FLIGHT MANUAL

GLIDERS

CENTRAIR 101 - 101P - 101A - 101AP

TYPE CERTIFICATE No 171

SERIAL N° REGISTRATION N°

APPROVED BY

LA DIRECTION GENERALE DE L'AVIATION CIVILE (DGAC)

Date of approval: 13 MARS 1991

The flight manual D.G.A.C. consists of all the pages marked "approuveé DGAC" and are coded « A » or non coded

IMPORTANT NOTICE

The practical value of this manual depends entirely upon revisions being implemented.
The revisions are to be written down on the next pages of this section.

At this revision, the application date of the manual is specified at the back side.

THIS DOCUMENT SHOULD BE ON BOARD AT ALL TIMES

Translation has been done by best knowledge and judgement. In any case of doubt the original French document is authoritative.

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	0.4	N.AP	"
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1	1.1	N.AP	Ed. 3
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Note: (1) AP : D.G.A.C. approved
N.AP : Not D.G.A.C. approved

(2) Coded pages wearing at least code 'A'

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March,29 1993
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July,28 1995

EASA APPROVAL

No 2005-303 on 10-01-2005

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1.1 DEFINITION

The Centrair gliders 101- 101P- 101A- 1O1AP are single seat gliders of the standard class.
There are four versions.

Centrair 101	Glider with fixed gear
Centrair lOlP	Glider with fixed gear and removable winglets
Centrair 101 A	Glider with retractable gear
Centrair 101 AP	Glider with retractable gear and removable winglets

The structure is realized in glass fibre reinforced plastic;

The wing has a laminar evolutive airfoil;

The airbrakes extend on the upper surface only;

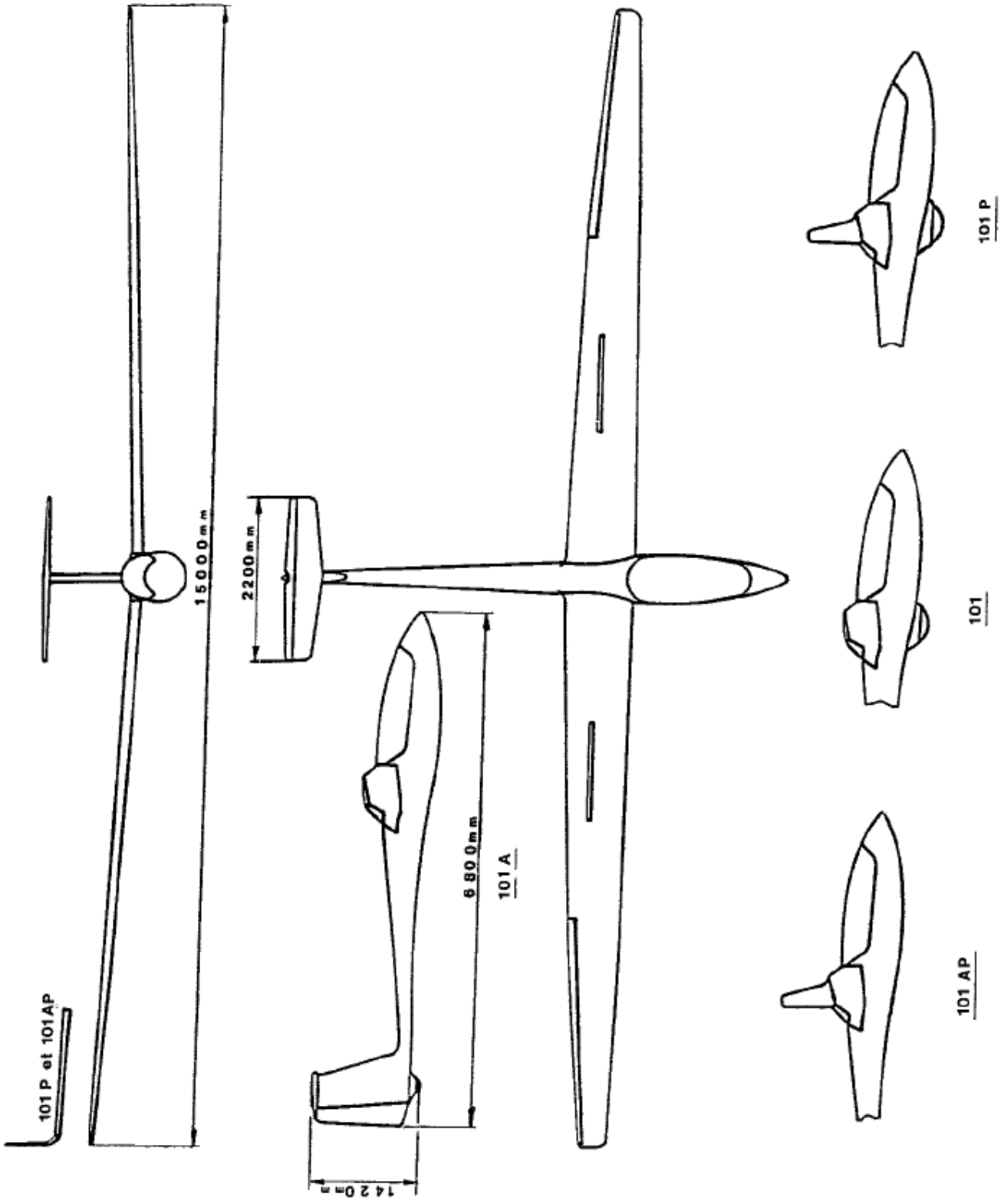
The tail is of the T-type;

All of the external surfaces are protected by white gelcoat;

The glider is constructed for training and competition;

Capacity of the water ballast in the wings: **120 litres.**

1.2. THREE DIMENSIONAL VIEWS



1.3 TERMINOLOGY

1.3.1 SPEED DEFINITIONS

Vc	**Conventional speed**, meaning airspeed read on the speed indicator and corrected for instrument and installation errors. The Vc is the true airspeed in standard atmosphere at sea level.
Vi	**Indicated airspeed**, meaning airspeed read on the speed indicator as installed in the glider.
Va	**Manoeuvring airspeed**, meaning maximum speed at which maximum deflection of the ailerons and rudder can be applied.
Vne	**Never exceed speed.** At this speed, control deployment may not exceed 1/3 of the maximum deflection.
vra	**Maximum airspeed in rough weather**. Do not exceed this speed unless in calm air and with good reason. Examples of rough air: Wave rotors, thunderclouds, mountain ridges, ...
Vt	**Maximum aero tow speed.**
Vw	**Maximum winch launch speed.**
vle	**Maximum speed with gear down.**
Vlo	**Maximum speed for gear handling.**

1.3.2 SIGNIFICANCE OF MASSES

Empty equipped mass

Is the mass of the new glider with the mandatory equipment.

This mass may vary by a few kg from one Pégase to another compared to the value given in § 2.6 on p2.4.

For a repaired glider the fixed weights, designated to correct the deficiency in the centre of gravity, are included in the new empty equipped mass.

For a given glider, the empty equipped mass of the glider, together with the additional equipment, is summarized on the weight and balance report.

Useful load

This includes:

- The mass of the pilot equipped with a parachute.
- The mass of the CoG adaptation ballast weights (for equipped pilots weighing less than 70kg)
- The mass of optional equipment.

The maximum allowed useful load, indicated in section 2, equals the difference between the maximum mass of the non lifting parts and the empty equipped mass.

It matches an average new glider.

For a given glider, the maximum allowed useful load is indicated on the weight and balance report.

NB: The water in the wing's water ballast tanks isn't part of the useful load.

Maximum mass with water ballast load

This mass can be achieved without the water ballasts being completely filled.
This is to be taken into account while filling.

2.1 CERTIFICATION BASE

The Centrair gliders **101 - 101P - 101A - 101AP** where given The type certificate N°171, category "U" (Utility) in accordance with JAR 22, edition April 80 regulations on June 3rd 1982.

2.2 OPERATING LIMITS

The operation of the glider is approved only for

Daylight VFR

THE FOLLOWING ARE PROHIBITED:

- Aerobatic flights, spins included.
- Winch launch using the forward hook.
- Flights with full water ballast tanks at negative Celsius temperatures.
- Flights with the wings in asymmetrical configuration. (water ballast load or winglets)
- The use of cable hooks other than those specified by the hook manufacturer.

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2.3 SPEED LIMITS IN INDICATED AIRSPEED (V_I)

- Never exceed speed without winglets	**Vne**	250 km/h	135 kts
*1 - Never exceed speed with winglets	**Vne**	220 km/h	119 kts
- Manoeuvring speed (a) (b)	**Va**	170 km/h 163 km/h	92 kts 88 kts
- Allowed rough air speed b)	**Vra**	170 km/h 163 km/h	92 kts 88 kts
- Maximum aero towing speed (b)	**Vt**	170 km/h 163 km/h	92 kts 88 kts
- Maximum winch launch speed	**Vw**	120 km/h	65 kts
*2 - Max speed with landing gear down.	**Vle**	170 km/h	92 kts
*2 - max speed for handling the landing gear	**Vlo**	170 km/h	92 kts

*1 applicable for Centrair gliders 101 P - 101 AP.
*2 applicable for Centrair gliders 101 A - 101 AP.

(a) Gliders that have received major modification 101-02.
(b) Gliders that haven't received major modification 101-02.

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2.4 **AIRSPEED MARKINGS**

Red radial line: (Vne without winglets) 250 km/h - 135 kts
Red triangle with "p": (Vne with winglets) * 220 km/h - 119 kts
Yellow arc: range to use with caution in calm air. start arc: (a) 170 km/h - 92 kts (b) 163 km/h - 88 kts end arc: 250 km/h - 135 kts without winglets * 220 km/h - 119 kts with winglets
Green Arc: normal operating range start arc: (c) 88 km/h - 48 kts (d) 80 km/h - 43 kts end arc: (a) 170 km/h - 92 kts (b) 163 km/h - 88 kts
Yellow Triangle: Lowest advised approach speed 97 km/h – 52 kts (Empty water-ballasts) 90 km/h – 49 kts

* Applicable for Centrair gliders 101 P - 101 AP.

(a) Gliders that have received major modification 101-02.
(b) Gliders that haven't received major modification 101-02.
(c) New marking serial applied starting with glider number 101A0433 and applied to all gliders.
(d) Old markings.

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2.5 LOAD LIMIT FACTORS CALCULATED AT MAXIMUM WEIGHT

- at 70 km/h - 92 kts (Vi) (a)
  163 km/h - 88 kts (Vi) (b)

Maximum positive	n = + 5.3 g
Maximum negative	n = - 2.65 g

- a 250 km/h - 135 kts (Vi) without winglets
- a 220 km/h - 119 kts (Vi) with winglets

Maximum positive	n = + 4.0 g
Maximum negative	n = - 1.5 g

* Applicable for Centrair gliders 101 P - 101 AP.

(a) Gliders that have received major modification 101-02.
(b) Gliders that haven't received major modification 101-02.

