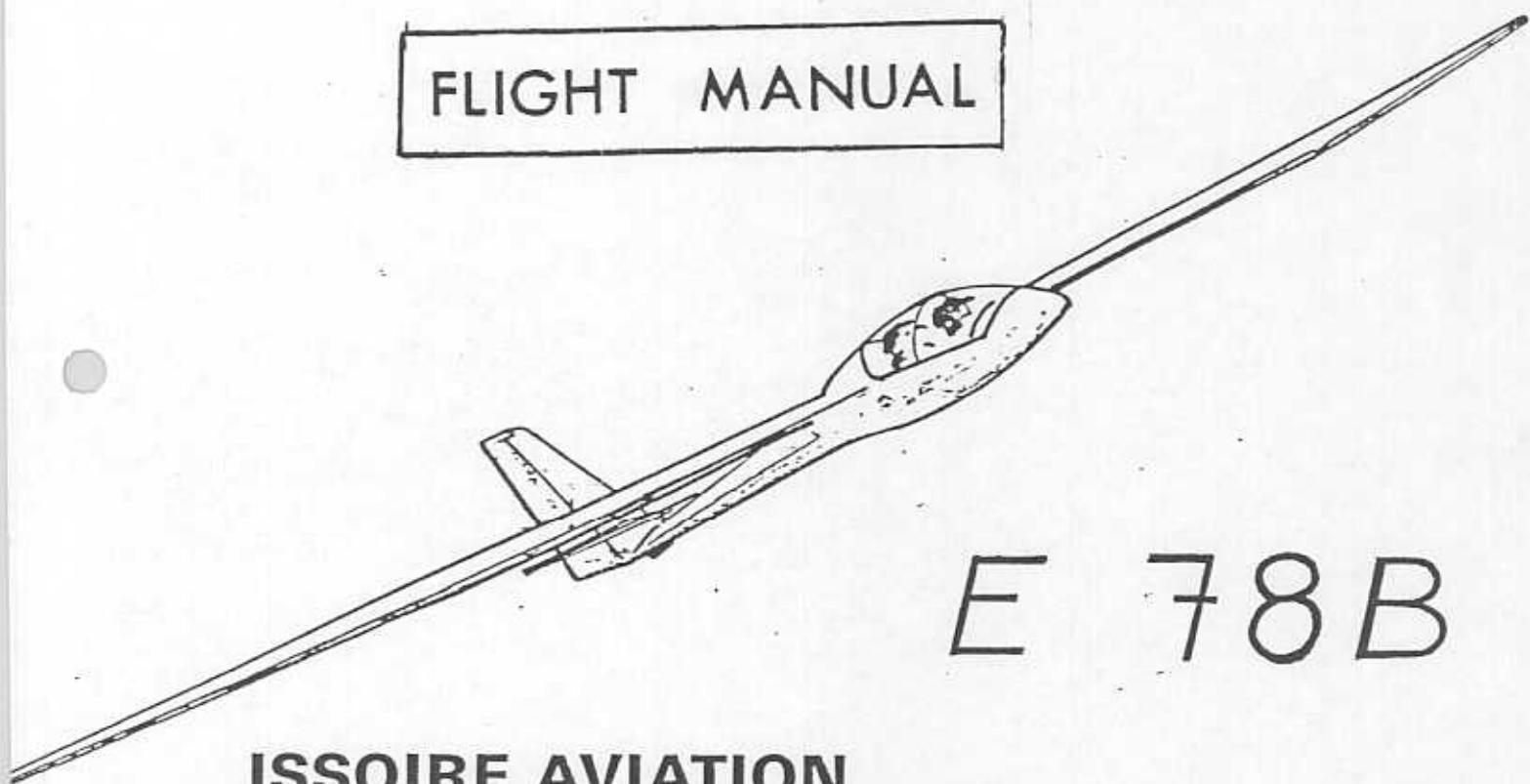




"S I L E N E"

E 78

FLIGHT MANUAL



E 78B

**ISSOIRE AVIATION**

CONSTRUCTIONS AÉRONAUTIQUES

B.P. N° 7 - 63501 ISSOIRE - France

Siège Social : Aérodrome d'ISSOIRE-LE BROC

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FLIGHT MANUAL FOR GLIDERS E78-E78B.SILENE

Constructor: Societe 'ISSOIRE-AVIATION' - Aerodrome du BROC - 63501 ISSOIRE  
France  
Tel: (73) 89.01.54 - Telex: ISSAVIA 990.185

Extension of the Airworthiness Certificate of Type No. 85 of the 1:8:1978

Category: U 'Utility'

Registration:

Series No:

Sections approved: 0, 2, 3, 4,

Page approved: 0.1 to 0.4  
2.1 to 2.4  
3.1  
4.1 to 4.2

Approved by the Director General of Civil Aviation the

Stamp of the Director General of Civil Aviation.

11 MARS 1983



The Glider must be used within the limitations of operation laid down in the present manual.

THIS DOCUMENT MUST BE KEPT PERMANANTLY IN THE GLIDER.

THIS GLIDER Flight Manual is the translation of an approved French flight manual. The note "D.G.A.C. approved" on certain pages means that these pages are an integral translation of the French issue approved by D.G.A.C."

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LIST OF AMENDMENTS

Edition No.	Revised Pages	Nature of amendments	Approval of the D.G.A.C. Date Stamp	
<u>D.G.A.C. APPROVED</u>				

DIMENSIONSGENERAL DATA

Wing span	18 m.	
Total length	7.95 m.	
Height at the fin	1.50 m.	
Height at the cockpit	0.95 m.	
Empty weight	365 kg.	- breaking down into:
- wings	2 x 105 kg	
- tail unit	15 kg	
- equipped fusilage (standard equipment)	132 kg	
- undercarriage	8 kg	
- that is to say 210 kg for the weight bearing elements and 155 kg for the non-weight bearing elements.		

WINGS

Aerofoil section BERTIN E 55 - 166

Surface area	18 m <sup>2</sup> .
Aspect ratio	18
Dihedral	2° on the upper surface of wing
Mean aerodynamic chord	1 m.

