LIBRETTO DI ISTRUZIONE

DI

IMPIEGO ALIANTE GROB G 103

«TWIN II»

I-ALOR

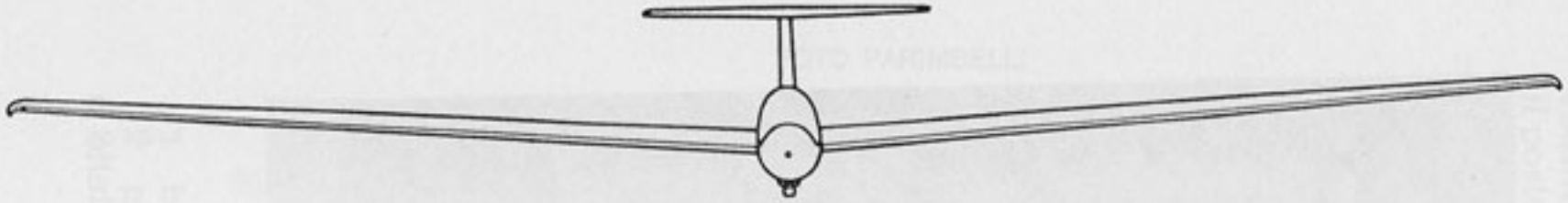
INDICE

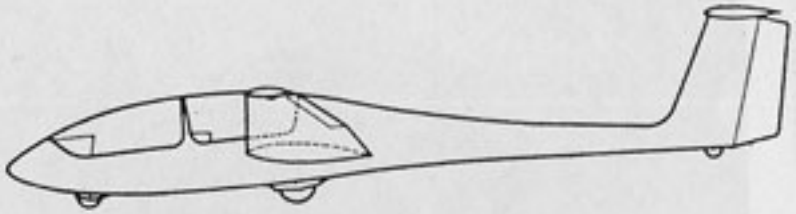
1 — DESCRIZIONE GENERALE DELL'ALIANTE

Aliante biposto in tandem con doppi comandi e doppio cruscotto - Cellula monoplana ad ala media in due pezzi monolongherone - impennaggio a T. Ruota principale fissa con freno a disco idraulico - ruotino anteriore e posteriore.

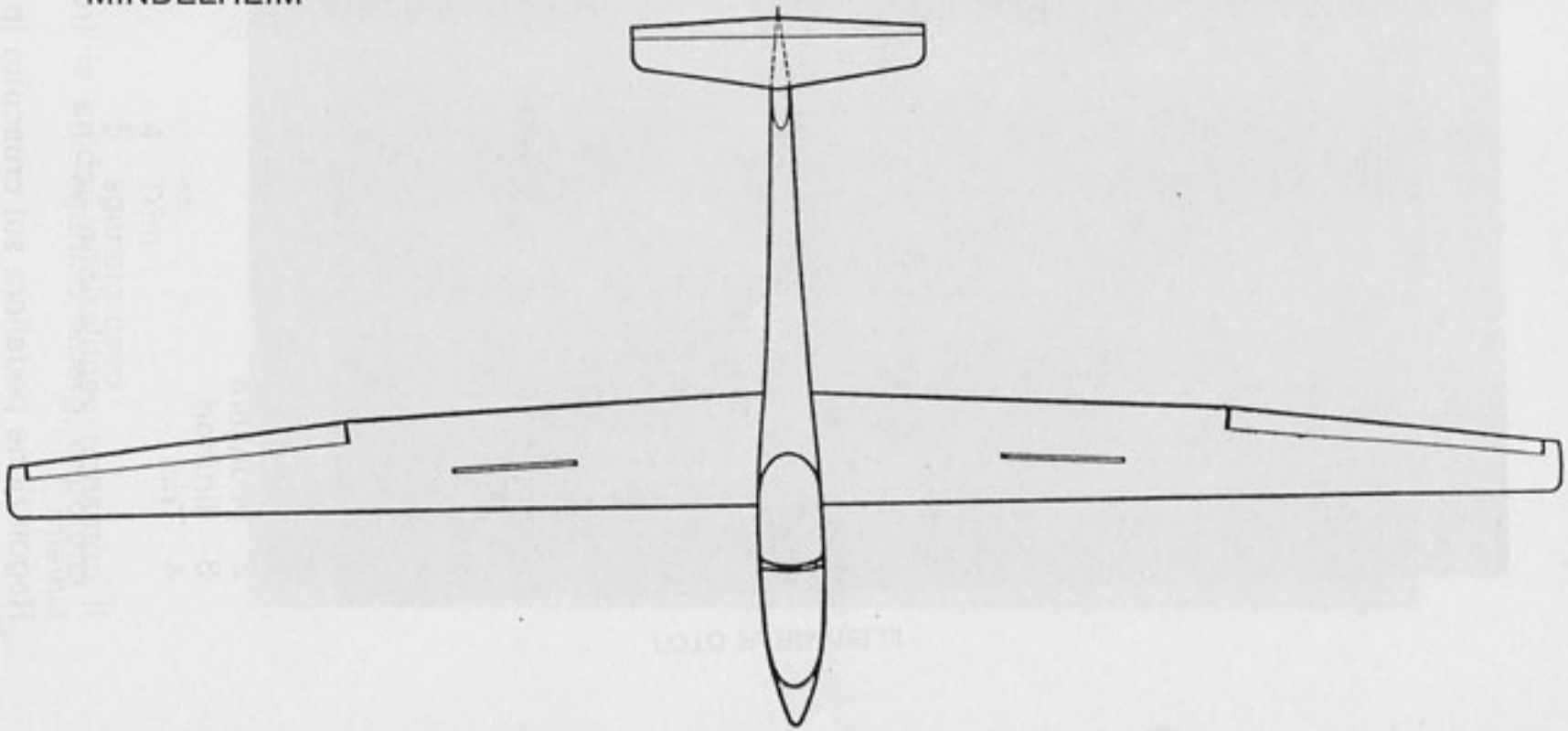
L'aliante è costruito completamente in fibra di vetro e resina.

— Apertura alare	17,5 m.
— Lunghezza	8,18 m.
— Altezza	1,55 m.
— Allungamento	17,1
— Superfice alare	17,8 m^2
— Peso massimo	580 Kg.
— Carico alare massimo	32.6 Kg./m^2