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2.6 MASSES

2.6.1. MASS OF THE GLIDERS WITH OR WITHOUT WATER BALLAST EQUIPMENT.

		101 - 101 A	101 P – 101 AP	
			No Winglets	**Winglets**
Maximum authorized mass (including water ballast)		**455 kg**	**455 kg**	**455 kg**
Maximum mass of the non lifting parts		**235 Kg**	**235 Kg**	**235 Kg**
Empty equipped mass (approx.)	Without water ballast equipment	**245 kg**	**247 kg**	**250 kg**
	With water ballast equipment	**251 Kg**	**253 kg**	**265 kg**
Useful load (approx.)	Without water ballast equipment	**118 kg**	**118 kg**	**118 kg**
	With water ballast equipment	**117 kg**	**117 kg**	**117 kg**

2.6.2. MAXIMUM LUGGAGE MASS

15 kg Secured

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2.7 CENTER OF GRAVITY

2.7.1. LIMITS OF THE CENTRE OF GRAVITY.

230 to 375 mm behind datum

References:

The leading edge at 20 mm outwards of the root

Levelling:

A slope of 45/1000 placed on the upper side of the rear fuselage boom so the top of the slope is horizontal.

2.7.2. REGAINING OF THE CENTER BY USING REMOVABLE WEIGHT DISCS.

In case there's no specific calculation for the glider, act as mentioned in section 6 or the weighting report, and use the following removable weight table. (mass of one weight is 1kg ±20g)

Number of weights	Minimum mass of the equipped pilot (kg)
0	70
1	67
2	65
3	63
4	61
5	59
6	57
7	55

Note: For a glider equipped with optional equipment use the information about masses and empty centre of the glider (cfr section 6 or weight and balance report) to determinate a new table of removable weights based on the information given in the section 6.

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2.8. MANDATORY EQUIPMENTS

- Airspeed indicator
- Altimeter
- Variometer
- Slip indicator

} connections: See wiring diagram page 7.4

- Compass

See the list of equipments in section 6

2.9. MATERIALS TO LAUNCH

Aerotow cable

- Maximum nominal resistance 600 kg = 590 daN
- minimum length 30 m

Winching cable

- Maximum nominal resistance (weak link) 600 kg = 590 daN

2.10. LIMITATIONS PLACARDS AND PICTOGRAMS

2.10.1. POSITION OF THE PLACARDS AND PICTOGRAMS

PEGASE old model:

See figure A page 2.7

PEGASE model 90:

See figure B page 2.8

(See Legend paragraphs 2.10.2 and 2.10.3.).

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Figure A : **PEGASE OLD MODEL**

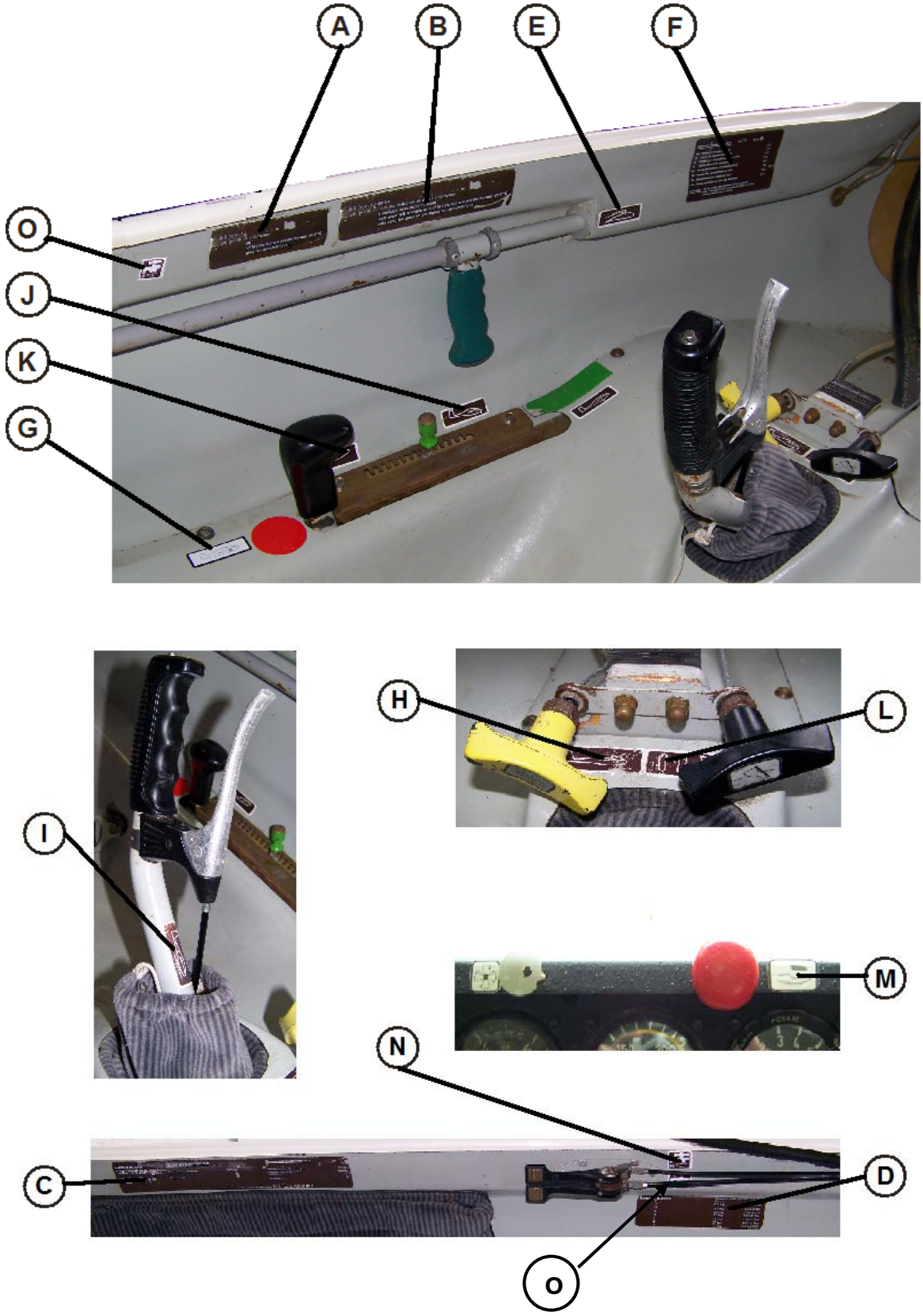
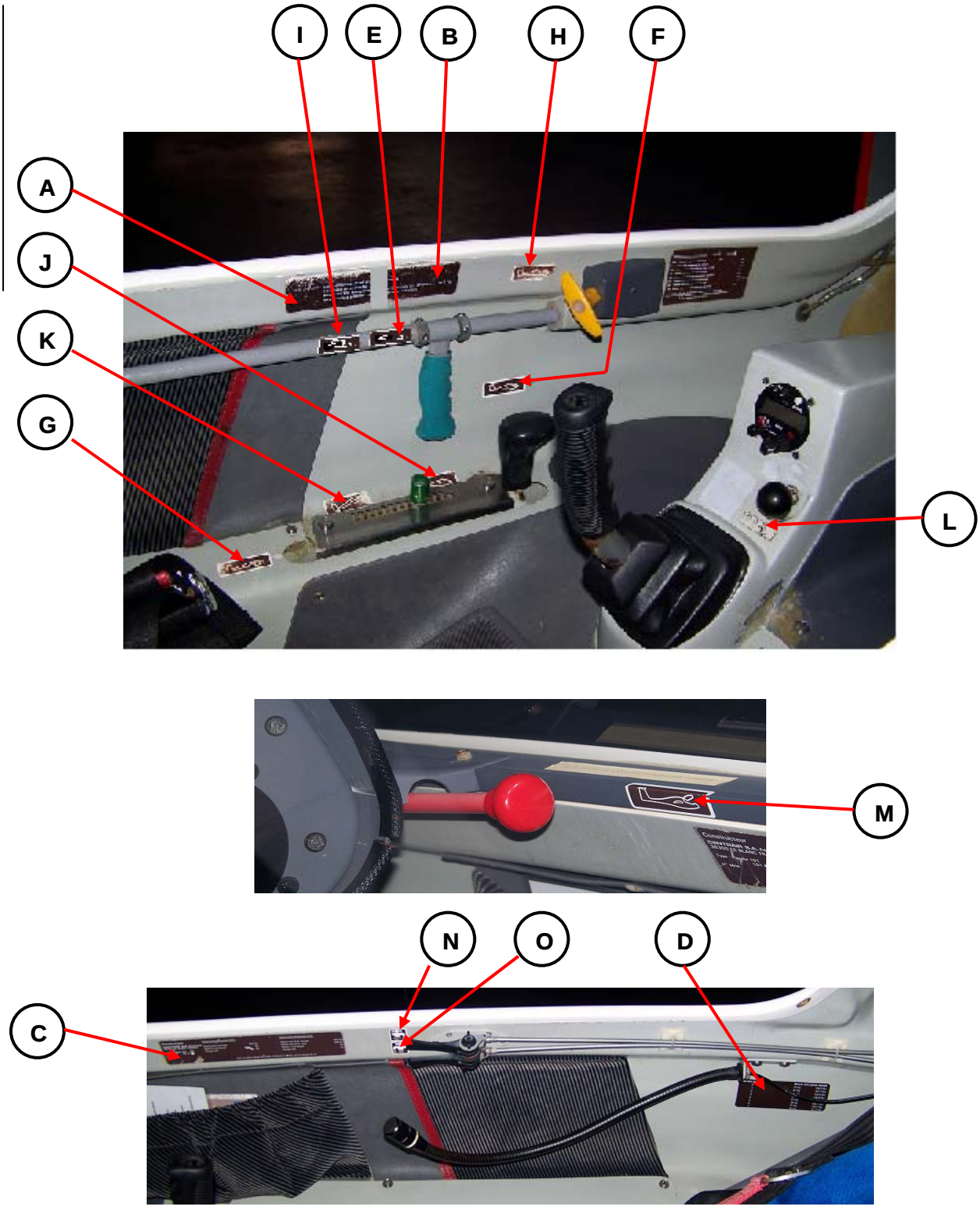


Figure B : PEGASE MODEL 90



2.10.2. LIMITATION PLACARDS

Type A **: OPERATING LIMITS**

Daylight VFR allowed.
Are prohibited:
- Aerobatic manoeuvres, spins included.
- Winch launching by the forward hook.
- Flights with fully loaded water ballasts by negative Celsius temperatures
- Flights with the wings in asymmetrical configuration.

Typ B : SPEED LIMITATIONS

Speed limits (Vi in km/h)	**No winglets**	**(*) Winglets**
Vne Speed never to exceed	250	220
Va manoeuvring speed	170 (a) 163 (b)	170 163
Vra Maximum speed in rough air	170 (a) 163 (b)	170 163
Vt Maximum aerotow speed	170 (a) 163 (b)	170 163
Vw Maximum winch launch speed	120	120
Vlo Maximum speed to operate the landing gear	170	170
Vle Maximum speed gear down	170	170
Vbs Maximum speed breaks out	250	220

(*) on gliders 101 P - 101 AP only.

(a) Gliders that have received major modification 101-02.
(b) Gliders that haven’t received major modification 101-02.

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Type C : MASS LIMITS

Maximum allowed mass : 455 kg Empty equipped mass : zzz kg (for water ballast use, see the flight manual)	
Min. pilot mass (*)	**Max. pilot mass (*)**
Xxx kg	**Yyy kg**
(*) mass of the pilot + all supplemental equipments	

xxx, yyy et zzz Kg : Indicated values for each glider as a result of the weighing.