PERFORMANCES

SPEED POLAR

Km/hour

200

180

160

140

120

100

80

60

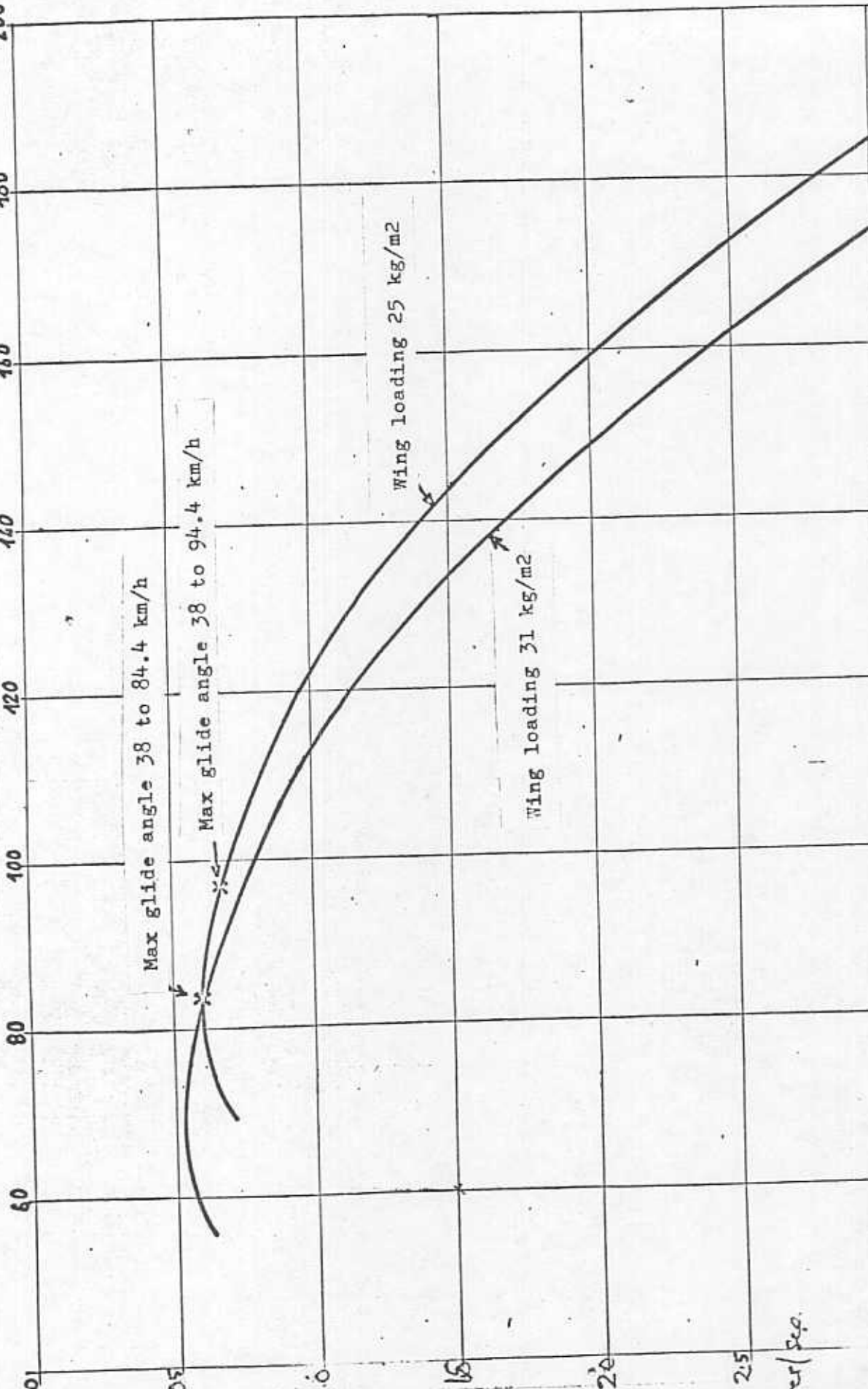
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Max glide angle 38 to 84.4 km/h

Max glide angle 38 to 94.4 km/h

Wing loading 25 kg/m<sup>2</sup>

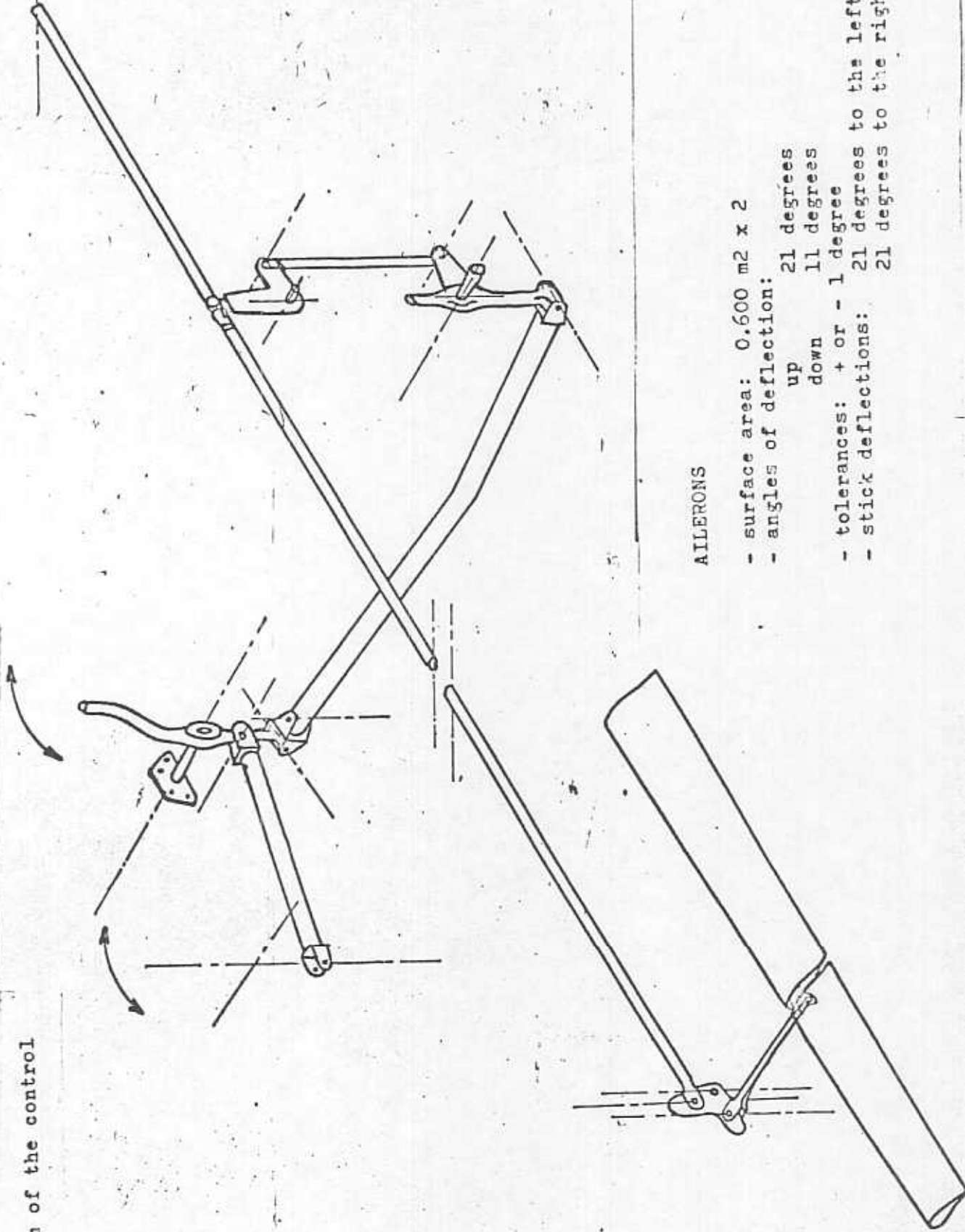
Wing loading 31 kg/m<sup>2</sup>



isother (Sep.