TWIN ASTIR
GROB FLUGZEUGBAU
MINDELHEIM



CABINA E COMANDI
I posto

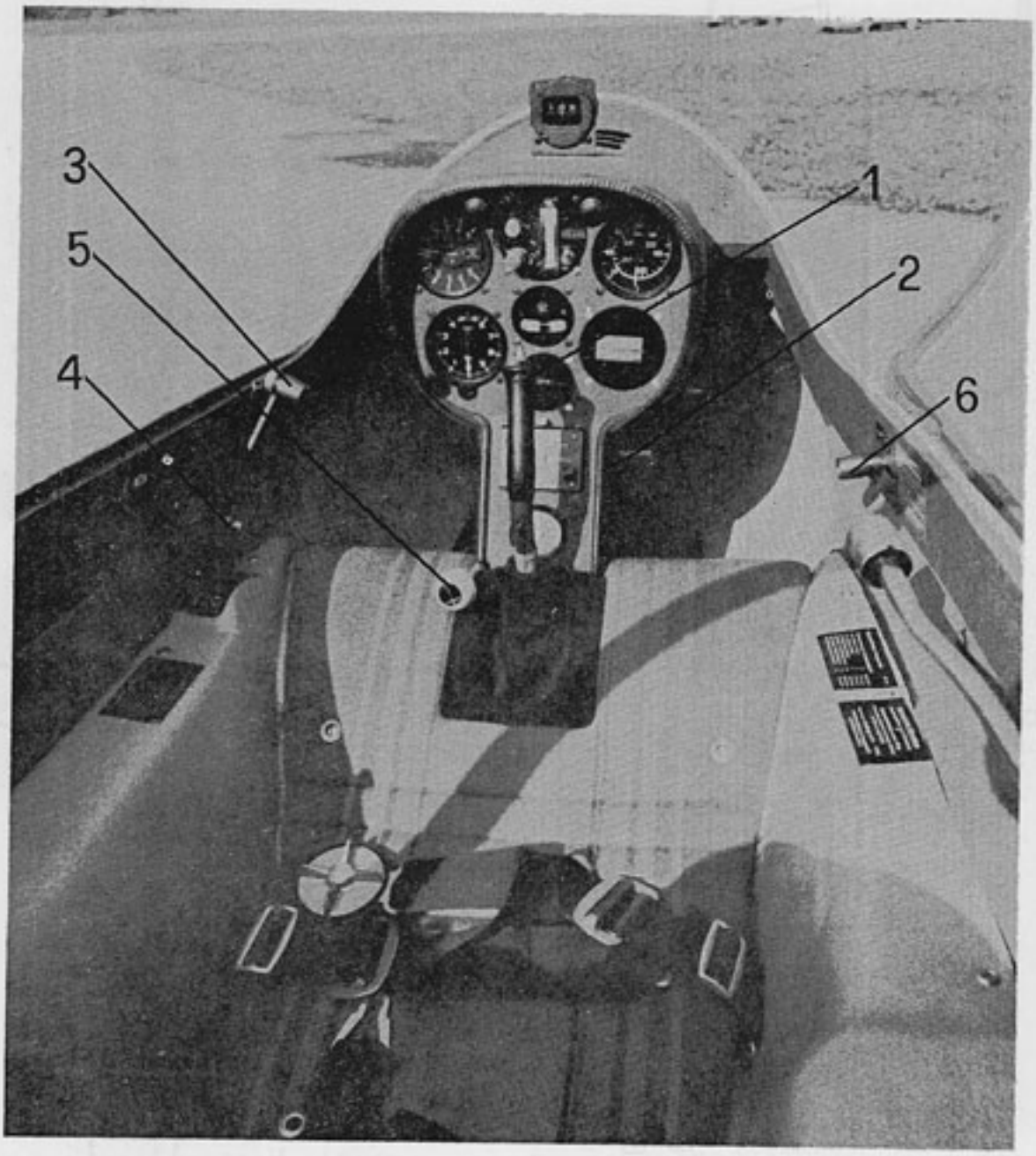


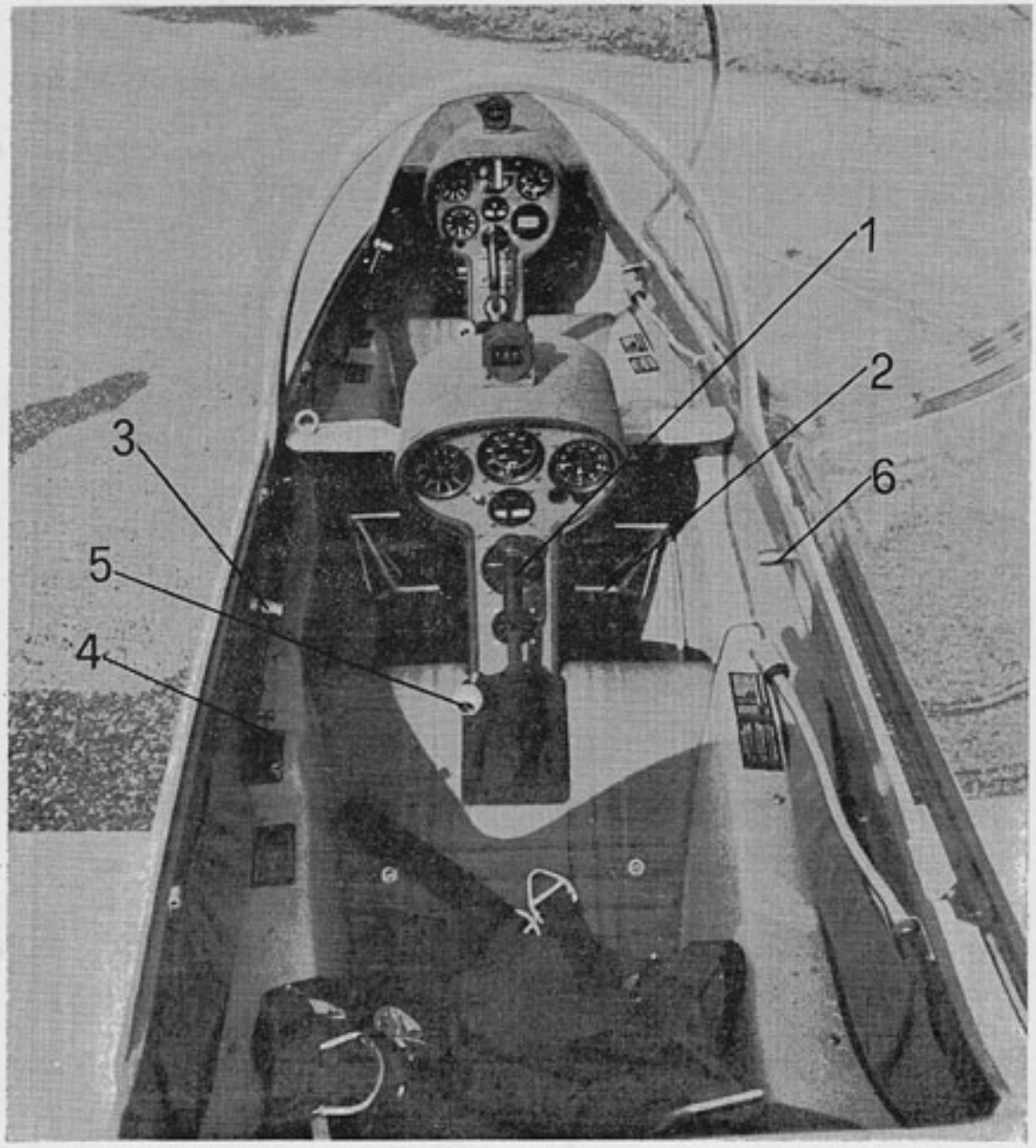
FOTO PARIMBELLI

1 barra
2 pedaliera
3 diruttori
4 Trim
5 sgancio cavo
6 sgancio emergenza capottina

Il comando ventilazione cabina si trova sul cruscotto in alto a sinistra
Regolazione pedaliera sul cruscotto in alto a destra

CABINA E COMANDI
II posto

FOTO PARIMBELLI



1 barra
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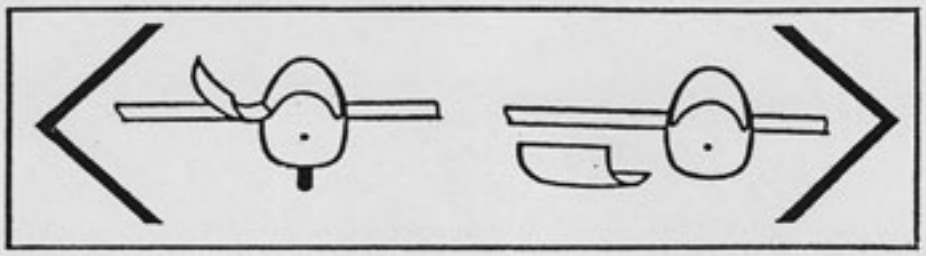
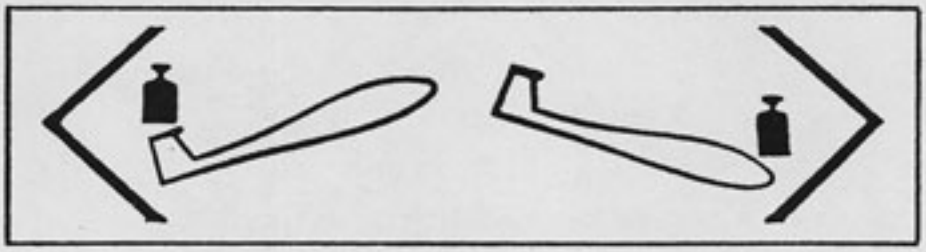
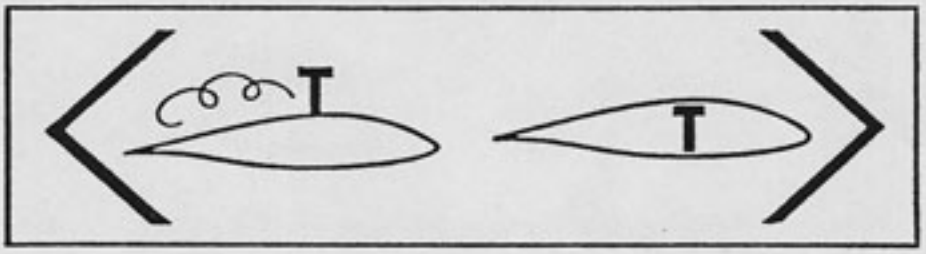
SIMBOLI



apertura e sgancio capottina



Trim



diruttori

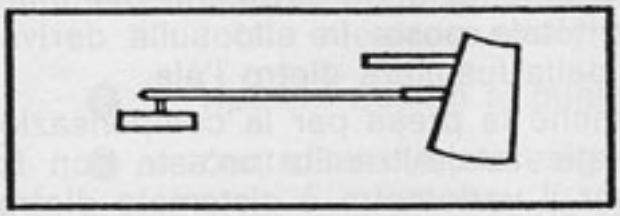
freno ruota

SIMBOLI

sgancio cavo traino

ventilazione cabina

regolazione pedaliera



tubo compensazione energia totale

2 — COMANDI DI VOLO

Sono a barra e pedaliera - tutte le trasmissioni sono ad aste metalliche ad eccezione della pedaliera fra il primo il secondo posto e il comando di rinvio. La pedaliera è regolabile in volo mediante pomello sporgente dal cruscotto. Tirando il pomello la pedaliera si sblocca e slitta verso il pilota.

Il comando dei diruttori è a sinistra e, a fondo corsa, entra in funzione il freno alla ruota.

Il comando del trim è a sinistra e agisce direttamente sull'aletta posta sull'equilibratore.

Il comando di sgancio del cavo di traino è sulla plancia del cruscotto in basso a sinistra.

Il comando apertura capottina è sul lato sinistro.

3 — IMPIANTO ELETTRICO

Costituito da un accumulatore a 12V situato nel bagagliaio e protetto da fusibile da 1,5 A. per la alimentazione degli strumenti elettrici e radio.

4 — STRUMENTI DI CONTROLLO DI ASSETTO E NAVIGAZIONE

Anemometro in Km/h

Altimetro in metri, a due lancette

Variometro ± 5 m/sec.

Variometro elettrico ± 5 m/sec.

Virosbandometro elettrico

Bussola magnetica

L'impianto per il funzionamento degli strumenti pneumatici consiste in una presa totale posta in alto sulla deriva e prese statiche sui lati della fusoliera dietro l'ala.

Sulla deriva si trova anche la presa per la compensazione del variometro di energia totale tramite un'asta con foro calibrato. Il thermos per il variometro è sistemato dietro il cruscotto o sotto il sedile.

5 — EQUIPAGGIAMENTO RADIO

E' installata una radio con ..... canali. Il pulsante MIC è situato sulla barra, il microfono a giraffa sul lato destro della cabina, l'altoparlante sul lato destro dietro lo schienale del pilota.

6 — PROCEDURE NORMALI

6.1 Ispezione pre volo:

❶ — aprire la capottina
— controllo attacchi alari interno fusoliera
— controllare tutti comandi interno fusoliera
— controllare che non vi siano corpi estranei
— provare comandi per movimenti completi, liberi
— controllare pressione pneumatico 2,5/2,8 atm.
— controllare condizioni gancio traino
— controllare funzionamento sgancio cavo
— controllare freno ruota

❷ — controllare intradosso ed estradosso
— controllare condizioni e movimento alettoni
— controllare le condizioni degli aerofreni bloccaggio, fissaggio, giochi.

❸ — controllare la fusoliera per danni specialmente parte inferiore.

❹ — controllare complesso di coda per un corretto montaggio.

❺ — controllare le condizioni del pattino di coda.

