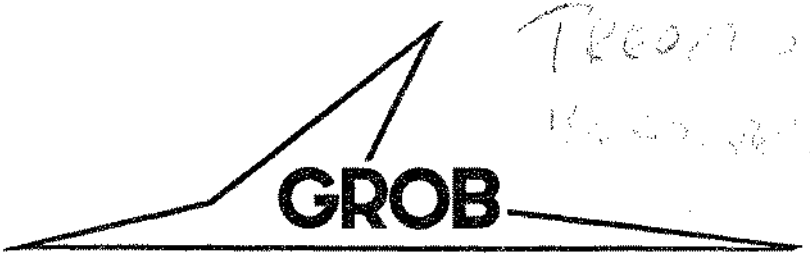

GROB-FLUGZEUGBAU
8939 Mattsies
Flugplatz Mindelheim-Mattsies
Telefon 08268/411
Telex 539 623

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: [redacted] Factory Serial Number: 3699

Owner: Aero Club d´Italia

Viale Maresciallo Pilsudski 124

00'97 Roma / Italien

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

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. 17.3.82

I.1. Updates:

Current number	Page	Reference	Date	Signature
* 1	1	Updates	7.7.82	
	1a	List of effect.pages	7.7.82	
	7	Airspeed markings	7.7.82	
	8	Load scheme	7.7.82	
	10	Tow hook	7.7.82	
	14	Daily preflight inspection	7.7.82	
	19	Acrobatic speed (two seat)	7.7.82	
	21a	Check after assembly	7.7.82	
	25	Service Instruction	7.7.82	
2	1, 1a, 8, 10, 12, 13, 20, 20a	Modification as of serial no. 3730	1.3.83	

* Rev. 1 from 7.7.82
Modification of the handbook in accord with the requirements of R.A.I.

December 1980
Rev. 1.3.83

14. April 1983

List of effective pages

Page	Issued	Revision
1	Dec.80	1.3.83
1a	" "	1.3.83
2	" "	
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4	" "	
5	" "	
6	" "	
7	Dec.80	7.7.82
8	" "	1.3.83
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10	" "	1.3.83
11	" "	7.7.82
12	" "	1.3.83
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21a	" "	7.7.82
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December 1980

