



# GROB

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## FLIGHT HANDBOOK

# GROB G 103 »TWIN II«

This handbook must be carried on board at all times.

It refers to the GROB G 103 Sailplane

Registration:

*VH-IUR*

Factory Serial Number: 3735

Edmund Schneider PTY! LTD.

Owner: Herrn Harry Schneider

Two Wells Road, Aerodrome

Gawler, S. A. 5118

Australien

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

Published December 1980

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

## I.1 • Updates:

Current number	Page	Reference	Date	Signature
1	21	Control of tailplane (TM 315-11 only until serial no. 3550)	1. Oct. 80	
2	5a	Reference to flight manual for acro- batics (only for GROB G 103 A)	1. Dec. 80	
3	1, 8, 10, 12, 13, 20, 20a	Modification of se- rial no. 3730	1. Apr. 82	

1. April 1982

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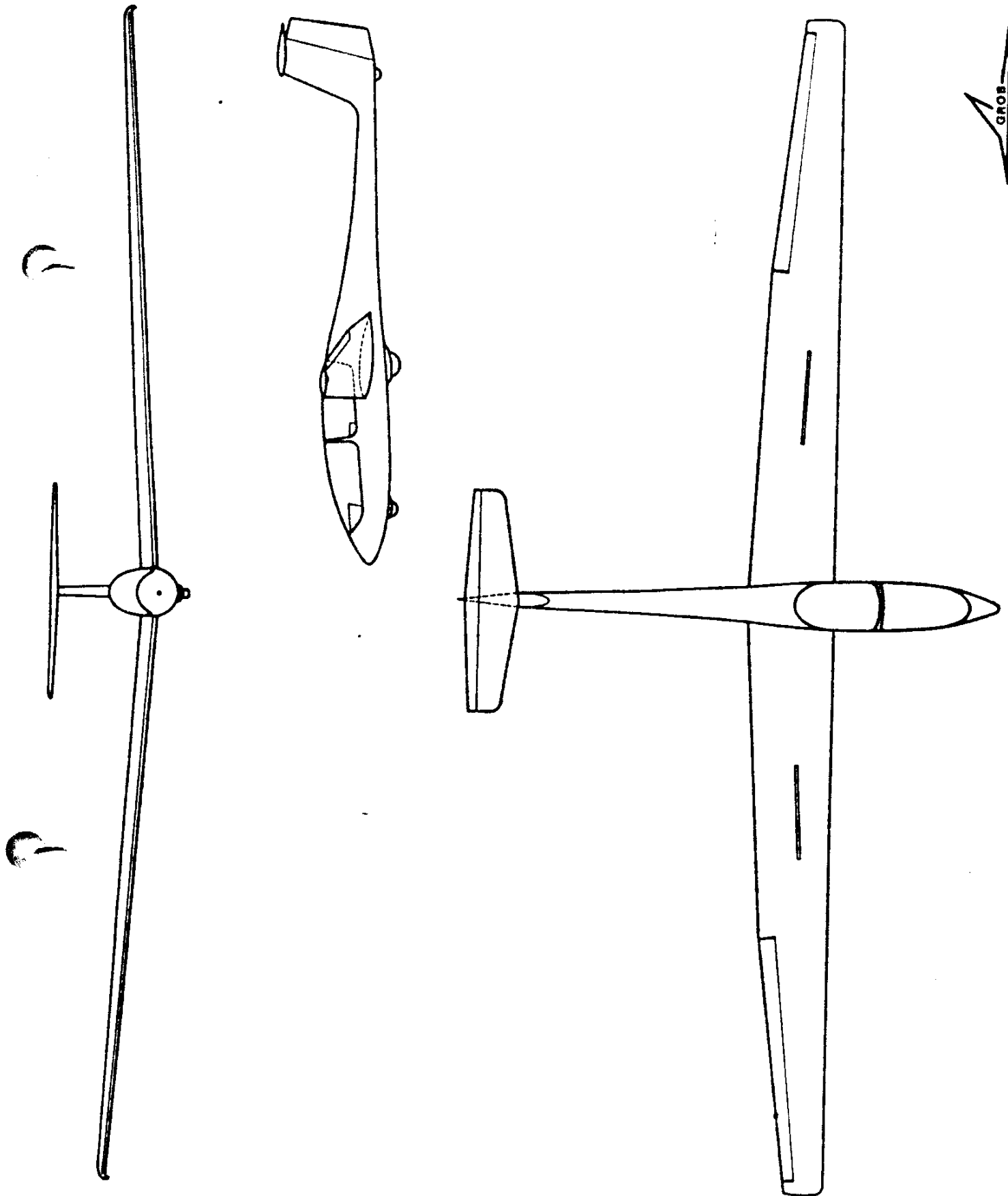
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## I. 5 Description