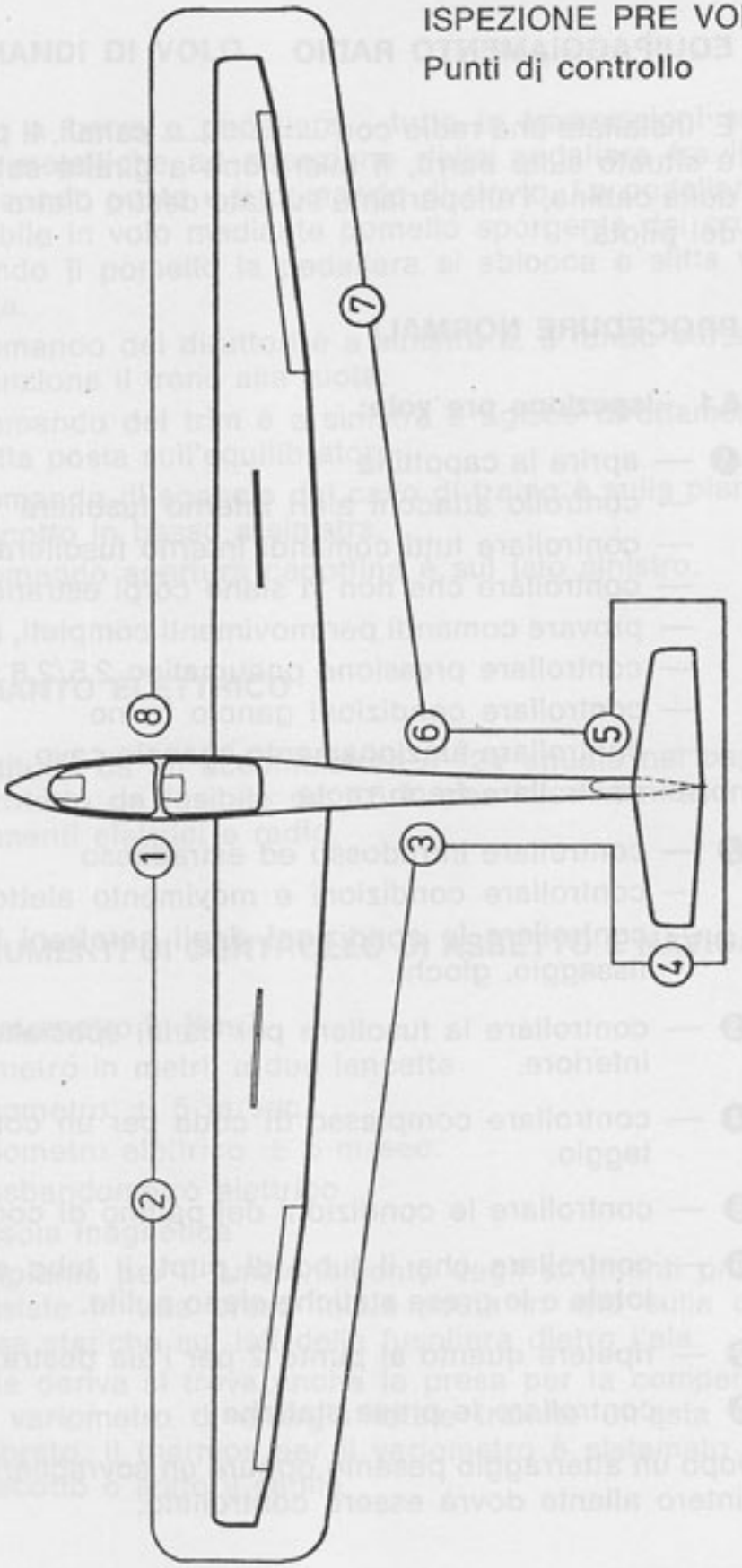
❻ — controllare che il tubo di pitot, il tubo dell'energia totale e le prese statiche siano pulite.

❼ — ripetere quanto al punto 2 per l'ala destra.

❽ — controllare le prese statiche

Dopo un atterraggio pesante oppure un sovraccarico in volo, l'intero aliante dovrà essere controllato.

ISPEZIONE PRE VOLO
Punti di controllo



Le semiali e il piano di coda dovranno essere smontati per questi controlli e se saranno constatati danni dovrà essere consultato un controllore. L'aliante non potrà volare prima che i danni siano stati riparati.

6.2 Controlli prima del decollo

— controllare i comandi per movimento completamente libero e a fondo corsa
— controllare che le cinghie e il paracadute siano allacciati
— controllare la regolazione dell'altimetro
— controllare che la radio sia accesa e selezionata sulla frequenza dell'aeroporto
— controllare la regolazione del Trim
— controllare la capottina chiusa e bloccata
— controllare che i diruttori siano chiusi e bloccati
— controllare che l'allineamento di decollo sia libero da ostacoli e che il traino sia nella giusta configurazione per decollo
— controllare manica a vento

6.3 Controlli prima dell'atterraggio
(in posizione sottovento)

— prova funzionamento diruttori
— trim per atterraggio
— controllo altimetro

7 — PROCEDURE ANORMALI E DI EMERGENZA

1 — Uscita dalla vite:
— spingere piede opposto alla rotazione
— barra al centro
— alettoni al centro
— quando la rotazione si è fermata centralizzare la pe-
— daliera e tirare dolcemente la barra

2 — Sgancio di emergenza della capottina e uscita:
— tirare le maniglie rosse destra e sinistra indietro in-

sieme, e spingere la capottina in alto e in avanti con la mano sinistra

— slacciare le cinture di sicurezza

— alzarsi in piedi e uscire a destra o sinistra a seconda dell'assetto

— quando si usa un paracadute con apertura manuale, sganciare la maniglia e tirarla con decisione per l'intera corsa dopo 1-3 secondi.

7.1 Volo con pioggia (ali bagnate o ghiacciate)

In tale situazione la velocità di stallo aumenta di 10 Km/h.

7.2 Imbardata al suolo

L'aliante non ha tendenza ad imbardare in decollo. Nel caso però che un'ala si abbassi fino al suolo provocando un'imbardata maggiore di 15 gradi è consigliabile sganciare immediatamente.

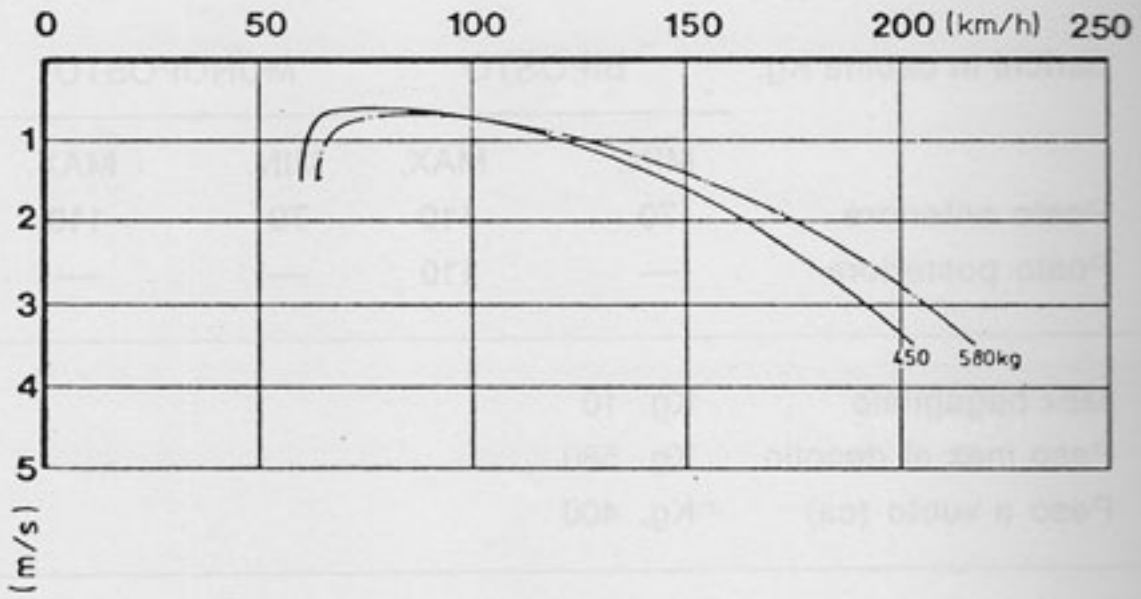
8 — PRESTAZIONI

Stallo:

Peso	Senza diruttori	Con diruttori
470 Kg.	66 Km/h	75 Km/h
580 Kg.	75 Km/h	85 Km/h

Peso di volo	450	580	kg
Carico alare	25,3	32,6	kg/m²
Efficienza	36,5	37,0	
alla velocità di	95	105	km/h
Minima caduta	0,64	0,70	m/sec
alla velocità di	80	85	km/h

POLARE DELLE VELOCITA'



9 — LIMITAZIONI DI IMPIEGO

L'aliante è omologato per:

— Volo in VMC

— Semiacrobatico (looping, virata in cabrata, otto lento chandelle e vite)

— Volo in nube (purchè gli strumenti siano quelli indicati a Pag. n. 9

— Fattori di carico: alla VM + 5.3 / — 2.65

Fattori di carico: alla VNE + 4 / — 1.5

CARATTERISTICHE OPERATIVE

Velocita limite	Km / h
— volo veleggiato e affondata V_{NE}	250
— in aria turbolenta V_B	170
— di manovra V_M	170
— in autotraino e vericello V_W	120
— massima di traino V_T	170

carichi in cabina Kg.	BIPOSTO		MONOPOSTO	
	MIN.	MAX.	MIN.	MAX.
Posto anteriore	70	110	70	110
Posto posteriore	—	110	—	—

Max bagagliaio	Kg. 10
Peso max al decollo	Kg. 580
Peso a vuoto (ca)	Kg. 400

La massima velocità di vento al traverso ammessa per il decollo e per l'atterraggio è di 20 Km/h

10 — SPECIFICHE DISPOSIZIONI DELLA SCUOLA

Pur essendo l'aliante omologato nella categoria semi-acrobatica è vietata ogni manovra acrobatica senza l'autorizzazione dell'istruttore.

Quando l'aliante è in sosta a terra la capottina piloti va protetta con apposito telo.

In caso di pioggia l'aliante deve essere ricoverato il più presto possibile e asciugato.

11 — MONTAGGIO E SMONTAGGIO

Montaggio

— La fusoliera deve essere tenuta in posizione esattamente orizzontale, e poggiare sulla ruota e sul pattino di coda.

— Verificare all'interno della fusoliera che le leve dei comandi alettoni e diruttori non siano incrociate.

— Verificare che i quattro attacchi alari siano in posizione SBLOCCATO. (pag. 18).

— Verificare che il comando diruttori sia sbloccato.

— Infilare la semiala **destra** in fusoliera tenendola allineata e spingendola verso la fusoliera stessa finchè non sarà completamente serrata.

