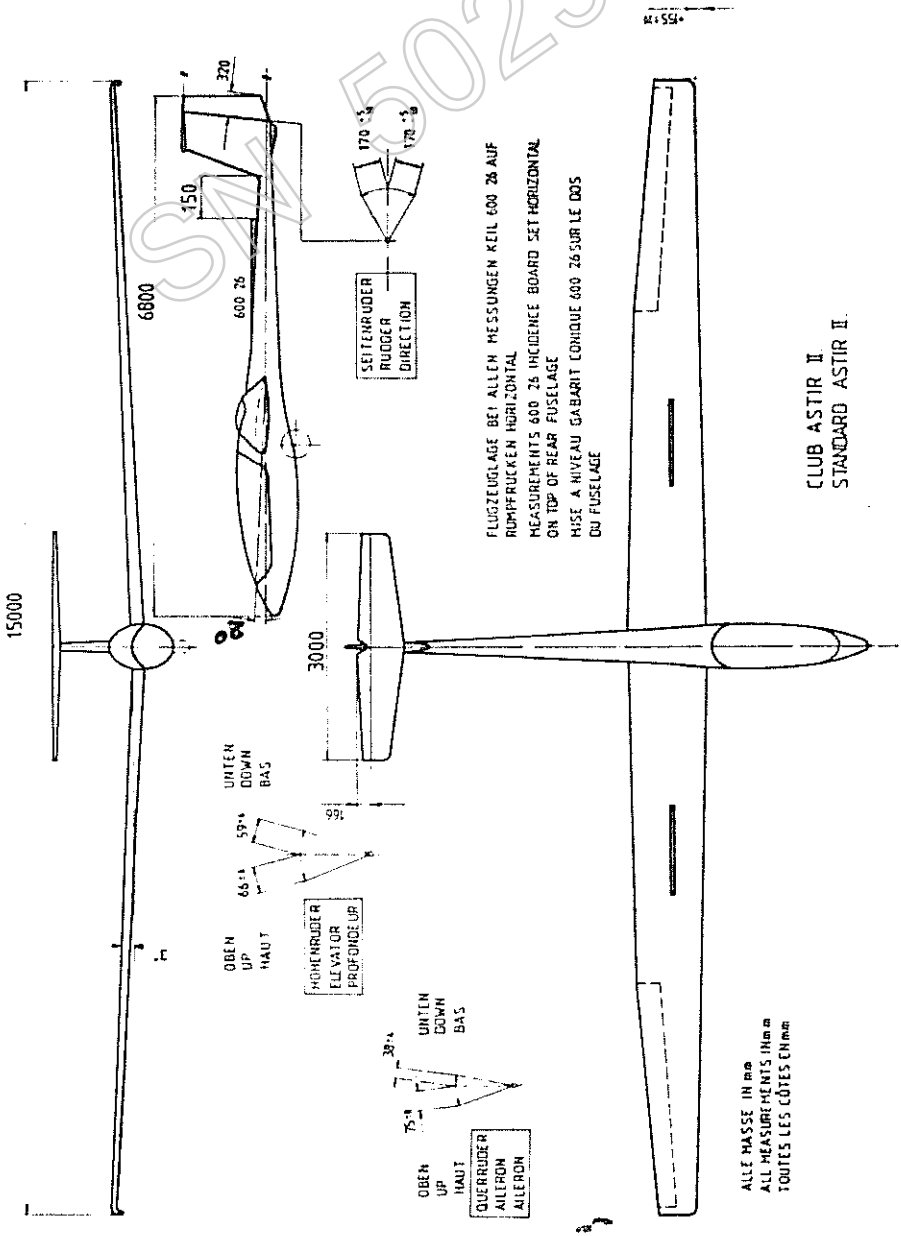
3. Rigging data

Adjustment	Reference line	Value	Tolerance
Wing — incidence angle	Angle between the centre line of the wing and the longitudinal axis of the fuselage	2^{o}	+ 15′ — 15′
Wing — sweep back	Distance of the line joining the wing tips from the reference line	155 mm (6,1 in)	$\pm$ 20mm ($\pm$ 0,79in)
Wing — dihedral	Angle between the top surface of the wing and horizontal	3 deg	+ 30′ — 30′
Tailplane — incidence angle	Angle between the chord of the tailplane and the longitudinal axis of the fuselage	0 deg	+ 15′ — 15′
Reference line	Front of the wing at root rib	QE 2000 (78,7in)	

Control deflections	Upwards (Right) Value	Upwards (Right) tolerance	Downwards (Left) Value	Downwards (Left) tolerance	Measurement point from centre of rotation
Aileron (both)	75	$\pm$ 8	38	$\pm$ 4	150 mm (5,91 in) trailing edge between aileron and wing
Elevator	66	+6 —6	59	+6 —6	166 mm (6.54 in)
Rudder	170	+5 —10	170	+5 —10	320 mm (12,6 in)


15000
6800
320
150
600 26
SEITENRUDER
RUDDER
DIRECTION
170
178
3000
FLUGZEUGLAGE BEI ALLEN MESSUNGEN KEIL 600 26 AUF
RUMPFRUECKEN HORIZONTAL
MEASUREMENTS 600 26 INCIDENCE BOARD SET HORIZONTAL
ON TOP OF REAR FUSELAGE
MISE A NIVEAU GABARIT CONIQUE 600 26 SUR LE DOS
DU FUSELAGE
CLUB ASTIR II
STANDARD ASTIR II
UNTEN
DOWN
BAS
OBEN
UP
HAUT
HOHENRUDER
ELEVATOR
PROFONDEUR
QUERRUDER
AILERON
AILERON
ALLE MASSE IN mm
ALL MEASUREMENTS IN mm
TOUTES LES COTES EN mm

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4. Components with a limited life

Tow hooks

The standard tost tow hooks have a life of 36 months, after which they must be checked (time counted from time of installation in the aircraft), or a maximum of 2000 launches.