Type D : Centre of gravity table

Number of weights	minimum mass of the equipped pilot (kg)
0	70
1	67
2	65
3	63
4	61
5	59
6	57
7	55

At the right side of the luggage compartment

MAX. LUGGAGE WEIGHT
15 kg secured

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2.10.3. **PICTOGRAMS**

type E		AIRBRAKES
type F		LANDING GEAR DOWN
type G		LANDING GEAR UP
type H		CABLE RELEASE
type I		WHEELBRAKE
type J		TRIM NOSE HEAVY (TRIM DOWN)
type K		TRIM TAIL HEAVY (TRIM UP)

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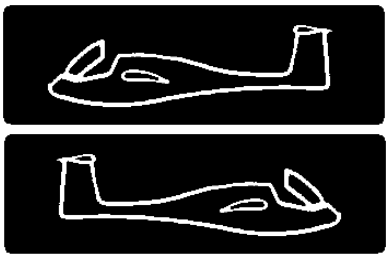
type L		PEDAL ADJUSTMENT
Type M		CANOPY JETTISON
Type N		RELEASE WATER-BALLAST LEFT
Type O		RELEASE WATER-BALLAST RIGHT
In front of the Red handles on each side of the canopy		CANOPY RELEASE
At the left side of The gray ventilation knob		VENTILATION

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3.1. STALL RECOVERY

1) Stick to the front.
2) Smoothly pull back.

The loss of height is less than 30 m (100 feet).

3.2. SPIN RECOVERY

1) Full rudder pedal opposite to the rotation direction.
2) Stick to the front.
3) Ailerons in neutral position.
4) Smoothly recover at a speed less than V_{NE}.

Note: - The opening of the airbrakes is allowed up to V_{NE}. Pay attention when unlocking the airbrakes at high speed.

- The spin recovery varies depending on the load (mass and CoG).
The recovery is always accomplished in less than one turn and the height loss is maximum 80 m. (265 feet)

3.3. CANOPY JETTISON

3.3.1 JETTISON OF THE HINGED CANOPY.

1) Move the two red handles located at both sides of the canopy (normal opening) forward.
2) Pull the round red coloured knob situated on top of the instrument panel.
3) Push the canopy upwards.

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3.3.2 JETTISON OF THE UNHINGED CANOPY.

1) Move the two red handles located at both sides of the canopy (normal opening)forward.

2) Push the canopy upwards.

3.4. BAIL OUT

1) Canopy jettison as described above.
2) Release the seatbelts.
3) Bail out to the most favourable side in order to avoid the tail section.
4) Open the security parachute at an sufficient distance away from the glider.

3.5 Various

On certain gliders, aileron vibrations, manifested by maintained stick oscillations can appear at full water ballast load and specific speed of 120-130km/h during aerotow and released stick.
In this case, hold the stick and empty the water ballasts.
The user wishing to solve this phenomenon should refer to the maintenance manual, **section 4, paragraph 4.2.**

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4.1. PRE FLIGHT INSPECTION

1) Open the canopy;
2) Verify mass and CoG;
3) Number of installed weights and securing (*)
4) Battery capacity;
5) Radio check;
6) Inspection of the rudder connections and deployment of the control surfaces;
7) Inspection of the airbrake deployment and locking;
8) Inspection of the speed indicator;
9) Inspection of the seatbelts;
10) Inspection of the main pins (locking hook);
11) Canopy lock (airbrakes remain extended);
12) Condition of the right wing (aileron attachment points) and wingtip locks (gliders Centrair 101 P - 101 AP);
13) Condition of the fuselage behind the wing section;
14) Remove the tail dolly;
15) Inspection of the tightness of the tailplane bolt.(constructors key);
16) Inspection of the elevator connection (for manually hookup connection version);
17) Condition of the tailplane;
18) Condition of the rudder;
19) Condition of the left wing (aileron attachment points) and wingtip locks (gliders Centrair 101 P - 101 AP);
20) Condition of the landing gear and gear doors (No unfamiliar objects);
21) Inspection of the parachute;
22) Inspection of the cable release mechanism;

(*) IMPORTANT: After lead disc weights have been installed the butterfly nut should be inspected before each take off and the security pin must be installed.
If the pilot's weight is more than 85Kg the lead discs must be removed.

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4.2. INSPECTION AFTER RIGGING

- Inspection of the engaged safety lock on the main pins and tight connection of the tailplane.
- make sure of the right connection of all of the controls. (See the instructions in section 8).

4.3 PEDALS ADJUSTMENT

- To move pedals forward: Pull the black knob at the right side of the stick bottom and push the pedals forward. Release the knob and push on the pedals to secure.

- To move pedals back: Don't push on the pedals. Pull the black knob at the right side of the stick bottom witch moves the pedals backwards. Release the knob and push slightly on the pedals to secure.

4.4. SEAT BACK ADJUSTMENT

- An adjustable seat back is installed. Adjust it for each pilot and verify that the two locking pins are well in place.

- A head rest is installed on the seat back and can optionally be adjusted.

  * forward-backward adjustment:
    Unlock by pushing to the right.

  * Height adjustment: a vertical pressure allows adjusting the height.

4.5. COCKPIT VENTILATION AND CANOPY DEFROSTING

Two ways of obtaining ventilation:

- Use of the command on the instrument panel (pull to open)

- Use of the window in the canopy

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4.6. CABLE HOOKUP

The use of an TOST hook is mandatory. The emplacement of the hook needs a particular attention when connecting the cable into the hook.
By applying a forward cable tension the correct hookup can be checked.

4.7. BEFORE TAKE OFF

- Commands: free deployment and in the right direction.
- Airbrakes closed and locked
- Trim adjusted
- Canopy closed and locked
- Seat back, seatbelts, pedals adjusted
- Altimeter set (QFE, QNH)
- Airspeed indicator, indication zero
- Ventilation closed

4.8. TAKE OFF

If, for any reason the centreline of the towed glider differs by more than approx. 20° relative to the cable direction, it is necessary to release immediately.

This procedure is a safety rule caused by the positioning of the hook near the centre of gravity.
It is necessary that the runway borders are cleared before take off.
If the glider is equipped with a forward hook, it is recommended that this hook is used for aero towing.

4.9. AEROTOWING

During an aerotow with the rear hook (CoG), the landing gear must stay down during the whole towing.
The recommended speed for aero towing is 120 km/h (65 kts).

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4.10 WINCH LAUNCHING

Because of the CoG hook position, the landing gear may only be retracted after the cable has been released.

In case of strong wind, it is advised to perform winch launching with full water ballasts.

The recommended speed for winch launch is 110 km/h (60.5Kts)

Note: Winch launches by the forward hook are PROHIBITED

4.11. LANDING

- Lower the gear at an altitude witch guarantees a safe landing gear operation

- The final is done at an advised speed of 97 km/h (52 kts)(This speed does not take in account the wind nor the load).

- The glide ratio is not more than **5** when:
  - Airbrakes fully extended.
  - Indicated airspeed: **97 km/h (52 kts).**

4.12. CROSS COUNTRY AEROTOW

At the maximum towing speed **Vt = 170 or 163 km/h (92 ou 88 kts)** (see § 2.3) and in rough air it is recommended to put:
- Landing gear down.
- Trim nose heavy.

If the glider catches up the tug plane, partially extend the airbrakes (pay attention when unlocking) or place the glider in a small side slip position.

4.13. FLIGHT IN RAIN OR HAIL

Water or ice might stay on the wings surface and decrease the aerodynamic performances of the glider. It is necessary to take this into account during flight (Reduction of the L/D), and during final where the speed has to be raised by about 10 km/h (5 kts).

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4.14. FILLING OF THE WATER BALLAST SYSTEM (when equipped)

4.14.1 METHOD FOR MANUAL CONNECTION

- Position the glider with the wing up.
- Open the water release valve of the upper wing.
- Connect into the drain opening, located behind the landing gear and at the upper wing side, a flexible gutter of corresponding diameter.
- Connect a funnel onto the other end of the gutter and perform the filling.
- After filling the needed quantity of water close the valve.
- For the other wing, handle likewise.

DON'T EVER PERFORM A FILLING UNDER PRESSURE

NB : If the water ballast tanks can be filled without exceeding the maximum authorised mass **(cf. table page 4.9)**, take off with completely filled tanks is recommended to avoid a distortion in the equilibrium.

Note: When the water release handles are located both at the left and the right side of the cockpit:

The **right handle** opens the **left ballast**
The **left handle** opens the **right ballast**

When they are on top of each other at the right side of the cockpit:

The **upper handle** opens the **left ballast**
The **lower handle** opens the **right ballast**

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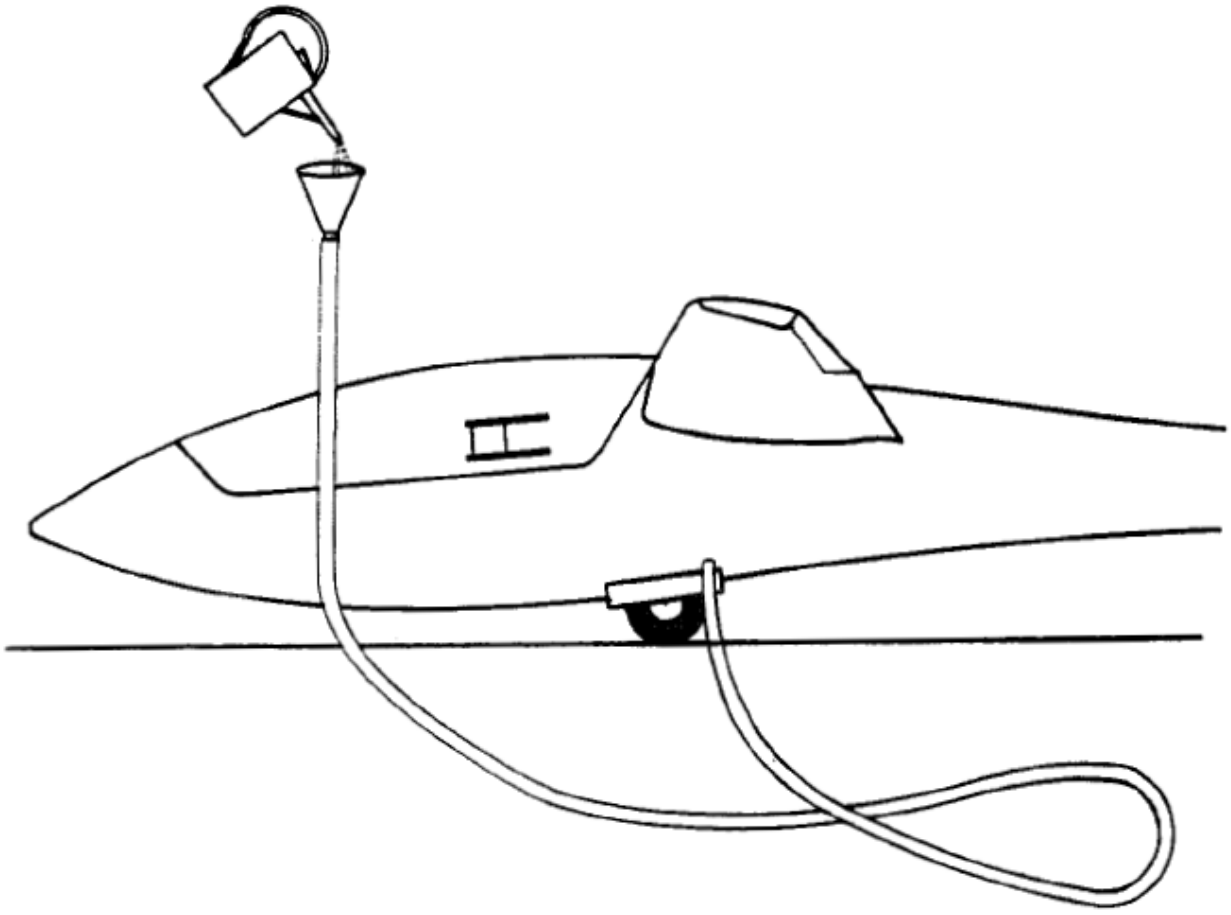
4.14.2 DRAWING WATER BALLAST FILLING OF A MANUAL CONNECTED SYSTEM



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4.14.3 METHOD FOR AUTOMATIC CONNECTED SYSTEM

- Position the glider with the wing up.

