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FLIGHT MANUAL

GROB G 103 »TWIN II«

This manual must be carried on board of the sail-plane at all times.

This Flight manual is FAA approved for U.S. registered gliders in accordance with the provisions of 14 CFR Section 21.29. and is required by FAA Type Certificate Data Sheet No. G 39 EU.

Registration: Factory Serial No.: ...

Owner: Cypress Soaring 33986-K-219

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

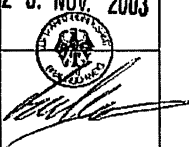
Published September 1981

LBA approved

Date 17th march 1982.

Approval of translation has been done by best knowledge and judgement - in any case the original text in German

I.1. Updates

No.	Page	Reference	Date	Signature	LBA - Approval
1	1, 1a, 8, 10, 12, 14, 17, 19	Modification of serial No. 3730 and subsequent	June 1982		
2	1, 1a, 12, 21, 5a	Automatic connection of elevator and spring trim system os S/N 33879 and subsequent (only for GROB G 103A)	26. Sept. 84		
3	1, 1a, 5a	MSB 315-65	16.10.2003		
4	1, 1a, 5a	OSB 315-66	16.10.2003		25. NOV. 2003 

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5a (*)	16.10.2003
6	17 th March 82
7	17 th March 82
8	16 th June 82
9	Sept. 81
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11	17 th March 82
12	16 th June 82
12a	26 th Sept. 84
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(*) only for GROB G 103A TWIN II ACRO

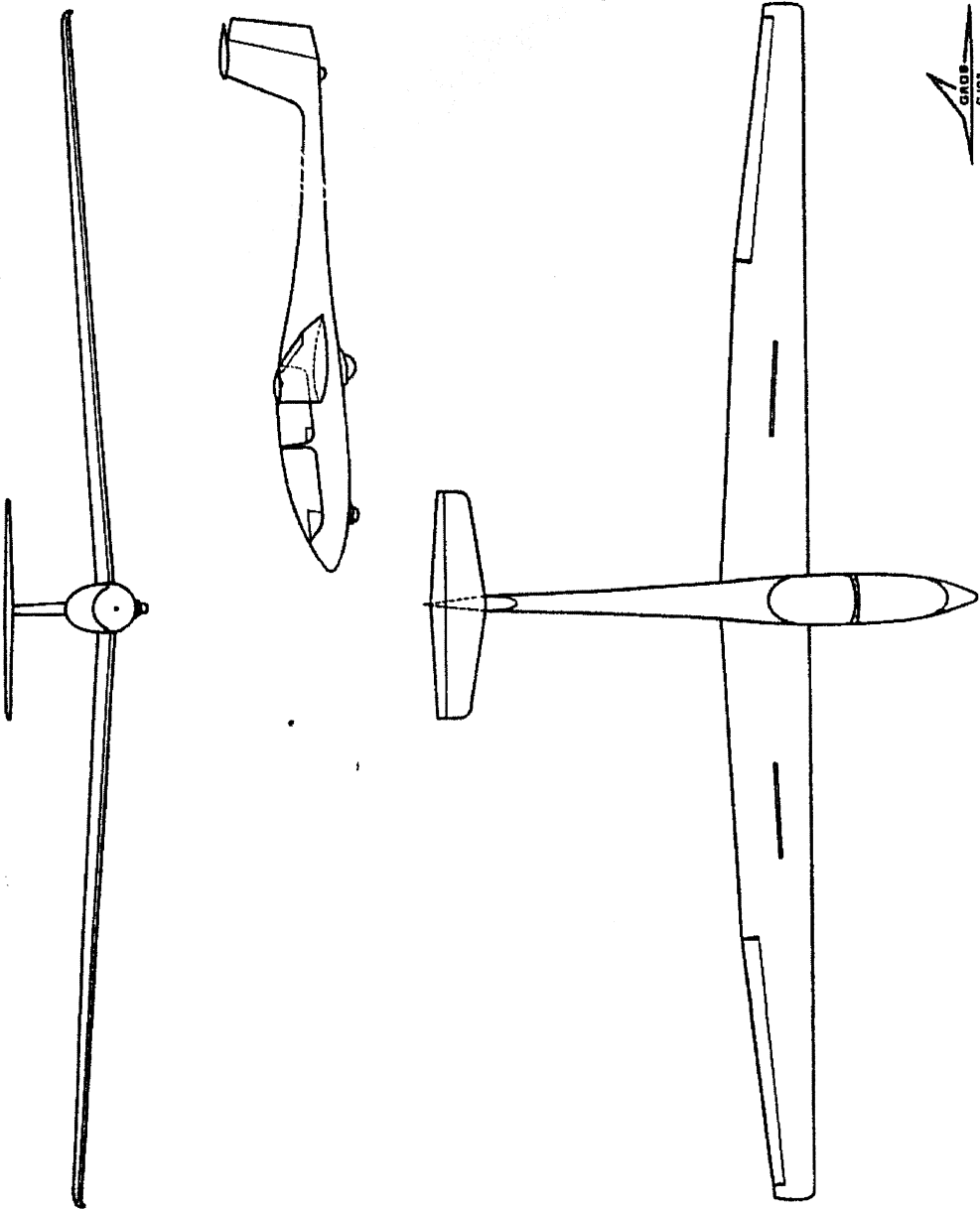
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September 1981