Oxygen Equipment

Overhaul times for specific Oxygen equipment is given in their test certificates.

Oxygen bottles must also be checked by the technical service every 5 years or according to the local laws on use of pressurized gases.

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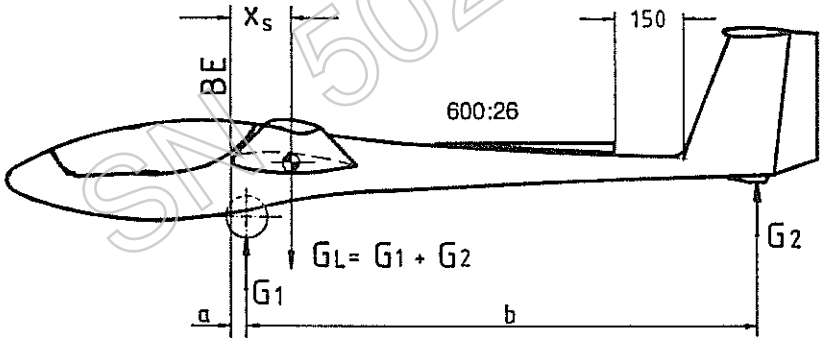
5. **Measurement of centre of gravity position**



Datum line: Front edge of the wing at the root rib

Level means: With a 600 : 26 incidence board set up horizontal on the top of the rear fuselage.

Weight on main-wheel	G_1 =	kg / lbs
Weight on tail-skid	G_2 =	kg / lbs
Empty Weight G_L	$= G_1 + G_2$ =	kg / lbs
Distance to main-wheel	a =	mm / inches
Distance to tail-skid	b =	mm / inches

Empty weight C. of G.

$$X = \frac{G_2 \times b}{G_L} + a = \frac{\quad}{\quad} + = \quad \text{mm/inches behind datum line}$$

The measurements to determine the empty weight, the empty weight C of G and the loading limitations must always be taken with the glider empty of water ballast and without removable ballast weights.

	from	to	multiply with
Convertion	kg	lbs	2.2
	mm	inches	0.0394

If the limits of the empty weight C of G positions and the loading limitations chart are adhered to, the C of G of the loaded glider will be within the permitted range.

STANDARD and CLUB ASTIR II

Empty Weight	Range of C. of G. behind Datum (mm)	
kg	Forward	Aft
250	723	766
255	715	760
260	707	754
265	700	749
270	693	743
275	669	738
280	646	733
285	623	728
290	601	724

It should be noted that to make use of the maximum load the minimum admissable load for non lifting parts must not be exceeded.

The weight of the non lifting parts is the sum of the fuselage, tailplane, and maximum load in the fuselage and must not exceed 240 kg (529,1 lbs) or the maximum load permitted in the fuselage must be correspondingly decresed. This refers to the load of the fuselage.

The Centre of Gravity should be rechecked after repair, repainting, the installation of additional equipment or when a period of 4 years has elapsed from the time of last weighing.

The empty weight, empty weight C of G position and the maximum load should be recorded after each weighing on page 10 of the Flight Handbook.

To find out the Center of Gravity of the loaded sailplane:

- C. of G. of the pilot is located 633 mm in front of the datum line
- C. of G. of the water ballast is located 315 mm behind the datum line

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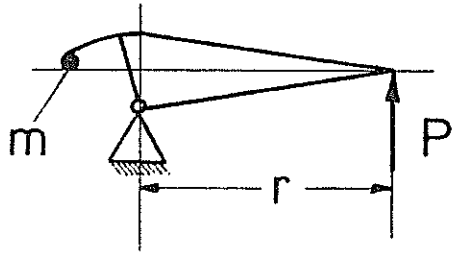
6. Weights and moments of the control surfaces:

Control surfaces moments

After fresh finishing or repairs the moments and weights of the control surfaces must not exceed the following values:

Elevator	13,0 cm kg +3,5% -4,2%	3,0 kg ± 12%
Rudder	0 - 6 cmkg	4,5 kg ± 10%

The rudder and elevator must be removed to measure the moments. To determine the moment $M = P \cdot r$ the surface should be mounted at the hinge line with the minimum friction possible. The force P can be measured, for example, using a letter scale. If these values are exceeded the mass balance should be increased. Before carrying out repairs which for example involve changing the mass balance on a surface the manufacturer or his repair agent should be consulted.



Ailerons	0 cm kg ± 1 cm kg	6,1 kg ± 10%

The aileron can not be removed to measure the moment with the elastic flap. In order to ascertain the moment $M = P \cdot r$ the wing must be placed horizontal on at least 3 supports to avoid bending under its own weight. The control rods should be detatched from the surfaces and pushed into the wing. The hanging control surfaces can be centered (0 deg) with a spring balance and P read off. If the moments are exceeded then do the same as with the rudder or elevator.

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7. Checks

Check lists

See Flight Handbook for daily inspection and pre flight checks.

Checks in specific cases.

After a heavy landing:

Check the undercarriage mechanism under the seat, check the undercarriage mountings in the wheel box, check the spar and root rib for white patches in the glass fibre reinforced plastic (GFK).

Check the wing fittings in the fuselage and in the root rib.

After a ground loop:

Check the undercarriage mounting, check the rudder control rod and bellcrank behind the wheel box. Check the GFK tube at the base of the fin. Check the wing fittings in the fuselage and the connecting pins in the root rib.