Rev. 1.3.83

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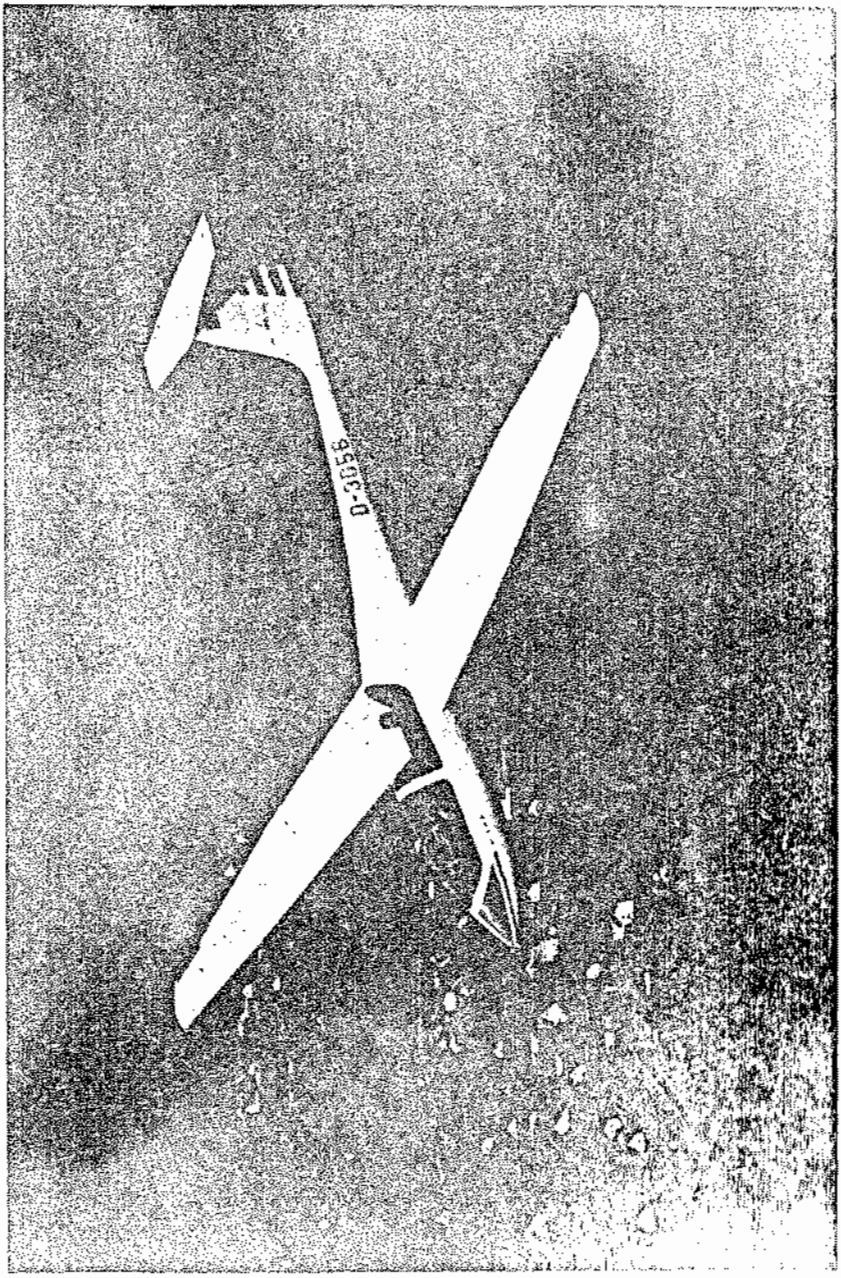
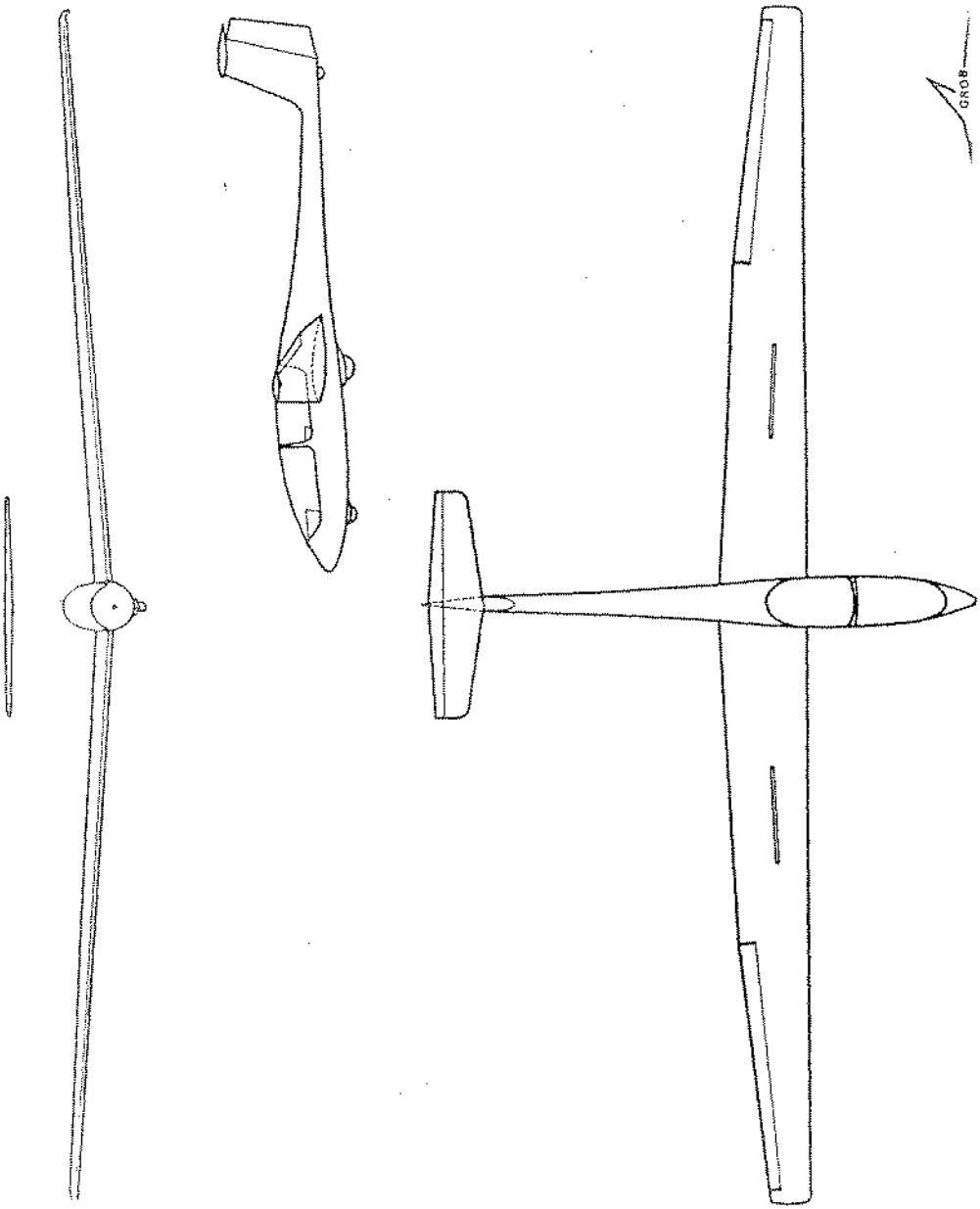