— Mettere i due attacchi alari in posizione CHIUSO (pag. 18)

— Infilare la semiala **sinistra** e procedere come per la destra, mettere in posizione CHIUSO i due attacchi alari.

— Con un leggero movimento avanti-indietro sulle estremità alari mettere le ghiere dei quattro attacchi alari in posizione BLOCCATO (pag. 18).

— Collegare gli attacchi rapidi degli alettoni e dei diruttori.

— Controllare agendo sulla barra che gli alettoni funzionino liberamente e a fondo corsa.

— Controllare agendo sulla leva dei diruttori che le palette funzionino liberamente e che la leva vada in blocco.

Piano di coda

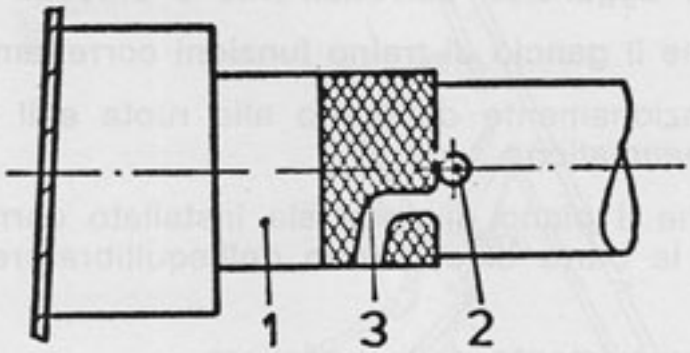
— Posizionare il piano di coda sopra la deriva

— Agganciare l'attacco rapido del Trim e dell'equilibratore

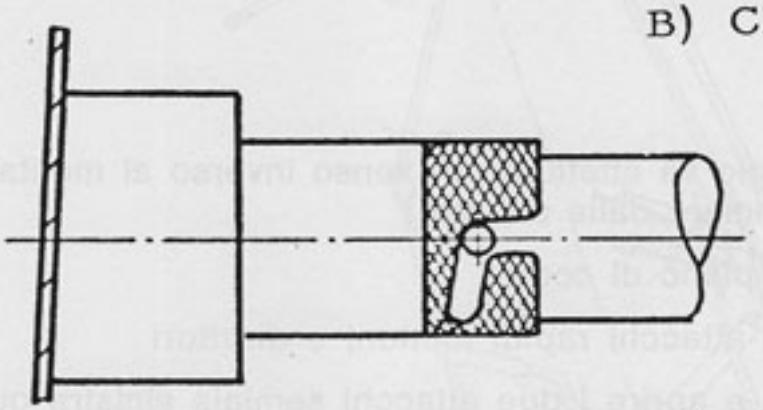
— Infilare il piano nei due spinotti conici e spingere indietro quel tanto che basta per l'inserimento del bullone filettato

— Avvitare a fondo il bullone (con le mani) finchè il piano sarà in posizione appropriata in modo che le frecce di riferimento del piano corrispondano con quelle della deriva.

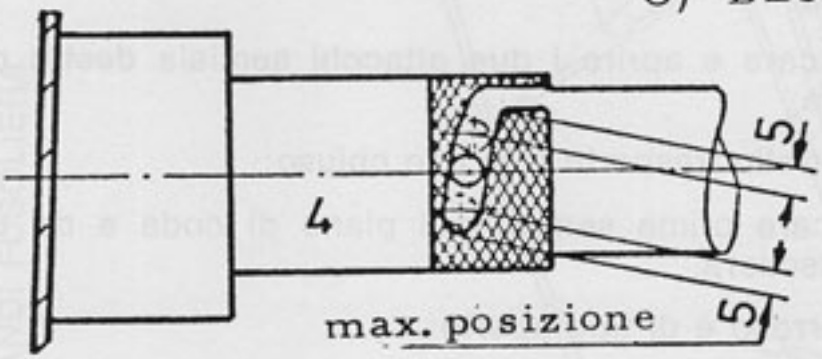
A) SBLOCCATO



B) CHIUSO



C) BLOCCATO



Controlli dopo finito il montaggio

1 controllare che i quattro attacchi alari siano in posizione BLOCCATO

2 Controllare che gli attacchi rapidi degli alettoni e dei diruttori siano agganciati correttamente e bloccati

3 Controllare che il gancio di traino funzioni correttamente

4 Provare il funzionamento del freno alla ruota e il gonfiaggio del pneumatico

5 Controllare che il piano di coda sia installato correttamente e che la barra di comando dell'equilibratore sia collegata.

6 Controllare il movimento della pedaliera.

Smontaggio

Lo smontaggio va effettuato in senso inverso al montaggio e non cominciare dalle ali, ma:

1 Smontare piano di coda

2 Sganciare attacchi rapidi alettoni e diruttori

3 Sbloccare e aprire i due attacchi semiala **sinistra** quindi sfilarla.

4 Sbloccare e aprire i due attacchi semiala **destra** quindi sfilarla

Se il carrello trasporto è di tipo chiuso:

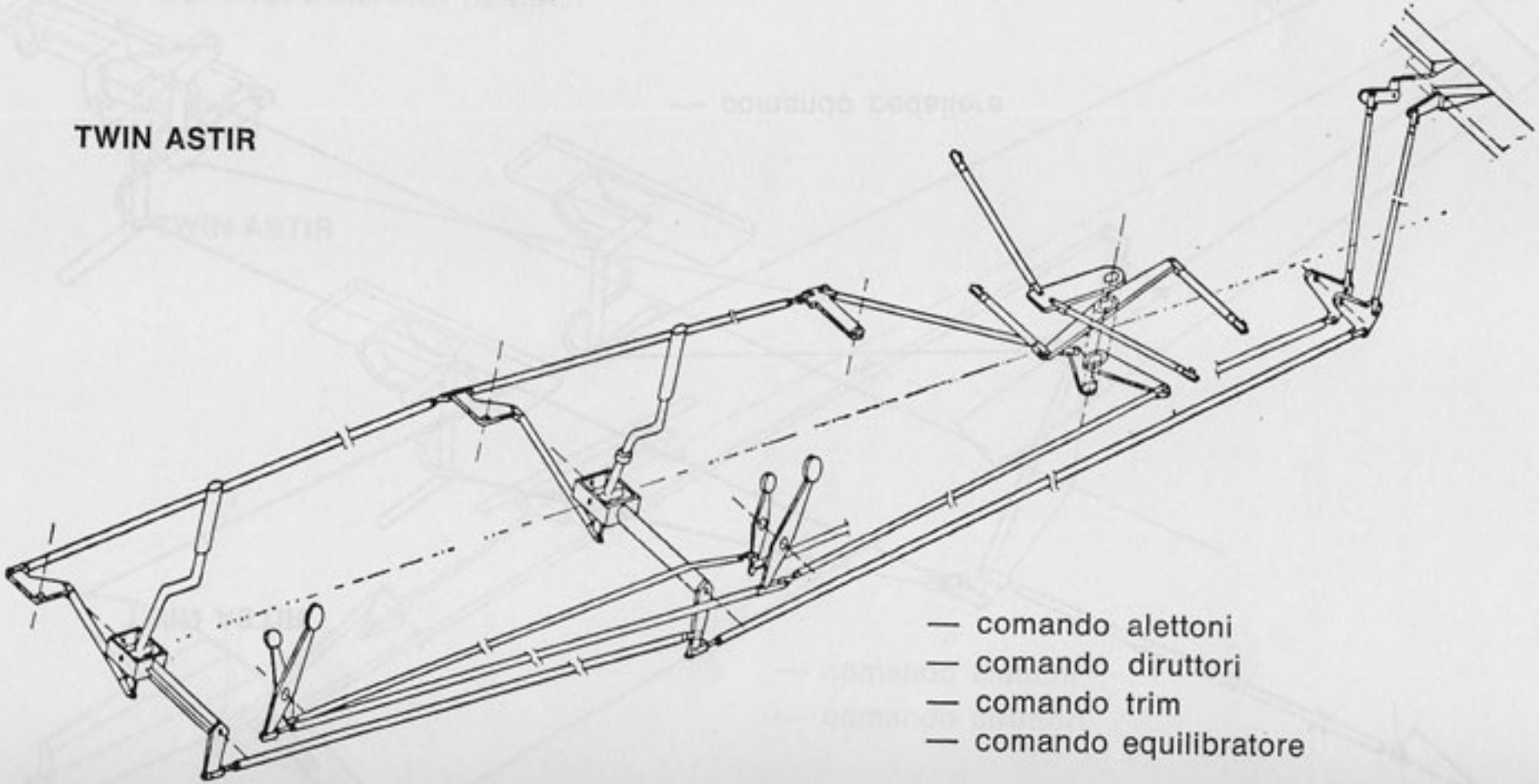
— caricare prima semiali poi piano di coda e da ultimo la fusoliera.

Se il carrello è di tipo aperto:

— caricare prima la fusoliera poi il piano di coda indi le due semiali.