Check the T-tail fittings

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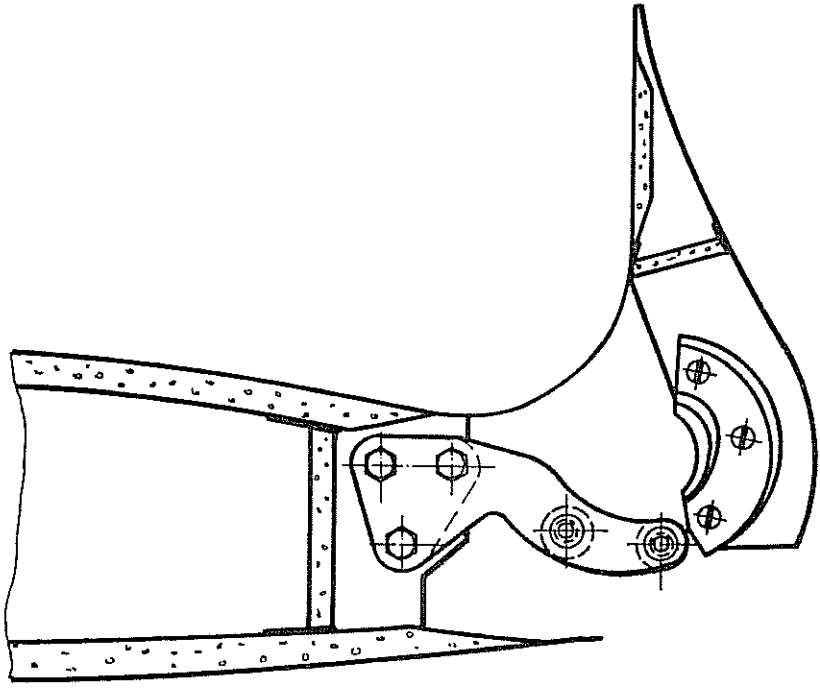
8. Regular service

The following schedule of service should be carried out regularly, and at the minimum during the annual airworthiness inspection.

1. The entire glider should be inspected for cracks, dents and bumps.
2. All fittings should be inspected for satisfactory condition (play, scores and corrosion).
3. All metal parts should be examined for corrosion, cracks, deformation and if necessary reconditioned and freshly protected.
4. Ceck that there is no play in the wing and tailplane to fuselage fittings.
5. Remove the control rods for the elastic flaps and bend fully upwards as shown in the sketch (max. ca. 90 deg) so the ball bearings are completely separated. Check all parts in this position.



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6. The controls including the brakes should be submitted to a functional test and the control deflections checked.
7. The control linkages (Bearings, stops, horns, hinges and control cables) should be inspected and replaced if there is evidence of bending or corrosion.
8. If the controls do not move freely throughout their range, search for the cause and correct.
9. The undercarriage should be inspected and the wheel and brake checked to be in good condition.
10. Tow hooks should be treated in accordance with their appropriate maintenance manual.
11. Check that the pitot for the ASI is clear and that all tubing to the instruments is in good condition and free of kinks or leaks.
12. The condition and calibration of all instruments should be checked and any other equipment inspected.
13. The wing bending mode has to be established and checked with the figure stated at the approval report (Stückprüfbericht). The glider has to be supported at mainwheel and tail. The tire pressure must be 3,5 atm/50 PSI /2,5 atm (36 psi)
14. Equipment and Instruments should be checked against the equipment list.
15. After repair or change of equipment, particularly after addition of a radio or Oxygen equipment, the weight table should be updated with the new empty weight and C of G by weighing or calculation.

9. Lubrication chart

Ball bearings

All ball bearings installed are sealed with a permanent grease filling. Greasing of bearings is therefore unnecessary.

Sliding bearings

All the sliding bearings in the control runs need no maintenance or lubrication, except for those in the wing root and fin which should be washed off with petrol when dirty and relubricated.

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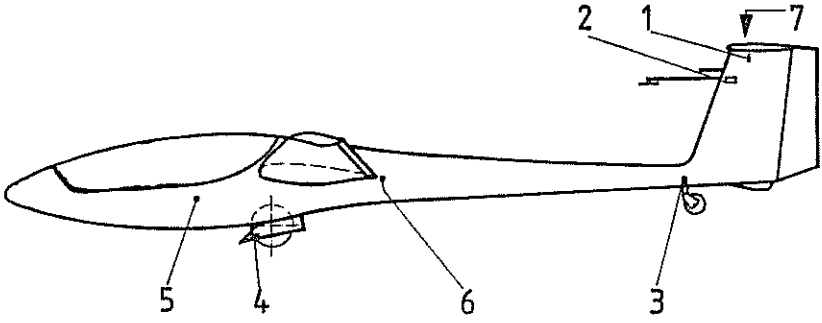
Grooved bearings

The 2 bearings on the inner torque tube and the mixing levers of the control spider must be cleaned and lubricated when stiff and at least every 4 years.

Lubrications areas

The pins and bushes on the wing fittings should be regreased when necessary during rigging. The pins on the tailplane fittings and the screw thread should be lubricated periodically. The hinge and catches of the canopy should be oiled occassionally. Dirty release hooks are best cleaned using a brush and compressed air whilst operating the mechanism. The belly hook is accessible from inside and can be lubricated with spray oil or similar.