AILERON CONTROL CIRCUIT

Diagram of the control



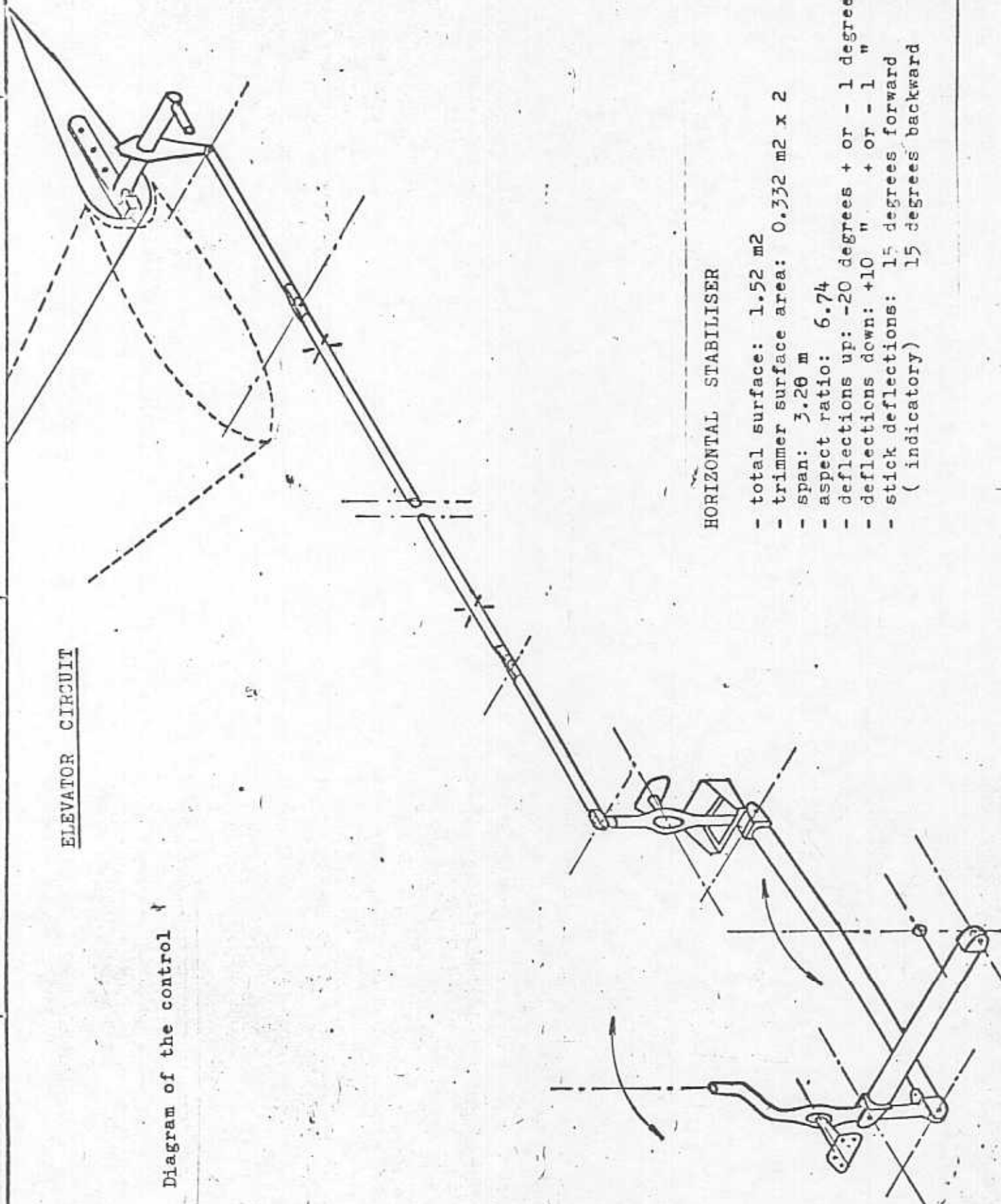
AILERONS

- surface area: 0.600 m<sup>2</sup> x 2
- angles of deflection:
  - up 21 degrees
  - down 11 degrees
- tolerances: + or - 1 degree
- stick deflections: 21 degrees to the left  
21 degrees to the right



ELEVATOR CIRCUIT

Diagram of the control



## HORIZONTAL STABILISER

- total surface: 1.52 m<sup>2</sup>
- trimmer surface area: 0.332 m<sup>2</sup> x 2
- span: 3.26 m
- aspect ratio: 6.74
- deflections up: -20 degrees + or - 1 degree
- deflections down: +10 " + or - 1 "
- stick deflections: 15 degrees forward  
( 15 degrees backward  
( indicatory)

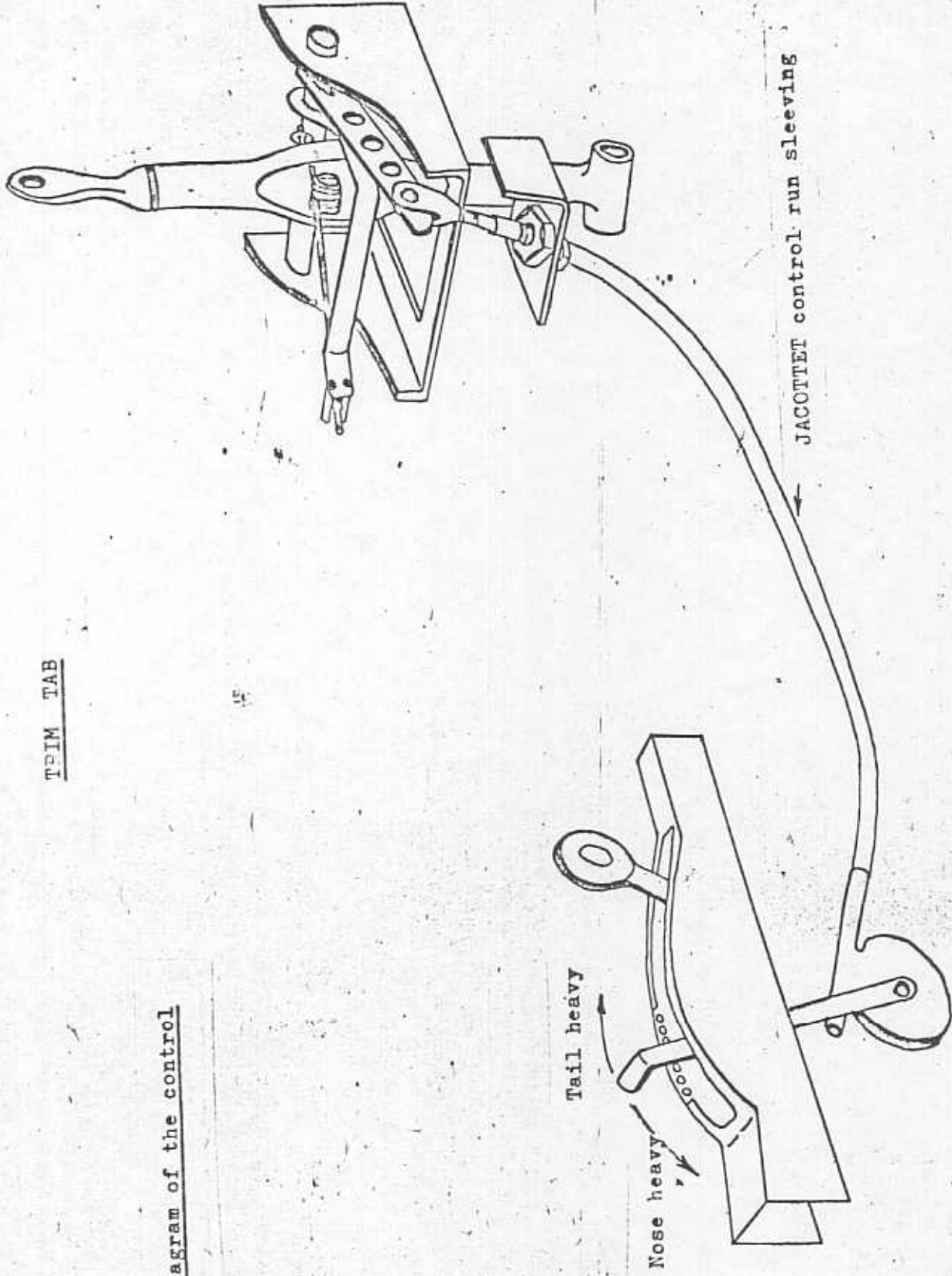
TRIM TAB

Diagram of the control  
(installation in the cockpit)