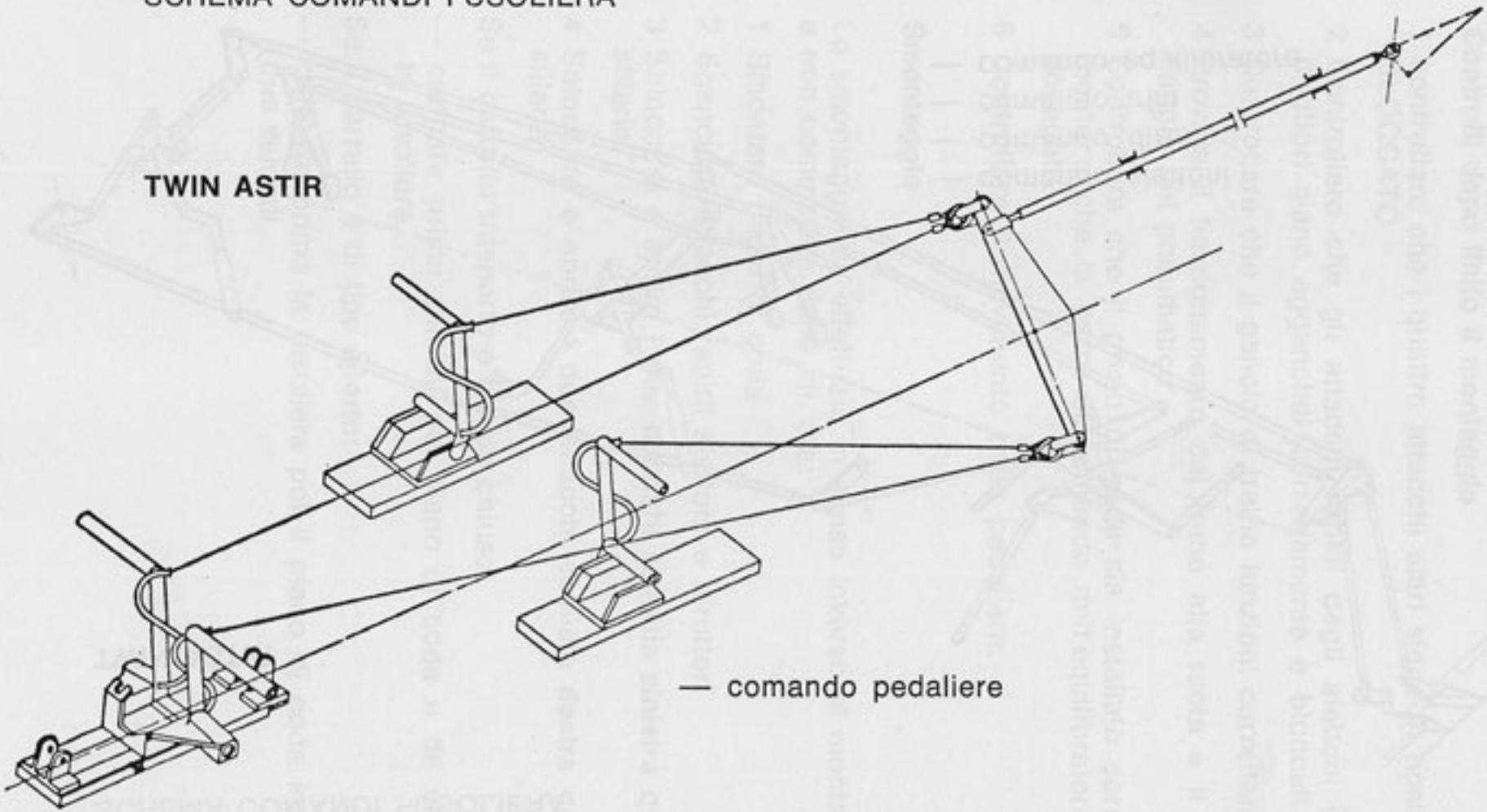
SCHEMA COMANDI FUSOLIERA

TWIN ASTIR



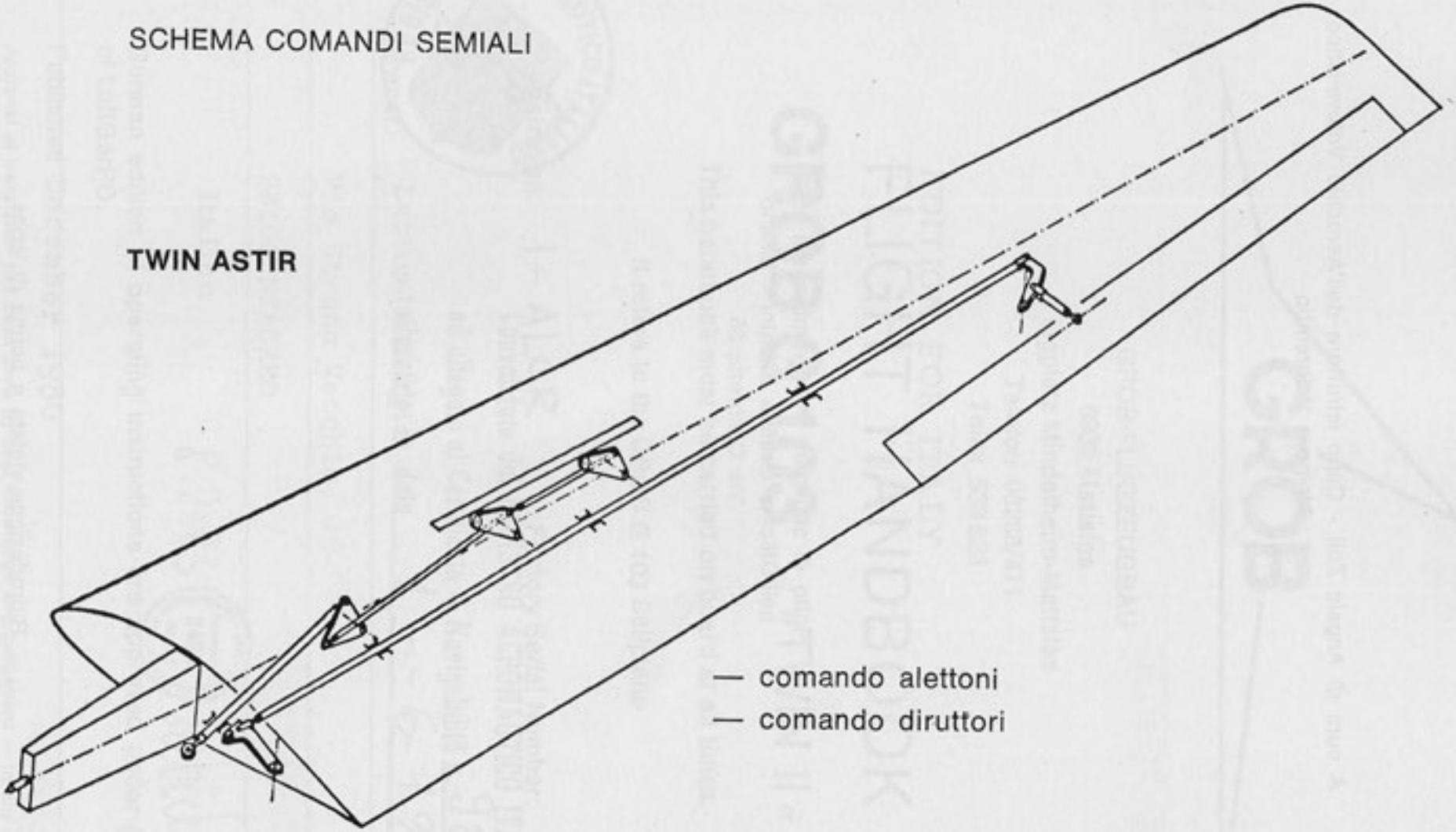
SCHEMA COMANDI FUSOLIERA

TWIN ASTIR



SCHEMA COMANDI SEMIALI

TWIN ASTIR



A cura di Angelo Zoli - Capo istruttore dell'Aeroclub Volovelistico
Alpino - Valbrembo

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EDITION FOR ITALY

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

REGISTRO AERONAUTICO ITALIANO

Registration: I - ALOR Factory Serial Number: 3533

Convalidato dal REGISTRO AERONAUTICO ITALIANO

ed allegato al Certificato di Navigabilità n. 989

rilasciato in data 1 - 6 1984

Owner: Lattuada

Via Strada Vecchia, 19

24100 BERGAMO

Italien 8.2.83

LBA Luftfahrtbundesamt Ausweis-Nr. 2456 Klasse 3

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.

Luftfahrt-Bundesamt Braunschweig

23. Sep. 1982

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	Aerobatic speed (two seat)	7.7.82	
	21a	Check after assembly	7.7.82	
	25	Service Instruction	7.7.82	
		* Rev.1 from 7.7.82: Modification of the handbook in accord with the requirements of R.A.I.		

List of effective pages

Page	Issued	Revision	Page	Issued	Revision
1	Dec.80	7.7.82	26	Dec.80	
1a	" "	7.7.82	27	" "	
2	" "		28	" "	
3	" "				
4	" "				
5	" "				
6	" "				
7	Dec.80	7.7.82			
8	" "	7.7.82			
9	" "				
10	" "	7.7.82			
11	" "	7.7.82			
12	" "				
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14	" "	7.7.82			
15	" "				
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19	" "	7.7.82			
20	" "				
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21	" "				
21a	" "	7.7.82			
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24	" "				
25	" "	7.7.82			