10. **Markings**



1. Markings to show correct rigging of the tailplane
2. Placard for total energy tube
3. Mark to aid location of the hole for the tailwheel
4. Label for weak link strength and tyre pressure
5. Red ring round static vent
6. Placard for tailplane fastening

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11. Placards and signs

Maximum weight	kp	lbs
without water ballast:	380	836
with water ballast:	450	990

Airspeed limits	km/h	m.p.h.	kts
Never exceed	250	155	135
In rough air	250	155	135
Manoeuvering	170	105	92
On aerotow	170	105	92
On winch tow	120	74	64
Airbrakes	250	155	135
Gear extended	250	155	135

cockpit

Payload

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.

Maximum load	110 kg	243 lbs

cockpit

Reg. 50296

Check before launch

Wing and tailplane connections checked?
Full and free movement of controls?
Parachute secured?
Straps tight and locked?
Pedals adjusted and locked?
Brakes closed and locked?
Trim correctly adjusted?
Altimeter adjusted?
Canopy locked?
Cable on correct hook?

Beware: -Crosswind! -Cable break!

Cockpit

Canopy jettison and exit

a) Open the canopy,
pull red canopy handles and turn 90° inwards !

b) release the canopy,
lift up the canopy with red handles to release canopy!

c) unbuckle seat harness

d) EXIT over left or right side

e) Wait 1 - 3 seconds before pulling the rip cord

side of cockpit e. g. forward and to right of seat

Tire Pressure
50 PSI 3,5 atm

Maximum weak link strength
1100 lbs 500 kg

wheel door

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

wheel cover

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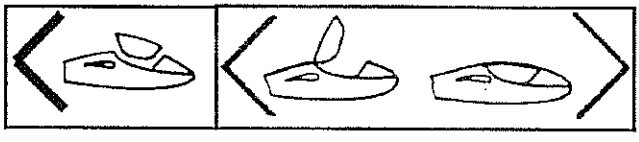
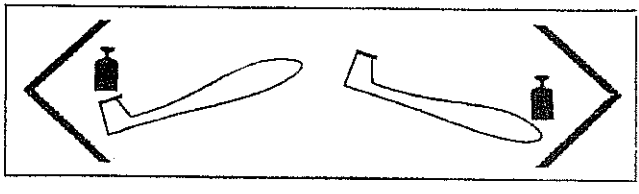
Undercarriage lever
(only STANDARD ASTIR II)

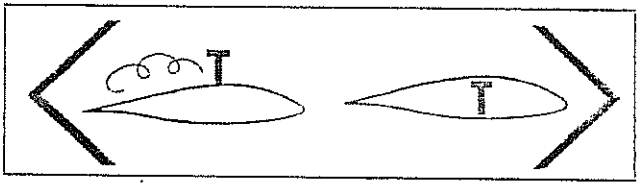
Canopy Catch /
Canopy Jettison RH

Canopy Catch /
Canopy Jettison LH

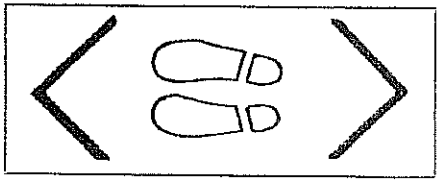




Trim Lever
(left side of fuselage)



Airbrake Lever



Rudder Pedal
Adjustment

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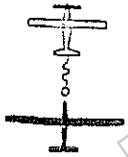
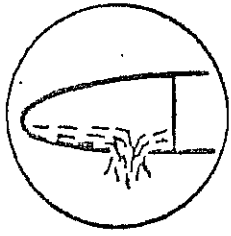


Cable Release
(Instrument panel)

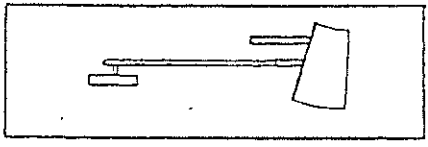
Baggage maximum
22 lbs 10 kg

Luggage compartment

Ventilation
(Instrument panel)



Water ballast jettison
(Instrument panel)
(Standard Astir II)



Total energy venturi
(Fin)

ELEVATOR QUICK LOCK CONNECTED
ROTATING KNOB TURNED IN
TAILPLANE SECURED (COVER CLOSED)

Tailplane checklist
(door in leading edge)

Cancelled with MSB 307-37

Canopy emergency jettison

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12. Air Speed Indicator Markings

km/h	knots	mph	Marking	Significance
72-170	39-92	45-106	Green arc	Normal range of flying speed
170-250	92-135	106-155	Yellow arc	Range of flying speeds to be used with care
250	135	155	Radial Red line	Maximum speed (VNE)
90	49	56	Yellow triange	Minimum recommended landing speed at maximum all up weight

72 km/h(39 kts/45 mph) = Vs 1,1 under max. flight weight conditions

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13. General care

Dampness

As far as possible the glider should be protected from damp. All the metal parts of the glider, with the exception of the wing and tailplane fittings are protected against damp. However, this will not prevent corrosion during extended exposure to moisture. Following any flights in rain any water which has entered the glider should be dried up and the exterior surfaces dried with a chamois leather. Polished metal parts should be regreased. Beware of condensation.

Sunlight

All structural parts of GFK gliders should have white surface to avoid heating up in sunlight.

Protection of the finish

The Gelcoat surface layer is very resistant and can therefore be cleaned using a mild detergent. Ingrained dirt, such as dead flies and grease, is best removed with a SILICONE FREE polish such as 1 Z Spezial-Reiniger – D 2, Fa. W. Sauer and Co., 5060 Bensberg, or "Reinigungspolish", Fa. Lesonal, Stuttgart. Sticky tape used for sealing the wing and tailplane joints may be removed using petrolium thinners (Beware thinners may remove the markings).

