AIRCRAFT COMPOSITE STRUCTURES
DEVELOPMENT AND PRODUCTION LTD.

SAILPLANE FLIGHT MANUAL

Model: **B1 - PW - 5**

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In Polish original pages identified by "Appr." are approved by Polish aviation authority:

General Inspectorate of Civil Aviation
Civil Aircraft Inspection Board

Seal:

Original date of approval:

This Manual should be always on the sailplane board

This sailplane is to be operated in compliance with information and limitations contained herein.

The English translation has been made to the best of our knowledge and belief, but in case of uncertainty the Polish original is authoritative.

0.1 RECORD OF REVISIONS

Any revision of the present Manual, except actual weighing data, must be recorded in the following table and in case of approved Sections endorsed by the responsible airworthiness authority.

A black vertical line in the left hand margin and the Revision No will indicate the new or amended text in the revised page, and the date will be shown on the bottom left hand corner of the page.

Rev. No	Affected Section	Affected pages	Date of issue	Approval	Date of approval	Date of insertion	Signature

0.2 LIST OF EFFECTIVE PAGES

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SECTION 1

GENERAL

1.1 INTRODUCTION
1.2 CERTIFICATION BASIS
1.3 WARNINGS, CAUTIONS AND NOTES
1.4 DESCRIPTIVE DATA
1.5 THREE-VIEW DRAWING
1.6 BALLASTS DRAWINGS
1.7 ABBREVIATIONS

1.1 INTRODUCTION

This Flight Manual has been prepared to provide pilots and instructors with the information for safe and efficient operation of B1-PW-5 sailplane.
This Manual includes the material required by Joint Airworthiness Requirements JAR-22 and supplementary information supplied by the sailplane manufacturer.

1.2 CERTIFICATION BASIS

This type of sailplane has been approved by Civil Aircraft Inspection Board in accordance with Joint Airworthiness Requirements JAR-22 - issue of October 28th, 1995 Change 5 .

The Type Certificate No **BG – 214** has been issued on June 12th, 2001, category of airworthiness "U" (utility).

1.3 WARNINGS, CAUTIONS, NOTES

WARNING:

MEANS THAT THE NON-OBSERVATION OF THE CORRESPONDING PROCEDURE LEADS TO AN IMMEDIATE OR IMPORTANT DEGRADATION OF THE FLIGHT SAFETY

CAUTION:

MEANS THAT THE NON-OBSERVATION OF THE CORRESPONDING PROCEDURE LEADS TO A MINOR OR TO A MORE OR LESS LONG TERM DEGRADATION OF THE FLIGHT SAFETY

NOTE:

Draws the attention on any special item not directly related to safety, but which is important or unusual.

1.4 DESCRIPTIVE DATA

BASIC DATA

wing span ……13.44 m = 44 ft 1 in
length……. 6.22 m = 20 ft 5 in
height ……... 1.86 m = 6 ft 1 in
wing area ……10.16 m^2 = 109.4 ft^2
aspect ratio ……17.8
wing loading……29.5 kg/m^2 = 6.05 lb/ft^2
Mean Aerodynamic Chord (MAC)……..… 0.798 m = 31 $^7/_{16}$ in

SAILPLANE DESCRIPTION

B1-PW-5 is the single-seat sailplane with the cantilever mid-wing and standard tailplane arrangement. The structure is all glass-epoxy composites.
The wings of trapeze contour with bow-shaped ends. The wings are of monospar structure with sandwich shells.
The plate airbrake extended on the upper wing surface only.
The fuselage shells are of monocoque structure, stiffened with frames.
Rudder is fabric covered.
The cockpit is equipped with in flight adjustable pedals and back rest adjustable on ground. The canopy opens forwards.
The fixed undercarriage contains of the main wheel with shock absorber and drum brake, front wheel and tailskid with small wheel.
On the tips of wings small wheels are installed.
The sailplane is equipped with:

- Two take-off hooks (nose hook for aerotowing and C.G. hook for winch launching),
- Special ballast (located under pilot‘s seat),
- Tail ballast placed in tail ballast bay under the tailplane,
- Total energy probe system with port located on the top of fin (for variometer and sailplane computer).

SPECIAL BALLAST DESCRIPTION

Special ballast is used only for increasing cockpit load in case when the weight of pilot, parachute and lugged is under the value determinate by competition organizer. Special ballast consists of eight painted red weights made of lead. Each weight marked 1 to 8 .

Weights with numbers 1, 2, 3, 4, 5, 6 and 8 each have a mass of $6^{-0.3}$ kg = $13.2^{-0.7}$ lb.; weight number 7 has a mass of $5{,}4^{-0.3}$ kg = $11.9^{-0.7}$ lb.

Every weight has marks as follows:

- manufacturer's name,
- sailplane serial number,
- sailplane type,
- ballast bay number, for which the weight is fitted,
- weight.

DEVICE FOR SPECIAL BALLAST

There is eight numbered ballast bay located under pilot's seat.(see Fig.1-2)

There are control holes in pilot seat to check the number of ballast weights.

Inside ballast bay there are some rubber elements to hold the weight in one position.

THE COVER OF THE SPECIAL BALLAST BAY

There is removable cover of the special ballast bay in the pilot seat. This cover makes possible rigging and de-rigging the weights without remove pilot seat.

The cover is fastened by screws to pilot seat and bulkhead of ballast bay.

TAIL BALLAST DESCRIPTION

The tail ballast is used for changing the centre of gravity position in specified range.

When the tail ballast is used the centre of gravity goes back..

How to use the tail ballast is shown in part 4 .

Tail ballast consists of four identical, painted red, lead weights. The weights fit in a tail ballast bay located in the rear fuselage under the tailplane (Fig. 1-3).

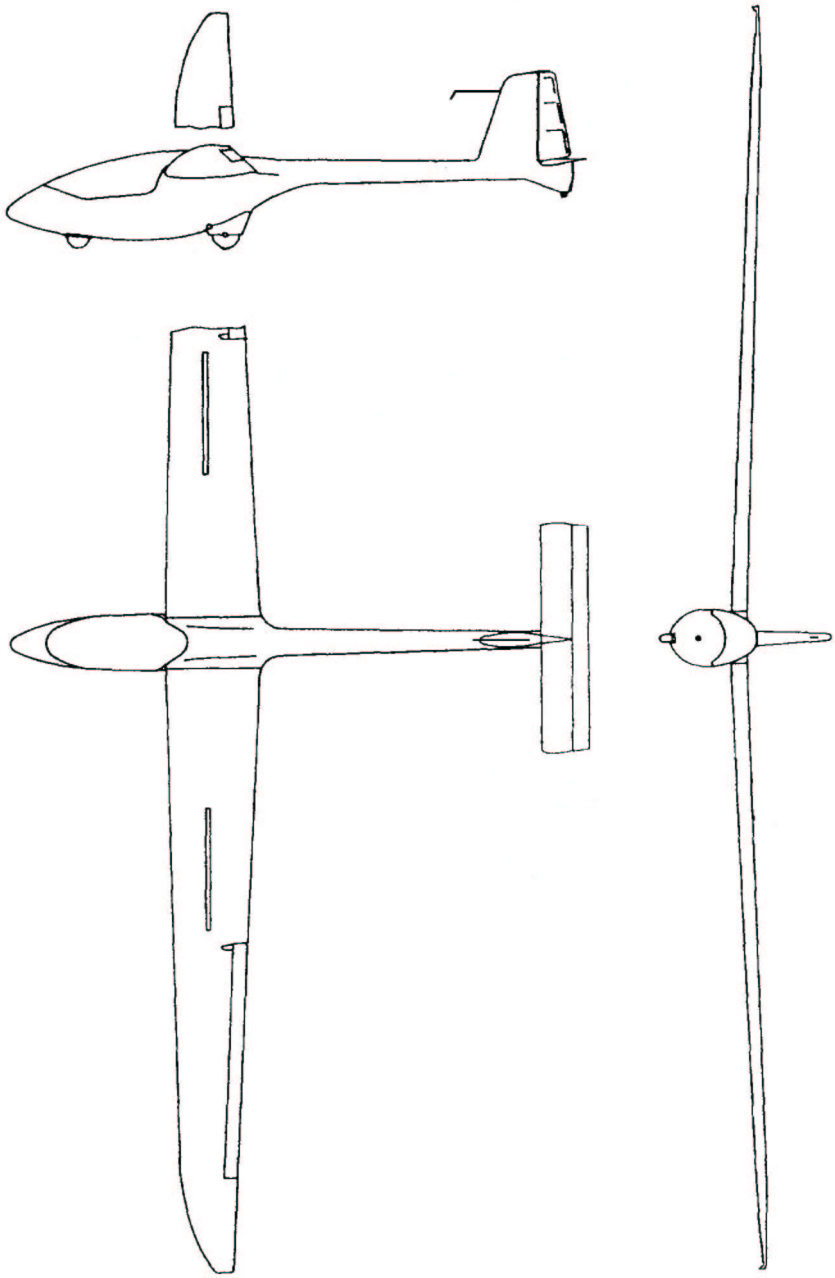
Every weight has a mass of approximately 1 kg = 2.2 lbs and has marks as follows:

- manufacturer's name,
- sailplane serial number,
- sailplane type,
- weight.