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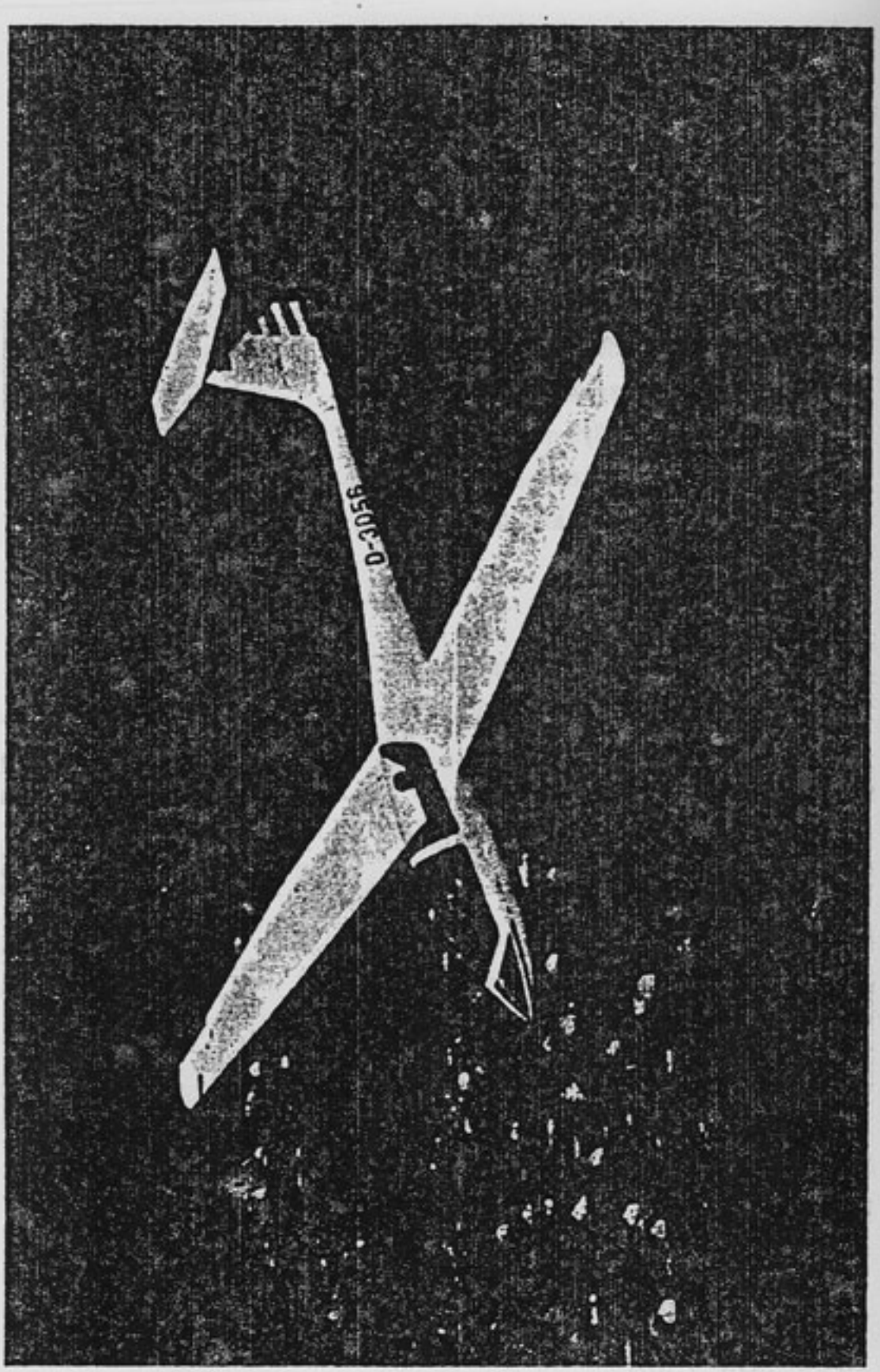
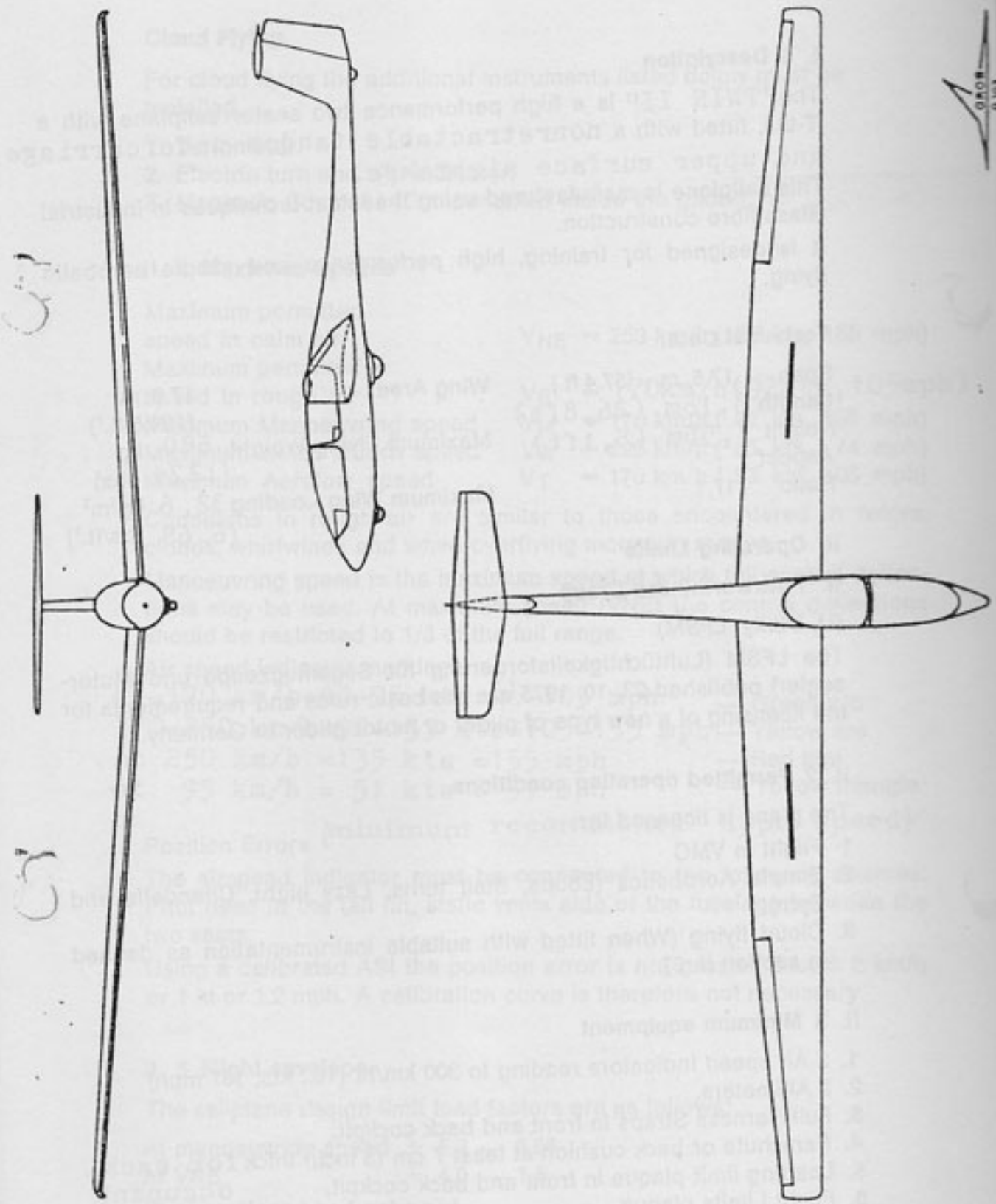


December 1980



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.

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 recommened 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)

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.

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.
Compensate missing weight in front seat through removable ballast in front seat

Date of weighing: carried out by.	Equipment list used for weighing (date)	Empty (Weight) kg/~~lbs~~	Position of cg empty behind reference mm/~~inches~~	Maximum total payload kg/~~lbs~~
2.7.80	2.7.80	382	742	197
27.1.89	26.3.83	390	739	
7.12.91	26.3.83	388	744	198,7
11.03.03	26.3.83	396,8	736	183,2

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.

II. 10 **Weak link strength recommended**

Winch launch and aerotow 600 ± 60 daN 1323 ± 132 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.

III. 2 Canopy Jettison and Emergency Exit

- Pull red handles on right and left of canopy full back simuttaneously.
- 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.

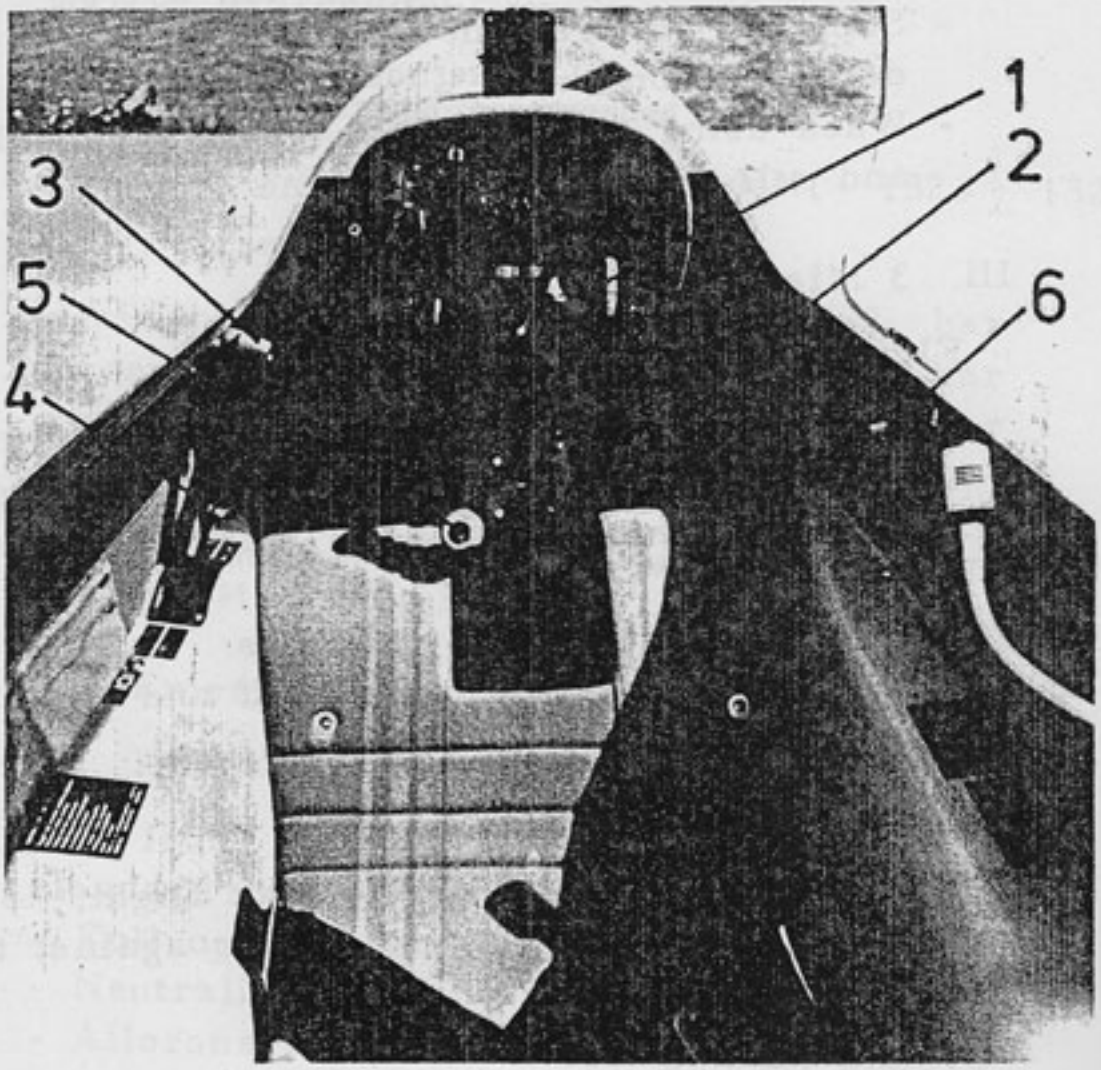
Ground looping

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.