Cleaning the canopy

The canopy should only be cleaned using a soft clean cloth and a mild soap solution. It should be rinsed with clean water and dried with a clean chamois leather. "Plexipol" is a suitable polish. Never rub perspex with anything dry.

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14. Inspection Procedure for Increase of Service Time

1. **General**

   The results of fatigue tests of wingspar sections have demonstrated recently that the service time of FRP gliders and motorgliders may be extended to 6000 hours, if for each individual glider (in addition to the obligatory annual inspections) the airworthiness is demonstrated according to a special multi-step inspection programm particularly with regard to the service life.

2. **Dates**

   When the glider has reached a service time of 3000 hours, an inspection must be done in accordance with the inspection program mentioned under point 3. If the results of this inspection are positive or if any defects found have been duly repaired, the service time of the glider is extended by another 1000 hours to a total of 4000 hours (first step).

   The above inspection program must be repeated when the glider has reached a service time of 4000 hours. If the results of this inspection are positive or if any defects found have been duly repaired, the service time of the glider is extended to 5000 hours (second step).

   When the glider has reached a service time of 5000 hours, the above inspection program again must be repeated. If the results of the inspection are still positive or if any defects found have been duly repaired, the service time may be extended to a total of 6000 hours (third step).

   For a possible service time exceeding 6000 hours procedures will be evaluated in the future.

3. In each case the latest issue of the inspection program which will be updated according to incoming inspection results, has to be ordered from the manufacturer.

4. The inspection must only be done by the manufacturer or by a licensed repair station or inspector.

5. The results of the inspections have to be recorded in an inspection test report wherein comments are required for each inspection instruction. If the inspections are done outside the manufacturer's facilities, a copy of the records must be sent to the manufacturer for his evaluation and information.

6. The annual inspection is not affected by this inspection program.

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REPAIR INSTRUCTIONS

CLUB-ASTIR II
STANDARD-ASTIR II

Manufactured by:
Burkhart Grob Flugzeugbau
8939 Mattsies
Flugplatz Mindelheim-Mattsies
West Germany
Telefon 08268/411
Telex 539 623

Published February 1980

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1. Foreword

The Gliders are constructed from Glass-Fibre reinforced Plastic (GFK). The fuselage consist of GFK laminate, and is localy reinforced by carbon fibre ribbons at wings and tailplane the laminate is froam supported. The rudder consists of GFK-Styropur-Sandwich.

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2. Authorized materials and suppliers

Resin:	BASF Glycidäther 162 100 parts	or	Rütapox L 20 100 parts
Hardener:	BASF Laromin C 260 38 parts		Rütapox VE 2896 18 parts

Ratio by weight.

Glass Fibre Cloth

Supplier: Interglas Textil GmbH. Söflinger Str. 246, 7900 Ulm

Use	Cloth	Weight g/qm	Interglas-Nr.
Fuselage	Double Twill	161	92 110
	Double Twill	390	92 140
	Chain Reinforced	433	92 146
Wings	Double Twill	161	92 110
	Double Twill	276	92 125
Elevator, Rudder and Ailerons	Double Twill	276	92 125
	Double Twill	161	92 110

All Glass-Fibre cloth is Alcholine free E-Glass with volan A-Finish or Finish I.550.

Glass Fibre Rovings

EC 10-80-2400 K 43

Supplier:

Gevetex
4000 Düsseldorf
Postfach 1205

Foam Material

PVC-Hartschaum
Conticell 60
6 and 8 mm large
Spec. Weight 60 kg/m³

Continental AG
3000 Hannover

GN 50295

Styropor:

Thermopete 4 mm large Spec. Weight 15 kg/m³	Poron-Werke GmbH 6122 Erbach Brunnenstraße 5
Depron 3 mm large Spec. Weight 15 kg/m³	Firma Kalle 6202 Wiesbaden/Bibrich

Filling Material for Resin

Microballoons brown	Lackfabrik Bäder KG 7300 Eßlingen Schließfach 25
Cotton Flock Type FL 1 f	Schwarzwälder Textil-Werke 7623 Schenkenzell Postfach 12

Paint

PE-Schwabbellack White. No. 03-69066 UP-Hardener No. 07-20510 100 Schwabbellack Paint (Gel-Coat) 3 Hardener mix ratio by Weight. Thinner No. 06-30260	Lesonal-Werke 7000 Stuttgart 30 Postfach 30 07 09

Red Paint

Nitro-Cellulose-Kombilack Orange RAL 2004	Lackfabrik Bäder KG 7300 Eßlingen Schließfach 25

Carbon Fibre Rovings:

KC 20-SDY LN 29964	Fa. Sigri, Elektrographit GmbH D-8901 Meitingen Fa. Far East Mercantile GmbH. Mintropstraße 20 D-4000 Düsseldorf 1

Carbon Fibre Cloth:

Sigratex KDU/NF 46-7,5 (6000 Filamente)	Fa. Sigri Elektrographit GmbH. D-8901 Meitingen

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3. Simplified "Texture" plan

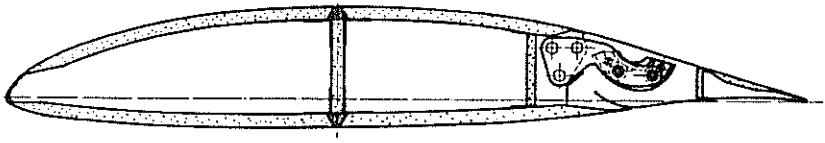
Reinforced regions for special loads and stress conducting are not shown.