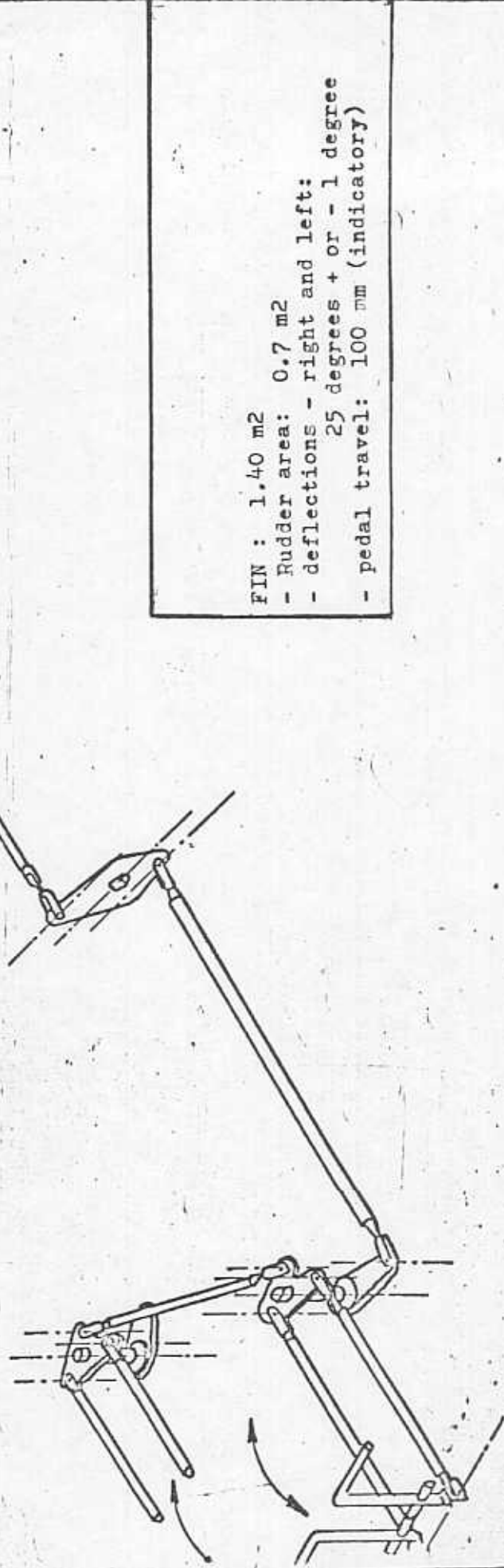


TRIM TAB

Diagram of the control

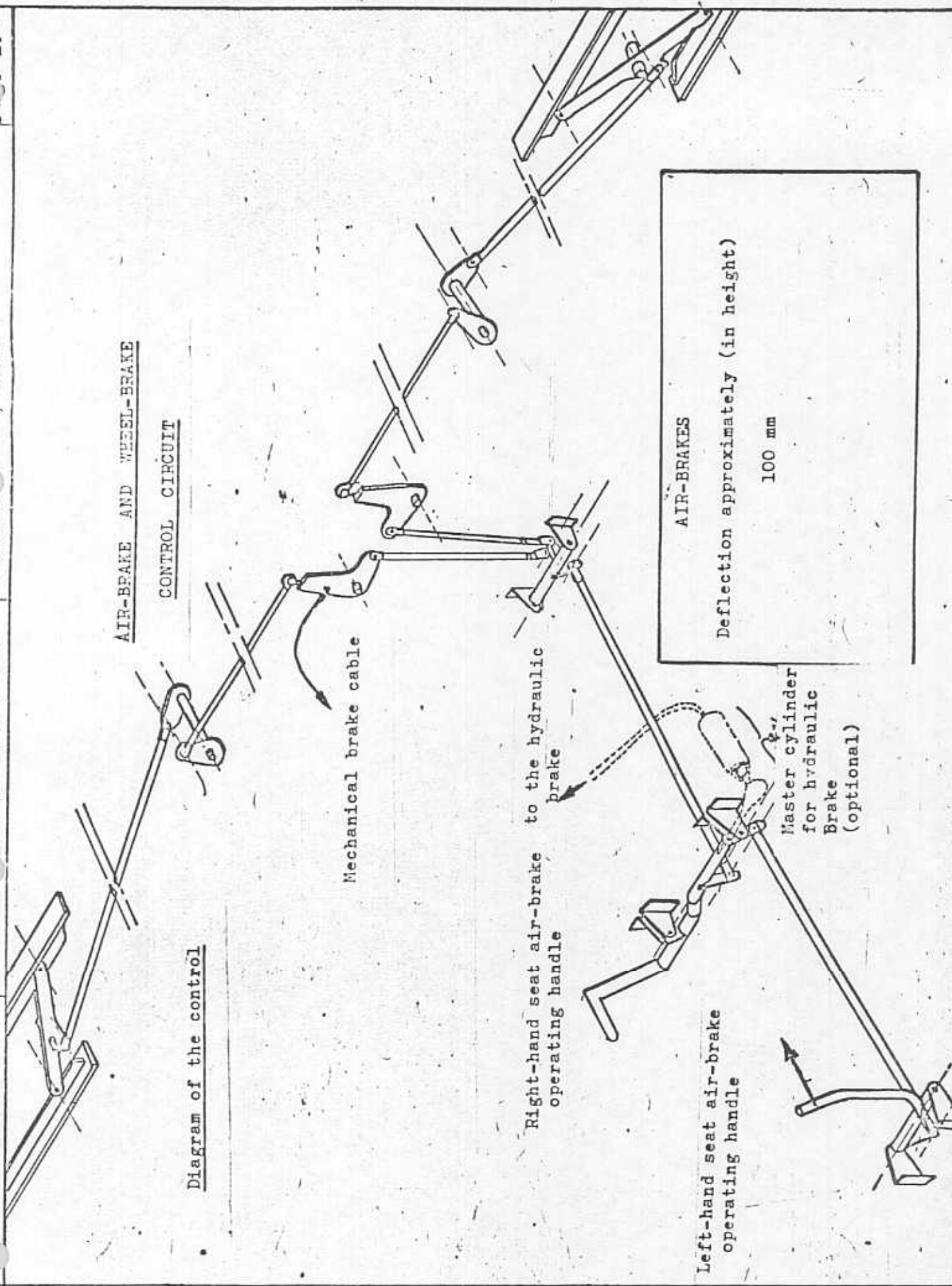


Travel of lever: 25 mm  
(about)

RUDDER CONTROL CIRCUITDiagram of the control

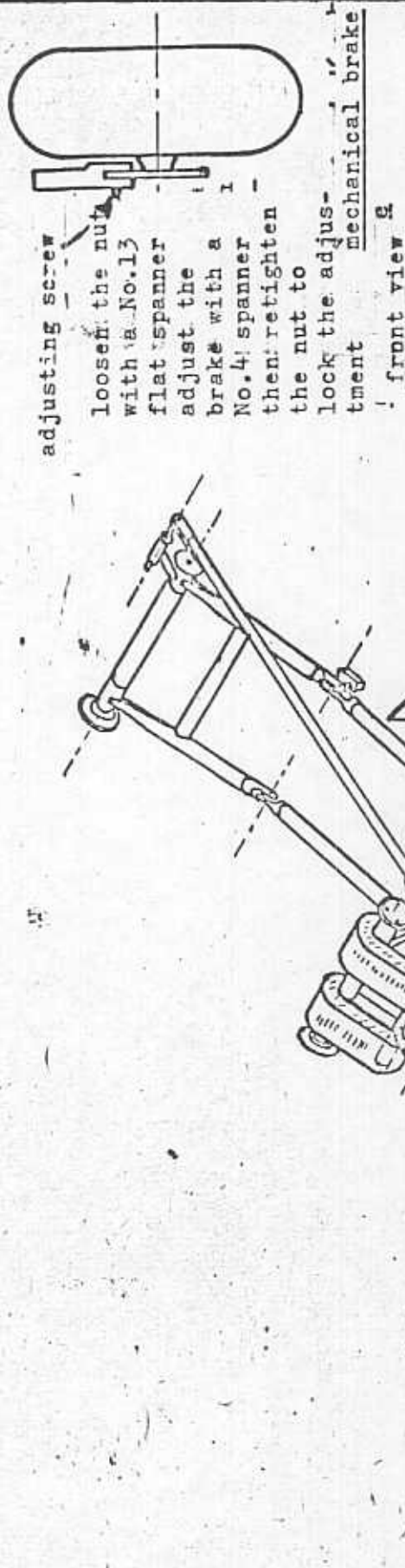
AIR-BRAKE AND WHEEL-BRAKE CONTROL CIRCUIT