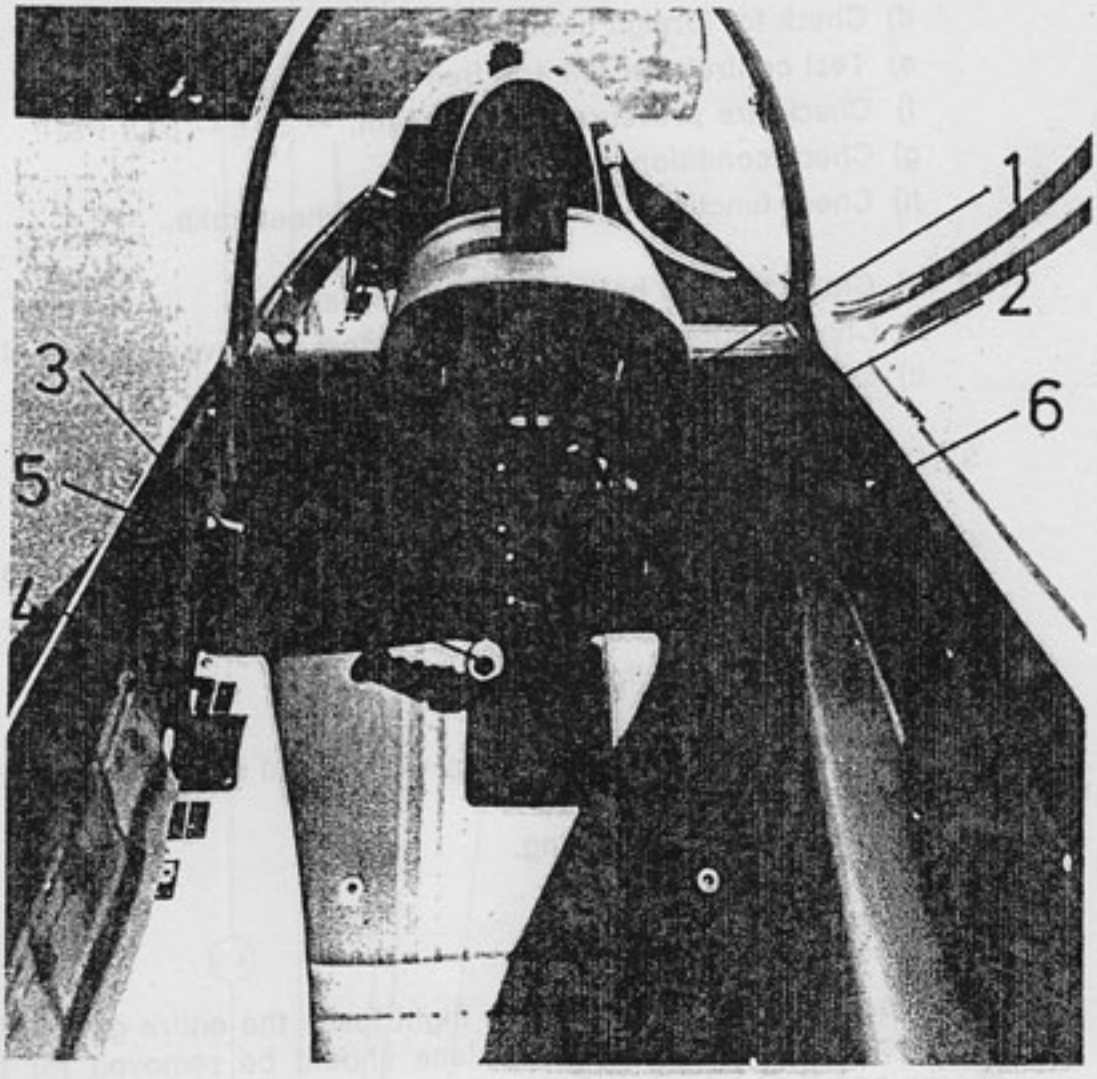


1 Stick
2 Rudder pedals
3 Airbrake lever and wheelbrake
4 Trim lever
5 Release knob
6 Canopy jettison

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
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 including landing gear and undercarriage suspension.
4. Check tail unit for correct assembly and that safety lock is in position.

5. Check condition of the tailskid.

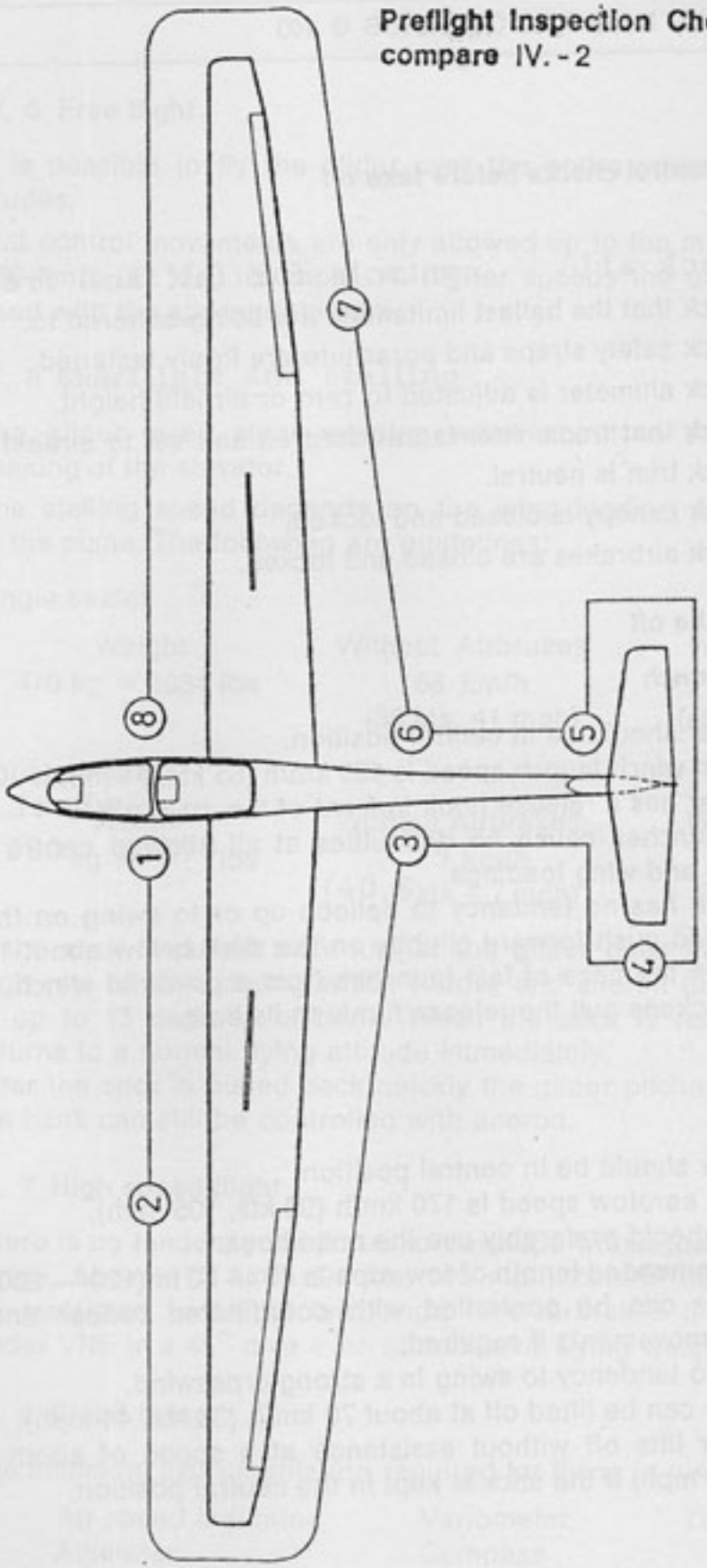
6. Check the pitot tube, total energy venturi and static vents are clean.

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.

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 apply 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 roundont 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 hight (98 km/h; 54 kts; 61 mph).

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

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

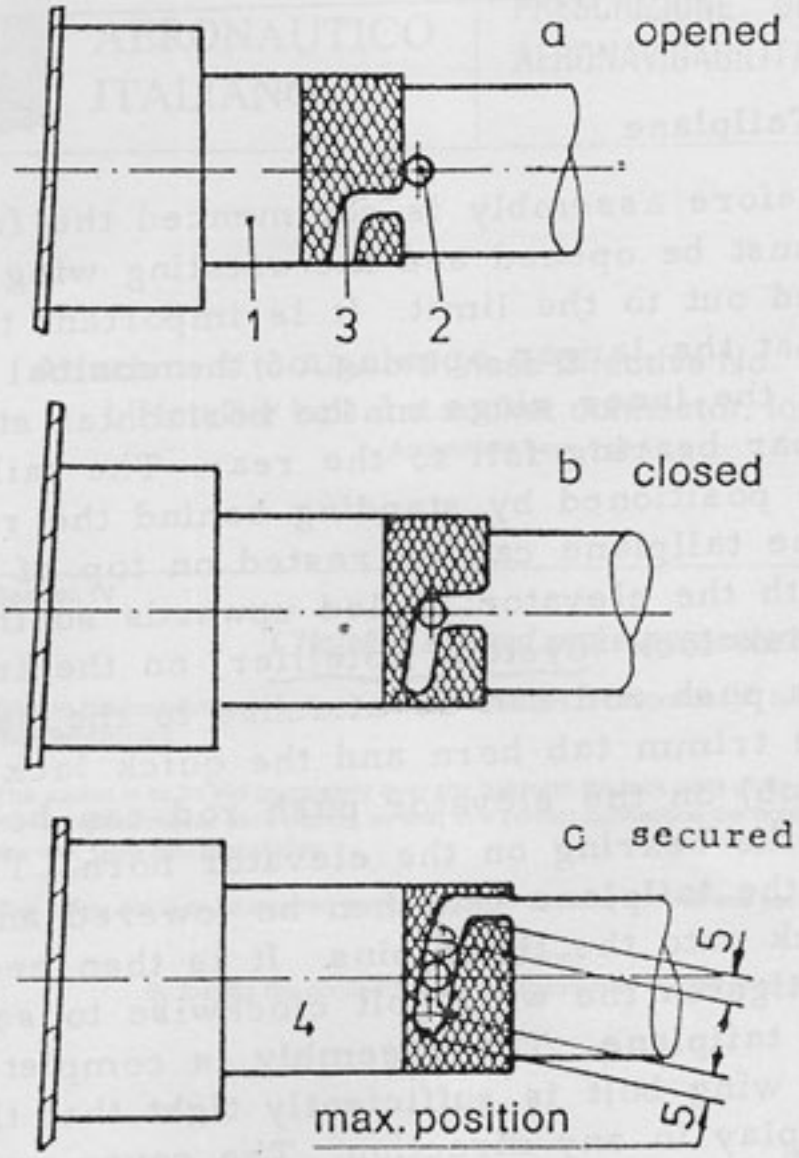
Unlock the 4 main wing fittings in the fuselage. Unlock the air-brakes on the wings. Guide the right wing into the fuselage. The safety catches on the fuselage fittings should now be released, and on gently moving the wingforward and aft it can be heard to snap into place. Next guide the left wing into the fuselage. Move the wing tips up or down so that the pin on the end of the spar 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 wing fittings the safety catches (1) have to be turned so that the pins (2) are pressed to the angled slots.