DEVICE FOR TAIL BALLAST

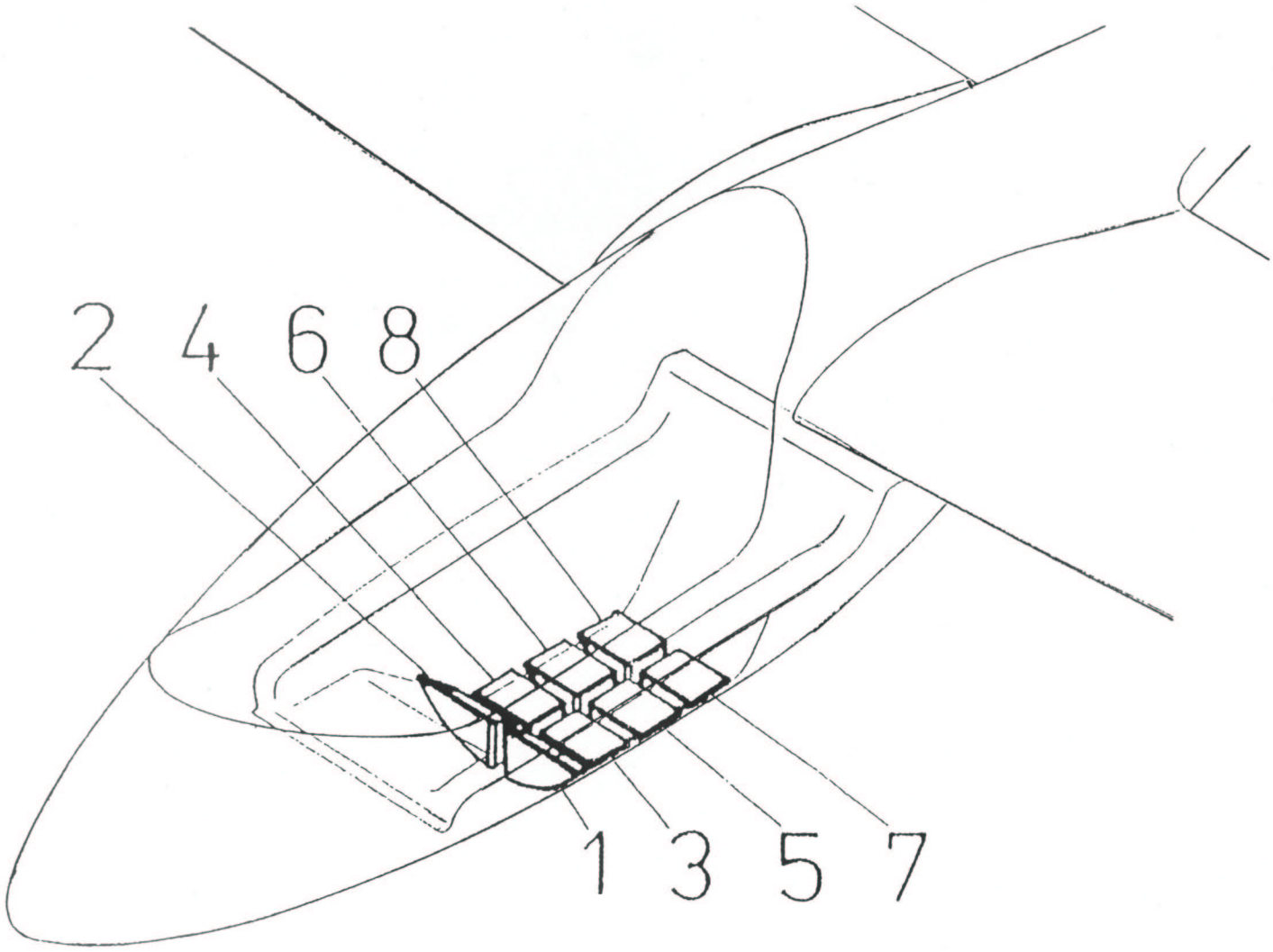
There is the bay for 4 identical weights with mass of app. 1 kg = 2.2 lbs. each. Weights closed by special cover placed on two pins. This cover has four holes to enable inspection of weights.

1.5 THREE-VIEW DRAWING

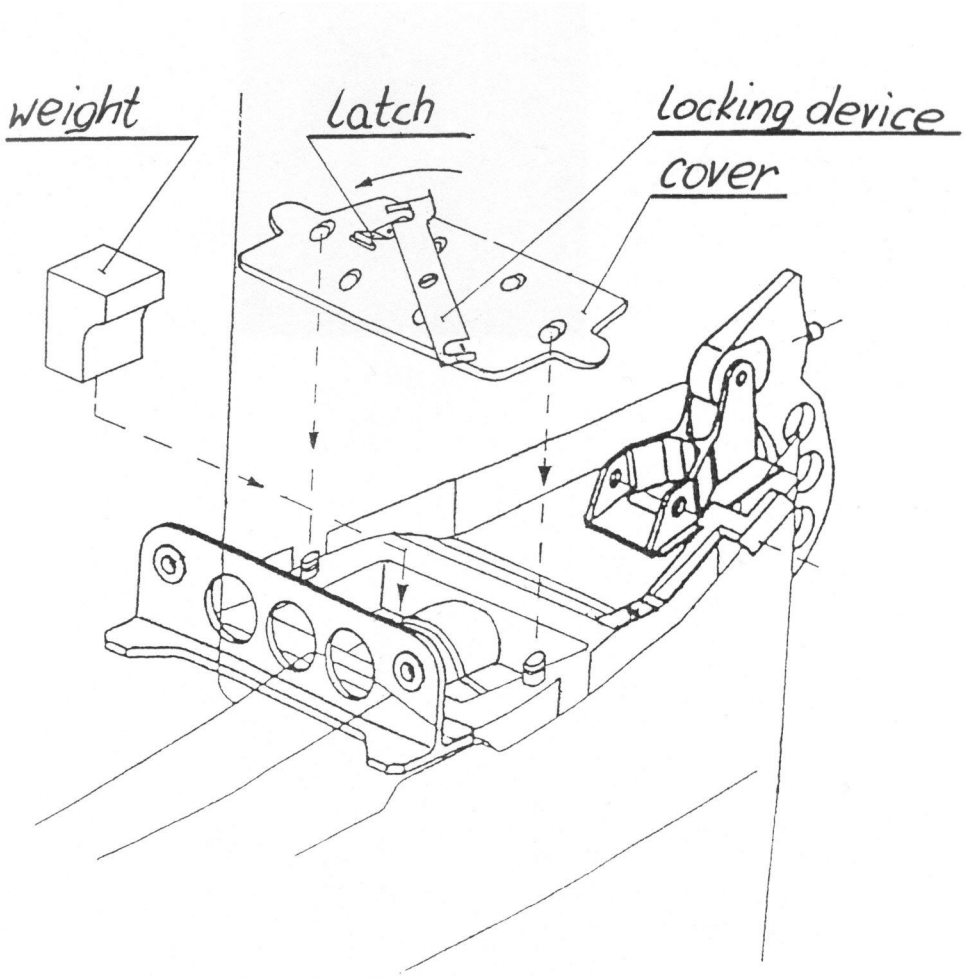


B1-PW-5 sailplane
Fig. 1 - 1

1.6 BALLAST DRAWINGS



Special ballast
Fig.1-2



Tail ballast
Fig. 1-3

1.7 ABBREVIATIONS

^{0}C - degree of Celsius
A - ampere
Ah - ampere-hour
C.G. - centre of gravity.
CAS - calibrated airspeed means indicated airspeed of a sailplane, corrected for position (due to position of pressure ports on sailplane) and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
cm - centimeter
daN - decanewton.
ft - foot
g - gram
h - hour.
IAS - indicated airspeed means the speed of a sailplane as shown on its pitot - static airspeed indicator uncorrected for airspeed indicator system error. In this Manual zero instrument error is assumed.
in - inch
kg - kilogram.
kG - kilogram-force
km - kilometre.
kt - knot
lb - pound
lbf - pound-force
m - meter.
MAC - mean aerodynamic chord
mm - millimetre
MPa - mega Pascal
s - second.
V - volt
Vs_1 - means the stall speed or the minimum steady flight speed obtained in a specific configuration.

SECTION 2

LIMITATIONS

2.1 INTRODUCTION

2.2 AIRSPEED

2.3 AIRSPEED INDICATOR MARKINGS

2.4 WEIGHT

2.5 CENTRE OF GRAVITY

2.6 APPROVED MANOEUVRES

2.7 MANOEUVRING LOAD FACTORS

2.8 KINDS OF OPERATIONS

2.9 MINIMUM EQUIPMENT

2.10 AEROTOW AND WINCH-LAUNCHING

2.11 OTHER LIMITATIONS

2.12 LIMITATIONS PLACARDS

2.1 INTRODUCTION

Section 2 includes operating limitations, air speed indicator markings, and limitations placards necessary for safe operation of the sailplane. Civil Aircraft Inspection Board has approved the limitations included in this Section and in Section 9.