- Open the water release valve of the upper wing.

- Connect into the drain opening, located at the intrados of the upper wing, a flexible gutter of corresponding diameter.

- Connect a funnel onto the other end of the gutter and perform the filling.

- After filling the needed quantity of water close the valve.

- For the other wing, handle likewise.

DON'T EVER PERFORM A FILLING UNDER PRESSURE

NB : If the water ballast tanks can be filled without exceeding the maximum authorised mass **(cf. table page 4.9)**, take off with completely filled tanks is recommended to avoid a distortion in the equilibrium.

Note: When the water release handles are located both at the left and the right side of the cockpit:

The **right handle** opens the **left ballast**
The **left handle** opens the **right ballast**

When they are on top of each other at the right side of the cockpit:

The **upper handle** opens the **left ballast**
The **lower handle** opens the **right ballast**

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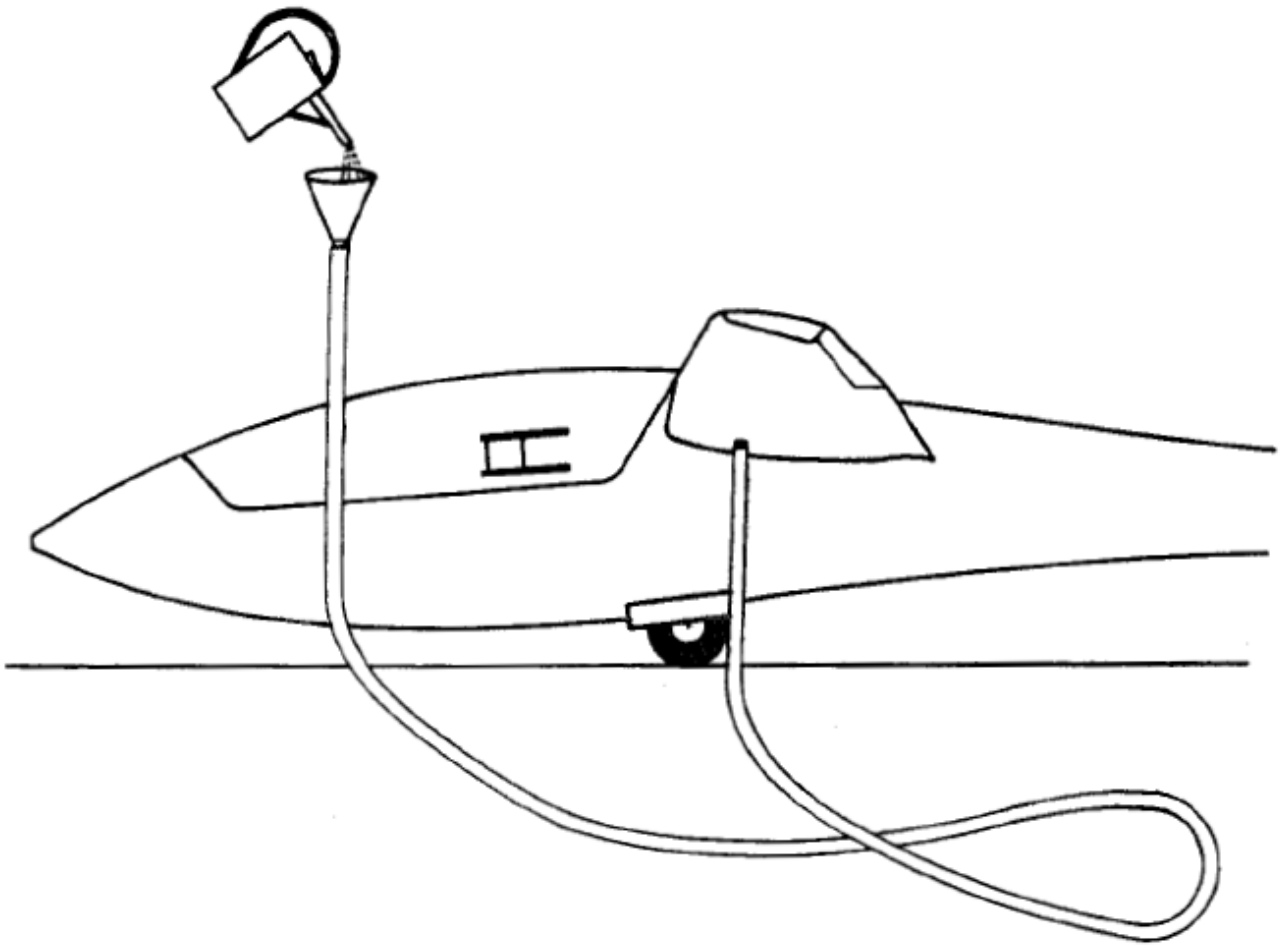
4.14.4 DRAWING FILLING WATER BALLAST WITH AUTOMATIC CONNECTION



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4.14.5. MAXIMUM ALLOWED WATER QUANTITY

The maximum authorised mass should never be exceeded.
To estimate the maximum allowed water quantity refer to the following table.

Water quantity (liter)		**Useful load (kg)**					
		65	75	85	95	105	115
Empty mass of the glider	230	full	full	full	full	full	110
	240	full	full	full	full	110	100
	250	full	full	full	110	100	90
	260	full	full	110	100	90	80
	270	full	110	100	90	80	70

Maximum capacity of the ballast tanks: 120 liter

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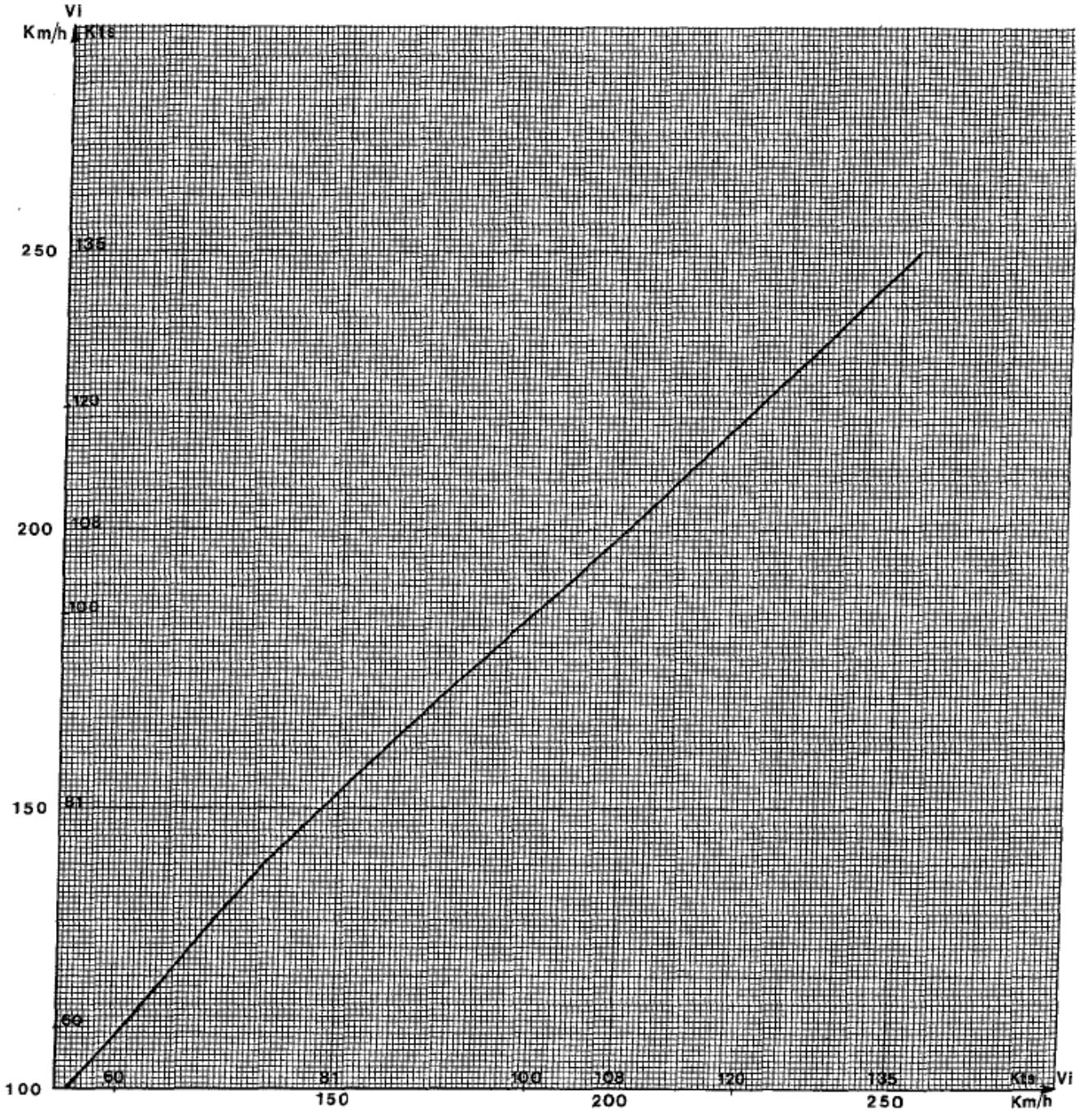
5.1 AIRSPEED INDICATOR CALIBRATION.



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5.2 STALL

The stall speed values in the following table are given for two common operational masses.

- Empty mass with equipment 250 kg + mass 90 kg = 340 kg

- Empty mass with equipment 250 kg + mass 90 kg + water 115 kg = 455 kg

INCLINATION	LOAD FACTOR	STALL SPEED			
		At 340Kg (750lbs)		At 455 Kg (1003 lbs)	
		Km/h	Kts	Km/h	Kts
0°	1	69	37	80	43
30°	1.155	74	40	86	45
45°	1.414	82	44	95	51
60°	2	98	53	113	61

Rev 1

The stall speed is raised by 5 **km/h (2,7 kts)** when the airbrakes are extended.