1. Flügel

Außenlaminat
1 Lage 92 110 diagonal
1 Lage 92 125 diagonal
Kern
Conticell 60, 8 mm
Innenlaminat
1 Lage 92 125 diagonal
Membrane des
ELASTIC Flap
2 Lagen 92 110 diagonal
1 Lage 92 110 längs
Holmgurt
Glasseidenroving
EC 10-80-2400k43

Wing

Outer laminate
1 Layer 92 110 diagonal
1 Layer 92 125 diagonal
Core
Conticell 60, 8 mm
Inner laminate
1 Layer 92 125 diagonal
Membrane of
Elastic Flap
2 Layer 92 110 diagonal
1 Layer 92 110 lengths
Spar
Glas fibre
EC 10-80-2400k43

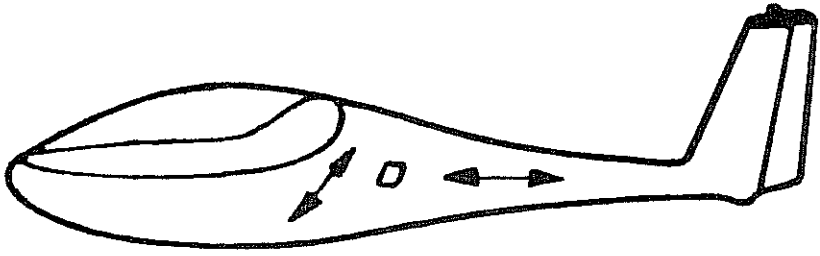


2. Rumpf

von außen nach innen
1 Lage 92 110 längs
1 Lage 92 146 längs
3 Lagen 92 140 diagonal

Fuselage

From outside to inside
1 Layer 92 110 lengths
1 Layer 92 146 lengths
3 Layers 92 140 diagonal



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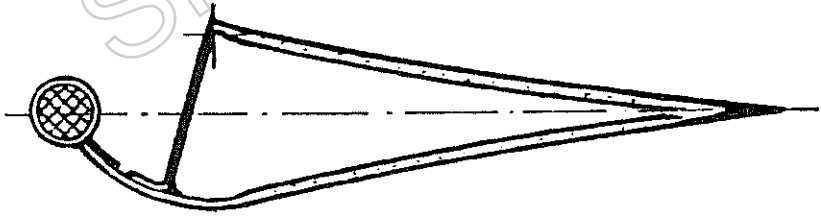
3. Ruder

Seitenruder rechts und links
2 Lagen 92 110 diagonal
Kern Depron 3 mm
1 Lage 92 110 diagonal

Controls

Rudder left and right
2 Layers 92 110 diagonal
Core Depron 3 mm
1 Layer 92 110 diagonal



Höhenruder oben
Höhenruder unten
Querruder unten
Wölbklappe unten
2 Lagen 92 125 diagonal

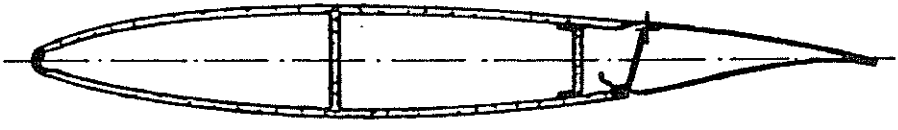
Elevator above
Elevator below
Aileron below
Flap below
2 Layers 92 125 diagonal

4. Höhenflosse

2 Lagen 92 110 diagonal
Kern: Conticell 60, 6 mm
1 Lage 92 110 diagonal

Fin

2 Layers 92 110 diagonal
Core: Conticell 60, 6 mm
1 Layer 92 110 diagonal



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4. Repair of GFK material

If the glider is damaged, first examine the outer surface very carefully, frequently other structural parts are involved, fractures can run unseen under the outer surface.

Carry-out repairs with extreme care. As the outer surface of GFK gliders is stressed (loading bearing), failure of this skin can lead to structural failure.

Keep to the Resin-Hardening mixing ratio exactly (± 0.5%) using a clean mixing pot. The ratio of Glass fibre — to Resin mix is approximately 1 to 1. Grind or splice the repair, before laying damp laminate on it, so that dirt cannot penetrate and stop safe adhesion.

As in plywood, the direction of the fibre glass cloth lay (length or diagonal) is of extreme importance to its strength. It is necessary to know approximately how many fibre and their direction in the damaged part with reference to the simplified texture plan, so it may be restored to the correct wall strength. If a small piece of the damaged laminate is broken off and burnt, the remaining glass-fibres can be counted and identified.

Splicing and grinding are time consuming, to save trouble, grind only as much away as necessary, only to the size of the cloth patch. When it is necessary to shorten the repair time it may be done with a hot air blower to speed the resin hardening time.

Warning. A too high temperature will produce large air bubbles in the cloth. A tent can be built out of foil, through which hot air can be guided, and thereby avoiding local overheating. In making repairs to control surfaces, be careful not to increase their weight as there is danger of creating flutter conditions.

5. Damage to section GFK Foam-Sandwich
(GFK Hard-Foam-Sandwich)

It can appear that only the outer surface (the outside laminate) is damaged but it can also happen that the whole skin (outside and inside hard foam laminate) is destroyed.

a) Important (Figure 1, Page 9)

With a split or fracture, the laminate can become detached from the supporting foam. Start by removing loose laminate until firm laminate is reached. To remove the foam laminate use a grinding disk, grinding block or sharp knife. With a grinding block or sharp knife only remove the cloth around the damage. Splice ratio per cloth covering approximately 20 mm. Ratio laminate thicknes to splice: approximately 1:50.

After grinding out the splice, the repair must be thoroughly cleaned. Remove the dirt (also out of the foam pores) with compressed air. Wash the splice with carbon tetrachloride or Acetone, in case it has been contaminated with dirt or grease.