2.2 AIRSPEED

Airspeed limitations and their operational significance are shown below:

	Speed	knots IAS	km/h IAS	Remarks
V_{NE}	Never exceed speed	115	213	Do not exceed this speed in any operation and do not use more than 1/3 of control deflection
V_{RA}	Rough air speed	81	150	Do not exceed this speed except in smooth air and then only with caution. Examples of rough air are: lee-wave rotor, thunderclouds, etc.
V_A	Manoeuvring speed	81	150	Do not make full or abrupt control movement above this speed, because under certain conditions full control movement may overstress the sailplane.
V_W	Maximum winch launching speed	65	120	Do not exceed this speed during winch launching.
V_T	Maximum aerotowing speed	81 (CAS =79.5)	150 (CAS =147)	Do not exceed this speed during aerotowing.

2.3 AIR SPEED INDICATOR MARKINGS

Airspeed indicator markings and their colour-code significance are shown below:

Marking	knots IAS value or range	km/h IAS value or range	Significance
Green arc	41-81	75-150	*Normal operating range.* (Lower limit is 1.1 V_{S1} at maximum weight and front limit C.G. location. The upper limit is the rough air speed).
Yellow arc	81-115	150-213	Manoeuvres must be conducted with caution and only in smooth air.
Red line	115	213	Maximum speed for all operations.
Yellow triangle	51	95	Approach speed at maximum weight.

2.4 WEIGHT

maximum weight ..... 661 lb(300 kg)
maximum fuselage and tailplane weight ..... 245 lb(112 kg)
maximum load in luggage compartment ..... 11 lb(5 kg)
maximum special ballast weight..... 104.5 lb(47.4 kg)
maximum tail ballast weight..... 8.8 lb(4 kg)

2.5 CENTRE OF GRAVITY

Centre of Gravity range for flight:

- front limit — 20% of Mean Standard Chord
  9.25 in (23.5 cm) aft of root chord leading edge
- rear limit — 42% of Mean Standard Chord
  16.14 in (41.0 cm) aft of root chord leading edge.

The way of C.G. location finding and the C.G. location range for empty sailplane are described in MAINTENANCE MANUAL.

WARNING:

THE SAILPLANE MAY BE OPERATED SAFETY ONLY WHEN LOADED IN RANGE DEFINED IN SECTION 6 OF THIS MANUAL.

2.6 APPROVED MANOEUVRES

This sailplane is certified in the Utility Category.
The following manoeuvres are allowed :

- looping,
- stall turn,
- spinning,
- spiral.

Performing technique and recommended entry speeds are contained in Section 4 of this Manual.

2.7. MANOEUVRING LOAD FACTORS

Load factor limits are :

- for V_A = 81 kt (150 km/h) airspeed +5.3 / -2.65
- for V_{NE} = 115 kt (213 km/h) airspeed +4.0 / -1.5

2.8 KINDS OF OPERATION

- day flying,
- cloud flying,
- aerobatics manoeuvres (according to item 2.6 of this Manual).

2.9 MINIMUM EQUIPMENT

- 4 pieces pilot's belts,
- airspeed indicator (marked acc. to item 2.3 of this Manual),
- altimeter,
- variometer,
- transceiver,
- power supply.

CAUTION:

DURING THE FLIGHT PILOT MUST HAVE BACK PARACHUTE ATTACHED.

2.10 AEROTOW AND WINCH - LAUNCHING

AEROTOW

The hook for aerotowing (nose hook) is located before the front wheel.

- maximum aerotowing airspeed ..... V_T =81 kt = 150 km/h (CAS =79.5 kt = 147 km/h)
- maximum force damaging the towing cable or safety link..... 1574 lb = 700 daN
- minimum towing cable length..... 65 ft = 20 m

WARNING:

THE AEROTOWING WHEN USING THE C.G. HOOK IS NOT PERMITTED.

WINCH-LAUNCHING

The hook for winch launching (C.G. hook with automatic release) is located before the main wheel on the left side of fuselage.

CAUTION:

THE WINCH-LAUNCHING WHEN USING THE FRONT HOOK IS NOT PERMITTED.

- maximum winch-launching speed..... V_W = 65 kt = 120 km/h
- maximum force damaging the cable or safety links 1574 lb = 700 daN

2.11 OTHER LIMITATIONS

1) Flying in known icing conditions is not permitted.
2) Night flying is not permitted.
3) Aerobatics manoeuvres in rough air are prohibited.
4) The pilots of body + parachute weight of below 60 kg (132 lb) must have the front limit location of the backrest.
5) The flights on the altitude of above 5 km are prohibited.
6) Placing at the ballast bay other things then weights described in section one is not permitted

2.12 LIMITATIONS PLACARDS

Maximum winch-launching speed .....V_W = 65 kt
Maximum aerotowing speed.....V_T = 81 kt
Manoeuvring airspeed.....V_A = 81 kt
Allowed manoeuvres: looping, stall turn, spinning, spiral

Empty sailplane weight .....max.190 kg (419 lb)
Maximum weight .....300 kg (661 lb)
Maximum cockpit load ..... 110 kg (242 lb)
Minimum pilot's + parachute weight .....55 kg (122 lb)
Maximum force damaging the towing cable or safety link. ……. 1574 lb

WARNING:

PILOTS OF BODY + PARACHUTE WEIGHT OF BELOW 60 kg (132 lb) MUST HAVE THE BACK-REST AT FRONT LIMIT LOCATION.

luggage max. 5 kg (11 lb)

CAUTION:

THIS SAILPLANE IS EQUIPPED WITH TAIL BALLAST.
CHECK THE LOADING CONDITIONS.

CAUTION:

THIS SAILPLANE IS EQUIPPED WITH SPECIAL BALLAST.
USING CONTROL HOLES IN PILOT SEAT CHECK NUMBER OF BALLAST WEIGHTS.
DO NOT OVERLOAD MAXIMUM COCKPIT WEIGHT.

TAIL BALLAST LOADING TABLE.	
Cockpit load (pilot + parachute + special ballast)	Allowable number of tail ballast weights
from 55 kg (122 lb) to 60 kg (133 lb)	use of tail ballast not allowed
from 60 kg (133 lb) to 65 kg (144 lb)	1or less
From 65 kg (144 lb) to 70 kg (155 lb)	2 or less
from 70 kg (155 lb) to 75 kg (166 lb)	3 or less
over 75 kg (166 lb)	4 or less

The other placards are shown in Section 7.
Location of the placards is described in MAINTENANCE MANUAL.

SECTION 3

EMERGENCY PROCEDURES

3.1 INTRODUCTION
3.2 CANOPY JETTISON
3.3 BAILING OUT
3.4 STALL RECOVERY
3.5 SPIN RECOVERY
3.6 SPIRAL DIVE RECOVERY

3.1 INTRODUCTION

Section 3 provides the procedures in emergency conditions

3.2. CANOPY JETTISON

1) Pull the canopy emergency jettison handle full.
2) Catch the handles of locks and push the canopy upwards.

3.3. BAILING OUT

1) Jettison the canopy.
2) Release the safety belts.
3) Bail out of the sailplane (if the sailplane rotates bail out towards the rotation).
4) If the altitude allows - open the parachute with a delay. At the altitude below 650 ft (200 m) open the parachute immediately.

3.4 STALL RECOVERY

Release the control stick.

3.5 SPIN RECOVERY

1) Check ailerons neutral.
2) Apply full rudder opposite to the direction of the spin.
3) Ease the stick forward until rotation ceases.
4) Centralize rudder and ease out of the ensuing dive.

3.6 SPIRAL DIVE RECOVERY

1) Cancel the bank with the co-ordinated aileron and rudder deflection.
2) Recover the sailplane out of the diving.

SECTION 4

NORMAL PROCEDURES

4.1 INTRODUCTION

4.2 RIGGING AND DE-RIGGING

4.2.1 SAILPLANE RIGGING AND DE-RIGGING

4.2.2 SPECIAL BALLAST RIGGING AND DE-RIGGING

4.2.3 TAIL BALLAST RIGGING AND DE-RIGGING

4.3 BALLAST BAY LOADING INSPECTION

4.3.1 SPECIAL BALLAST BAY LOADING INSPECTION

4.3.2 TAIL BALLAST BAY LOADING INSPECTION

4.4 K-1 PROBE RIGGING AND DE-RIGGING

4.5 PRE-FLIGHT INSPECTION

4.6 INSPECTION BEFORE TAKE-OFF

4.7 NORMAL PROCEDURES AND RECOMMENDED SPEEDS

4.5.1 PROCEDURES BEFORE TAKE-OFF
4.5.2 TAKE-OFF
4.5.3 FLIGHT
4.5.4 APPROACH
4.5.5 LANDING
4.5.6 FLIGHT IN RAIN
4.5.7 AEROBATICS

4.8 PROCEDURES AFTER FLIGHTS

4.9 OVERLOADED SAILPLANE FLIGHT

4.1 INTRODUCTION

Section 4 provides the procedures of normal sailplane operation. The normal procedures associated with additional equipment can be found in Section 9.