The "TWIN II" is a high performance two seater sailplane with a T-tail, fitted with a nonretractable tandem undercarriage and upper surface airbrakes.

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

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

### Technical Data:

Span	17.5 m (57.4 ft.)	Wing Area	17.8 m <sup>2</sup> (191.6 ft. <sup>2</sup> )
Length	8,18m (26,8ft)	Maximum Flying Weight	580 kg (1279 lbs)
Height	1,55m (5,1ft)	Maximum Wing Loading	32,6 kg/m <sup>2</sup> (6,68 lbs/ft. <sup>2</sup> )
Aspect Ratio	17.1		

## 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.

### 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 kts, 187 mph)
2. 2 Altimeters.
3. Full Harness Straps in front and back cockpit.
4. Parachute or back cushion at least 7 cm (3 inch) thick for each occupant.
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. VHF-radio (operational).

**II. 4 Maximum Speeds**

Maximum permitted speed in calm air . . . . .	$V_{NE} = 250 \text{ km/h (135 kts, 155 mph)}$
Maximum permitted speed in rough air . . . . .	$V_B = 170 \text{ km/h (92 kts, 105 mph)}$
Maximum Manoeuvring speed	$V_M = 170 \text{ km/h (92 kts, 105 mph)}$
Maximum winch launch speed	$V_W = 120 \text{ km/h (65 kts, 74 mph)}$
Maximum Aerotow speed . . . . .	$V_T = 170 \text{ km/h (92 kts, 105 mph)}$

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

**Air speed indicator markings**

77-170 km/h=42-95 kts=48-105 mph	— Green arc
170-250 km/h=92-135 kts=105-155 mph	— Yellow arc
at 250 km/h =135 kts =155 mph	— Red line
at 95 km/h = 51 kts = 59 mph	— Yellow triangle
(recommended minimum appr. speed)	

**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  $\pm 2 \text{ km/h}$  or 1 kt or 1.2 mph. A calibration curve is therefore not necessary.

**II. 5 Flight envelope.**

The sailplane design limit load factors are as follows:

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 380 kg (837,7 lbs)  
 Maximum flying weight . . . 580 kg (1278,67 lbs)  
 Maximum permitted weight of non lifting parts 400 kg (881,84 lbs)

**II. 7 Centre of gravity position**

The approved range of centre of gravity positions during flight is 260 mm (10.24 inches) to 460 mm (18.11 inches) behind the datum line, equivalent to 24.7% to 43.6% of the M.A.C. of the wing.  
 A/c attitude: incidence board of 600:24 angle.  
 The datum line is the front edge of the wing at the wing root.

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

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

*SET FOR 50KG PILOT -*

**II. 8 Load scheme „TWIN II“**

Minimum load in the front seat for all flight . . . . .	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)

The maximum flying weight of 580 kg (1278,67 lbs) must not be exceeded.

Trim weights must be used at the suspensions in front of stick bulkhead to compensate if the front seat load is lower than 70 kg ( 154 lbs ). See page 14.

Date of weighing: carried out by.	Equipment list used for weighing (date)	Empty (Weight) kg/lbs	Position of cg empty behind refe- rence mm/inches	Maximum total payload kg/lbs

**II. 9 Tow hooks**

For Aerotow: Nose hook "E 75" with modification 1-79.

For Winch launch: Safety back release hook "G 72" or "G 73".

The E 75 and the G 73 Tost hooks are limited to 36 months after installation or 2000 launches which ever occurs first, at which time they are to be recertified by the manufacturer.