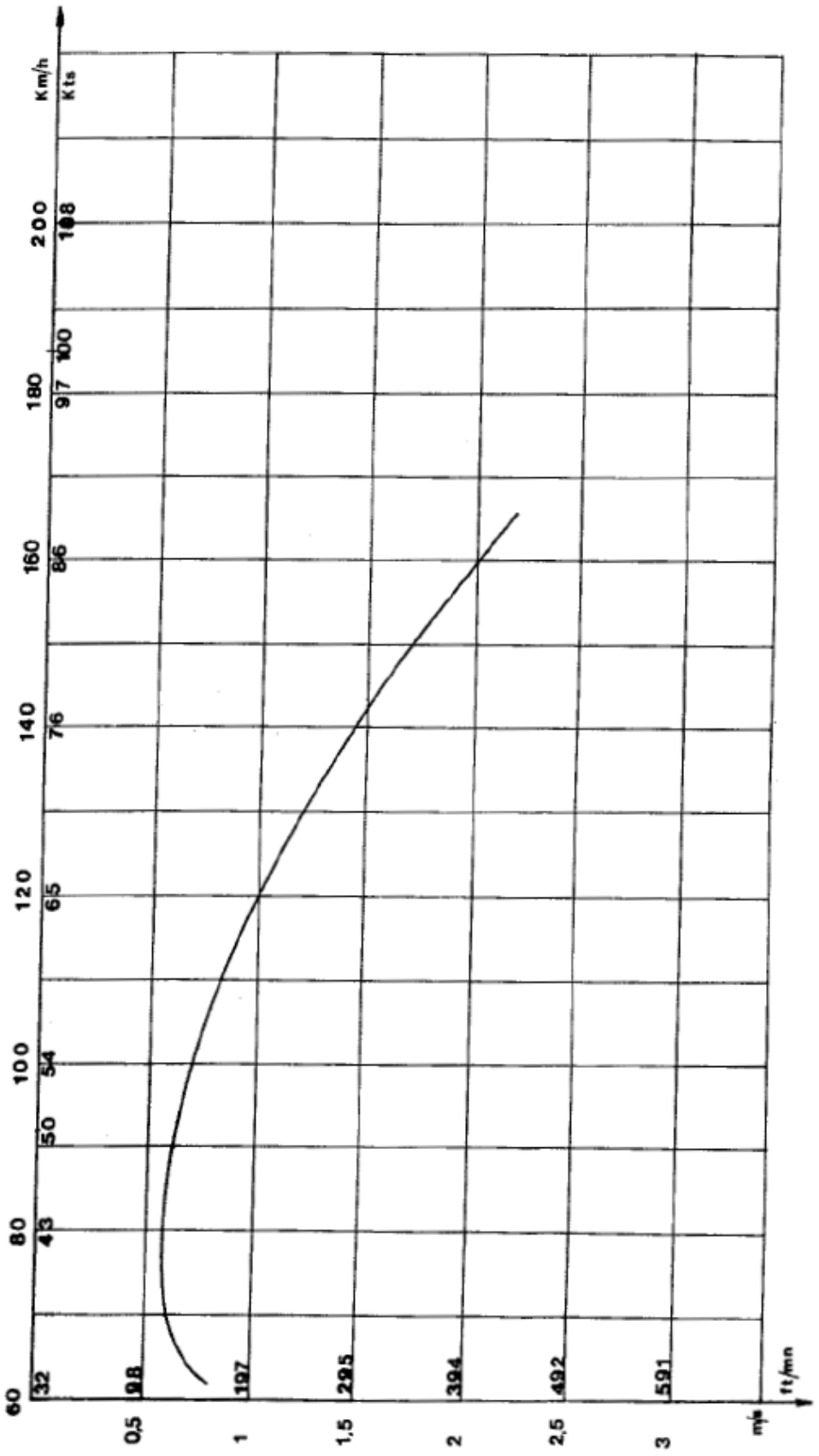
The rudder efficiancy is reduced when approaching the stall speed and a weak vibration of the tail section occurs.

5.3. CROSS WIND

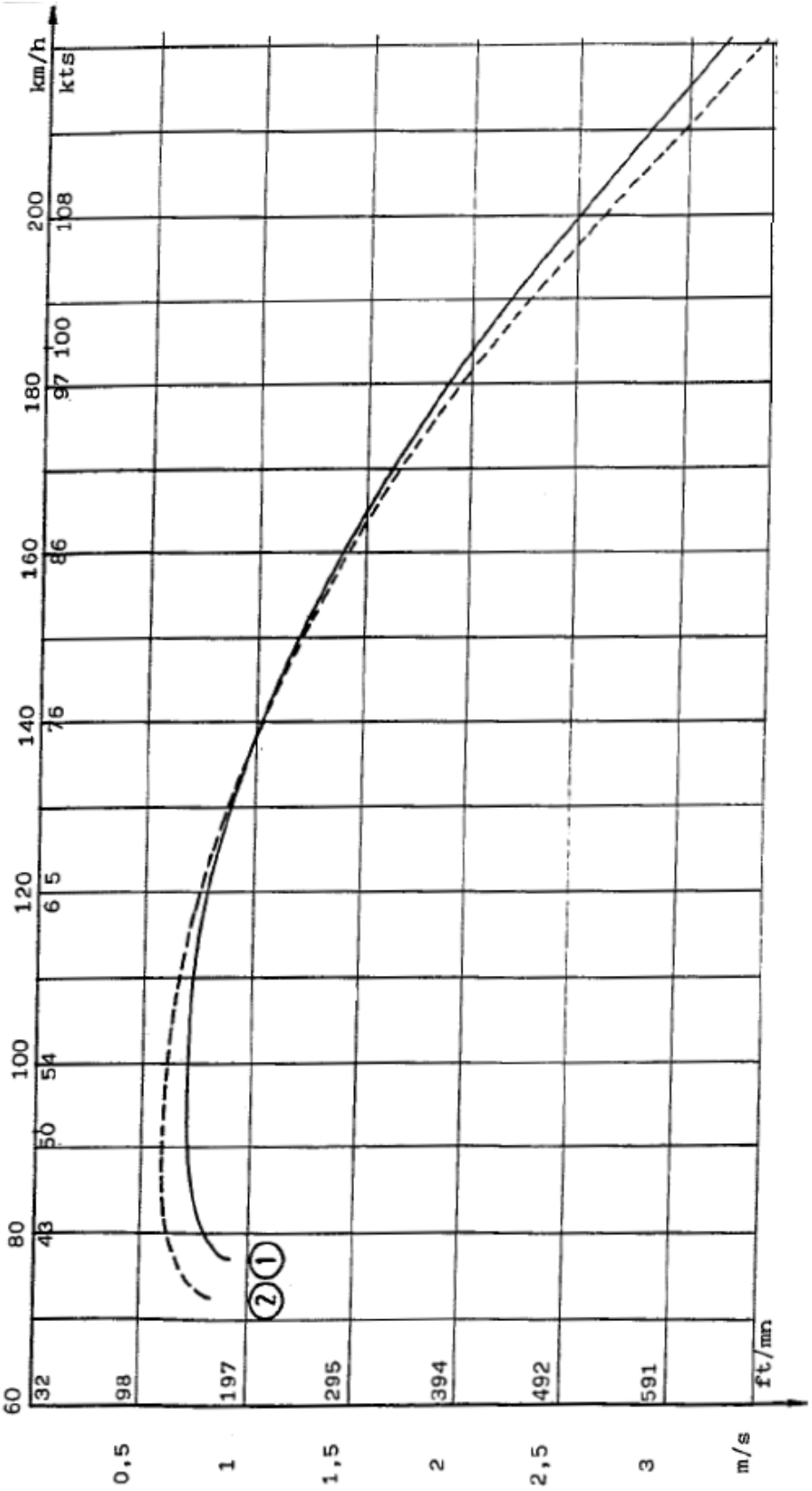
The landing and take off manoeuvres have been demonstrated with full crosswind speeds reaching **20 km/h (11 Knots)**

5.4. SPEED POLARS

(See pages 5.3 and 5.4)



Speed polar at 31,4 kg/m² (330kg) no winglets



speed polars at 43,3 kg/m² (445kg) no winglets

① no winglets

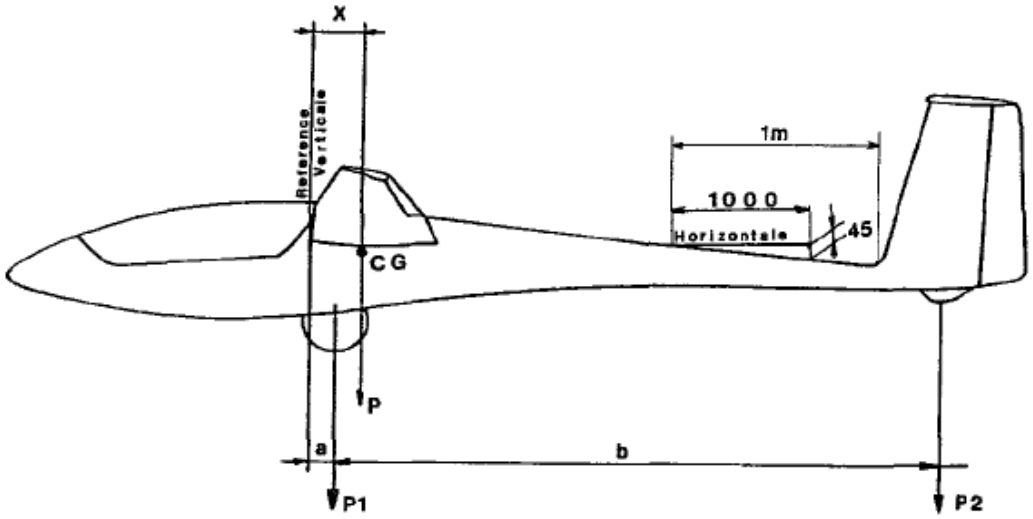
② winglets

6.1. VERIFICATION OF CENTRE OF GRAVITY

The maximum and minimum masses of the equipped pilot, in accordance with the Centre of gravity limits, are given on the weight and balance sheet of the glider. Those masses are calculated for the given glider without removable weights (lead disks), empty water ballast and with the same optional equipment as at the time of weighing.

In order to define the exact centration for a given pilot, in particular following the modification of optional equipment, perform a new weighing (paragraph 6.1.1.) or an Arithmetic calculation (paragraph 6.1.2.).

6.1.1 WEIGHING



- Place the two supporting points of the concerned glider on balances so that a slope of **45/1000**, measured on the cone at the rear fuselage boom, is of level (see the drawing above)

- Measure **P1** and **P2** subtracting eventually used tares.

support	Scale reading	TARE	NET MASS (kg)
Front :			P1 =
rear :			P2 =

- **Remarks** :

P1 of witch the value is about 220 kg has to be measured with a precision of at least 2 kg.

P2 of witch the value is about 30 kg has to be measured with a precision of at least **500 g**.

- write down the values of the lever arms a and b on the weight and balance report :

a= , m b = , m

- The location of the centre of gravity is calculated as followed:

$$x = \frac{P2xb}{P1+P2} + a$$

- Verify that the CoG is located within the limits given in paragraph 2.7.1.

6.1.2. ARITHMETIC CALCULATION

6.1.2.1. Calculation example

DESIGNATION	MASS (kg)	X	Lever arm (m)	=	MOMENT (m.kg)
Empty equipped glider	254 (*1)	x	0,630 (*2)		
Equipped pilot (with parachute)	85	x	– 0,65 (*3)		
Lead discs	0	x	– 1,84 (*3)		
Water-ballast	116	x	0,15 (*3)		
Optional SB 7 included (e-vario)	0,610 (* 4)		x - 1,10(* 5)		
Rear CoG hook removed	- 0,700	x - 0,15		=	- 0,105
		X		=	
		X		=	
TOTAL M = 454,91 (a)					121,604 (b)

$$x = \frac{(b)}{(a)} = \frac{121{,}604}{454{,}91} = 0.267m$$

(Compare X to the limit values of paragraph 2.7.1.).

(* 1) Mass of the empty equipped glider (MVE) } cf W&B
(* 2) Empty lever arm of the equipped glider (Xo) } sheet
(* 3) lever arm: see paragraph 6.2.
(* 4) The mass is positive if it concerns an optional device.
The mass is negative if it concerns a device that's removed since last weighing index list.
(* 5) Mass and lever arm: see paragraph 6.3.