Diagram of the control



CONTROL CIRCUIT FOR UNDERCARRIAGE (E78 only)

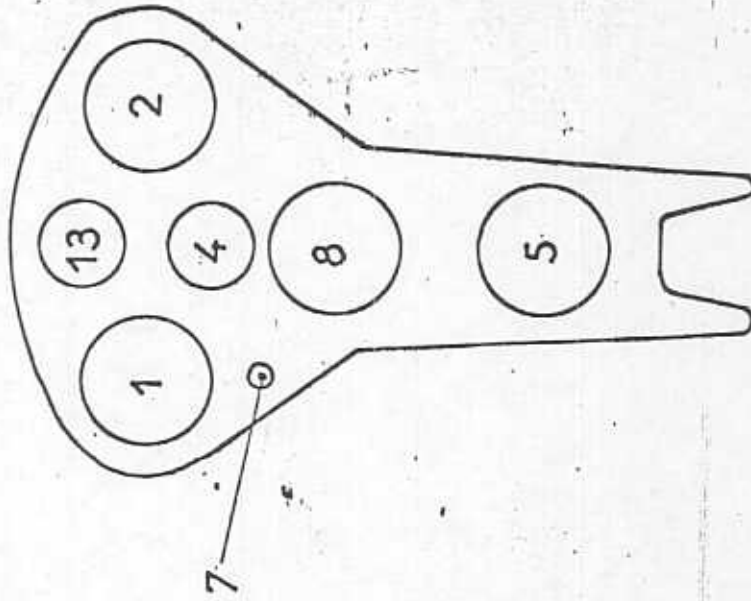
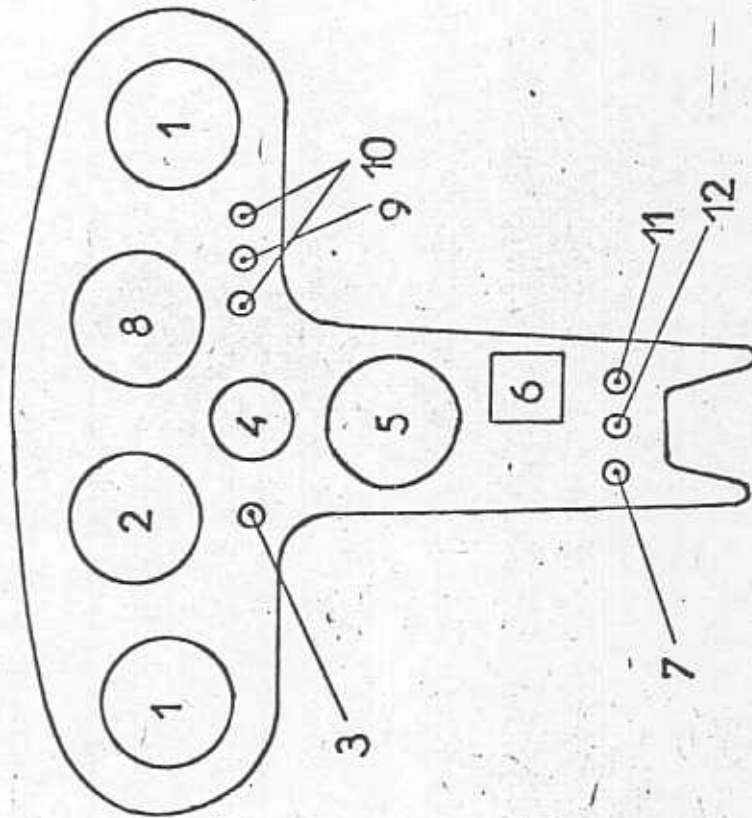
Diagram of the control



UNDERCARRIAGE

- retractable by hand control
- wheel damping is by sandows
- wheel specification - 330/130
- inflation pressure: 2.4
- mechanical brake adjustment is by means of a screw (see accompanying sketch)
- the control is locked by means of a trigger, preventing its mistaken operation

CONTROL PANELS



OPTIONAL.

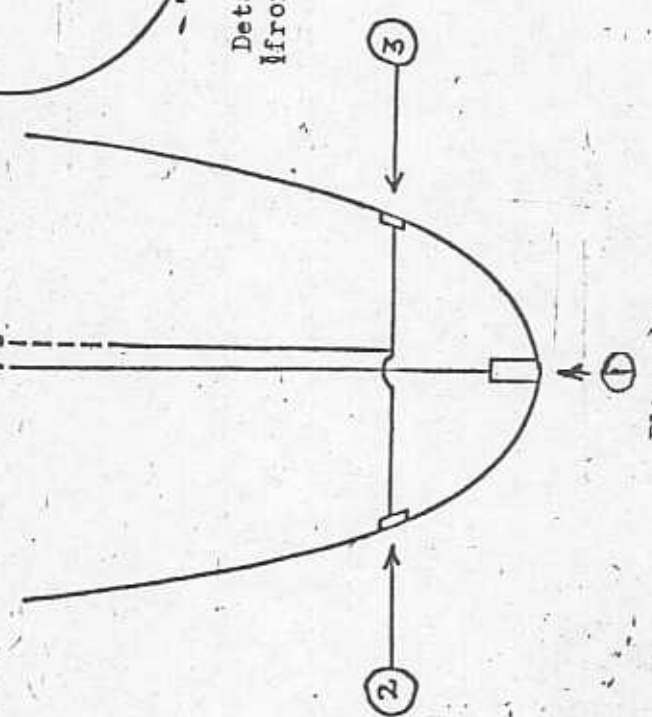
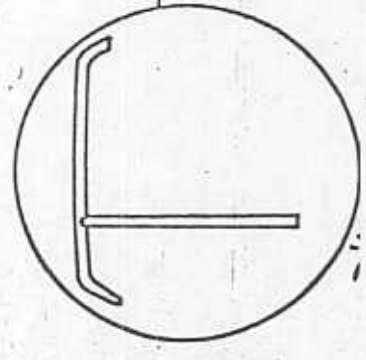
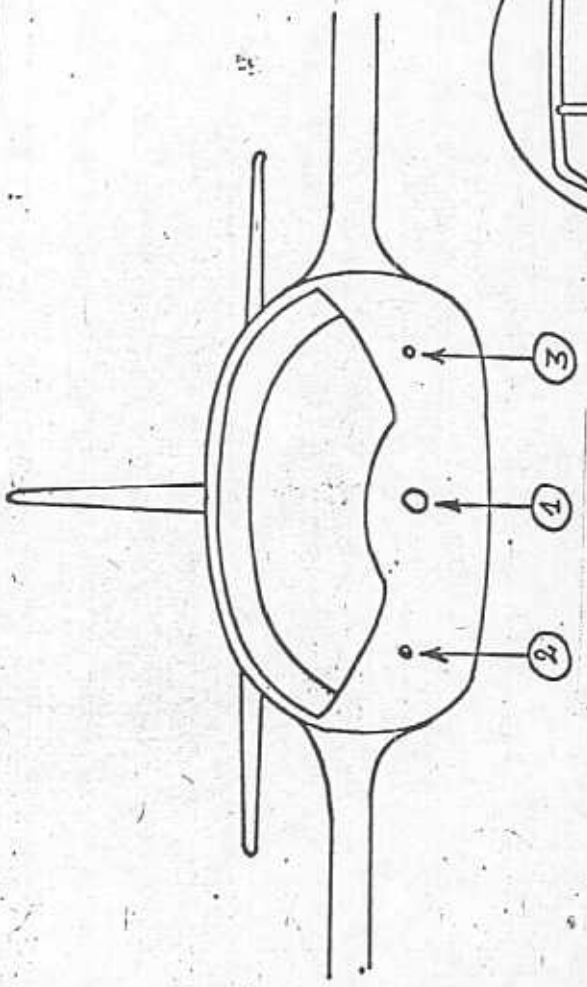
FLIGHT INSTRUMENTATION.