**II. 10 Weak link strength recommended**

Winch launch and aerotow **max 754 daN , max 1662 lbs**

**II. 11 Tire Pressure**

mainwheel	6.00-6	2,5-2,8	bar
nosewheel	260x85	2,5	bar
tailwheel	210x65	2,5	bar

**II. 12 Crosswinds**

The maximum crosswind component approved for take off and landing, is 20 km/h (11 kts, 12 mph).

**III. Emergency procedures****III. 1 Spin recovery**

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

- Full opposite rudder
- Neutralize stick
- Ailerons should be neutral
- When rotation stops neutralize rudder and pull out gently.

### III. 2 Canopy Jettison and Emergency Exit

- Pull red handles on right and left of canopy full back simultaneously.
- Push canopy up and away with the left hand
- Release safety harness
- Stand up and get out over left or right side depending on the attitude.
- When using a manual parachute grip release and pull firmly to full extend after 1-3 seconds

### III. 3 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 stall speed by about 6 knots:

Increase approach speed by 6 knots.

The characteristics during lift off and touch down remain the same.

#### Wing dropping

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

#### Ground looping

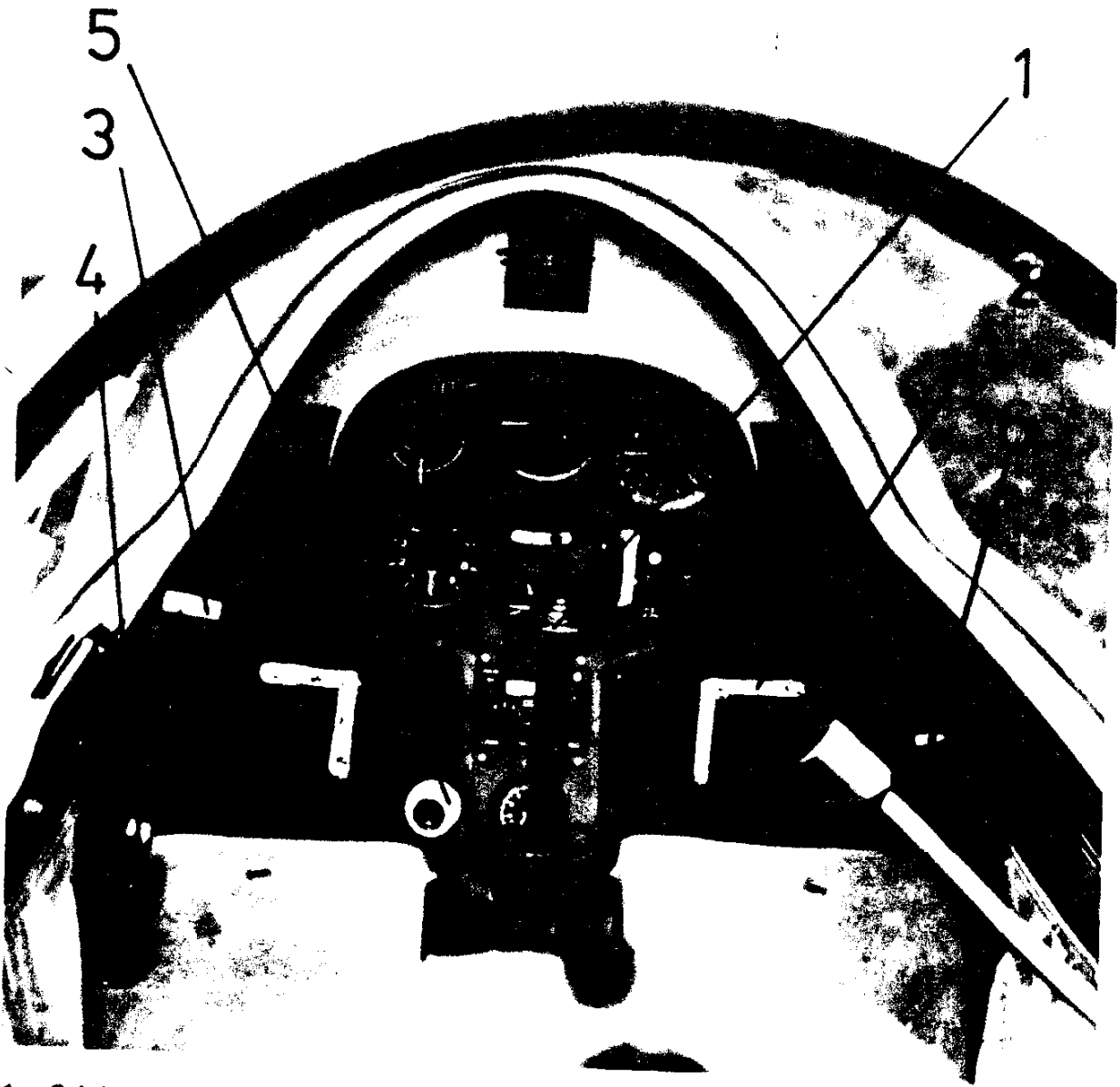
The aircraft is not prone to ground loop on take off.