4.2 RIGGING AND DE-RIGGING

4.2.1 SAILPLANE RIGGING AND DE-RIGGING

A) Rigging team: 2 persons (or 3 persons without the rigging jigs).
B) Rigging jigs: fuselage support, wing tip support (of about 4 in height).
C) Sequence of rigging procedures:
   1. clean and grease all the assembling fittings, bolts and control system connections,
   2. put the fuselage on the support (in case no support is in disposition one person holds the fuselage), open the canopy, put the airbrake cockpit lever forwards, open the inspection hole on the fuselage, put both rear bolts forwards,
   3. rig the right-hand wing first. Insert the spar end into the fuselage. Align together the wing and fuselage fittings, insert the right-hand rear bolt till to stop, insert the right-hand main bolt to "1/2" location (bolt lever locate in the grip) then insert the left-hand main bolt into "1/2" location too (as above) - (see Fig. 4 -2),

CAUTION:

THE BOLTS SHALL BE INSERTED BY HAND ONLY, NO TOOL ALLOWED. IN CASE OF JAMMING (EXCESSIVE MOTION DRAG) STOP THE RIGGING AND CHECK THE FITTING AND BOLTS FOR CORRECT CLEANING.

NOTE:

During rigging check the fitting of fuselage and wing automatic connections of air-brake and ailerons control systems.

   4. rest the wing tip on the support (having no support one person should hold the wing),

5. left-hand wing rigging: insert the spar end into the fuselage, align the wing/fuselage fittings, insert the left-hand main bolt till it will be secured by a click, then the right-hand main bolt on the same way,
6. tailplane rigging: deflect the rudder till to stop, align the tailplane/fuselage position (the front stabilizer pins shall be fitted into the fuselage fittings), insert the rear bolt (placing the latch in lower position) till it gets secured by means of latch. The elevator is connected automatically (see: Fig.3-4),
7. check securing of the main wing bolts and the rear bolt of tailplane, close the fuselage inspection hole.

De-rigging requires the inverted sequence.

4.2.2 SPECIAL BALLAST RIGGING AND DE-RIGGING

Rigging or de-rigging of the Special ballast requires the following sequence:

- remove cover of the special ballast bay,
- put in or take out appropriate number of ballast weights (pay attention to weights and ballast bays numbers),
- replace the cover of the ballast bay.

Assembling and disassembling of the special ballast bay cover is shown in SAILPLANE MAINTANCE MANUAL.

4.2.3 TAIL BALLAST RIGGING AND DE-RIGGING

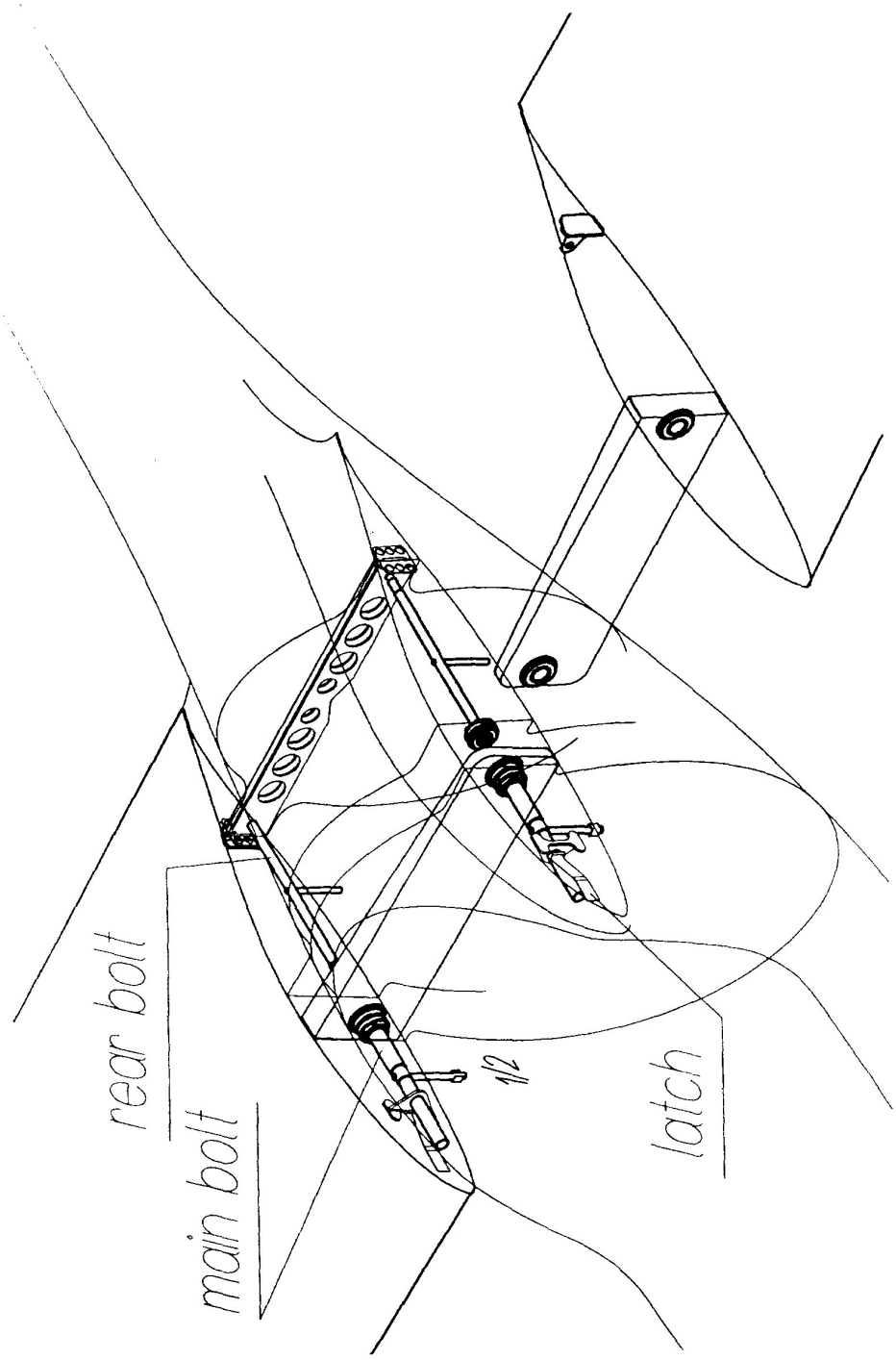
Rigging or de-rigging of the tail ballast requires the following sequence:

1) remove the tail plane (as shown in 4.2.1 – 6)
2) press the latch and turn the locking device clockwise until the cover unlocks,
3) remove the tail ballast bay cover,
4) put in or take out appropriate number of ballast weights (to determine allowable number of ballast weight use the TAIL BALLAST LOADING TABLE);

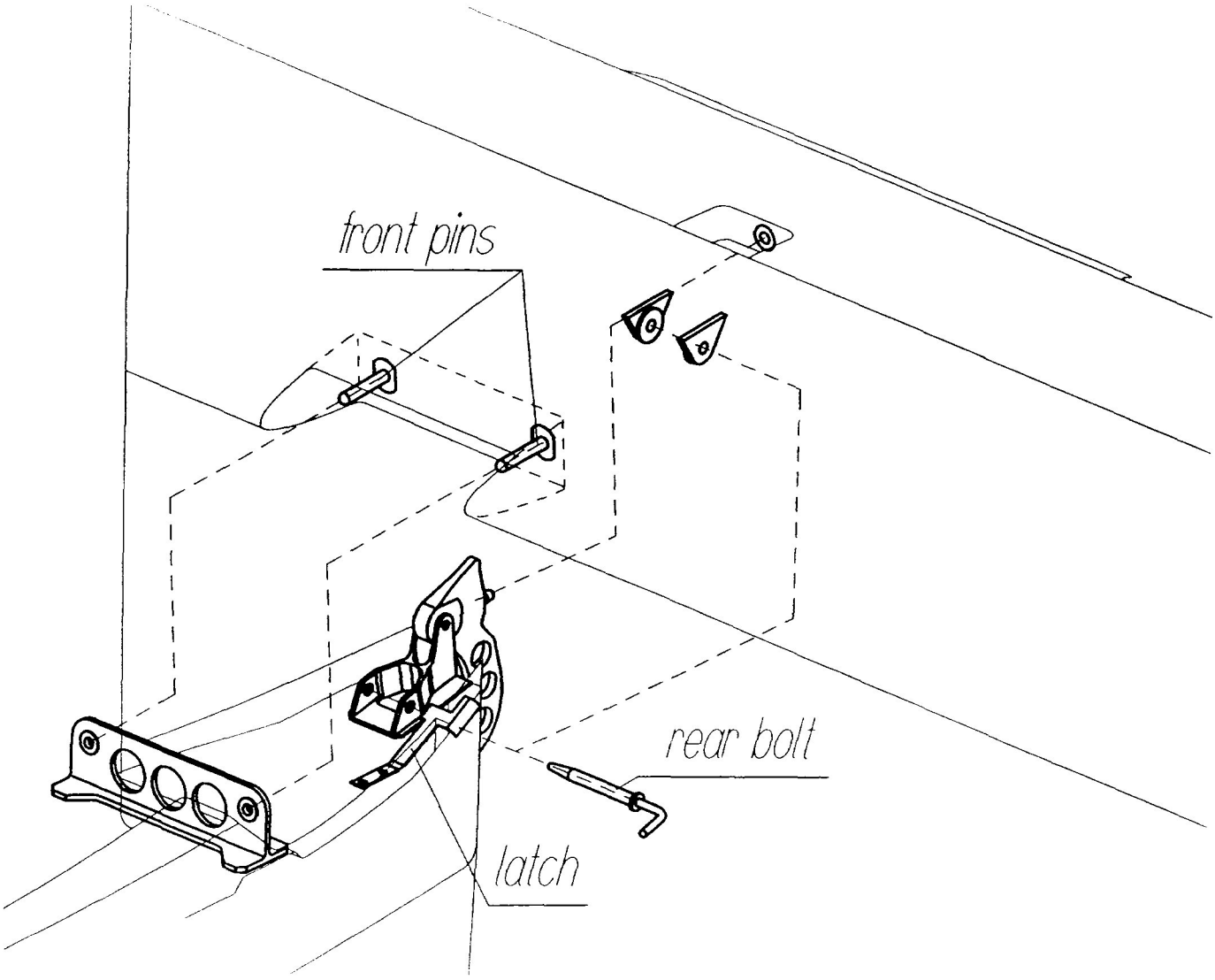
5) place the cover and press it slightly, then turn the locking device counter clockwise till the latch clicks (see Fig.1-3),
6) rig the tailplane (as shown in 4.2.1 – 6)