- 1. Variometer
- 2. Airspeed indicator
- 3. Switch for turn and slip needle
- 4. Turn and slip
- 5. Radio
- 6. Voltmeter
- 7. Master switch
- 8. Altimeter
- 9. Undercarriage tester
- 10. Undercarriage position indicator
- 11. Voltmeter tester
- 12. Fuse
- 13. Compass

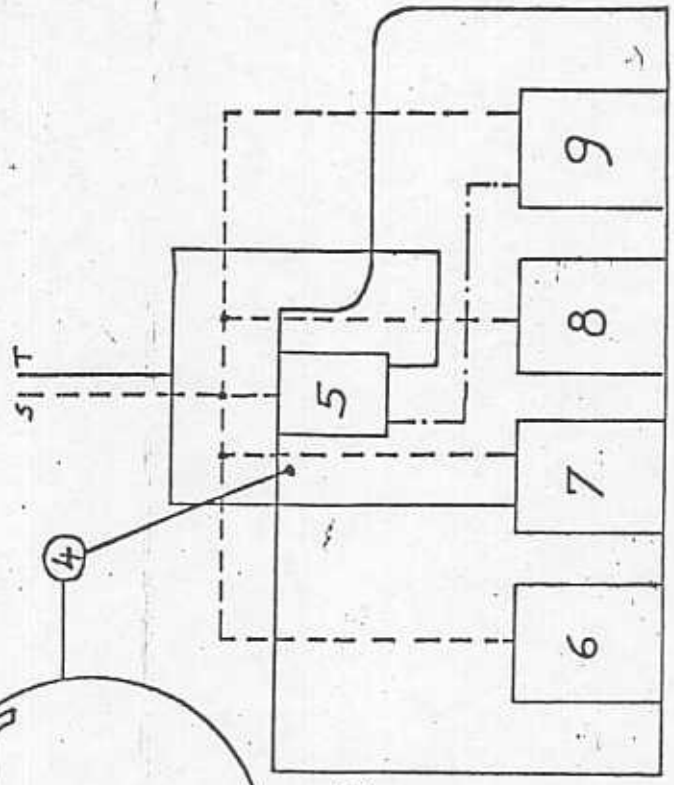
{ green-correctly extended  
 { red -incorrectly extended  
 { red -incorrectly retracted  
 { green-correctly retracted

STANDARD.

AIR VENTS AND INTAKES



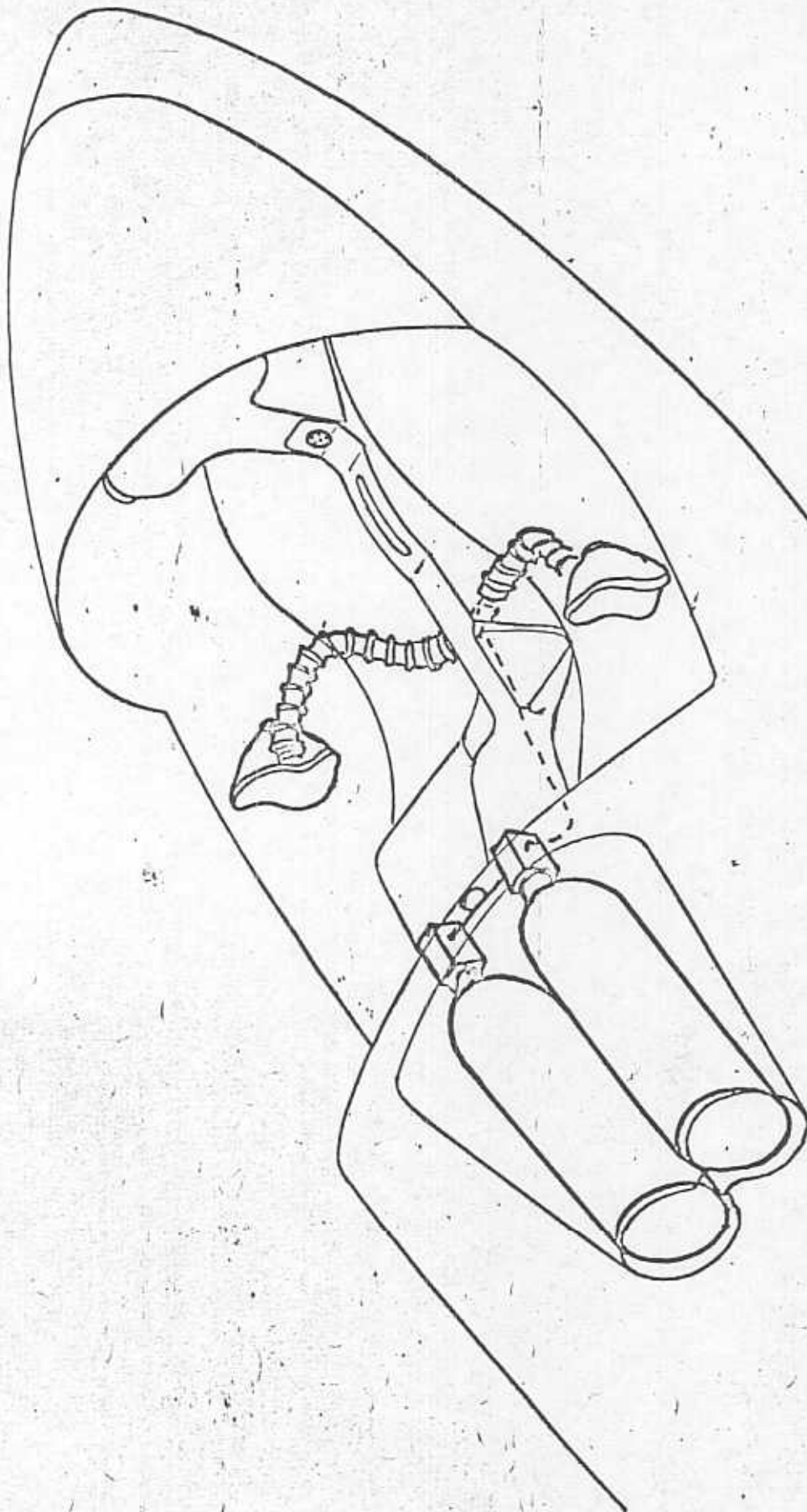
- KSY
1. Pitot tube
  2. Starbord static vent
  3. Port static vent
  4. Static pressure vent
  5. Variometer compensator
  6. Variometer
  7. A.S.L.
  8. Altimeter
  9. Total energy variometer
- E.B: If the system is modified take care to block off any redundant static pressure vents.