6.1.2.2. **Centre of gravity calculation table**

DESIGNATION	MASS (kg)	X	LEVER ARM (m)	=	MOMENT (m.kg)
Empty equipped glider	(*1)	x	(*2)	=	
Equipped pilot (with parachute)		x	(*3)	=	
Lead discs		x	(*3)	=	
Water-ballast		x	(*3)	=	
Optional SB 7 included (e-vario)	(* 4)	x	(* 5)	=	
		x		=	
Rear CoG hook removed		X		=	
		X		=	
TOTAL M =	**(a)**				(b)

$$x = \frac{(b)}{(a)} = \quad \text{---------- = 0,} \quad \text{m}$$

(Compare X to the limit values of paragraph 2.7.1.).

(* 1) Mass of the empty equipped glider (MVE) } cf W&B
(* 2) Empty lever arm of the equipped glider(Xo) } sheet
(* 3) lever arm: see paragraph 6.2.
(* 4) The mass is positive if it concerns an optional device.
The mass is negative if it concerns a device that's removed since last weighing index list.
(* 5) Mass and lever arm: see paragraph 6.3.

6.2. LEVER ARMS OF THE REMOVABLE ELEMENTS

PILOT (Average, taken in consideration the seat adjustment and the physique of the pilot)	**– 0,65 m**
Lead disk	**- 1,84 m**
WATER-BALLAST	**+ 0,15 m**
BATTERY	**+ 0,15 m ahead of spar** **+ 0,65 m behind the spar**
INSTRUMENT IN THE PANEL	**- 1,10 m**
OXYGEN BOTTLE	**+ 0,20 m**

6.3. MASSES AND LEVER ARMS OF CERTAIN EQUIPMENT

EQUIPEMENT	MASS (kg)	LEVER ARM (m)
Speed indicator - Winter **6 FMS 5** 50 - 300 km/h	0,270	-1,10
Altimeter - Winter **4 FGH 10** 0 - 10000 m - Winter **4 HM 6** 0 - 6000 m	0,410 0,250	-1,10
Variometer (pneumatic) - Winter **5 STV 5** +/- 5 m/s	0,300	-1,10
Slip indicator - Winter **QM1** or **QM2**	0,050	-1,10
Compass - Airpath **C 2300**	0,265	-1,10
Radio VHF - Becker **AR 2008/25B** - Dittel **ATB 720** - Becker **AR 3201**	 0,950 0,780 0,820	 -1,10 -1,10 -1,10
Variometer (electric) - Ilec **SB 7** - Ilec **SB 8** - Averager 3 Scales (Ilec)	 0,610 0,885 0,220	 -1,10 -1,10 -1,10
Flight calculator - Ilec **ASR**	0,225	-1,10

EQUIPEMENT	MASS (kg)	LEVER ARM (m)
Seatbelts - Sirbain **501-594-403** - Anjou Aéronautique **346**	1,015 0,960	- 0,50 - 0,50
Wheel - Leleu **2790.00** - **Luchier** (hydraulic brake) - wheel **500 x 5** (depending of model) - air chamber (depending of model)	1,840 3,900 2,600 0,650	+ 0,50 + 0,50 + 0,50 + 0,50
Hook Tost G 73 or G 88 - Forward hook - Backward hook	0,700 0,700	- 1,20 - 0,15
Water-ballast - a pair of bags **SGTP 101 110 354**	2,740	+ 0,15
Battery - Sonnenschein **6 FX 55 A 200**	3,480	+ 0,15 (Ahead of the spar) + 0,65 (behind the spar)
Battery support - **101 100 328** or **101 100 895**	0,220	+ 0,15 (Ahead of the spar) + 0,65 (behind the spar)
Winglets (pair of)	5,00	+ 0,20
Oxygen equipment (AMP)	4,290	+ 0,20
Speaker (depending of model)	0,200	+ 0,15
Headrest	0,900	- 0,10

7.1. GENERAL DIMENSIONS

Wingspan	15,OO m
Total length	6,80 m
Total Height	1,42 m
Wing area	10,50 m²

7.2. WINGS

Evolving profile	OAP 01 to OAP 02
Aspect ratio	21,43
Dihedral	2,3°
Average geometrical chord	0,700 m

7.3. AILERONS

Controls driven by rods	
Single surface	0,381 m^2
Deployment angles	+ 14° +/- 2°
	- 22° +/- 2°

7.4. AIRBRAKES

Dual-panel upper wing type airbrakes driven by pushrods.

7.5. WINGLETS (Centrair 101 P - 101 AP)

Surface of the vertical projection	0,13 m^2
Height/wing cord	0,80 m
Length at the winglet's edge	0,095 m
Depth of the winglet at 65 cm of the edge	0,18 m

7.6. HORIZONTAL STABILIZER

Pushrod driven	
Surface	0,997 m^2
Deployment angle of the moving part	+ 18° +/- 2° - 22° +/- 3,5°

7.7. VERTICAL STABILIZER

Cables driven	
Surface	1,0 m²
Surface of the rudder	0,3 m
Profile FX 71 - L 150/30	
Deployment angle of the rudder	+ 30° +/- 3° - 30° +/- 3°

7.8. LANDING GEAR

Damped fixed gear (101 - 101 P) or retractable gear Driven by rigid rod (101 A - 101 AP).

Cable driven drum brake (hydraulic system optional available) with command situated on the stick or at the end of the airbrake handle deployment.

Tire pressure: **2,5 to 3,4 bar** (cfr paragraph 8.1.).

Tail skid out of expanded foam with metal shoe.

7.9. ADJUSTMENT WEIGHTS

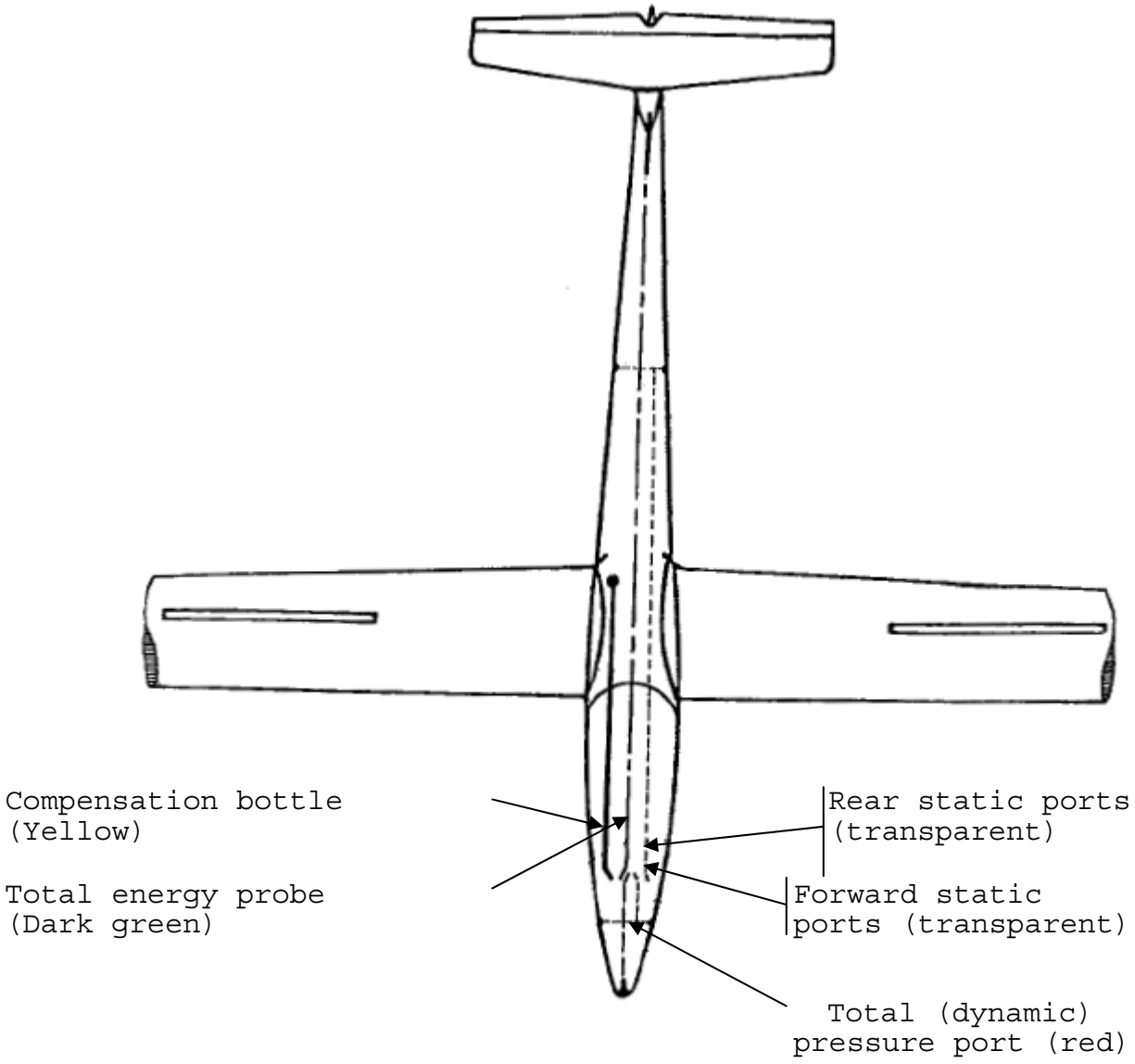
A treated bold situated in front of the pedals allows fixing **7 weights of 1 kg** in order to keep the CoG within the limits.

The securing is done by a butterfly nut and a Fokker safety pin.

7.10. PRESSURE PORTS

Connection of the standard instruments:

*** Altimeter : forward static ports**
*** Speed ind. : Forward static and dynamic**
*** Variometer : Total energy probe in the fin and thermos bottle**



8.1. GENERAL MAINTENANCE

- The glider shouldn't be hangared in an atmosphere with relatively high humidity.

- The surface doesn't support extended sun exposure.

- Avoid long term storage in non ventilated hangars or trailers.

- The airbrake chambers don't have a drain. Absorb and clean the chambers after exposure to the rain.

- The canopy should preferably be cleaned with soaped water and polished with a soft tissue and appropriate products.

- Fibre glass gliders should be clean. Competition experience has shown that, in case of a dirty glider, the performance was affected by 15% at low speed and by 30% at high speed.

- Clean the well of the wheel after landing on soiled terrain.

- Verify regularly the tire pressure : **2,5 to 2,7 bar** for a mass of **350 kg** and **3,2 to 3,4 bar** for a mass of **455 kg**. In case the tire pressure is too low, there's a risk of damaging the gear port doors while rolling

- See the maintenance manual for more details and the regular maintenance or repairs.

8.2. RIGGING

2 persons + 1 trestle

8.2.1. **RIGGING OF THE WINGS** with manual connection of the controls (schema page 8.3).

- All pins, housings and ball bearings must be cleaned and greased sufficiently.
- The right wing is positioned into the fuselage tunnel. (Pay attention to the control rods when inserting).
- Position the right wing onto a trestle by the aileron (Avoiding the caps over the aileron drive rods).
- The left wing is inserted in the same way as the right one (Pay attention to the control rods when inserting).
- Insert the main pins into their holes
  They have to enter freely and by hand.
- Secure the main pins with the spring clip.
- Put the wingtips in place and lock. (Gliders Centrair 101P - 101AP).
- Verify the wing connection and check on free movement of the main pins.
- Connect the four l'Hotelier control connections through the inspection hatch on top of the fuselage
  (See paragraph 8.4.).
- Screw on the ends of the water ballast pipes and connect the vent pipes.