CAUTION:

THE TAIL BALLAST BAY COVER SHOULD BE SECURED. BOTH ENDS OF LOCKING DEVICE SHOULD BE PLACED INSIDE THE CUTS IN POSITIONING PINS.



Rigging the wings
Fig. 4 - 2



Rigging the tailplane
Fig. 4 - 3

Appr. 4.6

4.3 BALLAST BAY LOADING INSPECTION

4.3.1 SPECIAL BALLAST BAY LOADING INSPECTION

Take the following operations:

- remove seat pillow,
- throughout control holes check which weights are in ballast bay
- determine special ballast load using following table:

Fill status of ballast bay	Load of special ballast
0	0 lb
1	6 kg (13.23 lb)
1+2	12 kg (26.5 lb)
1+2+3	18 kg (40 lb)
1+2+3+4	24 kg (53 lb)
1+2+3+4+5	30 kg (66 lb)
1+2+3+4+5+6	36 kg (80 lb)
1+2+3+4+5+6+7	41.4 kg (91 lb)
1+2+3+4+5+6+7+8	47.4 kg (104.5 lb)

- add the pilot weights with parachute and lugged to the weight of special ballast – this is total cockpit load

4.3.2 TAIL BALLAST BAY LOADING INSPECTION

Take the following operation:

- remove the tail plane (as shown in 4.2.1 – 6)
  - check the number of weights at bay using the control holes in bay cover
  - definite weight of tail ballast and check loading conditions with the following table:

TAIL BALLAST LOADING TABLE.	
Cockpit load (pilot + parachute + special ballast)	Allowable number of tail ballast weights
from 55 kg (122 lb) to 60 kg (133 lb)	use of tail ballast not allowed
from 60 kg (133 lb) to 65 kg (144 lb)	1or less
From 65 kg (144 lb) to 70 kg (155 lb)	2 or less
from 70 kg (155 lb) to 75 kg (166 lb)	3 or less
over 75 kg (166 lb)	4 or less

- rig tail plane (as described in 4.2.1 –6)

WARNING:

BEFORE ANY FLIGHT CHECK TAIL BALLAST LOADING

WARNING:

MAXIMUM WEIGHT OF SAILPLANE WITH BALLAST DO NOT EXEED 300 kg (661 lb)

4.4 K-1 PROBE RIGGING AND DE-RIGGING

Insert probe into tube located on the top of the fin (end of probe bend down) and seal.
De-rigging requires the inverted sequence.

In case when the probe is out the hole of tube must be plugged or the duct of probe must be disconnect.

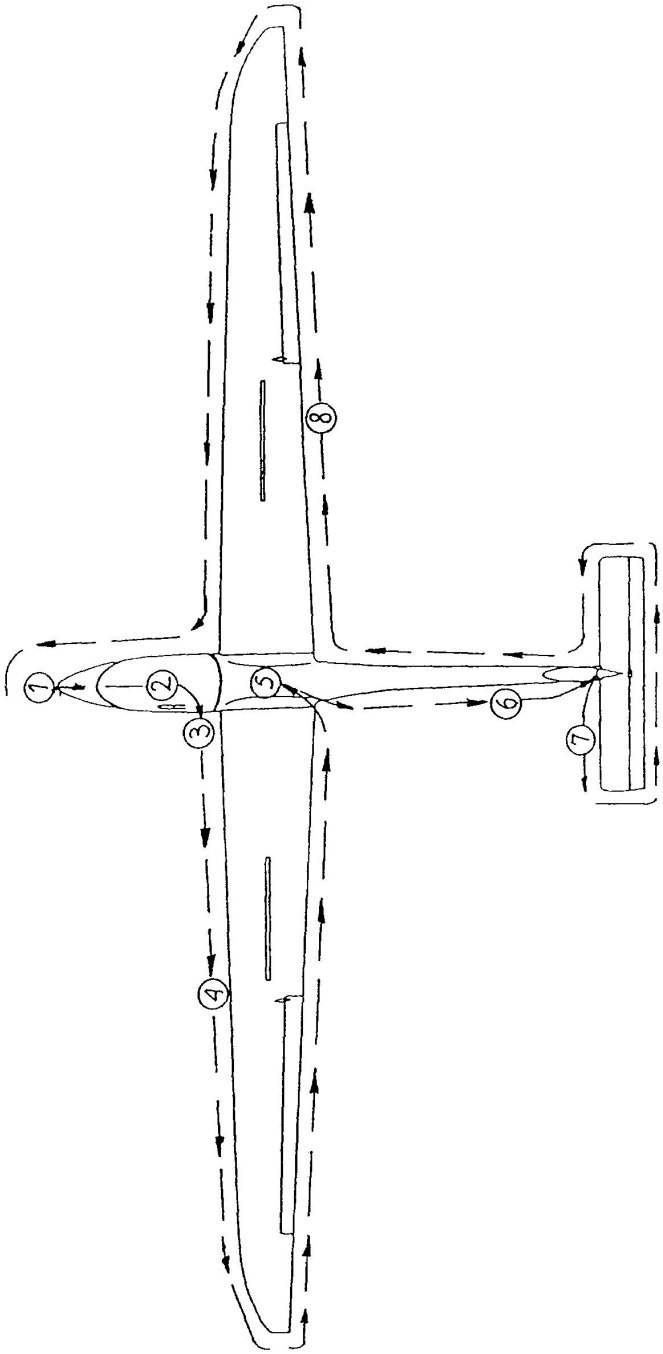
4.3 PRE - FLIGHT INSPECTION

NOTE:

Before the flight the validity of Airworthiness Certificate and the updating of periodic inspections should be checked.

The pre-flight inspection and after every rigging inspection are recommended to be performed according to the diagram (see Fig. 4 - 4):

1. - check the fuselage front part, surface condition, the pressure ports being not obscured,
2. - check the condition of perspex surface, open the canopy,
   - check the wing connection bolts to be inserted and secured,
   - check the instruments and installation connection,
   - check the correct operation of the elevator, rudder and ailerons, maximum deflections, plays and friction,
   - check the correct operation of air brake - the maximum extended position and locking in the retracted position,
   - check the operation of trimming device,
   - check the operation of front and C.G. take-off hooks,
   - check the cockpit for the moveable items - remove,
   - check the opening and locking of the canopy,
   - check the safety belts, pilot's backrest, seat pillow,
   - check special ballast bay loading,
3. - check the condition and pressure in pneumatics,
   - check the rollability of the wheels,
   - check the operation of wheel brake and shock absorber,
4. - inspect the upper and lower wing surface as well as leading and trailing edges,
   - check the ailerons, surface condition, suspension, plays, deflections, friction,
   - check the air brake, condition, plays, extending, retracting, fitting the caps into the contour,
5. - check if the fuselage inspection hole is covered,



Pre - flight inspection
Fig. 4 - 4

6. - check the fuselage rear part, especially bottom part and tailskid,
   - check the fin, surface condition,
   - check fixing, position and leakproof of K-1 probe,
   - check the rudder for fabric covering damages, upper hinge and cable fitting securing,
7. - check tail ballast bay loading,
   - check locking of tail ballast bay cover,
   - check the tailplane, fitting, securing, surface condition,
   - check the elevator deflections, plays, friction,
8. - as in item 4.

CAUTION:
VERIFY IF SPECIAL AND TAIL BALLAST LOADING ARE ACCEPTABLE TO THIS MANNUAL (SEE: BALLAST LOADING TABLE)

4.6 INSPECTION BEFORE TAKE-OFF

- check the fastening bolts to be in position and secured,
- check special and tail ballast bay loading,
- check the tailplane for the correct rigging and securing,
- check the correct operation of control surfaces and air brake namely without jamming, excessive play and that they have the full movements.

