

ORIGINAL



GROB-FLUGZEUGBAU  
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# FLIGHT HANDBOOK

## TWIN-ASTIR

This handbook must be carried on board at all times.

It refers to the TWIN ASTIR Sailplane

Registration:

Factory Serial Number:

Owner:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Operating instructions are approved under 12 (I) 2. by LuftGerPO.

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Current number	Page	Reference	Date	Signature

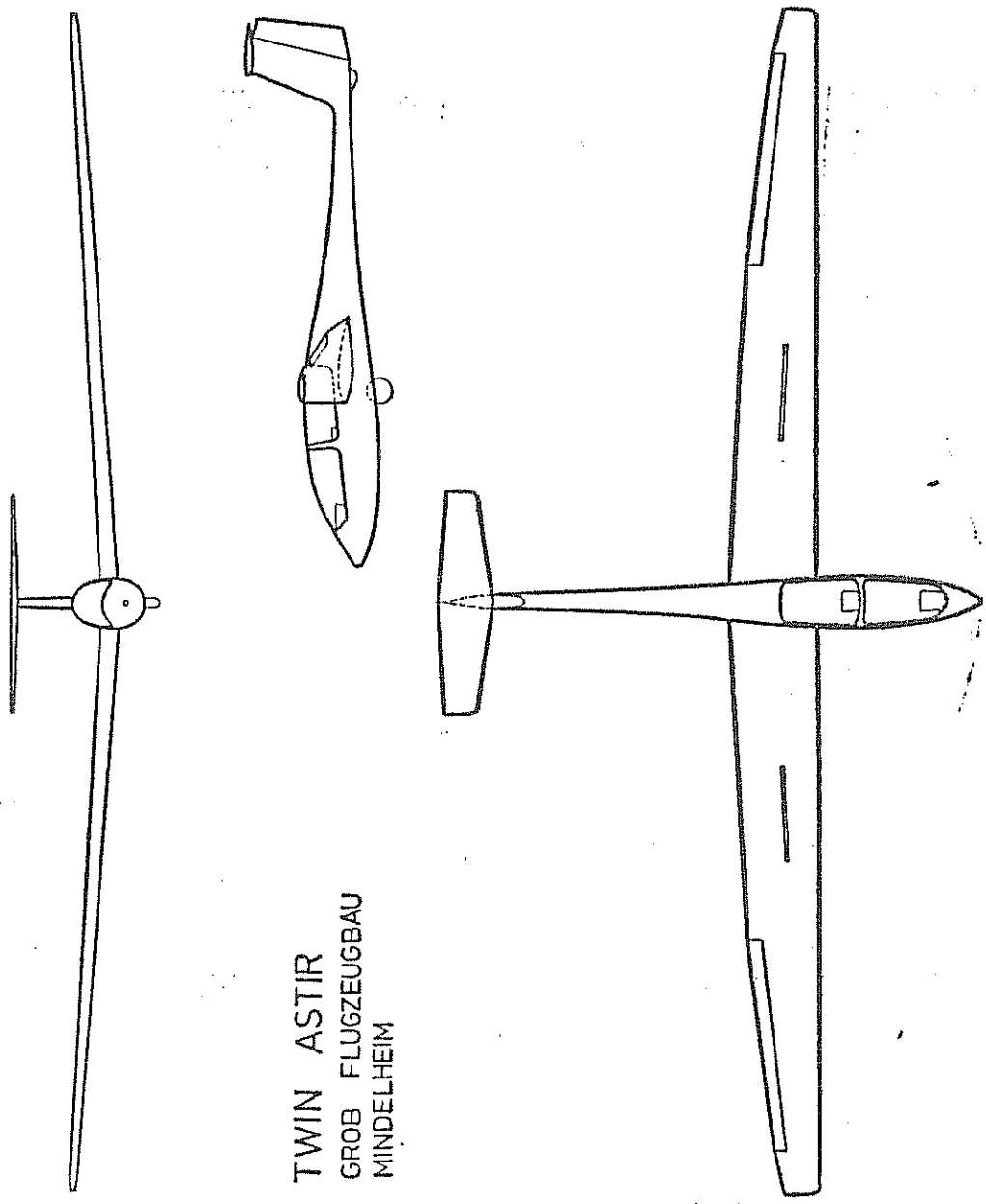
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TWIN ASTIR  
GROB FLUGZEUGBAU  
MINDELHEIM

## I. 5 Description

The TWIN ASTIR is a high performance two seater sailplane with a T tail, fitted with a retractable undercarriage, upper surface airbrakes and water ballast tanks in the wings.