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If the fuselage reinforcement according to OSB 315-65 had not been performed the following is applicable:

The glider GROB G 103A "TWIN II ACRO" is derived from the GROB G 103 "TWIN II". Due to structural reinforcements the "TWIN II ACRO" is approved in the category "Acrobatic". According to MSB 315-65 only "simple aerobatics" (Loop, Turn, Lazy Eight, Chandelle, Spin) is approved (refer to II.2 and IV.9)

The

Flight Handbook for Aerobatics
 GROB G 103A "TWIN II ACRO"
 Edition February 1984
 LBA approved

is invalid according to MSB 315-65 and must be removed from the Flight Handbook.

If the fuselage reinforcement according to OSB 315-66 had been performed the following is applicable:

The glider GROB G 103 A "TWIN II ACRO" is derived from the GROB G 103 "TWIN II". Due to structural reinforcements the "TWIN II ACRO" is approved and certified for acrobatics in conjunction with the following valid operating instructions:

Flight handbook for acrobatics,
 GROB G 103 A " TWIN II ACRO",
 edition February 1984,
 LBA approved.

These operating instructions must be added to the flight manual and contain special instructions valid for acrobatic operations. Main modifications to the "normal" flight manual are contained in the following sections:

- Airworthiness group (II. 1) page 6
- Permitted operating conditions (II. 2) page 6
- Minimum equipment (II. 3) page 6
- Maximum speeds (II. 4) page 7
- Flight envelope (11.5) page 7
- Load scheme (II. 8) page 8

The following items were modified in the maintenance handbook with respect to the acrobatic version:

- Weights and moments of control surfaces (VI)

References to the flight handbook for acrobatics are shown on the affected pages of the "standard" flight manual.

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

II. Operating limitations:

II. 1 Airworthiness Group

Certification Basis: 14 CFR Sections 21.23 and 21.29 effective 1 February 1965; and Joint Airworthiness Requirements for Sailplanes and Powered Sailplanes (JAR-22), dated 1 April 1980.

II. 2 Permitted operating conditions.

The plane is licensed for:

1. VFR Day
2. Simple Aerobatics (Loops, Stall turns, Lazy eight, Chandelle and Spin).

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 .
5. Loading limit plaque in front and back cockpit. occupant.
6. Flight Limits plaque.
7. Flight Manual

17 th march 1982



Perle
17. März 1982

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	$V_B = 170 \text{ km/h (92 kts, 105 mph)}$
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 (VNE) the control deflections should be restricted to 1/3 of the full range.