SCHEMA OF RIGGING THE WING (Manual connection of the controls)

1 - Main pin.

2 - Spigot.

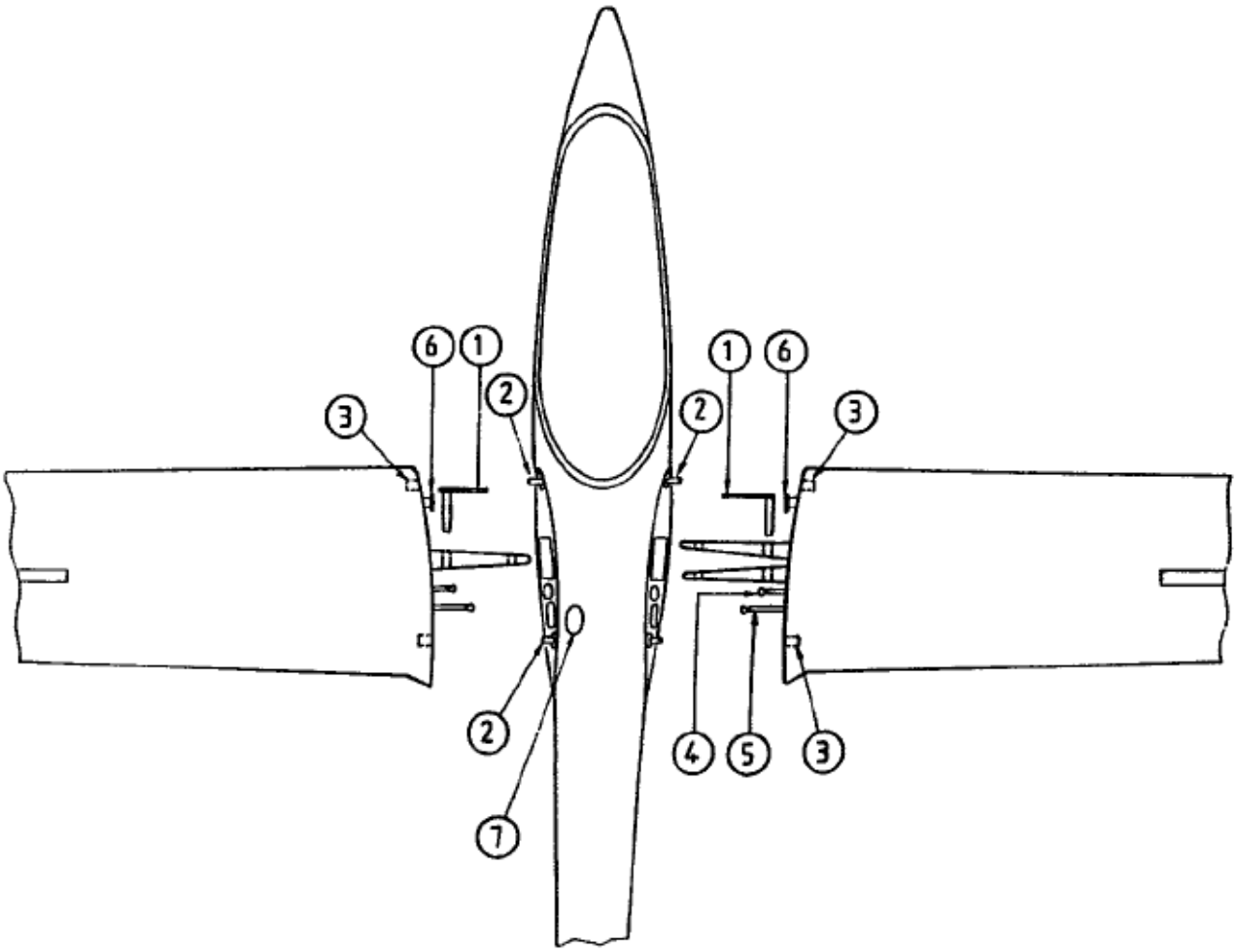
3 - Socket.

4 - Airbrake pushrod.

5 - Aileron pushrod.

6 - Water ballast pipe.

7 - Inspection hatch for control connection.



8.2.2 <u>RIGGING OF THE WINGS</u> with automatic control connection (schema page 8.5).

- All pins, housings and ball bearings must be cleaned and greased sufficiently.

- The right wing is positioned into the fuselage tunnel. (Pay attention to the control rods when inserting).

- Pose the right wing onto a trestle by the aileron (Pay attention to the caps over the aileron connection).

- The left wing is inserted in the same way as the right one (Pay attention to the control rods when inserting).

- Insert the main pins into their holes
  The have to enter freely and by hand.

- Secure the main pins with the spring clip.

- Put the wingtips in place and lock. (Gliders Centrair 101 P - 101 AP).

- Verify the wing connection and check on free movement of the main pins.

- Connect the water ballast vent pipes.

SCHEMA RIGGING OF THE WINGS (With automatic control connection)

1 - Main pin.

2 - Spigot.

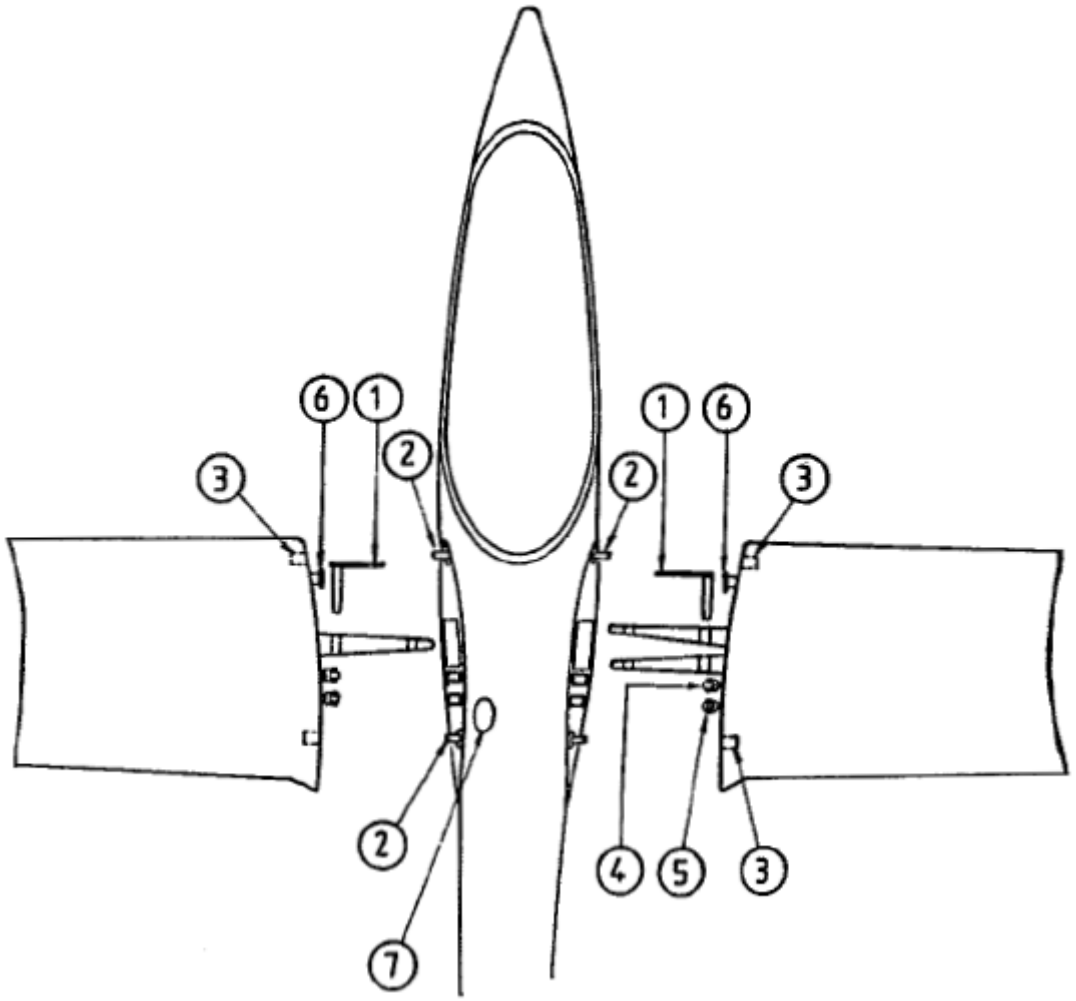
3 - Socket.

4 - Airbrakes pushrod.

5 - Ailerons pushrod.

6 - Automatic water ballast connection.

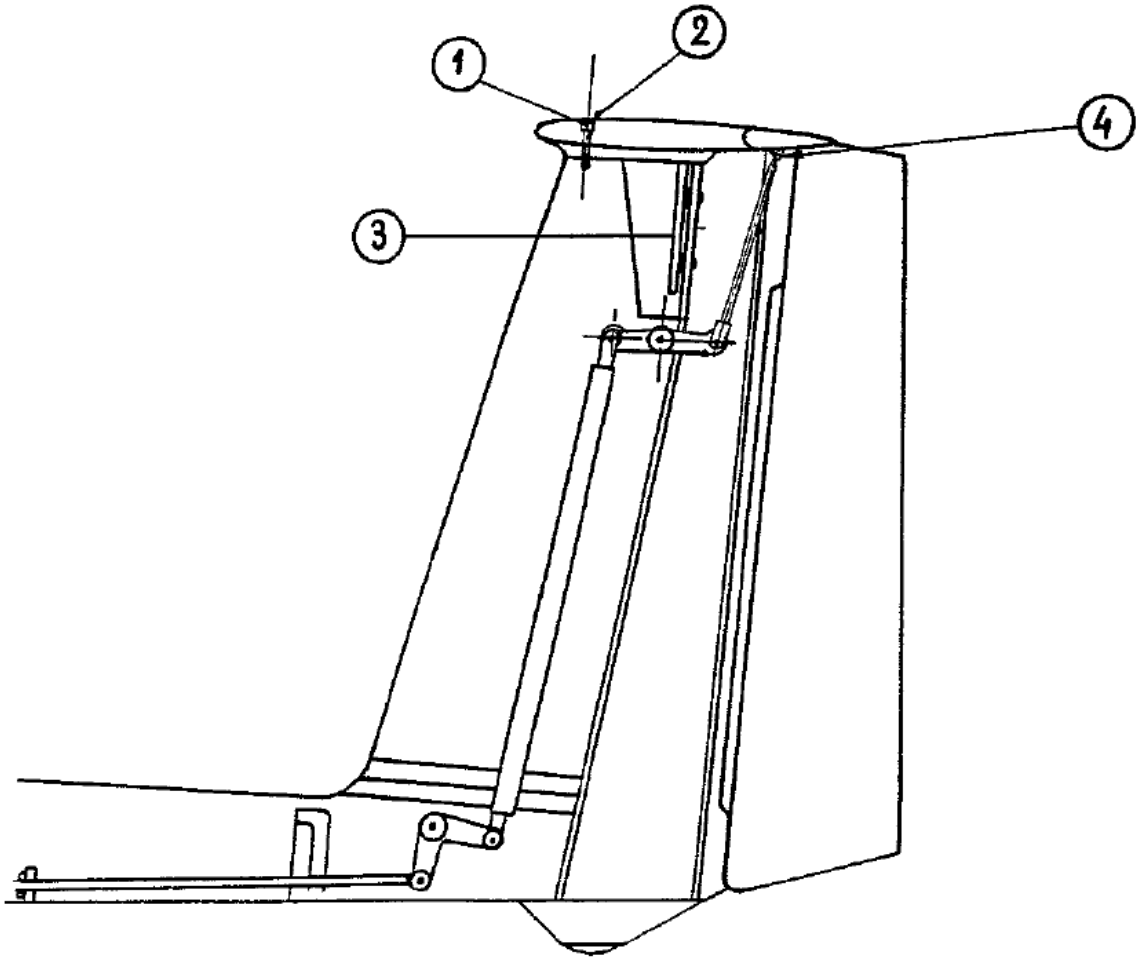
7 - Inspection hatch for control connection.