Plan view of Control Panel



OXYGEN-SYSTEM INSTALLATION



SECTION 2 → OPERATIONAL LIMITATIONSa) Basic certification

The E 78 'Silene' glider was granted, on the 1/8/78, an extension of the C.D.N. type No. 85, conforming to regulations CTG 010, in category "U" within the limits set out below.

b) Indicated airspeed limits

- Velocity never to exceed	VNE = 220 km/h	
- Maximum speed on aerotow	VI = 170 "	
→ Maximum speed in free flight in rough air	VB = 170 "	
→ Maximum speed of calculated manoeuvres	VA = 170 "	
- Maximum speed for opening air-brakes	VBS = 220 "	
- Maximum speed for lowering u/carriage	VLD = 170 "	(E78 only)
- Maximum speed with lowered u/carriage	VLE = 170 "	(E78 only)

c) Markings on the Air Speed Indicator

- Velocity never to exceed	VNE = 220 km/h	Red line
- Speed to be used in rough air	70 to 170 "	Green sector
- Speed to be used in calm air only	170 to 200 "	Yellow sector

d) Standardisation of the Air Speed Indicator Installation

$$VI = VC + \text{or} - 2\%$$

e) Calculated load limit factors

$$n + = 5.3$$

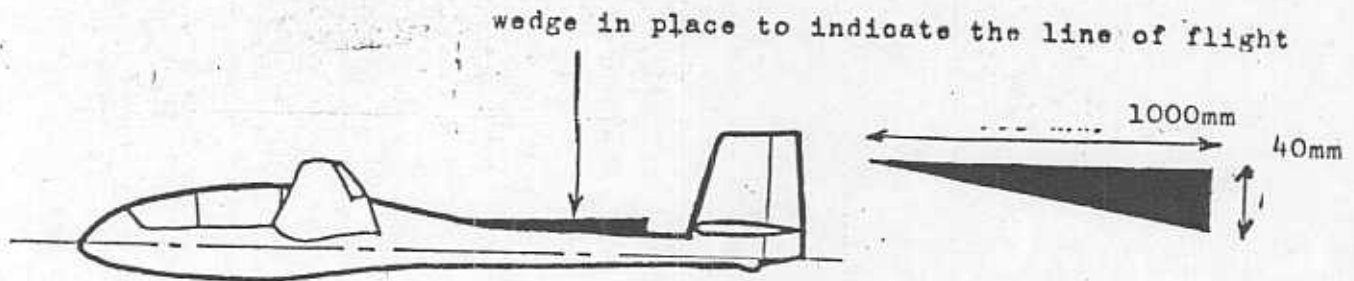
$$n - = 2.65$$

f) Weights

- Maximum permitted weight 565 kg
- Empty weight with minimum equipment 365 kg
- Useful load 200 kg

g) Centre of gravity

- Place the aircraft level



- C. of G. limits: forward limit = 20% of the mean aerodynamic chord
- aft limit = 33% of the M.A.C. for E7B
- and 37% of the M.A.C. for E7BB

- leverage exerted by the, variable loads present:

- front ballast X = 670 mm
- control panel X = 1.200 mm
- left-hand pilot X = 1.550 mm
- right-hand pilot X = 1.790 mm
- luggage compartment X = 2.600 mm

- Pilots are responsible for ensuring the aircraft's loading to be within limits.

N.B. The reference  $X = 0$  is the plane of the nose of the glider having first fixed the C. of G.

The leading edge reference point: is situated at  $X = 2143$  mm

The mean aerodynamic chord is 1000 mm

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h) Operational limitations

- Cross-wind component must not exceed 10 kts
- Cloud flying is forbidden
- All aerobatic manoeuvres are forbidden

i) Equipment list

- Obligatory equipment:
  - 1 A.S.I.
  - 1 Variometer
  - 1 Altimeter
  - 1 Turn and slip
  - 1 Compass
  - 2 Pilot harnesses, including shoulder straps of a standardised type
  
- Optional Equipment:
  - Artificial horizon
  - Radio installation
  - Oxygen installation for both seats
  - Total energy variometer

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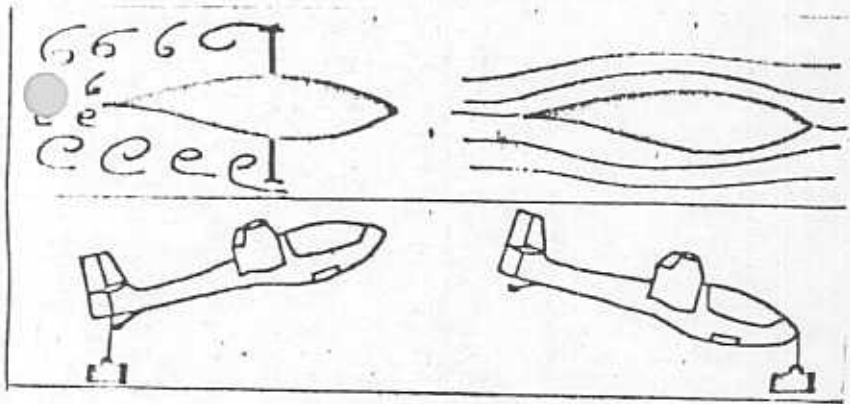
List of compulsory placards

- Fuselage: inside the cockpit on the control-rod cover
- Wings: on the root rib
- Ailerons: on the inner rib
- Rudder: on the lower part of the main stringer
- Tailplane: on the centre of the main spar
- Elevator: on the root rib

Fuselage: inside the cockpit:

- in the baggage compartment - permitted load of the compartment.
- on the ballast mounting point:- weight of extra ballast.
- on the starboard interior wall - operational limitations.

Diagrams - see below



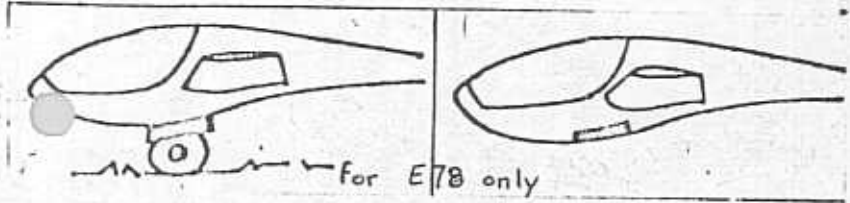
MAXIMUM LOAD

IN THIS COMPARTMENT = 10 kg



EXTRA BALLAST

SEE FLIGHT MANUAL

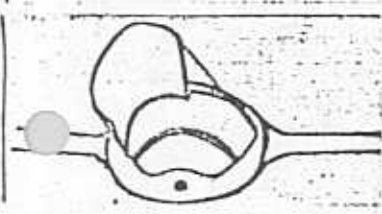
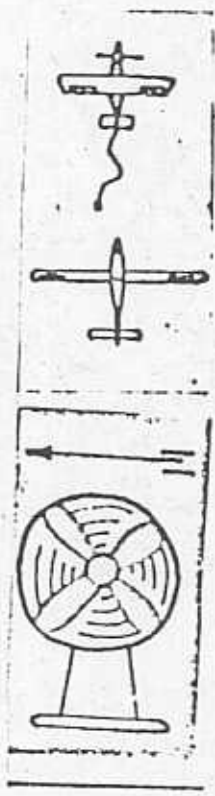


- OPERATIONAL LIMITATIONS -

E 78 - SILENE

- Speed never to exceed - VNE 220 km/h
- Maximum rough air speed- VB 170 km/h
- Maximum towing speed - VT 170 km/h
- Maximum all-up weight - 565 kg

ALL AEROBATIC MANOEUVRES ARE FORBIDDEN



SECTION 3 - EMERGENCY PROCEDURESa) Jettisoning the canopy

In every instance the canopy may be jettisoned by pulling the RED handle on the right side of the cockpit, on the right of the fixed canopy frame, as far as it will go. It is not necessary to undo the cord which normally restrains the canopy: it will break automatically when the canopy detaches. The backward canopy pin will also leave by itself.

b) Spin recovery

All intentional spinning is forbidden.