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

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

Installation 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 VNE	+ 4.0 — 1.5

(Brakes closed and calm air)

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II. 6 Weight limits

Empty weight about 380 kg(838 lbs)
 Maximum flying weight . . 580 kg(1279 lbs)
 Maximum permitted weight of non lifting parts 400 kg(882 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.

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 the baggage compartment	10 kg (22 lbs)

The maximum flying weight of 580 kg (1279 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.

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II. 9 Tow hooks and cable length

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

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

Minimum aerotow cable length 40 m (130 ft)

Minimum launch cable length 600 m (1970 ft)

II. 10 Weak link strength

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).

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25. AUG. 1982

II.13. Placards, control markings and instrument markings

Maximum flying weight	580kg 1280lbs			
Airspeed limits		km/hr	knots	mph
Never exceed	V_{NE}	250	135	155
In Rough Air	V_B	170	92	105
On Aerotow	V_T	170	92	105
On Winch or Auto Launch	V_W	120	64	74
Airbrakes Open	V_{DF}	250	135	155
Manoeuvring	V_A	170	92	105

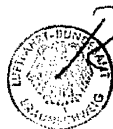
both cockpits

Payload (Pilot and Parachute)		
Minimum in Front cockpit for all flight	70kg	154 lb
Less must be compensated with ballast secured in the seat		
Maximum load front	110kg	242lb
The maximum weight must not be exceeded		

both cockpits

Simple aerobatics air speeds			
Recommended entry speed	km/hr	knots	mph
Loop	180	97	111
Stall turn	180	97	111
Spin	80	43	50
Chandelle	170	92	105

Required placards (front and back cockpit)



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Altitude (ft)	0-6500	10 000	13 000	16 500	19 000
VNE (KIAS)	135	128	121	115	109

near speed ind.

both cockpits

Check before launch

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!

Front cockpit

Canopy Jettison and Emergency Exit

- Pull red handles on right and left of canopy fully back together
- 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 altitude
- When using a manual parachute grip release and pull firmly to full extent after 1-3 seconds

By Canopy release front and back

**Tire Pressure
36 PSI 2,5 atm**

mainwheel
nosewheel
tailwheel

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Elevator quick lock connected
 Markings notice
 Rotating knob turned in
 Tailplane secured (cover closed)

Rudder fin (until s/n 3877)

Markings notice
 Rotating knob turned in
 Tailplane secured (cover closed)

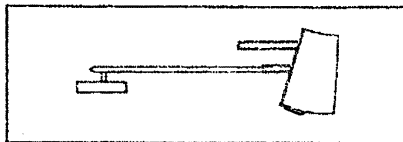
Rudder fin (from s/n 33879)

Baggage maximum
 22 lbs 10 kg

Baggage compartment

Dont push or
 lift here

Rudder




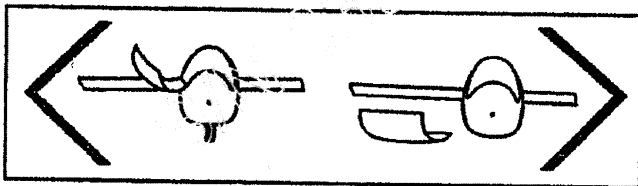
Total energy
 compensation tube
 (until s/n 3836)

FUR	N	30	60	O	120	150
FLIEGE						
FDR	S	210	240	W	300	330
FLIEGE						
DATUM						ASTIR

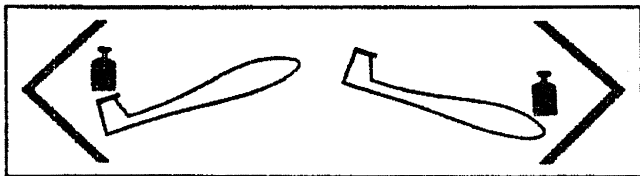
near magnetic direction
 indicator

26th sept. 1984 (AM 315-14/2)