This sailplane is manufactured using the latest techniques in industrial Class fibre construction.

It is designed for training, high performance and simple aerobatic flying.

### TECHNICAL DATA:

Span	17.5 m	(57.4 ft.)
Length	8.1 m	(26.6 ft.)
Height	1.6 m	(5.25 ft.)
Aspect Ratio	17.1	

Wing Area	17.8 m <sup>2</sup>	(191.6 sq. ft.)
Maximum Flying Weight	650 kg	(1433 lbs.)
Maximum Wing Loading	36.5 kg/m <sup>2</sup>	(7.48 lbs.)

## II. Operating Limits

### II. 1 Airworthiness Group

(U, Utility, LFSM)

The LFSM (Lufttüchtigkeitsforderung für Segelflugzeuge und Motorsegler) published 23. 10. 1975 are the basic rules and requirements for the licensing of a new type of glider or motor glider in Germany.

N.B. This handbook applies to Gliders registered in Germany and additional conditions and restrictions may apply in other countries. The certificate of Airworthiness issued in country of use should also be consulted.

### II. 2 Permitted operating conditions

The plane is licensed for:

1. Flight in VMC
2. Simple Aerobatics (Loops, Stall turns, Lazy eight, Chandelle and Spin).
3. Cloud flying (When fitted with suitable instrumentation as defined in section II.3).

### II. 3 Minimum equipment

1. 2 Air speed Indicators reading to 300 km/hr. (162 knots, 187 mi./hr.)
2. 2 Altimeters.
3. Full Harness Straps in front and back cockpit.
4. Parachute or back cushion at least 7 cm (2.76 in.) thick.
5. Loading limit plaque in front and back cockpit.
6. Flight Limits plaque.
7. Flight Handbook.

## Cloud Flying

For cloud flying the additional instruments listed below must be installed.

1. Variometer.
2. Electric turn and slip indicator.
3. Magnetic Compass (Compensated inside the glider).
4. Radio (Ready for use).

## II. 4 Maximum Speeds

Maximum permitted speed in calm air	$V_{NE}$	250 km/h, 135 knots, 155 mi./hr.
Maximum permitted speed in rough air	$V_B$	200 km/h, 108 knots, 124 mi./hr.
Maximum Manoeuvring speed	$V_M$	170 km/h, 92 knots, 105 mi./hr.
Maximum winch launch speed	$V_W$	120 km/h, 64 knots, 74 mi./hr.
Maximum Aerotow speed	$V_T$	170 km/h, 92 knots, 105 mi./hr.

Conditions in rough air are similar to those encountered in rotors, clouds, whirlwinds and when overflying mountain ranges.

Manoeuvring speed is the maximum speed at which full control deflections should be used. At maximum speed ( $V_{NE}$ ) the control deflections should be restricted to 1/3 of the full range.

## Air speed indicator markings

Green arc, 82-170 km/h = 44-92 knots = 51-105 mi./hr.

Yellow arc, 170-250 km/h = 92-135 knots = 105-155 mi./hr.

Red line, 250 km/h = 135 knots = 155 mi./hr.

Yellow triangle (recommended minimum approach speed) 102 km/h = 55 knots = 63 mi./hr.

## Position Errors

The airspeed indicator must be connected to the following sources: Pitot head in the tail fin, static vents side of the fuselage between the two seats.

Using a calibrated ASI the position error is not greater than  $\pm 2$  km/h or 1 knot or 1.15 mi./hr.

A calibration curve is therefore not necessary.

## II. 5 Flight envelope.

The following loadings must never be exceeded.

At manoeuvring speed + 5.3 - 2.65

At  $V_{NE}$  + 4.0 - 1.5

(Brakes closed and calm air)

## II. 6 Weight limits

Empty Weight. . . . .	about 400 kg	882 lbs.
Maximum permitted weight without water ballast . . . . .	650 kg	1430 lbs.
Including water ballast. . . . .	650 kg	1430 lbs.
Maximum permitted weight of non lifting parts . . . . .	470 kg	1036 lbs.