4.7 NORMAL PROCEDURES AND RECOMMENDED SPEEDS

4.7.1 PROCEDURES BEFORE TAKE-OFF

- check and put on the parachute,
- adjust the pilot's backrest,
- take place in the cockpit,
- fasten and tighten the belts,
- adjust the pedals,
- make the full movements of control surfaces, pull the towing cable release handle, extend and retract the air brake,
- check the transceiver operation,
- check the altimeter setting,
- close and lock the canopy.

4.7.2 TAKE-OFF

A) AEROTOWING

Before take-off put the trimming device handle into 1-2 position for the light pilot and up to 5-6 position for the heavy pilot.
Roll on the main wheel.
The controlling behaviours in towed flight are the typical ones.
The sailplane can be trimmed in the whole airspeed range in towed flight.
The flying under the towing airplane downwash is not recommended since the towing cable rubs the fuselage front part.
Recommended aerotowing airspeeds:

- at climbing 59.5 kt = 110 km/h
- at cross-country towing 81 kt = 150 km/h

B) WINCH-LAUNCHING

Before take-off put the trimming device handle into position 1 for the light pilot up to 5-6 position for the heavy pilot.
Due to the hook location it is recommended the launching cable position at the left-hand side of the sailplane.
However, if the cable is situated clearly at the right-hand side of the sailplane it should not be positioned on the left side of the front wheel.
For the light pilot (55-70 kg (122–155 lb)) in the beginning of roll out and climbing will be better to move the sick foreword over neutral position. This avoids the tailskid impact onto the ground and quick take off. Roll on the main wheel.
During the steep climb the stick forces are small.
The best launching airspeed is 48.6 – 54 kt (90-100 km/h).

RELEASING

The sailplane is equipped with the self-releasing hook.
Two releasing techniques exist:
1) before the intended releasing release the stick to lower the cable tension then pull the releasing handle in the cockpit,

2) before the intended self-releasing hold the stick in position till the self-releasing occurs. After releasing recover immediately the glide and check the cable releasing pulling the control handle.

4.7.3 FLIGHT

CIRCLING

The circling airspeed, depending on the bank angle and sailplane weight ranges 43 – 46 kt (80 - 85 km/h).
The bank reversal 45deg/45deg requires 3.5 seconds.

SIDE SLIP

The sideslip should be performed at the airspeed of 49 kt (90 km/h) or higher. Up to 20 deg bank the sailplane allows to retain the heading. For the greater bank the sailplane turns. With air brake retracted as well as with extended the sideslip is a typical one. The airspeed indicator records in sideslip are not valid.

AIR BRAKE OPERATION

For the airbrake full extended the sailplane ratio in approach ranges 6.5. The diving at 45 deg in respect to the horizon with air brake full extended does not exceed 115 kt (213 km/h) airspeed. The extending or retracting of the air brake creates no pitch. The air brake may be extended in the whole airspeed range. The retraction requires the airspeed of below 81 kt (150 km/h).

NOTE:

When extending the airbrake at the airspeed above 92 kt (170 km/h) the considerable negative vertical acceleration appears. Therefore the air brake should be extended gently. The pilot should be tightened with the belts.

4.7.4 APPROACH

Recommended approach airspeed is 51 kt (95 km/h).
The approach angle should be adjusted by means of air brake.

4.7.5 LANDING

Touch ground with the main wheel. Avoid the tailskid ground impact. Ground run should employ the front wheel to allow for direction retaining and efficient braking.
When the tail ballast bay is loaded after landing when pilot leaves cockpit the tail falls down suddenly.

4.7.6 FLIGHT IN RAIN

No abnormal control characteristics when flying in rain appear. No significant increase of stalling speed observed.

4.7.7 AEROBATICS

Before the initiation of the manoeuvres the sailplane should be trimmed for about 70 kt (130 km/h) airspeed. Check the air brake to be locked and check the absence of moveable items in the cockpit.
Manoeuvres are performed in the typical way.
The recommended entry (recovery) speeds and load factors gained are listed below:

Manoeuvre	entry speed (IAS) kt	entry speed (IAS) km/h	load factors
looping	92 to 97	170 to 180	3.4 g
stall turn	97	180	3.2 g
spinning	81 (recovery)	150 (recovery)	4.0 g
spiral	65	120	3.5 – 4.0 g

SAILPLANE BEHAVIOURS IN SPINNING

pilot with parachute	light 122 – 155 lb (55 - 70 kg)	mean 155 – 198 lb (70 - 90 kg)	heavy above 198 lb (above 90 kg)
aileron deflection	arbitrary	neutral or towards rotation	only towards rotation
longitudinal oscillations	exist considerable	exist	not exist
angle in respect to the horizon	40 - 50 deg.	50 deg.	60 - 70 deg.
delay in recovery	no more than 3/4 of turn	no more than 1/4 of turn	without delay

The recovery is typical one (see item 3.5).

4.8 PROCEDURES AFTER FLIGHTS

- switch-off the electrical devices,
- drain, if necessary, the ducts of total, static pressure and K-1 probe installations (acc. to MAINTENANCE MANUAL),
- clean the pilot's cockpit and the whole sailplane,
- perform the inspection same as the pre-flight one.

4.9 FLIGHT ON OVERLOADED SAILPLANE

Overloaded sailplane by special ballast does not generate abnormal control characteristics. Sailplane overloaded does not stall and spinning. Due to possibility of overstressed sailplane structure do not pass manoeuvring speed and land as quickly as possible. Then remove overload special ballast.

SECTION 5

PERFORMANCE

5.1 INTRODUCTION

5.2 APPROVED DATA

5.2.1 AIRSPEED INDICATOR SYSTEM CALIBRATION
5.2.2 STALL SPEED (IAS)

5.3 NON-APPROVED FURTHER INFORMATION

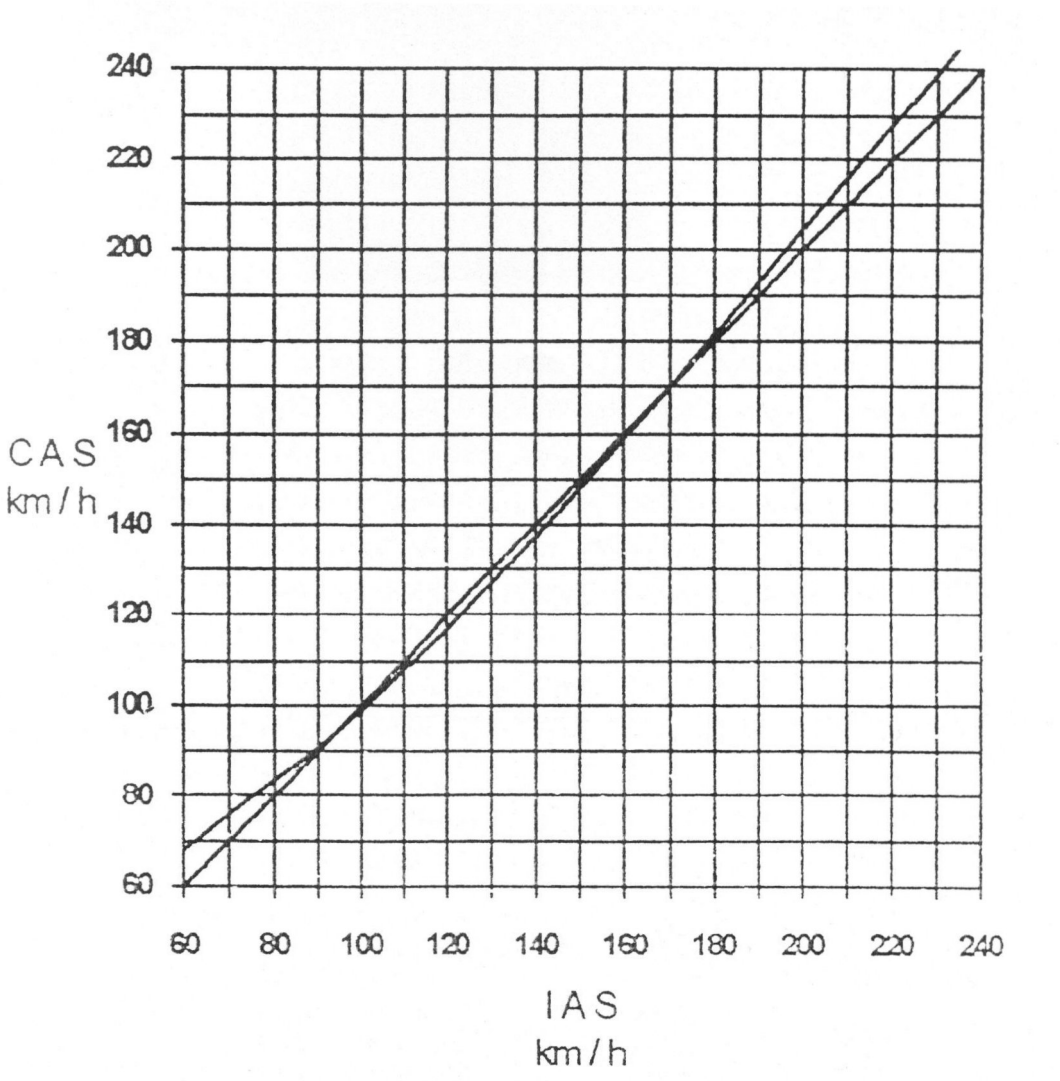
5.3.1 DEMONSTRATED CROSSWIND PERFORMANCE
5.3.2 FLIGHT POLAR

5.1 INTRODUCTION

Section 5 provides approved data for airspeed calibration, stall speeds and additional non-approved information.
The data are calculated on the base of actual flight test results gained on the sailplane of good condition and using the average controlling techniques.