If one wing touches the ground or the aircraft changes direction by more than 15 degrees, release cable immediately.

IV. Normal operation

VI. 1 Cockpit and controls

Front Seat.



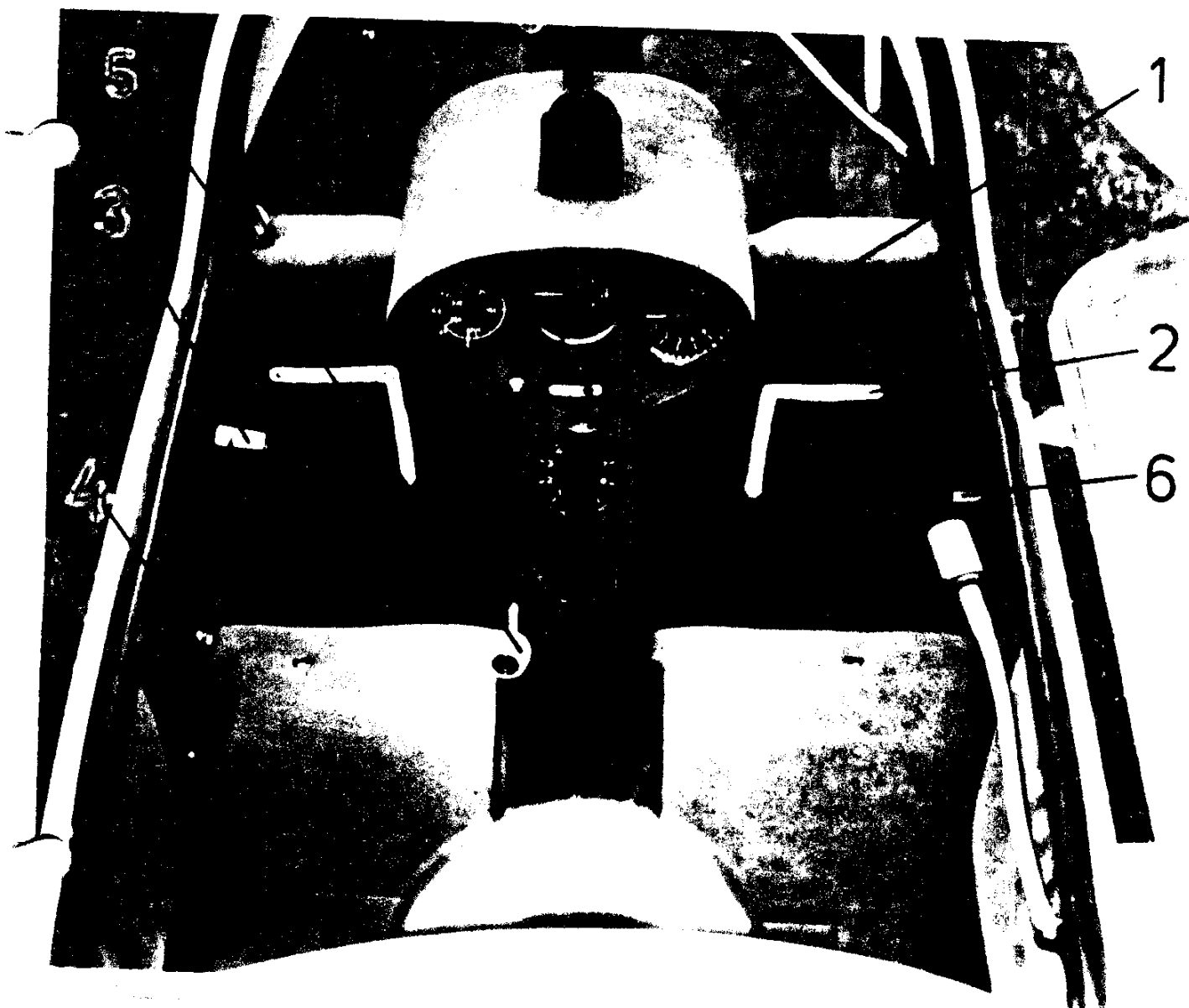
- 1 Stick
- 2 Rudder pedals
- 3 Airbrake lever and wheelbrake
- 4 Trim lever
- 5 Release knob
- 6 Canopy jettison