Recovery from an accidental spin is performed by means of the standard recovery procedure: stick is returned to neutral and rudder applied in the opposite direction to the spin. Recovery will occur in  $1/3$  to  $1/2$  a turn.

After recovery pilots should be wary of the rapidity with which the aircraft can pick up speed: use the controls gently.

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111 - PRE-FLIGHT CHECK

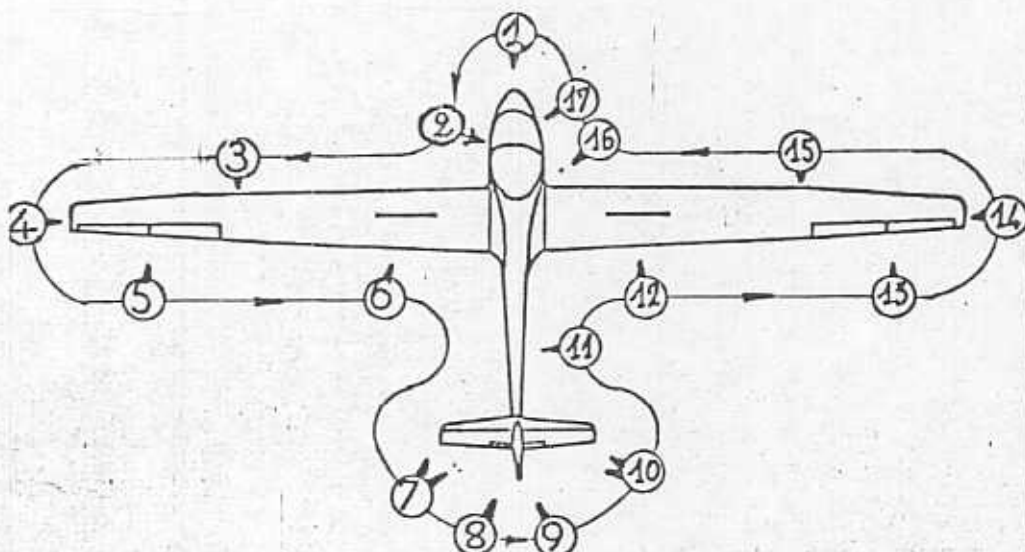
a) After rigging

When the glider has just been rigged, check the spindles are locked in place, the pins are correctly located, and the controls linked up.

b) Before each flight

1. Towhook - clean and functioning
2. Open the airbrakes
3. State of the wing surface -leading edge - inspection flaps
4. Shake the wings
5. Port ailerons, hinges, attachment rods
6. Airbrakes, hinges and attachment rods
7. Tailplane, security, full deflection, hinges
8. Rudder, hinges, attachment rod
9. Tail-skid - remove the ground-handling wheel if attached
10. Tailplane, security, full deflection, hinges
11. Fuselage, state of surface, - the u/carriage well is susceptible to collecting thrown up mud.
12. Airbrakes, hinges, attachment rods
13. Starbord ailerons, hinges, attachment rods
14. Shake the wing
15. Wing (repeat 3 and 4)
16. Undercarriage, tyre pressure (2.4 bars)
17. Canopy, cleanliness, hinges, restraining cord.

CHECK BEFORE EACH FLIGHT THAT THE RETAINING SCREW OF THE HORIZONTAL STABILISER HAS NOT SLIPPED BEYOND ITS SEATING



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IN THE COURSE OF THE FLIGHT

- a) Take-off, Aerotowing: Trimmer set to neutral - hold the stick fully forward until the aircraft starts to roll.  
Take-off speed - 80 km/h - minimum recommended speed during aerotow is VI 120 km/h.
- b) Retracting the Undercarriage: Unbolt the trigger on the left side of the handle and pull the latter fully back. (E78 only)
- c) Tow-hook release: The tow-hook release handle is yellow, and is situated in front of the control panel on the central console.
- d) Soaring: Recommended thermalling speed is 95 km/h with a 30 degree angle of bank at maximum all-up weight, lateral stability in the turn is practically neutral.
- e) Airbrakes: The handlescontrolling the airbrakes are blue, and are situated on the left cockpit wall on the pupil's side, and on the righthand side of the central console on the Instructor's side  
Glide ratio of 6 at 1.4 VS = 95 km/h.
- f) Stalling: This is preceded by buffeting 5 km/h above VS. Lateral control id easy right down to the stall, which occurs at a speed of 75 km/h at maximum all-up weight. Recovery is standard.
- g) Lowering the Undercarriage: Push the control lever forward, then ensure the locking mechanism is engaged by trying to pull the handle back again. (E78 only)
- h) Landing: The recommended approach speed is 100 km/h in calm air.

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SECTION 5.1 - INSTRUCTIONS FOR RIGGING AND DERIGGINGInstructions for rigging and derigging:Rigging - Wings

- a) Clean and lightly grease all spindles and attachment sockets
- b) Mate the right wing to the fuselage, mating the front fuselage attachment pin with the swivel on the root rib. Make sure that the socket in the swivel is properly lined up to receive the pin.
- c) Mate up the rear attachment and the air-brake attachment with the help of a SAFIL pin on the front of the spindle.
- d) Present the other wing to the fuselage in the same way as the first, and locate the rear attachment.
- e) Locate the central spindle (pointing towards the nose of the glider). To line up the mountings easily jiggle the wings. The spindle should go home 'by hand' without the use of force. For the airbrake attachment slide the vice-grip into the hole provided for this purpose, then pin. Shake the wings up and down in time, and make sure the spindles are home.
- f) Connect up the 4 push-rods for the ailerons and the airbrakes in front of the main spar. (Hotellier ball and socket swivel joints. Brake by pinning V Ø 1 x 15.

Tailplane

- g) Present the tailplane to the fuselage and mate up its greased spindles on either side of the fin by lifting up the elevators and, when half-way, lowering them.
- h) Immediately screw up the screw Ø6 in front of the tailplane key.
- i) Check all controls and control surfaces for full and free movement.

De-rigging

- j) Open the canopy.
- k) Free the control-run cover which is retained by 4 DZUS fasteners.
- l) Follow the above instructions in reverse order.
- m) Remove the tailplane, and immediately replace the screw Ø6.

De-rigging (cont)

- n) Detach the connection rods for the ailerons and airbrakes.
- o) Open the access doors on the upper surface of the wing, the "KARMAN", then release the vice-grip on the central spindle by taking the wing's weight. Remove the spindle.
- p) Remove the rear spindle and lift one wing. Take care not to bend the rods when the wing is placed on the ground.
- q) Remove the other rear spindle, lifting the wing.
- r) Immediately replace the rear spindles.

Ground Handling

The tail of the glider can be lifted by means of a strap passed beneath the fuselage. (2 needed to lift.)

11 - PRE-FLIGHT CHECKS

- a) Check the centre of gravity load: See page 2.2 of the present flight manual.
- b) Canopy: We have retained a hinge mounted canopy to avoid the risk of a breakage due to the canopy falling off its glider
  - The generous access provided with the canopy open allows pilots to bale out unhindered in the case of an unavoidable jump.
  - To open the canopy pull back the red handle on the left side.
- c) Sitting in the Cockpit: The rudder pedals are adjustable: all that is necessary is to pull the black toggles situated on each side and the rudder pedals will then be positioned fully aft. In order to extend them push on the pedals with both feet, still pulling the toggle.
- d) Ventilation and de-misting: Pull the black lever beneath the tow-hook release handle, to de-mist the canopy.. Cockpit ventilation is effected by way of side-openings in the canopy which are covered by small flaps. These are controlled by a black lever on the right side of the cockpit at knee-height.