December 1980


GROB

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 m² (191.6 ft.²)
Length	8,18m (26,8ft)		
Height	1,55m (5,1ft)	Maximum Flying Weight	580 kg (1279 lbs)
Aspect Ratio	17.1	Maximum Wing Loading	32,6 kg/m² (6,68 lbs/ft.²)

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.

December 1980

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).

II. 4 **Maximum Speeds**

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

Air speed indicator markings

82-170 km/h=44-95 kts=51-105 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.
minimum recommended 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 ± 2 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)

Via di Villa Ricotti, 42
00161 ROMA

o all'indirizzo E-mail: seg.smp@enac.rupa.it

English Translation:
In case of any difficulty reference shall be made to the Italian original text.

EFFECTIVE DATE: 18 December 2001

APPLICABILITY: Sailplanes GROB mod. Twin Astir, G 103 "Twin II", and G 103C "Twin III ACRO".

COMPLIANCE:
Before further flights as of the effective date of this AD.

A sailplane of the models mentioned in paragraph applicability, performing an acrobatic maneuver, suffered, apparently for torsional stress, the failure and subsequently disjunction of the fuselage tail at half of its length.

Waiting for the result of investigation, and probable modification, as a precaution measure, the following actions are prescribed:

1. Any acrobatic maneuvers are prohibited;
2. Reduce the maximum speed VNE at 165 Km/h, (89,1 kts / 102,5 mph);
   a. Apply a red marker on the airspeed indicator at 165 Km/h;
   b. Apply a placard, in the middle of airspeed indicator, with the following data:

VNE =
165 Km/h
89,1 kts
102,5 mph.h

3. Before the next flight carry out a detailed inspection to:
   a. The elevator and pertinent fall, for damage and correct installation;
   b. Fuselage tail, internal and external, behind the trailing edge, for failure, delamination, ungluing and matting;
4. Copy of this AD has to be inserted in the Limitation section of the Flight Manual.

PAG 7a

The report of required inspections has to be sent to ENAC to the following address:

PAG 7/a

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 both seats	220 kg (485 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 26a of Maintenance Handbook.

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 overhauled.

WINCH LAUNCHING USING THE NOSE HOOK IS PROHIBITED

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
- Neutralise stick
- Ailerons should be neutral
- When rotation stops, neutralise rudder and pull out gently.