5.2 APPROVED DATA

5.2.1 AIRSPEED INDICATOR SYSTEM CALIBRATION



Airspeed indicator system calibration
Fig. 5 - 1

5.2.2 STALL SPEEDS (IAS)

SAILPLANE WITH HEAVY PILOT

The sailplane with heavy pilot (above 90 kg (198 lb)) does not stall in straight flight with air brake extended as well as retracted.
The flight with the stick pulled full is possible with the minimum airspeed of about 35 – 39 kt (65 - 73 km/h). Similar condition appears in circling with 45 deg bank. With the air brake extended the minimum airspeed is increased to about 38 – 42 kt (70 - 78 km/h).

SAILPLANE WITH MEAN OR LIGHT PILOT

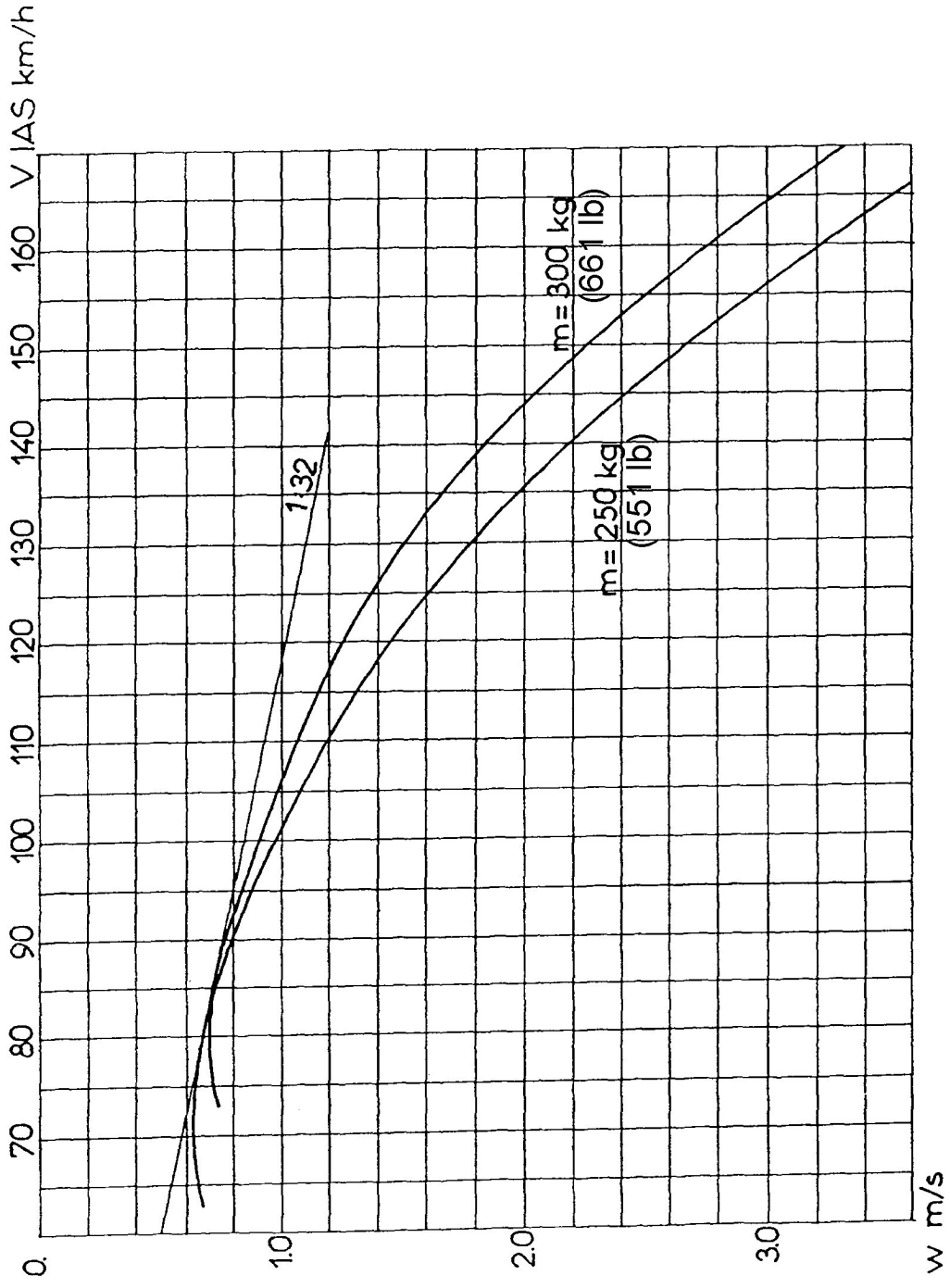
The sailplane with mean or light pilot (55-90 kg (122-198 lb)) stalls in straight flight gently and it is possible to retain the lateral balance.
The stall warning is mild. When stalled the sailplane drops down very gently and symmetrically. When pulling the stick more no tendency to wing dropping appears.
The stalling speed is 33.5 – 36 kt (62 - 67 km/h) with air brake retracted and 38 – 40.5 kt (70 - 75 km/h) with air brake extended.
The recovery is gained by means of releasing the stick. The height loss is about 66 ft (20 m).
When circling with mean or light pilot (55-90 kg (122-198 lb)) as the critical airspeed is gained the sailplane automatically recovers the wings to level position or gently banks towards the turn.
The slight releasing of the stick or the aileron deflection associated with the stick releasing results the transition to the normal flight without the tendency to spinning.

5.3 NON-APPROVED FURTHER INFORMATION

5.3.1 DEMONSTRATED CROSSWIND PERFORMANCE

The demonstrated crosswind component at take-off and landing ranges 12 kt (6 m/s).
During the take-off or landing ground run on two wheels the sailplane is practically non-sensitive to the crosswind action.

5.3.2 FLIGHT POLAR



Flight polar
Fig. 5 - 2

SECTION 6

WEIGHT AND BALANCE

6.1 INTRODUCTION

6.2 PERMITTED PAYLOAD RANGE AND WEIGHT AND BALANCE RECORD

6.1 INTRODUCTION

This Section contains the payload range within which the sailplane may be safely operated.
The weighting and C.G. location calculation procedure as well as the range of weight and C.G. locations of empty sailplane are contained in MAINTENANCE MANUAL.
Comprehensive list of all equipment available for this sailplane and the installed equipment during the weighting of the sailplane is contained in MAINTENANCE MANUAL.

6.2 PERMITTED PAYLOAD RANGE AND WEIGHT AND BALANCE RECORD

PERMITTED PAYLOAD RANGE

Maximum cockpit load (pilot + parachute +luggage)242 lb=110 kg
Minimum pilot's weight with parachute.....122 lb=55 kg

CAUTION:

PILOTS OF THE BODY+PARACHUTE WEIGHT BELOW 60 kg (132 lb) MUST HAVE THE BACK-REST LOCATED IN LIMIT FRONT POSITION.

CAUTION:
MAXIMUM SAILPLANE WEIGHT WITH SPECIAL AND TAIL BALLAST DO NOT EXEED 300 kg (661 lb).

WEIGHT AND BALANCE RECORD

Date	Empty sailplane weight	C.G. location	Approved:	
	[kg]	[cm]	Date	Signature

SECTION 7

SAILPLANE AND SYSTEMS DESCRIPTION

7.1 INTRODUCTION
7.2 COCKPIT DEVICES
7.3 LUGGAGE COMPARTMENT
7.4 INFORMATION PLACARDS IN COCKPIT

7.1 INTRODUCTION

This Section provides description and operation of the cockpit devices. The particular data on the additional or other than standard devices are contained in Section 9 of this Manual.
The detailed description of the sailplane and its systems is contained in MAINTENANCE MANUAL.

7.2 COCKPIT DEVICES

Description for Fig. 7 – 1(cockpit device):

1) instrument panel,

2) towing cable releasing hand-grip (yellow) - pull to release,

3) pedal adjusting hand grip (brown on the instrument panel pedestal) - to adjust the pedals:
   - unlock the pedals pulling the hand-grip,
   - locate the pedals into the required position by pushing or pulling the feet,
   - release the hand-grip,
   - check the locking by pushing the pedals with feet.

4) canopy emergency jettisoning hand-grip (red) - pull to jettison the canopy,

5) air brake control lever (blue)- operation of air brake control:
   - extension – backwards,
   - retraction - forwards,
   - locking of the air brake in retracted position - press the lever forwards till clearly perceptible locking click appears,
   - unlocking of the air brake - pull the control lever backwards till the clearly perceptible unlocking click appears.