## II. 7 Center of gravity position

The approved range of center of gravity positions during flight is 260 mm (10.24 inches) to 460 mm (18.11 inches) behind the reference point, equivalent to 24.7% to 43.6% of the effective chord of the wing.

The reference point is the front edge of the wing at the wing root.

The approved center of gravity range does not get exceeded by the payload distribution specified in the loading plan II.8.

The exact position of the center of gravity at flying weight can be calculated according to VI 5.

## II. 8 Load scheme TWIN ASTIR

Minimum load in the front seat . . . . .	70 kg	154 lbs.
Maximum load in the front seat . . . . .	110 kg	242 lbs.
Maximum load in the back seat . . . . .	110 kg	242 lbs.
Maximum load in both seats . . . . .	220 kg	485 lbs.
Maximum load in the baggage compartment . . . . .	10 kg	22 lbs.

Fixed ballast should be used on the front seat to compensate if the front seat load is too low.

The maximum flying weight of 650 kg (1430 lbs.) must not be exceeded.

Waterballast may only be taken on until the maximum flying weight is reached.

Water ballast cannot be used to compensate if the load in the front seat is too low.





## II. 9 Tow hooks

For Aerotow: Nose hook "E 75".

For Winch launch: Safety back release hook "G 73".

## II. 10 Weak link strength

Winch launch and aerotow                      600 ± 30 kg              1323 ± 66 lbs.  
(ie. Tost weak link colour code black-red)

## II. 11 Tire Pressure

Tire size 5.50-5 . . . . . 2.5-2.8 atm.              35,6-39,8 PSI

## II. 12 Crosswinds

The maximum crosswind component for approved take off and landing, as required by the regulations for glider construction is 20 km/h or 11 kts. (12 mi./hr.).

## III. Emergency procedures

## III. 1 Exit from a spin

Exit from a spin can be accomplished by

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

## III. 2 Emergency canopy jetisoning and exit

The spacious cockpit allows unhindered exit in an emergency. It is advisable to keep to the following order:

- a) Pull red handles on left and right back together and push canopy upwards and away with the left hand.
- b) Remove safety belts.
- c) Stand up and get out over left or right side depending on the attitude.
- d) When using a manual parachute grip release handle and pull firmly to full extent after 1-3 seconds.

III. 3 Landing with retracted undercarriage

It is possible on hard and soft ground without risk of overturning. Approach as normal and touch down on two points, avoiding holding of until nose is high.

III. 4 Others

Flying in rain

Wet or lightly iced wings have little noticeable effect on flying. Thick ice deposits on the wing increase the stalling speed by about 10 km/h, 6 kts. (6.5 mi./hr.).

Stall

Stall out of straight flight or a turn: Neutralise stick and opposite rudder to any turn.