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                 | 5 | Release knob    |
| 3 | Airbrake lever and wheelbrake | 6 | Canopy jettison |

1. April 1982 (ÄM 315-12)

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## **Instruments specifications**

### **Basic equipment: Airspeed**

The installation error of an airspeed indicator is not greater than 2 km/h or 1 kt. or 1,2 mph using the pitot tube in the tail fin and the static vents side of the cockpit.

The original certification was carried out using a Winter 6FMS4-2 and a PZL PR 400 S Airspeed indicator.

A similiar FAA approved airspeed indicator to meet TSO C 2 reading to 300 km/h (162 kts, 187 mph) may be used.

### **Altimeter**

The original certification was carried out using a Winter 4FGH 10 and a PZL 12 S Altimeter.

A similiar FAA approved altimeter to meet TSO C 10 with a range to 35.000 feet may be used.

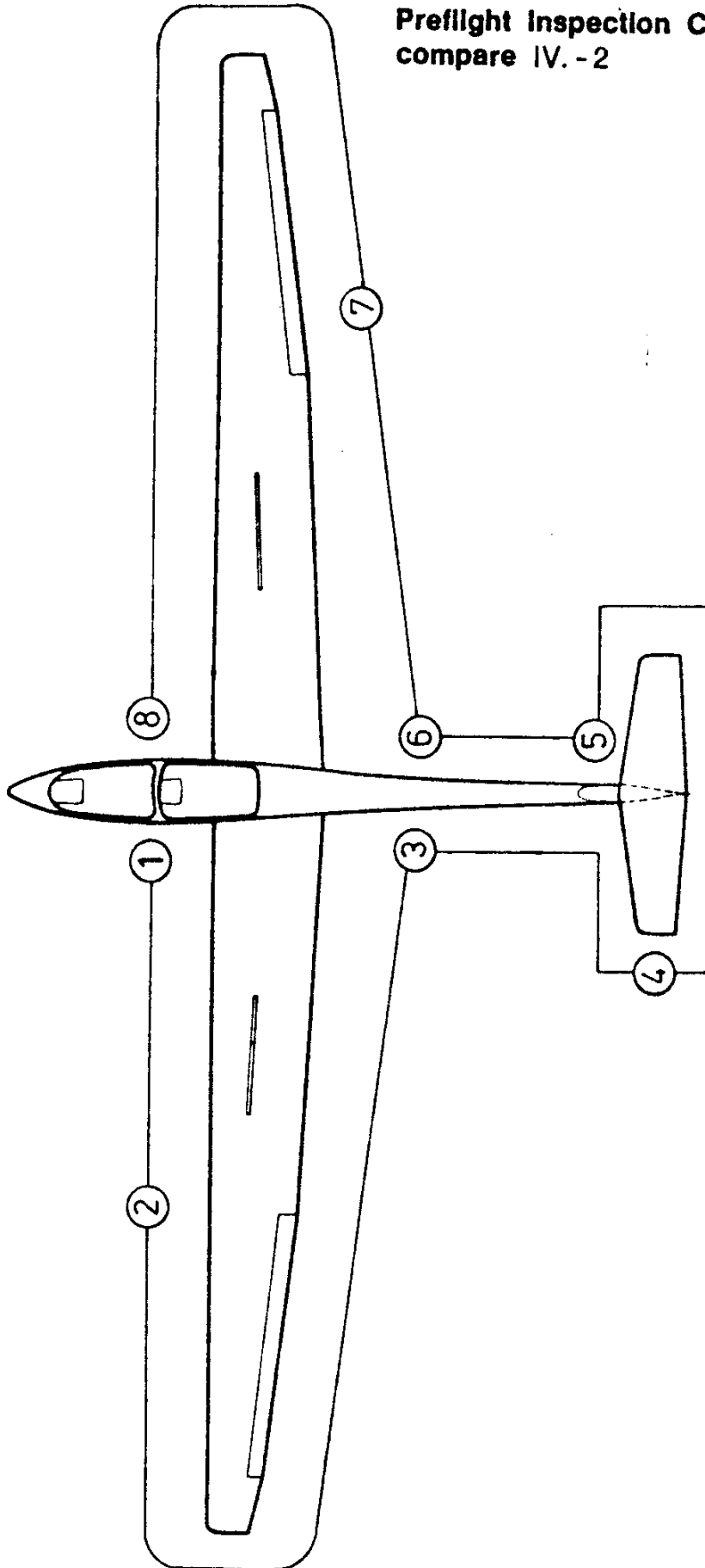
#### IV. 2 Daily preflight inspection

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. Repeat step 2 for right wing.
  
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 Checkpoints  
compare IV. - 2**



#### IV. 3 Control checks before take off

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

The glider has a release hook in front of the main 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

Trim lever should be in central position.

Maximum aerotow speed is 170 km/h (92 kts, 105 mph).

Aerotow should preferably use the nose hook.

The recommended length of tow rope is 40 — 60 m (120 — 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, 44 mph).

The glider lifts off without assistance at a speed of about 80 km/h (43 kts, 50 mph) if the stick is kept in the neutral position.

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 170 km/h (92 kts, 105 mph). At higher speeds the controls should be used with the appropriate care.

#### IV. 6 Slow flight 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 mph)	75 km/h (40,5 kts, 47 mph)

##### Double seater

Weight	Without Airbrakes	With Airbrakes
580 kg = 1279 lbs	75 km/h (40,5 kts, 47 mph)	85 km/h (46 kts, 53 mph)