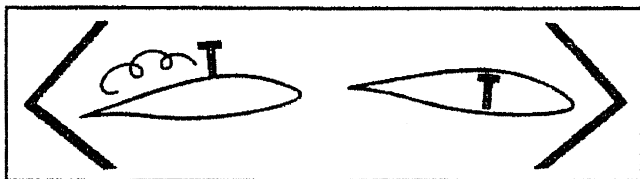
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 Approved by LBA
 24. OCT. 1984



**Canopy open
Canopy jettison**



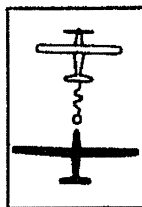
Trim



Airbrakes



Wheelbrake



**Cable
release**



Pedal adjustment
Top right of front
instrument panel



Air-vent
Top left of front
instrument panel

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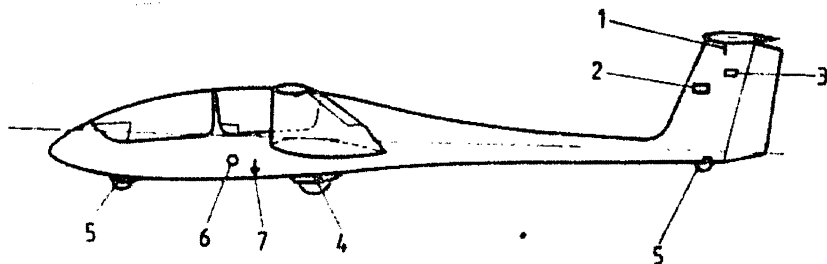
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TRIM WEIGHTS				
Pilotsweight including parachute	kg	55-62,4	62,5-69,9	70-110
	lbs	121-137	138-153	154-242
Number		2	1	0

1 Trim weight: 5,6kg (12,3 lbs)

front cockpit

Labels and Markings outside of the fuselage



1. Marking controlling the correct rigging of the tailplane.
2. Label for the total energy tube.
3. Label for tailplane security
4. Label for tyre pressure
5. Label for tyre pressure
6. Red ring round the static pressure port
7. Marking to find the belly hook

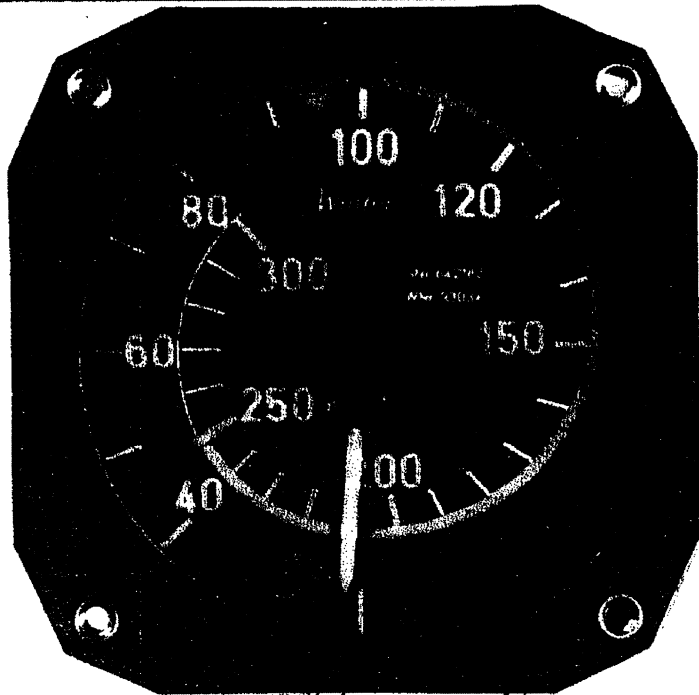
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ASI Markings

mph	Speed		Mark	Significance
	knots	km/h		
48-105	42-92	77-170	Green Arc	Normal range of flying speed
105-155	92-135	170-250	Yellow Arc	Range of flying speeds to be used with care
at 155	135	250	Radial Red Line	Maximum Speed
at 59	51	95	Yellow Triangle	Minimum recommended landing speed at full load



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