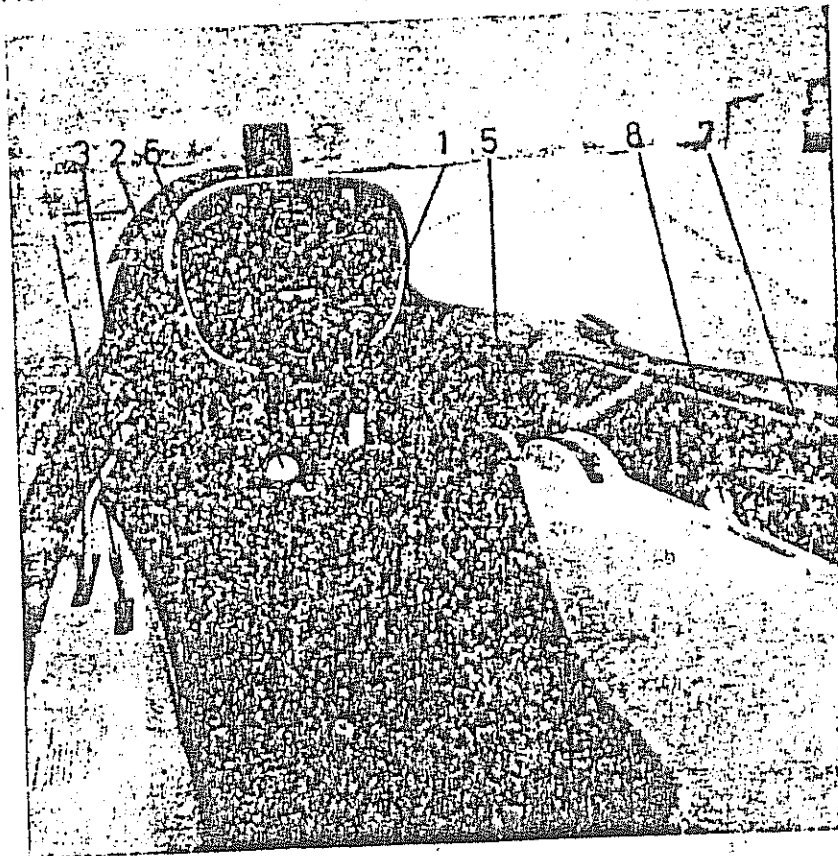
Ground Loops

The glider has no tendency to ground loop whilst taking off. However if a wing touches or the direction changes by more than 15 degrees during a take off release immediately.

IV. Normal operation

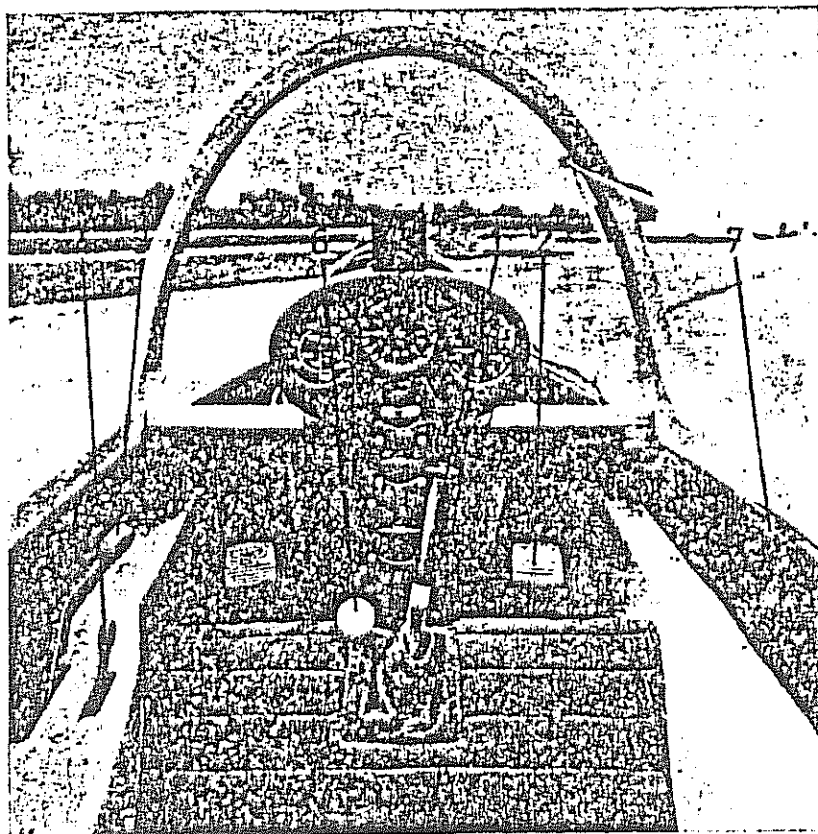
VI. 1 Cockpit and controls

Front Seat.



- |                                 |                         |
|---------------------------------|-------------------------|
| 1 Stick                         | 5 Undercarriage lever   |
| 2 Rudder pedals                 | 6 Release knob          |
| 3 Airbrake lever and wheelbrake | 7 Canopy jetison        |
| 4 Trim lever                    | 8 Water ballast jetison |

Ventilator top of instrument panel left side.  
 Rudder pedal adjustment top of instrument panel right side.