Fill up the pores of the foam with Resin and Microballoons until it is smooth. Then join the laminates with the correct cloth, laying it in the right direction.

Repairs must be dirt and grease free.

At room temperature the resin will harden in about 8 hours.

The repair can now be ground smooth and be painted.

Warning: Grind only to the edge of the repair.

b) Damage to the whole of the Sandwich (Figure 2, Page 9)

When the inner laminate is destroyed, so there is no binding with the foam, widen the hole so far as foam material is secure, then it is possible to repair the inner laminate. A edge of at least 20 mm must be obtained (retaining laminates thickness : splice ratio approximately 1:50).

The inner laminate must be carefully ground and cleaned.

The outer laminate is repaired as described in section a).

With „minor" damage a piece of thin plywood support can be glued with Pattex from within on the inner skin, the cloth patch of the inner laminate can then be layed in and the hole filled with resin and Microballons mixed with Styroporballs. When hardend (app. 8 hours room temperature) the outer surface can be ground smooth and the outer cloth put on.

The plywood support should remain as part of the repair. When the hole is of large or of long size the plywood support should be held in place with thin nails which can be removed later, by pushing them out from the top surface.

Warning: The plywood support must be well jointed to avoid wrinkles in the cloth. (Figure 3)

With large holes in the sandwich, the weight of the Microballoons filler must be considered. A piece of Conticell hard foam is made before-hand, which exactly fits into the existing hole. The inside pores are closed with resin and Microballoons and laid on the inner cloth to harden, until the foam is just bendable (hot air). Then the foam with thickened resin (cotton flock-Microballoons) can be glued in the hole. Microballoons are used to close the outside pores, the repair is then ground and the outside cloth is then laid on.

6. **Damage to section of GFK Styropor-Sandwich** (Figure 3, Page 9)

Repair of Styropor damage of section.

The Styropor has a closed upper surface, the cloth is held with pure or lightly thickened resin. Splits in the upper surface pores can be filled. With large damage put a patch inside and allow to harden first before working further. This will stop the structure wrinkling.

Warning: Do not use strong heat to speed up hardening time, or Styropor will develop blisters and the repair must be done again.

7. Damage to section of GFK laminate (Figure 4, Page 9)

Repairs to GFK laminate are simple. Splice the laminate around the hole, lay the cloth in layers on (largest patch first) and after 2–3 hours, when the resin has partially hardened smooth over with resin and Microballoons. Splice length pro cloth layer app. 20 mm. Retaining laminate thickness : Splice ratio 1:50. In case the splice is dirty it can be cleaned with Carbon Tetrochloride or Acetone.

With large damage an under laying support (plywood) should be used. Wet laminate should not bridge a gap of more than 20 mm unsupported. The plywood support can be held in place with Pattex glue and nails (e. g. metal fitting in fuselage) which can be removed afterwards.

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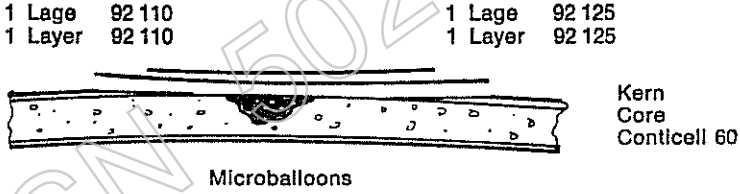

Abb. 1
Fig. 1

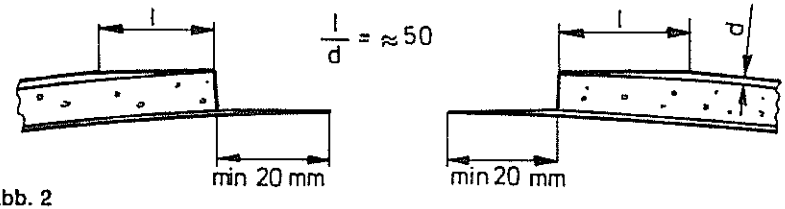

Abb. 2
Fig. 2

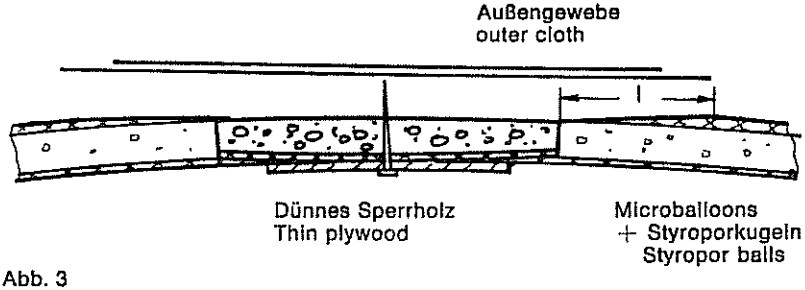

Abb. 3
Fig. 3

Rumpfschale
Fuselage skin

1 Lage 92 146
1 Layer 92 146

1 Lage 92 110
1 Layer 92 110

3 Lagen 92 140
3 Layers 92 140

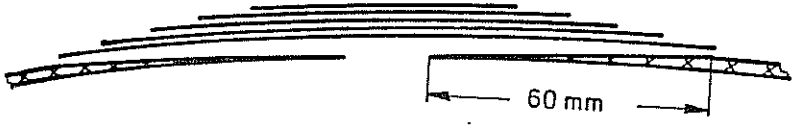

Abb. 4
Fig. 4

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8. Damage to parts with Carbon Fibre reinforcement

The canopy surround consists of Carbon fibre rovings. The fuselage and tailplane are reinforced with Carbon fibre tape. Repairs are carried out as described in sections 6 and 7. Here too the depth to length ratio of the scarf must be 1 : 50.