TM 315-35/2

03-03-98

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~~ Unlock 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

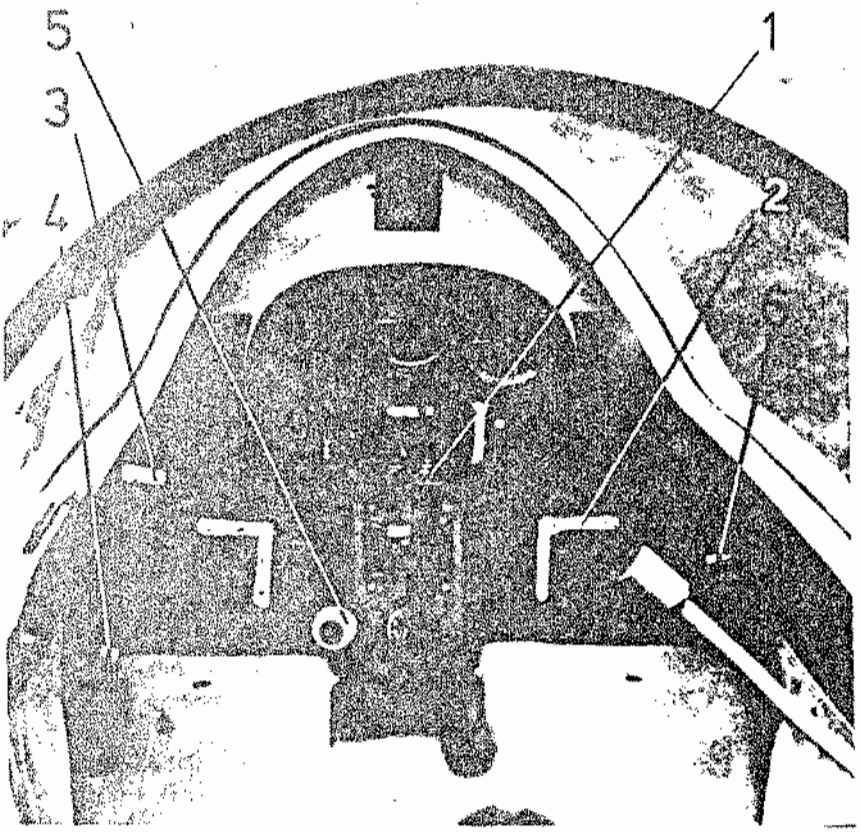
If a wing drops in a turn or straight flight, leave the stick neutral and apply rudder against the direction of rotation.