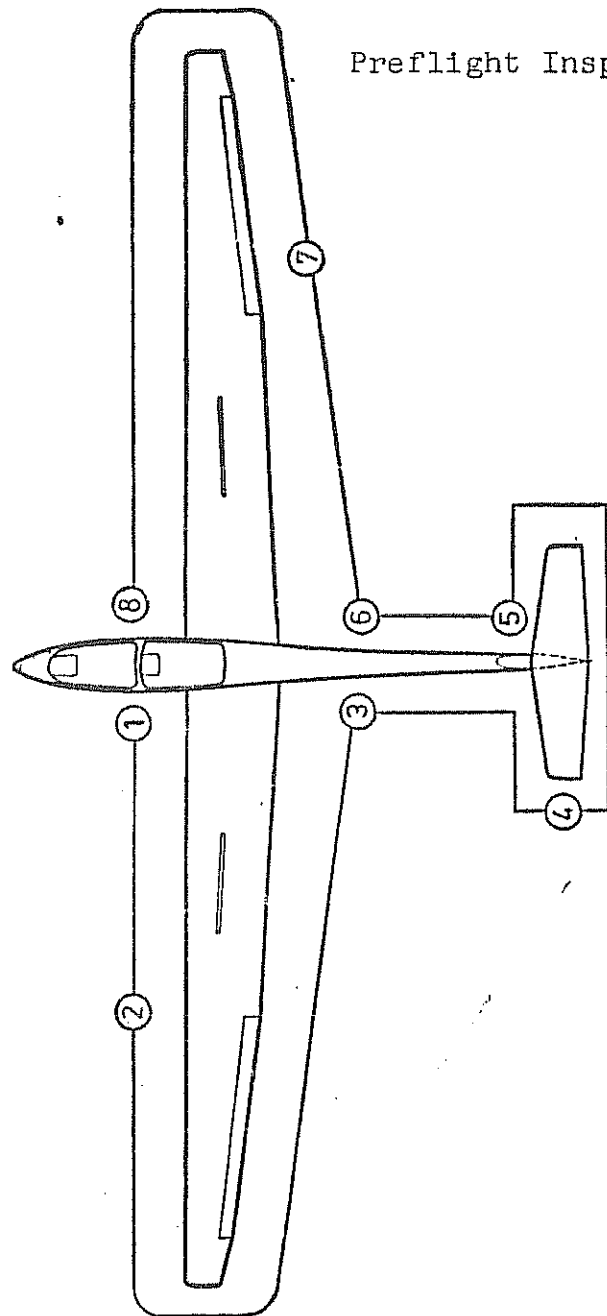
**IV. 1 Cockpit and controls****Back seat.**

- |                                 |                  |
|---------------------------------|------------------|
| 1 Stick                         | 4 Trim lever     |
| 2 Rudder pedals                 | 6 Release knob   |
| 3 Airbrake lever and wheelbrake | 7 Canopy jetison |

## IV. 2 Daily Checks

1.
  - a) Open canopy.
  - b) Check the 4 wing fastenings inside the fuselage if locked.
  - c) Visually check all controls inside the cockpit.
  - d) Check for foreign bodies.
  - e) Test controls for full and free movement.
  - f) Check tire pressure 2.5-2.8 atm. = 35.6-39.8 PSI.
  - g) Check condition of both hooks.
  - h) Check functioning of releases and wheelbrake.
2.
  - a) Check top and bottom of wing for damage.
  - b) Check ailerons for condition, freedom of movement and play.
  - c) Check airbrakes for condition, locking and fit.
3. Check fuselage for damage especially on the underside.
4. Check tail unit for correct assembly and that safety lock is in position.
5. Check condition of the tailskid.
6. Check the pitot tube, total energy venturi and static vents are clean.
7. See (2).
8. Check static vents.

After heavy landings or excessive flight loads the entire glider should be checked. The wings and tailplane should be removed for these checks and if any damage is found an inspector should be consulted. The plane should not be flown before any damage is repaired.



Preflight Inspection (IV.2)

## IV. 3 Control checks before take off

1. Check all the controls for full and free movement.
2. Check undercarriage lever is fully forward and locked down.
3. Check that the ballast limitations are being adhered to.
4. Check safety straps and parachute are firmly fastened.
5. Check altimeter is adjusted to zero or airfield height.
6. Check that transmitter is switched on and set to airfield frequency.
7. Check trim is neutral.
8. Check canopy is closed and locked.
9. Check airbrakes are closed and locked.

## IV. 4 Take off

## Winch launch

Trim lever should be in central position.

Maximum winch launch speed is 120 km/h, 65 kts., 74 mi./hr.