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.

After 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 mph) 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	Variometer	Turn and Slip
Altimeter	Compass	

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

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

In emergency open brakes and leave cloud at about 170 km/h (92 kts, 105 mph).

Spin should not be used for rescue provision.

#### IV. 9 Simple Aerobatics

The glider is licenced for the following aerobatics

##### 1. Loop

Entry speed *	180 km/h (97 kts, 111 mph)
Maximum g	ca. 3 g
exit speed	ca. 180 km/h (97 kts, 111 mph)

##### 2. Stall turn

Entry speed *	180 km/h (97 kts, 111 mph)
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At 140 km/h (76 kts, 87 mph) 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 hold all controls in the centred position firmly.

##### 3. Spin (possible in aft c.G. positions only)

Preparation. Decrease speed slowly to 80 km/h (43 kts, 50 mph) pull stick back and <sup>apply</sup> full rudder. Glider spins slowly. Rotation rate is one turn every 3 seconds with a height loss of about 80 m (262ft.) per turn.

Recovery : opposite rudder, neutralise stick and recover gently.

#### 4. Chandelle

Entry speed            170 km/h (92 kts, 105 mph)

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

#### 5. Lazy Eight

Entry speed            140 km/h (76 kts, 87 mph)

### IV. 10 Approach and landing

Normal flying practice is to approach at 95 km/h = 51 kts. 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.

Fully extended the airbrakes increase the stalling speed: do not extend the airbrakes fully during the roundout to avoid heavy landings. Don't use the airbrakes to full extension during touch-down due to strong effect of the wheel-brake.

If the nosewheel touches the ground the direction can be controlled by rudder until 40 km/h (22 kts, 25 mph).

The side-slip is quite controllable and, if needed, this manoeuvre can be used for steeper approaches. It is effective by using a 15 degrees angle of side-slip and should be finished of a safe hight (98 km/h; 54 kts; 61 mph).