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

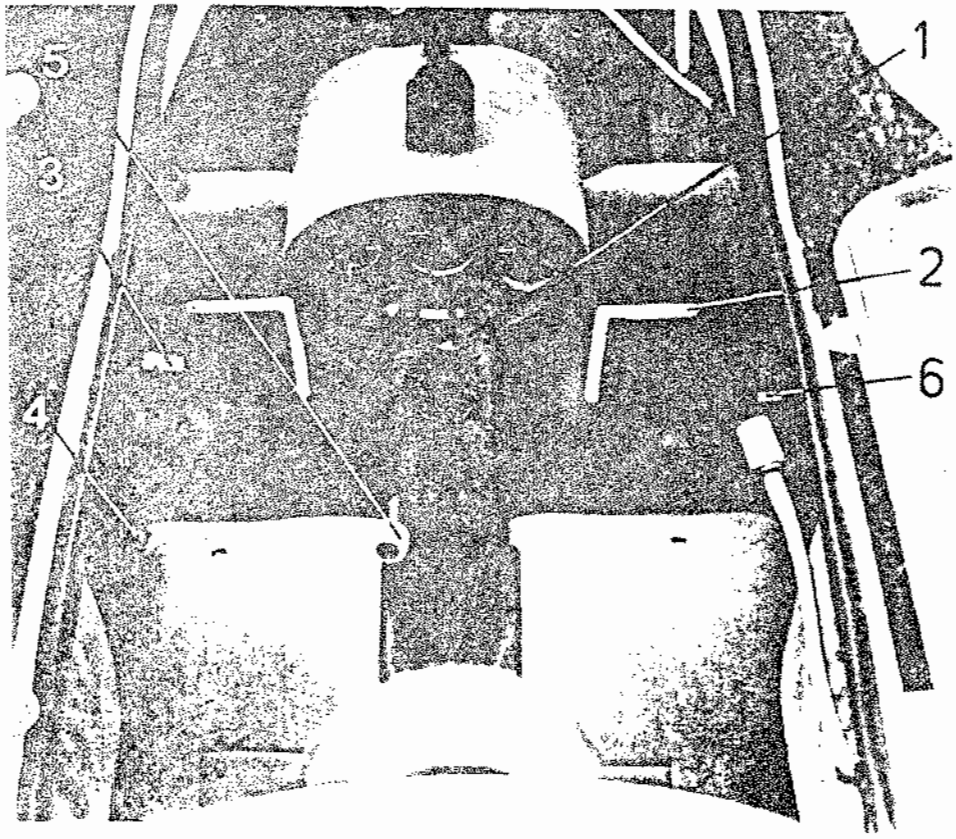


1 Stick
2 Rudder pedals
3 Airbrake lever and wheelbrake
4 Trim lever
5 Release knob
6 Canopy jettison

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

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.

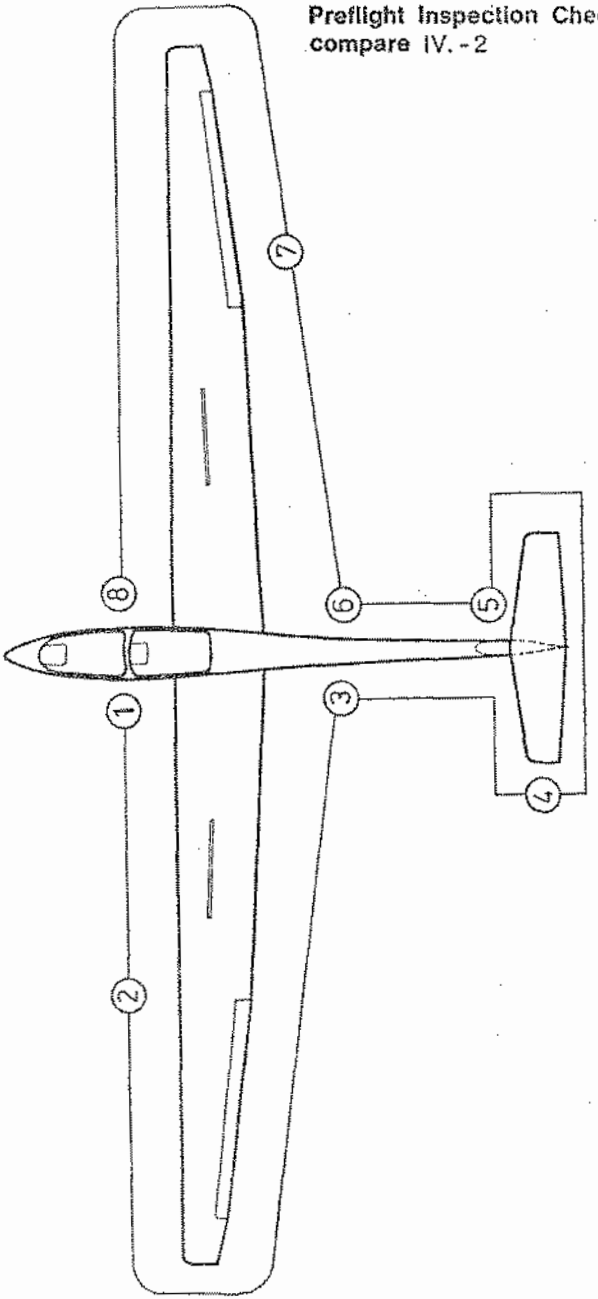
6. Check the pitot tube, total energy venturi and static vents are clean.

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 mainwheel.
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.
WINCH LAUNCHING USING THE NOSE HOOK IS PROHIBITED

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 develope 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)

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 accidently 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 ~~give~~ full rudder. Glider spins slowly. Rotation rate is one turn every 3 seconds with a height loss of about 80 m (262 ft.) 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. Dont 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 heght (98 km/h; 54 kts; 61 mph).

(*) For two seater configuration increase entry speed by 20 Km/h (11Kts, 12mph).