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

Winch launches cause no difficulties at all allowed center 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 meters (330 ft.) in the case of fast launches from a powerful winch. When the cable slackens pull the release firmly to its limit.

## Aerotow

Trim lever should be central.

Maximum aerotow speed is 170 km/h, 92 kts., 105 mi./hr.

Aerotow should preferably use the nose hook.

The recommended length of two rope is 30-60 m (100-200 ft.).

The glider can be controlled with coordinated rudder and aileron using full movements if required.

There is no tendency to swing in a strong crosswind.

The glider can be lifted off at about 70 km/h, 38 kts., 43.5 mi./hr.

The glider lifts off without assistance at a speed of about 70-80 km/h, 43 kts., 48 mi./hr. if the stick is kept in the neutral position.

The undercarriage can be retracted during aerotow at a reasonable height but should not be retracted on a winch launch.

The yellow release handle is mounted on the instrument panel and must be pulled to its limit when releasing.



## IV. 5 Free flight

It is possible to fly the glider over the entire speed range in all attitudes.

Full control movements are only allowed up to the manoeuvring speed 92 kts., 170 km/h, 105 mi./hr. At higher speeds the controls should be used with the appropriate care.

## IV. 6 Slow flying and stalling

The glider gives clear warning when about to stall by a distinct shaking of the elevator.

The stalling speed depends on the wing loading and the condition of the plane. The following are guidelines:

Single seater:

Weight	Without Airbrakes	With Airbrakes
470 kg, 1034 lbs.	66 km/h, 36 kts., 41 mi./hr.	75 km/h, 40,5 kts. 46.6 mi./hr.

Double seater:

Weight	Without Airbrakes	With Airbrakes
650 kg, 1430 lbs.	80 km/h, 43 kts. 49.7 mi./hr.	90 km/h, 49 kts. 56 mi./hr.

If the stick is pulled back further the glider goes into a controllable high rate of sink, during which rudder and aileron turns can be flown at up to 15 degrees of bank. When the stick is released the glider returns to a normal flying attitude immediately.

If the stick is pulled back quickly the glider pitches nose down and the bank can still be controlled with aileron.

## IV. 7 High speed flight

There is no tendency for flutter to develop within the permitted speed range. Above 170 km/h, 92 kts., 105 mi./hr. control movements should be restricted to 1/3 of full range. The airbrakes limit the speed to under VNE in a 45° dive even at maximum flying weight.

## IV. 8 Cloud flying

The minimum instrumentation required for flying in cloud is:

Air speed indicator	Compass
Altimeter	Turn and Slip
Variometer	Radio

Experience to date shows that the ASI does not get affected by icing.

If the manouvering speed is exceeded pull out the airbrakes to avoid overstressing.

In emergency open brakes and leave cloud at about 170 km/h, 92 kts., 105 mi./hr.

Note: Flying in cloud should only be practised by pilots who hold the appropriate license to do so. The regulations and requirements concerning airspace and instrumentation should be carried.

#### IV. 9 Simple Aerobatics

The glider is licensed for the following aerobatics:

##### 1. Loop

Entry speed	180 km/h, 97 kts., 111 mi./hr.
Maximum g	ca. 3 g
exit speed	ca. 180 km/h, 97 kts., 111 mi./hr.

##### 2. Stall turn

Entry speed 180 km/h, 97 kts., 111 mi./hr.  
At 140 km/h, 76 kts., 86.9 mi./hr., slowly apply rudder.  
Shortly before the top apply opposite aileron.

Note: The stall turn is difficult to carry out because of the high moment of inertia. If a tailslide is accidentally initiated during the climb lock all controls in the center position.

##### 3. Spin

Preparation. Decrease speed slowly to 80 km/h, 43 kts., 49.7 mi./hr., pull stick back and give full rudder. Glider spins slowly. Rotation rate is one turn every 3 seconds with a height loss of 80 m (263 ft.) per turn.

Exit: Full opposite rudder to direction of turn, neutralise stick then pull out slowly after rotation has stopped.

#### 4. Chandelle

Entry speed                                170 km/h, 92 knots, 105 mi./hr.

Pull up to fly 90° turn. During turn decrease speed and exit from turn with rudder and aileron. Chandelle should be completed heading in opposite direction.