Moving the wing tip strongly forward and aft enables the ety catches should to be sufficiently turned (4). They should be hand tight and the prins not reach the end of the angled slot.

Check: The red rings on the fuselage connection-rods must be covered by the rotated catches. The catches must be tight.

In the closedbut 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 trimm tab push rod can be attached to the ball on the trimm 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.

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

Section IV

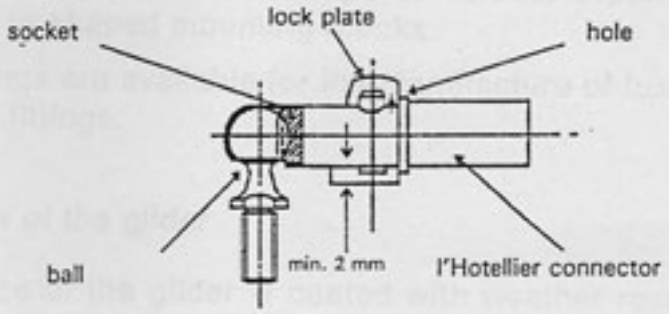
L'Hotellier ball and socket connectors

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.

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 seated and that the elevator and trim tab push-rod an connected, check the 4
6. Rudder movement. markings.

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.

December 1980

Rev. 7.7.82

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.

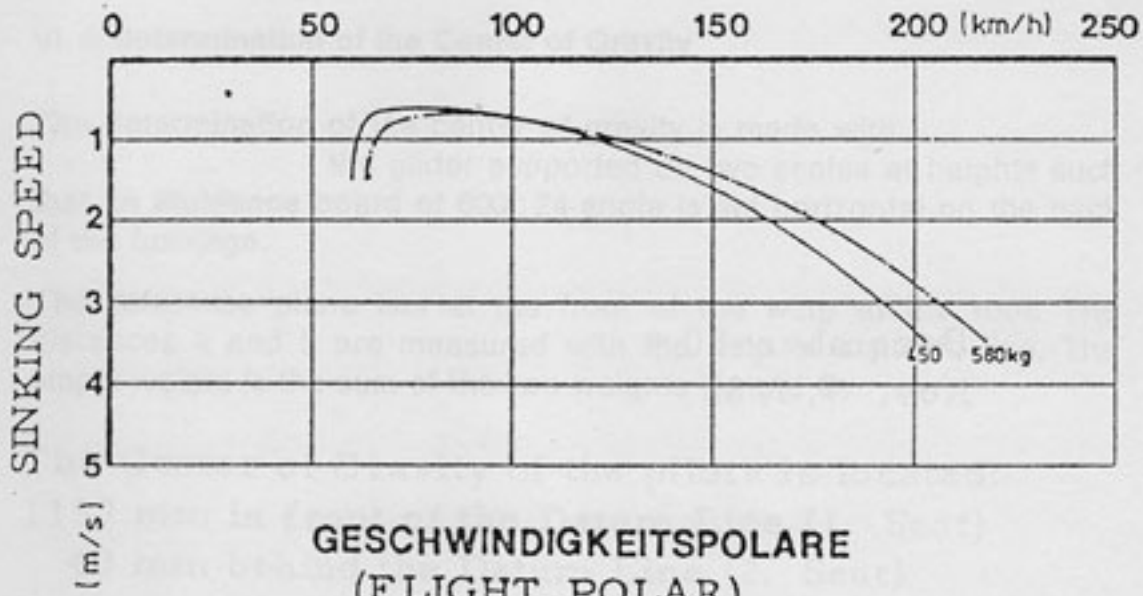
To fill up use ATE hydraulic brake fluid DOT 3.

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)

FLUGGESCHWINDIGKEIT (VELOCITY)



GESCHWINDIGKEITSPOLARE
(FLIGHT POLAR)

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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.

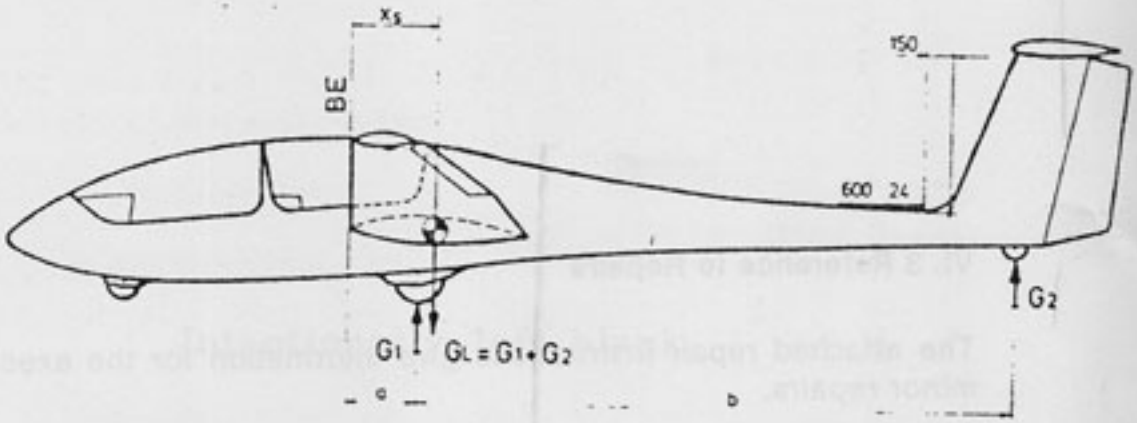
VI. 5 Determination of the Center of Gravity

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.

$$X = \frac{G_2 \times b}{G_L} + a = \frac{\quad}{\quad} + = \quad \text{mm/inches behind Datum Line}$$

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

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.

Genave Italiana snc
GENERAL AVIATION ELECTRONICS ITALIANA
AVIONIC EQUIPMENT • SALES & SERVICE

odello 16

VARIAZIONE PESATA

Elenco equipaggiamenti

AEROMOBILE **GROB G103 "TWIN II"** Marche **I - ALOR**

Variazione equipaggiamenti

Modello	Variazione	Peso ☐ LBS ☒ KG	Braccio ☐ Inch ☒ Mt	Momento ☐ LBS x Inch ☒ Kg x MT
INDICATORE TURN&BANK	A	0,4200	-0,4200	-0,1764
				0,0000
				0,0000
				0,0000
				0,0000
				0,0000
				0,0000
				0,0000
				0,0000
				0,0000
				0,0000
				0,0000
				0,0000
TOTALE		0,4200		-0,1764

A = Aggiunto R = Rimosso

	Peso ☐ LBS ☒ Kg	Momento ☐ LBS x Inch ☒ Kg x Mt
Aeromobile vuoto	396,8000	292,0448
Variazione equipaggiamenti	0,4200	-0,1764
Nuovo peso a vuoto	397,2200	291,8684
Nuovo baricentro	☐ Inch ☒ Mt	0,7347

Operatore *Prast Hubert* Data

CERTIFYING STAFF

Certifying Staff *- Prast Hubert -* 05.07.2005

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Righistraße, 9 via Righi • I-39100 Bozen/Bolzano (BZ) • Mwst.Nr.-P.IVA. IT 00436130215 • Iscr. Reg. Impr. BZ nr. 4801
Tel. 0471 / 203328 • Fax 0471 / 205062 • Internet: http:// www.genave.it • E-Mail: info@genave.it
R.A.I. 041 • JAR 145 Approved

Glasfaser Italiana S.p.A.
I-alor.xls

PESATA AEROMOBILE	I-ALOR	DATA	11-gen-03

	peso kg.	peso p.n.p.
Ala sinistra	94,7	##
Tip sinistra	,	##
Ala destra	94,8	##
Tip destra	,	##
Fusoliera	172,4	172,4
Capottina anteriore	8,2	8,2
Capottina posteriore	7,8	7,8
Piano di coda	16,2	16,2
Timone di direzione	,	,
Accessori	2,7	2,7
Zavorra anteriore	,	,
Zavorra posteriore	,	,
Peso a vuoto	396,8	
	0,4	
Peso parti non portanti		207,3

reazione	anteriore	379,2 Kg
	posteriore	17,6 Kg
braccio m	anteriore	,546 m
	posteriore	4,293 m
peso masimo		580, Kg
peso massimo p.n.p.		400, Kg
carico utile		183,2 Kg

NOTA: carico utile limitato dal peso massimo

Posizioni limite ammissibili del baricentro al peso di 396,8Kg:

Limite anteriore	0,691 m
Limite posteriore	0,744 m
Posizione calcolata	0,736 m

Piano di riferimento longitudinale: Bordo di Attacco alare alla centina di radice
Piano di riferimento orizzontale: Tronco di Coda livellato 600:24

Equipaggiamenti come da lista allegata al maunale di volo

In volo solista il pilota deve occupare il posto anteriore
Qualora il peso del pilota fosse inferiore a 70Kg è obbligatorio l'uso di zavorra

Carico utile in cabina Posto Anteriore (pilota + paracadute) Min. 70Kg Max 110Kg
Carico utile in cabina Posto Posteriore (pilota + paracadute) Max 110Kg
Carico utile in cabina (piloti + paracadute) Max 183,2Kg

E' RESPONSABILITA' DEL PILOTA ACCERTARE CHE L'AEROPLANO SIA CORRETTAMENTE CARICATO

GLASFASER ITALIANA S.p.A. VALBREMBO
APPROVAZIONE JAR 145 IT-M 062

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