V. Rigging and derigging

V. 1 Rigging

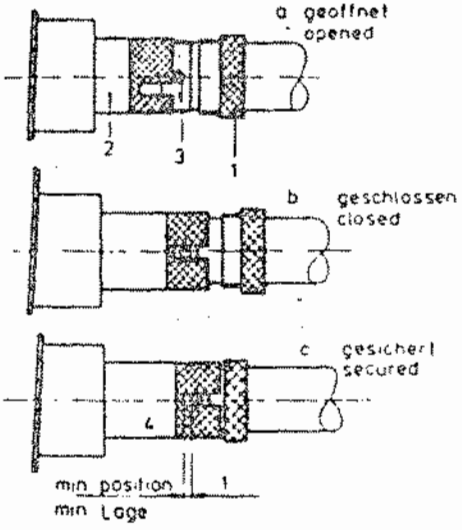
The fuselage must be held firmly in a horizontal position when rigging. It is recommended to use a fuselage stand or the trailer fittings are used.

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 wingforward and aft it can be heard t 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 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 fuselage fittings and by gently moving the wing to and fro they too can be made to snap into place.

To secure the fuselage-wing linkage in the closed position the safety nut (1) must be turned into the threaded socket (2) so that the socket is pull in-boards against the red ring which is held by the guide pin (3).



By moving the wings forward and aft strongly while turning the safety nut into the socket this linkage can be secured tight enough (4). The guide pin must not touch the end of the slot in the socket.

Check: The socket must cover the red ring.
The safety nuts must be turned hand-tight.

In the closed but unsured position (b) the wing bolt cannot be pulled out of the fitting.

The connecting rods can be connected by means of the quick lock fasteners through the inspection opening.

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 when 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 bearing fall to the rear. 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 quick lock (System Hotellier) on the trim~~X~~-tab push rod can be attached to the ball on the trim~~-~~ tab horn and the quick lock (System Grob) on the elevator push rod can be attached to the bearing 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.

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.

he ("Hotellier bolt and swivel joint must be secured".

Checks to be made after assembly

1. Check that the 4 main wing fittings are locked.
2. Check that aileron and brake quick-actions 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 tire pressure
5. Check that the tailplane is securely fitted and that the elevator and trim tab push-rod are connected, check the 4 markings.
6. Rudder movement.

Derigging

Derigging is carried out in the opposite order and in this case it doe 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.

Attachment to Airworthiness Directive No. 1993-001/3
L'Hotellier ball and socket connector, lock plate

Section IV

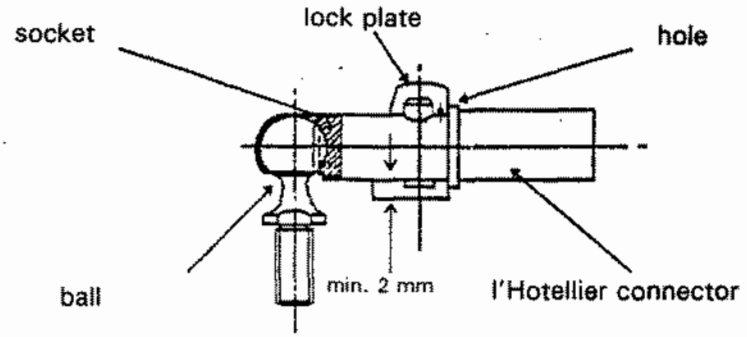
L'Hotellier ball and socket connectors

Prior to the installation of ball and socket connectors, everyone has to familiarize himself with their functioning.

The socket is to be slid completely over the ball with the lock plate pressed down. During locking the lock plate moves back slightly so that in a correct connection the hole on the narrow edge of the lock plate becomes visible.

The safety pin is to be inserted in this hole thus securing the ball and socket connector.

Attention:
By loading the connection full engagement of the ball is to be verified!



Warning!
Unsecured ball and socket connectors may open automatically in flight.

DAC 21 (ITA 93-001/3)

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).

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 2.5 to 2.8 bar
nosewheel and tailwheel 2, 5 bar

The wheelbrake of the "TWIN II" is a disk brake. The master brake cylinder with the brake fluid reservoir is located under the baggage compartment.
The marks for the lowest and highest level of the hydraulic brake fluid have to be observed.

