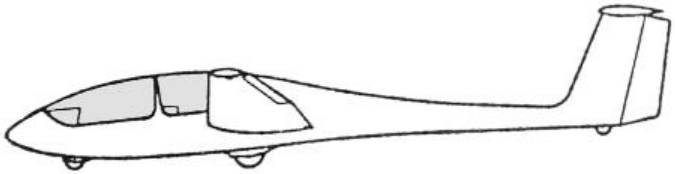
GROB

GROB-FLUGZEUGBAU



Information Guide

GROB G103 'Twin II'

This document contains extracts from the December 1980 approved translation of the German edition of operating instructions for this sailplane. The original text in German is authoritative.

Description

The 'Twin II' is a high performance two-seater sailplane with a T-tail, fitted with a non-retractable undercarriage and upper surface airbrakes. This sailplane is of glass fibre construction. It is designed for training, high performance and simple aerobatic flying.

Adelaide Soaring Club - December 2005

Technical data

Span	17.5m
Wing area	17.8m^2
Length	8.18m
Height	1.55m
Aspect ratio	7.1
Maximum flying weight	580kg approx.
Maximum wing loading	32.6kg/m^2 approx.

This sailplane is approved for VMC *(Visual Metrological Conditions)* flight and can execute simple aerobatic manoeuvres (inside loops, chandelles and stall turns).

Maximum speeds

Maximum permitted speed in calm air	V_{NE} = 135kts
Maximum permitted speed in rough air	V_B = 92kts
Maximum manoeuvring speed	V_m = 92kts
Maximum winch launch speed	V_W = 65kts
Maximum aerotow speed	V_T = 92kts

Conditions in rough air are similar to those encountered in wave rotors, clouds, whirlwinds and when overflying mountain ranges. Control deflection is reduced progressively from full movement at maximum manoeuvring speed to 1/3 deflection at V_{NE} (never exceed speed).

Crosswinds

The maximum crosswind component approved for take off and landing is 11kts.

Front cockpit layout

Flight envelope

The sailplane design limit load factors (airbrakes closed and in calm air) are as follows:

At manoeuvring speed	*+ 5.3 G to -2.65 G*
At V_{NE}	*+ 4.0 G to -1.5 G*

Air speed indicator markings

42 to 92kts	'Green' arc
92 to 135kts	'Yellow' arc
above 135kts	'Red' line

Weight limits *(refer to cockpit placards for individual gliders)*

Empty weight	395kg approx.
Maximum flying weight	580kg approx.
Maximum permitted weight (non-lifting parts)	400kg approx.

Loading scheme *(refer to cockpit placards for individual gliders)*

Minimum load in the front seat for all flight	70kg
Maximum load in the front or rear seat	110kg
Maximum load in the baggage compartment	10kg

The placarded maximum flying weight (580kg approx.) must not be exceeded. You compensate for missing weight in the front seat by placing fixed ballast blocks in the front cockpit.

Tire pressures

Nose and tail wheel 36 PSI (2.5 Bar)
Main wheel 40 PSI (2.8 Bar)

Winch launching

Trim lever should be in the central position. Maximum winch launch speed is 65kts. 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 may need to use forward stick pressure below about 100 metres in the case of fast launches from a powerful winch. When the cable slackens pull the release firmly to it's limit.

Aerotowing

- Trim lever should be in the central position or forward (nose down) of that position, depending on the aircraft payload
- Maximum aerotow speed is 92kts
- Aerotow should preferably use the nose hook
- The glider can be controlled with coordinated elevator, rudder and ailerons
- The glider lifts off without assistance at a speed of about 43kts if the stick is kept in the neutral position
- The yellow release handle is mounted on the instrument panel and must be pulled to it's limit when releasing

Free flight

It is possible to fly the glider over the entire speed range in all attitudes. Full control movements of a single control surface are allowed up to the manoeuvring speed 92kts (i.e., the control surface for 'pitch' is the elevator). Control deflection is reduced progressively from full movement at maximum manoeuvring speed to 1/3 deflection at V_{NE} (never exceed speed).

High speed flight

There is no tendency for flutter to develop within the permitted speed range. Above 92kts control movements should be restricted to 1/3 of full range. The airbrakes should limit the speed to under V_{NE} in a 45^0 dive, even at maximum flying weight.

Flying in rain

Wet or lightly iced wings cause noticeable deterioration of flying characteristics. A heavy deposit of water or ice on the wing can raise the stall speed by up to 6kts and reduces the glide performance. For wet or lightly iced wings, increase approach speed by 6kts. The characteristics during take off and touch down remain essentially the same.

Slow flight and stalling

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

Weight	*Without airbrakes*	*With airbrakes*
580kg	41kts	46kts

Stall recovery: Lower the nose down until the aircraft resumes normal flight. Only use rudder to counter any adverse yaw.

Spinning

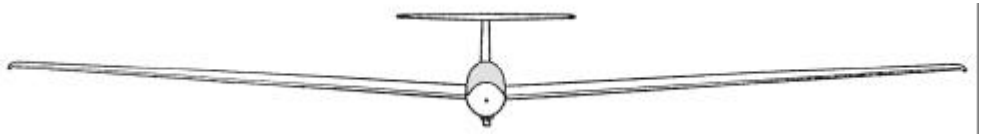
Observe the cockpit ballast placards and placarded crew payload limits.

At a forward centre of gravity entering the spin in not very likely and premature recovery from the spin has to be expected.

Entering the manoeuvre with full nose down trim facilitates spinning in the 'Twin II'. In order to keep the glider in the spin, with two pilots on board, 'whiskers' (canards) can be mounted on the fuselage nose.

During instructional flights, the heavier pilot should be placed in the rear seat. 'Whiskers' (canards) can be used in the whole permissible flight envelope.

Fully developed spin recovery: FULL opposite (to direction of the spin) rudder (on it's stop), keep easing the control stick forward until the rotation stops. Ailerons must be neutral. When the auto rotation stops the spinning has ceased, so centralise rudder and ease out of the dive. Minimise speed build up and height loss during recovery.



Approach and landing

Normal flying practice is to approach at 55kts (plus half the wind strength). The airbrakes are sufficiently powerful for steep approaches. The use of airbrakes causes the glider to pitch slightly nose down.

Fully extended the airbrakes increase the stalling speed. Do not extend the airbrakes fully during the round out to avoid heavy landings. Don't use the airbrakes to full extension during touch down due to the effect of the wheel brake (which is engaged at about ¾ airbrake extension).

Flight performance

Flying weight	*450kg*	*580kg*
Wing loading	*25.3kg/m²*	*32.6kg/m²*
Best glide angle	*36.5*	*37*
at a speed of:	51kts	57kts
Minimum sink	*126 ft/min*	*138 ft/min*
at a speed of:	43kts	46kts

Canopy jettison and emergency exit

- Pull red handles on right and left of canopy full back simultaneously
- Push canopy up and away with your hands
- Release the safety harness
- Stand up and get out over left or right side, depending on the attitude of the aircraft

Flight polar curve for the G103 'Twin II' (at 580kg)