#### IV. 10 Approach and landing

Normal flying practice to is approach at 100 km/h, 54 knots, 62 mi./hr. The airbrakes are sufficiently powerful for steep approaches. The use of brakes causes the glider to be slightly nose heavy, so that the glider holds the required speed by itself.

Avoid changing the airbrake setting during the roundout to avoid heavy landing.

#### IV. 11 Flight with waterballast

The water tanks are in the front of the wings and can hold about 1, 13.2 gal., per wing. The tanks are filled through the openings on the top of the wings. The cap can be removed with a pin. There is no noticable water movement when the tanks are partially filled because of baffles installed within the tanks. There must always be equal amounts of water in each tank to avoid affecting the stability in roll.

The white lever on the right hand side of the cockpit should be pulled back to empty the tanks. The outlet is underneath the fuselage behind the wheel. It takes about 3 minutes to empty the tanks. It is strongly recommended that the tanks are emptied before landing.

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## V. Rigging and derigging

### V.1 Rigging

The fuselage must be held firmly in a horizontal position when rigging. It is recommended that a fuselage stand or the trailer fittings are used.

The glider can be rigged by 4 people.

#### 1. Wings

Unlock 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 fittings should now 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 or down so that the pin on the end of the spar stud 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 fuselage fittings and by gently moving the wing to and fro they too can be made to snap into place. To lock the fuselage fittings turn so that the pins are engaged in the slots. They should be hand tight only and do not reach the end of the angled slots when locked.

Check - The red rings on the fuselage sides must be covered by the rotated sockets.

#### 2. The aileron and brake connections lie behind the spar.

The short connecting rods in the fuselage are fitted with quick lock fasteners which must be coupled onto the balls on the linkages that move inside the wings.

After rigging the connections should be examined to check that the sprung catches are properly inserted so that they project some mm. out of the locks.

Also after coupling the quick-lock fasteners, check that the ball cannot be extracted by twisting the lock back and forth. Do this gently with not more than 10 lbs. pull. Check all the control connecting rods and locks in a methodical order.

### 3. Tailplane

Before assembly is commenced the front cover must be opened and the rotating wing bolt pulled out to the limit. The tailplane can 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 snap lock fastener on the elevator push rod can be attached to the ball on the elevator horn. The front of the tailplane can then be lowered and pushed back onto 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 that there is 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 1/4 turn to suit. Derigging is carried out in the opposite order and the wing bolt is turned anticlockwise and pulled fully out.

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 wheelbrake and the air pressure of the tire.
5. Check that the tailplane is securely seated and that the elevator push-rod is connected.
6. Rudder movement.

### Derigging

Derigging is carried out in the opposite 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 Storage

When the glider is stored the canopy should be locked. To tie down the wing, a rope can be pulled through the wing tip skids.

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For ground handling the rotating tail wheel should be used.

### V3. 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, 15.7 inches, 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., 7.85 inches, 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., 11.8 inches, and height of 400 mm., 15.7 inches. 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 - D2. Fa. W. Sauer and Co., 5060 Bensberg or Reinigungs polish Fa. Lesonal).

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 very 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 drainage 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 manufacturer's 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 tire pressure should be kept at 2.5 to 2.8 atmospheres (36 - 40 psi).

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. Screw the M6 threaded special tool onto 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 re-assembly 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.

If repairs are carried out on the glider which are more extensive than normal maintenance work, the manufacturers or their service agents should be contacted.

It is absolutely essential to ensure that if the glider is re-painted all surfaces which are directly exposed to the sun's rays should be painted WHITE.