8.3. ASSEMBLY OF THE HORIZONTAL STABILIZER

8.3.1 ASSEMBLY OF THE HORIZONTAL STABILIZER (manual connection).

- Use the special T-shaped spanner.
- Insert the stabilizer into the gap on top of the rudder and slide the hinge pins into the funnels. (3).
- Afterwards insert the leading edge bolt (2) and tighten with the spanner. When lifting the key make sure that the locking spring (1) enters one of the slots in the bolt head.
- Connect the elevator control pushrod onto the l'Hotelier connection (4) (see paragraph 8.4.).



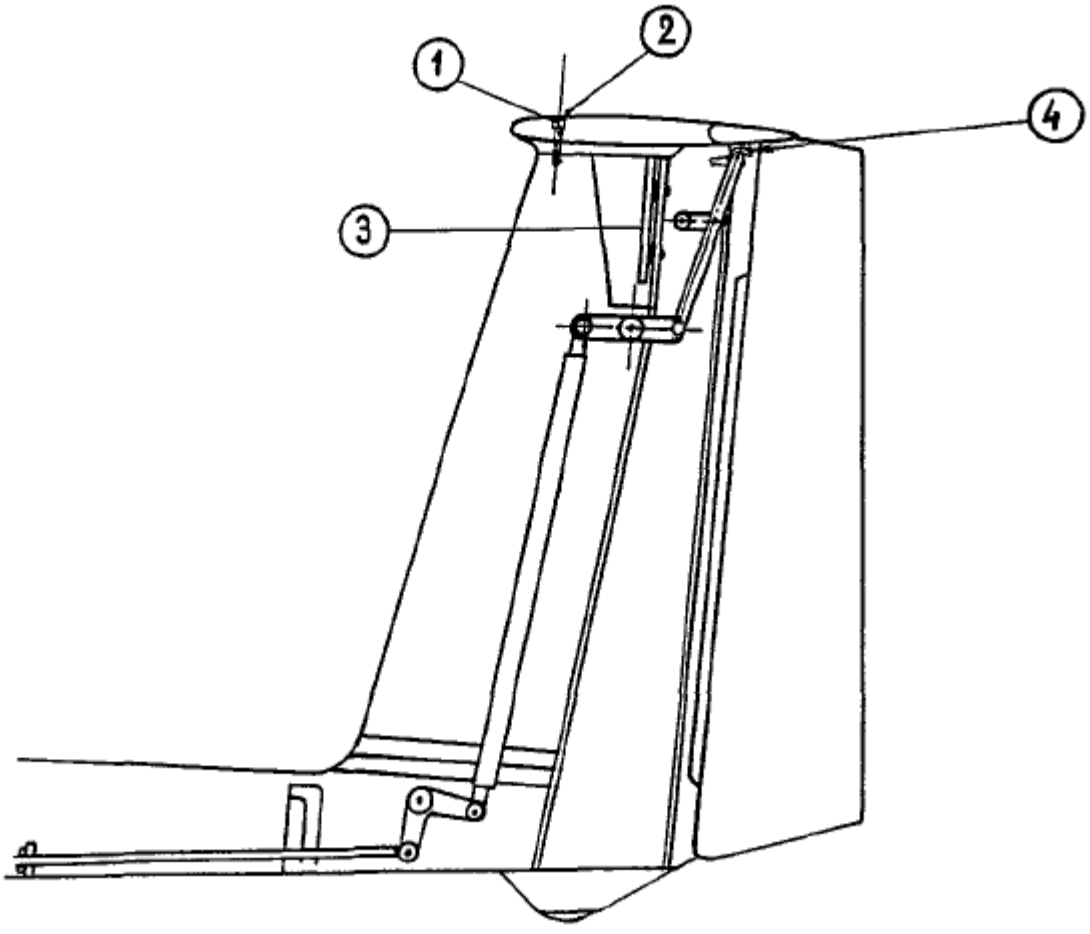
8.3.2. <u>ASSEMBLY OF THE HORIZONTAL STABILIZER</u> (automatic connection)

- The special T-shaped spanner.

- Insert the stabilizer into the gap on top of the rudder and let it rest on the top surface of the rudder.

- Lift the elevator in such a way that the housing at the bottom of the elevator command coincides with the connection bearing on the command rod.(4). Push the stabilizer backwards to slide the hinge pins into the funnels. (3).

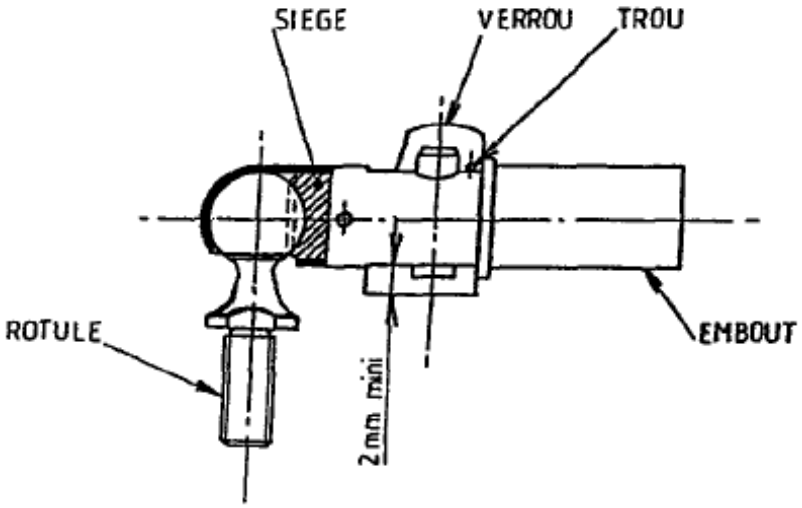
- Afterwards insert the leading edge bolt (2) and tighten with the spanner. When lifting the key make sure that the locking spring (1) enters one of the slots in the bolt head.



8.4. FINAL INSPECTION AFTER RIGGING

- MANUAL CONNECTION OF THE CONTROLS.

It is imperative to verify, after each assembly, that the connection of the balls into their housings is executed properly. For this purpose a hole is made into the locking system. When the connection is done properly the hole is visible and it is possible to insert a safety pin (réf.400014) or a similar device to secure the lock.



- SECURING THE RIGGING PINS.

Main pins: Verify that the spring safety clip is correctly positioned over the handles.

Horizontal stabilizer: Verify the proper position of the horizontal stabilizer and the tightening of the leading edge bolt.

- PRE FLIGHT INSPECTION.

To be executed as mentioned in paragraph 4.1.
Starting in the cockpit, verify the proper movement of the whole control system as well as the deployment of the controls.

8.5 DERIGGING

Proceed opposite to rigging.

Don’t forget first of all to disconnect the controls. (Manual connection only).

9.1 INTRODUCTION

This section holds the appendices, considered necessary to the safety and to the good use of the glider, when equipped with several optional systems and equipment not installed in the standard gliders.

9.2 LIST OF THE INSERTED ADDITIONS

Date of insertion	N° of the addition	Title of the inserted addition
July, 28 1995	**N° 1**	Major modification 101-34 **MANUAL COMMAND OF THE PEDALS**

9.3 INSERTED ADDITIONS

See the following pages.

ADDITION N° 1

Major modification 101-34
MANUAL COMMAND OF THE PEDALS

SECTION 0

PAGES INDEX OF THE ADDITION

SECTION	PAGE	AP/N.AP	EDITION/REVISION
0	9.1.1	AP	Ed. 1
1	9.1.1	N.AP	Ed. 1
2	9.1.2	AP	Ed. 1
3	9.1.2	AP	Ed. 1
4	9.1.2	AP	Ed. 1
5	9.1.3	N.AP	Ed. 1
6	9.1.3	N.AP	Ed. 1
7	9.1.3	N.AP	Ed. 1
8	9.1.3	N.AP	Ed. 1

Note : (1) AP : D.G.A.C. Approved
N.AP : not D.G.A.C. approved

APPROUVE D.G.A.C.
Le 28 JUIL. 1995
L'Ingénieur Général de l'Armement
Chef de la Division Aéronefs
Patrick LAFASSET

SECTION 1 : GENERAL

The purpose of this addition is to supply specific information about the pégase glider equipped with the optional manual pedal command (major modification 101-34) and necessary to the safe and right use of the gliders equipped with this option.

SECTION 2 : **LIMITATIONS**

2.2 **OPERATIONAL LIMITS**

Operational limits of the standard version (see flight manual §2.1).
All flights with the manual pedals command device installed (see installation **5 8.3** bis of this addition) is prohibited to all other persons than those having a handicap of the legs and have received a specified training on a double seat glider equipped with a similar manual pedal command installed.

2.10.2 **LIMITATION PLACARDS**

Besides the limitation placard

This glider is modified to the use of a manual pedal command device.
See the addition N°1 of the flight manual.

SECTION 3: EMERGENCY PROCEDURES

No modifications in this section.

SECTION 4: NORMAL PROCEDURES

4.3 PEDAL ADJUSTMENT

When the manual pedal command is in place, the pedals are not adjustable; they are in the maximum forward position (see installation of the manual pedal command paragraph **8.3** bis of this addition).

4.3 bis **OPERATION OF THE AIRBRAKES**

The airbrakes are equipped with a system to hold position. To change the position, rotate the handle upwards (towards a near horizontal position) and move the handle forwards or backwards. To fix the airbrake handle position rotate downwards and slide into a locking groove (Vertical position of the handle): The command can be released with the airbrakes in any position.

Note: When the gear is retracted the two last locking grooves can't be reached, on the other hand the airbrakes can manually be held completely extended.

SECTION 5 : PERFORMANCES

No modifications in this section.

SECTION 6 : Centre of gravity

The mounting of the manual pedal command forwards the CoG about 5mm, the deinstalling moves it backwards by 5mm.

j

SECTION 7 : DESCRIPTION

No modifications in this section.

SECTION 8: MAINTENANCE

8.3.bis **INSTALLATION OF THE MANUAL PEDAL COMMAND**

Assembly:

1 Take the rigid part of manual pedal command
2 Bring back the pedals to the rearward position.
3 Disconnect the cable witch connect the pedals to the spring of the canopy.
4 Install the rigid part of the manual command: connect the l'hotelier connection of the forward part onto the ball of the left pedal (clean and grease) and connect the Zeus to the ring on the backwards part of the command at the left side of the fuselage.
5 Disconnect and reconnect the forward pin of the command by inserting the left end of the connection cable into the fork of the command.
6 Push forward the pedals to the widest forward position possible.
7 Connect the right end of the cable onto the right pedal using the disconnected pin in #3.

Disassembly:

Act in opposite way as described.

Note: Make sure that the pin witch holds the connection cable of the pedals is exactly in place on the spring of the canopy.

Note: A system to disable play is visible next to the handle (two pieced handle). This system is adjustable at the connection of the connection cable and the rigid part of the command. At about 20°C, the adjustment has to be of that order that it is set around mid-course.