9. Damage to the Membrane of the Elastic Flap

The membrane should be cut out between the wing and the control surface in the damaged area (80 mm wide grey strip). A fresh strip of membrane (about 120 mm wide) should be layed up on a flat sheet (1 layer 92 110 diagonal, 1 layer 92 110 lengthwise, 1 layer 92 110 diagonal). When the new strip is cured it should be scarfed in with the smooth side outwards between the wing and the control surface (scarf width about 20 mm.) and bonded on, fully tensioned using resin. A fine fissure may remain in the chordwise direction to the adjoining undamaged membrane. If necessary this can be stuck down with smooth tape.

10. Damage to Spar Caps

The spar caps are made of Glas rovings. In the outer wing (starting at 6 mm spread area) they are made of Glas fibre tapes. Whenever a spar cap is broken it necessitates a major repair (See under section 13).

11. Paint-work

As soon as the laminate of the repaired section is hard, it can be rough ground with (80 grit) sandpaper. Large uneveness must be filled and smoothed with white polyester filler. Then with fine dry-grinding paper (150 grit) until a moderately smooth outer surface is produced. Before painting, the repaired section must be perfectly cleaned from grinding dust, separated mediums and other foreign bodies.

For successful painting, with Gel-Coat (Schwabbellack + hardener) a not too large brush should be used, putting on several thin coats, until the laminate can no longer be seen.

The first coat should be allowed to harden and then ground with (360 grit wet paper) additional coats should then be added and likewise ground.

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The final finish should be carried out with 600 grit or 800 grit Wet and Dry grinding paper and then polished with a silicon-free car polish or with hard-wax, using a polishing machine.

12. Repair of Metal Fittings

a) Damage to Steel Fittings

Repair of damage to fittings made of steel should only be accomplished after approved procedures are obtained from the manufacturer.

Welded steel fitting (push rods) out of 1.7734.4 or 1.0308.1 (St. 35.4). Welding only to be carried out with WIG Welding method (Wolfram-Inert-Gasschmelzschweißung) and with welding material 1.7734.2 (for 1.7734.4) and 1.7324.0 (for 1.0308.0 or combination of 1.7734.4 and 1.0308.1)

b) Damage to Aluminium Castings

Repair of Aluminium castings 3.2374.6 (GALSi7 Mgwa) cannot be carried out. Fractured or bent Aluminium castings must be replaced by new ones.

Warning: Bent or chipped Aluminium castings are not under any circumstances to be straightened.

c) Main Wing and Fuselage fittings

The main fitting between wing and fuselage (4x in the fuselage) 6 steel balls (ø 6 mm) are contained in each fitting. The balls are forced by a sliding cover through the lock shell into a groove in the moveable lateral axis force bolts in the spar caps thus securing the wings.

Faults of one or more balls, the connecting fitting should be changed.

d) Control rods

The Control Rods are made from:

Tube 20 x 1	Type 3.3214. 5 or AlMgSi 0,5 F20
Round stock 9 mm O. D.	Type 3.1354. 5 or AlCuMg1F35
Round stock 9 mm 0. D.	Type 1.1654. 7 (115 CrV3)
Square tube 20 x 20 x 2	Type AlMgSi 0,5 F 22

Aluminium control rods that have been buckled kinked or badly bent must not be straightened. Threads on control rods are rolled from 9 mm round stock. Cut threads are not permitted.

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13. Major repairs

Major repairs are only to be carried out by the manufacturer or by an agent (who has the authorization of the manufacturer.).
Major repairs are:

— **Broken** off wing, fuselage, tailplane, control surface, spar stumps (spar caps)
— **Ripped or torn-out** - Main fittings (in fuselage ø 45 x 3, Fitting of the tailplane in fin. In the wing, aileron securing both ø 18 mm, joining bearing GE 20. Spar cap bolts ø 20 mm).
— Destruction of main rib (vertical frame)
— Damage to the GFK laminate (tear, splits, cracks immediately near the main fittings).

14. Construction details of extra equipment attachment fittings

The fittings for the oxygen bottles are built in as standard on the right side of the luggage compartment. Bearing stands and quick action lock can be obtained from the manufacturer.

Other fitting points can be installed by the owner. (Figure 5)

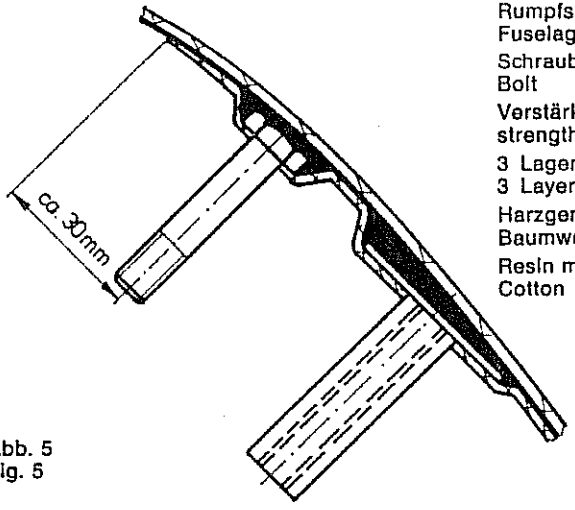

Abb. 5
Fig. 5

The fitting must be made as shown in the drawing so as to take the weight of the additional equipment. Fittings made in this manner must stand a load 10 g without failure.

When additional equipment is fitted the glider must be re-weighed to check if the C of G is within the permitted limits.

Blueprints for the installation of radio and oxygen equipment are obtainable from the manufacturer.