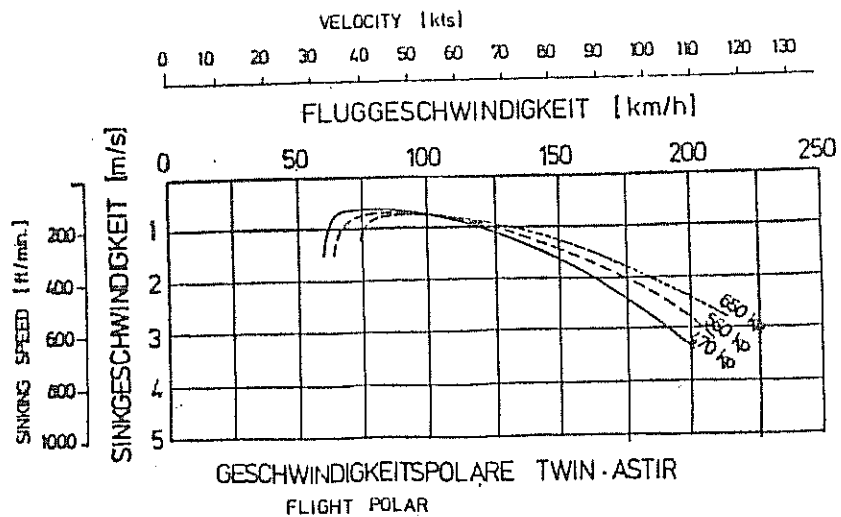
When any repairs are done or a fresh coat of paint added the position of the empty weight C. of G. must be re-checked.



VI Appendices

VI.1 Flight Performance

Flying weight	470 kg (1036 lbs)	560 kg (1234 lbs)	650 kg (1430 lbs)
Wing loading	5.4 lbs/ sq. ft.	644 lbs/ sq. ft.	7.48 lbs/ sq. ft.
Best glide angle	37.0	37.5	38.0
at a speed of	95 km/hr (59 mi/hr)	105 km/hr (65 mi/hr)	110 km/hr (68 mi/hr)
Minimum sink	.62 m/sec. (2.03 ft/sec.)	.68 m/sec. (2.23 ft/sec.)	.73 m/sec. (2.30 ft/sec.)
at a speed of	75 km/hr (46.6 mi/hr)	80 km/hr (49.7 mi/hr)	90 km/hr (55.0 mi/hr)



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## VI.2 Service and Maintenance instructions.

### Regular service.

The following schedule of service should be carried out at regular intervals and at the very least during the annual inspection.

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 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.
6. The controls including the brakes should be submitted to a functional test and the control deflections checked.
7. If any stiffness is felt, 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 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.

### 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 authorized aircraft works. Grob will name a company with the appropriate qualifications in any individual case.

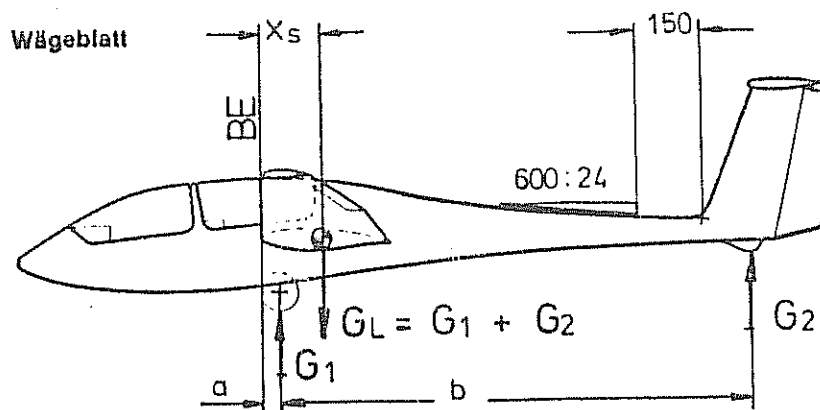
### VI.4 Installation, maintenance and examination of the release hooks

One is bound by the Maintenance Manuals for the nose hooks. 'E72' and 'E75' published in May 1975 and the Maintenance Manual for the belly hooks 'Europa G72' 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 24 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  $G_2$ .



Datum Line : Front edge of the wing at the root.  
 Level Means : With a 600:24 Incidence Board set up horizontal on the top of the rear fuselage.

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

Empty Weight C. of G.

$$X = \frac{G_2 \times b}{G_1} + a = \text{_____} + \text{mm behind Datum Line}$$

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 waterballast.

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

<u>Empty Weight</u>		<u>Range of C. of G. behind Datum</u>	
<u>Kg</u>	<u>Lbs</u>	<u>Forward</u>	<u>Aft</u>
390	860	725	747
395	871	719	744
400	882	713	740
405	893	708	737
410	904	702	733
415	915	697	730
420	926	692	727
425	937	687	724
430	948	682	720

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 should not exceed 470 kgs (1036 lbs) or the maximum load permitted in the fuselage must be correspondingly decreased.

The Center of Gravity should be recalculated 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 9 of the Flight Handbook.