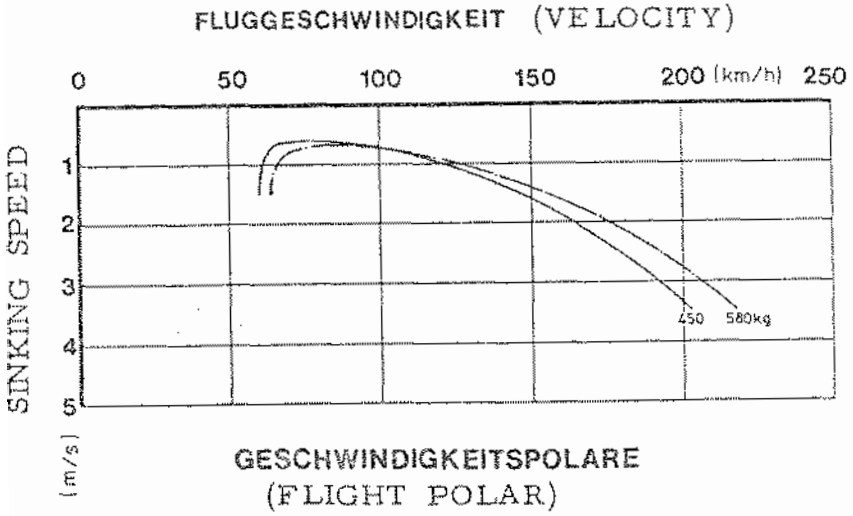
To fill up use ATE hydraulic brake fluid DOT 3.

Dezember 1980

VI. Appendices

VI. 1 Flight Performance

Flying weight	450 (902)	580 (1213)	kg (lbs)
Wing loading	25,3 (5, 2)	32,6 (6, 7)	kg/m² (lbs/ft²)
Best glide Angle	36,5	37,0	
at a speed of	95 (51)	105 (57)	km/h (kts)
Minimum sink	0,64 (126)	0,70 (138)	m/sec (ft/min)
at a speed of	80 (43)	85 (46)	km/h (kts)



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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.

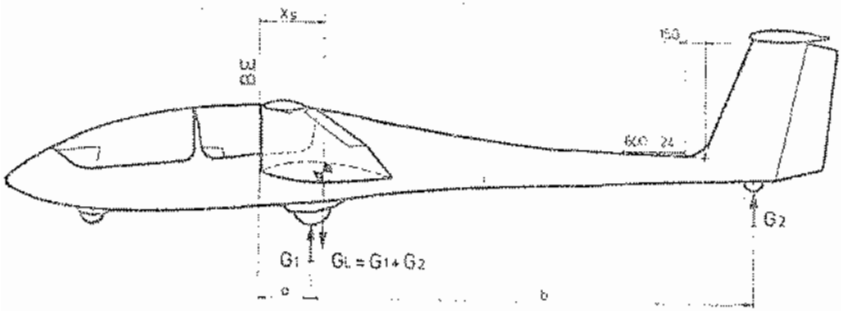
VI. 5 Determination of the Center of Gravity

The determination of the center of gravity is made with the 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.

The Center of Gravity of the pilots is located:
1150 mm in front of the Datum Line (1. Seat)
40 mm behind the Datum Line (2. Seat)

Procedure for determining C. of G. empty



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 / 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.

$$X = \frac{G_2 \times b}{G_L} + a = \frac{\qquad}{\qquad} + =$$

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.

	from	to	multiply with
Convertion	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 glider will be within the permitted range.

Empty Weight		Range of C. of G. behind Datum			
		Forward		Aft	
kg	lbs	mm	inches	mm	inches
360	794	758	29.84	773	30.43
365	805	748	29.45	769	30.28
370	816	739	29.09	765	30.12
375	827	729	28.70	761	29.96
380	838	720	28.35	757	29.80
385	849	711	27.99	753	29.65
390	860	703	27.68	749	29.49
395	871	694	27.32	745	29.33
400	882	686	27.01	742	29.21

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 400 kgs (882 lbs) or the maximum load permitted in the fuselage must be correspondingly decreased.

The Centre 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.