6) wheel brake lever
   - to brake the wheel press the wheel brake lever to the air brake lever,

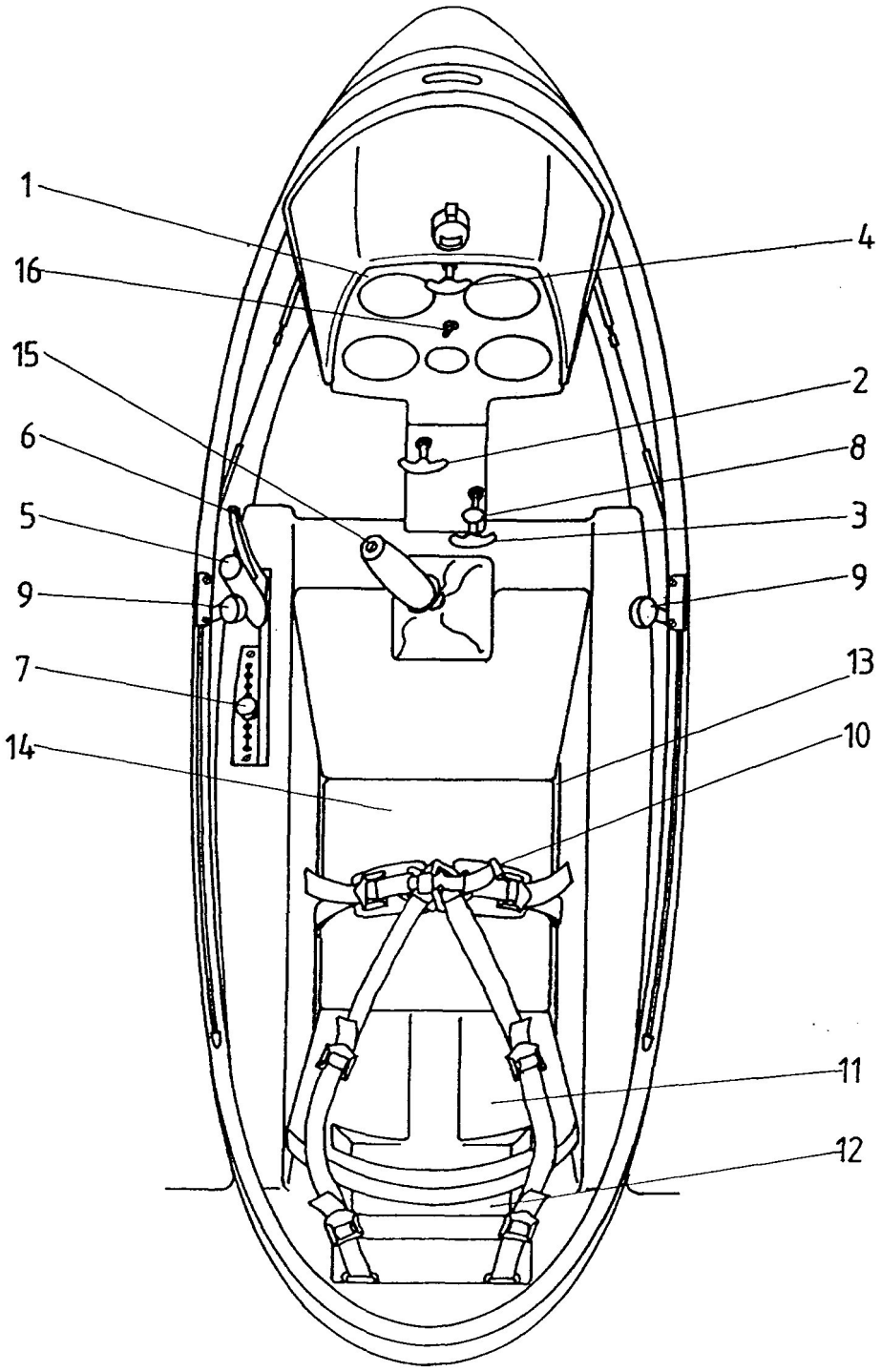
7) trimming device ball-grip (green) - sailplane trimming:
   - unlock the device pressing down the ball-grip,
   - locate the ball in one of 11 locations (moved forward – the airspeed increases, moved backward - the airspeed decreases),
   - lock the device by means of releasing the pressing on the ball,
   - check the locking by moving the ball forwards or backwards,
8) ventilation hand -grip - pull the hand-grip to open the air intake,
9) canopy locks hand-grips (white)- operation of locks:
   - forwards - canopy opened,
   - backwards till to perceptible lock - canopy locked,
10) pilot's belts,
11) pilot's back-rest - the back-rest is adjusted by means of:
   - location of back-rest lower fitting in one of 5 openings in the seat plan,
   - inserting under the back-rest the suitable amount of adjusting inserts (item 12),
12) pilot's back rest adjusting inserts,
13) special ballast cover,
14) seat cushion,
15) push-to-talk button,
16) turn indicator switch,

Description to Fig. 7 – 2 (special ballast bay):

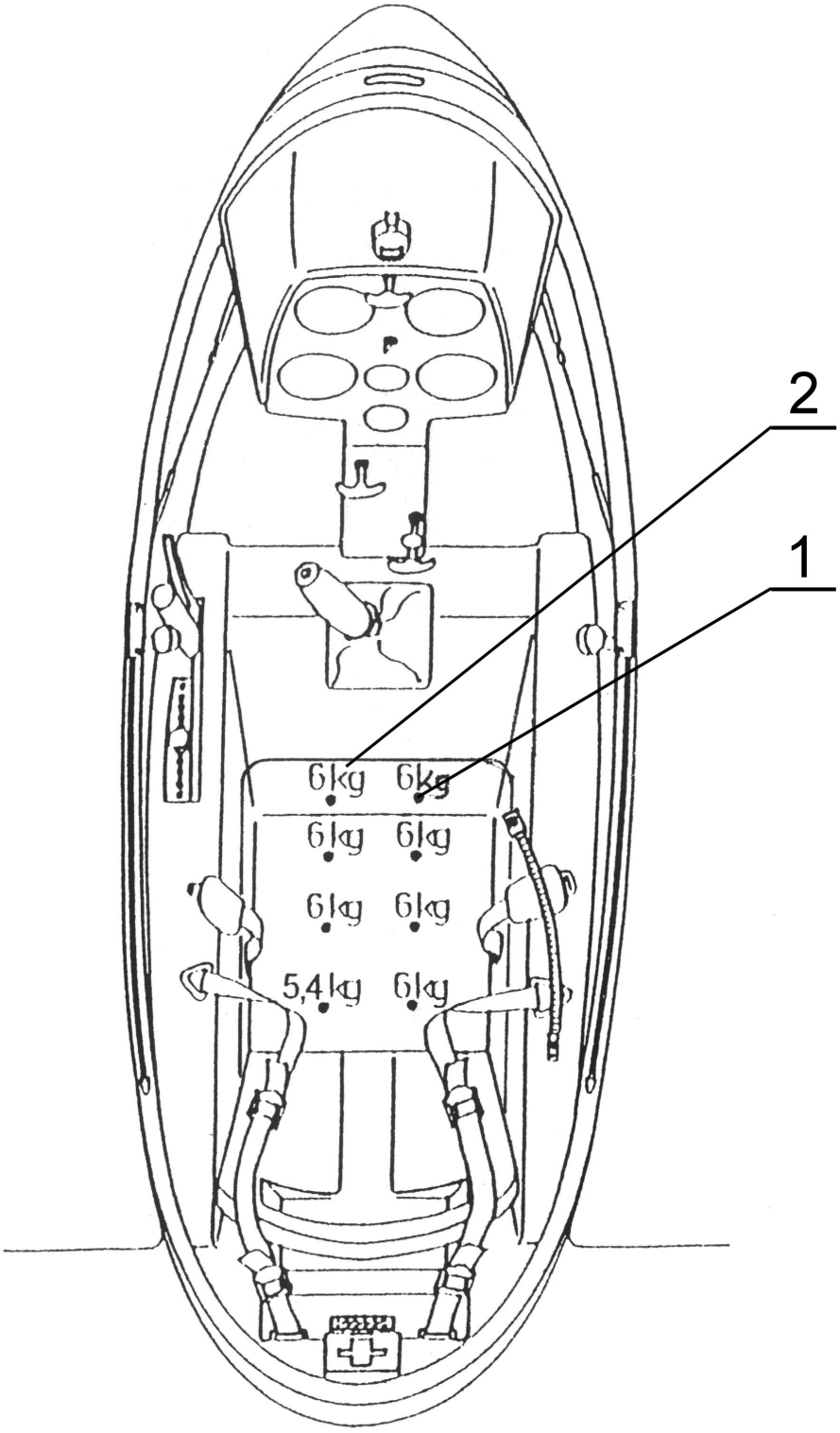
1) ballast bay inspection hole,
2) weight mark

7.3 LUGGAGE COMPARTMENT

The luggage compartment is located behind the pilot's back-rest at the left-hand side. It is provided for barograph or other items.
Inside the compartment 4 fixing points are provided for strips fastening the luggage.
Maximum luggage weight is 11 lb (5 kg).



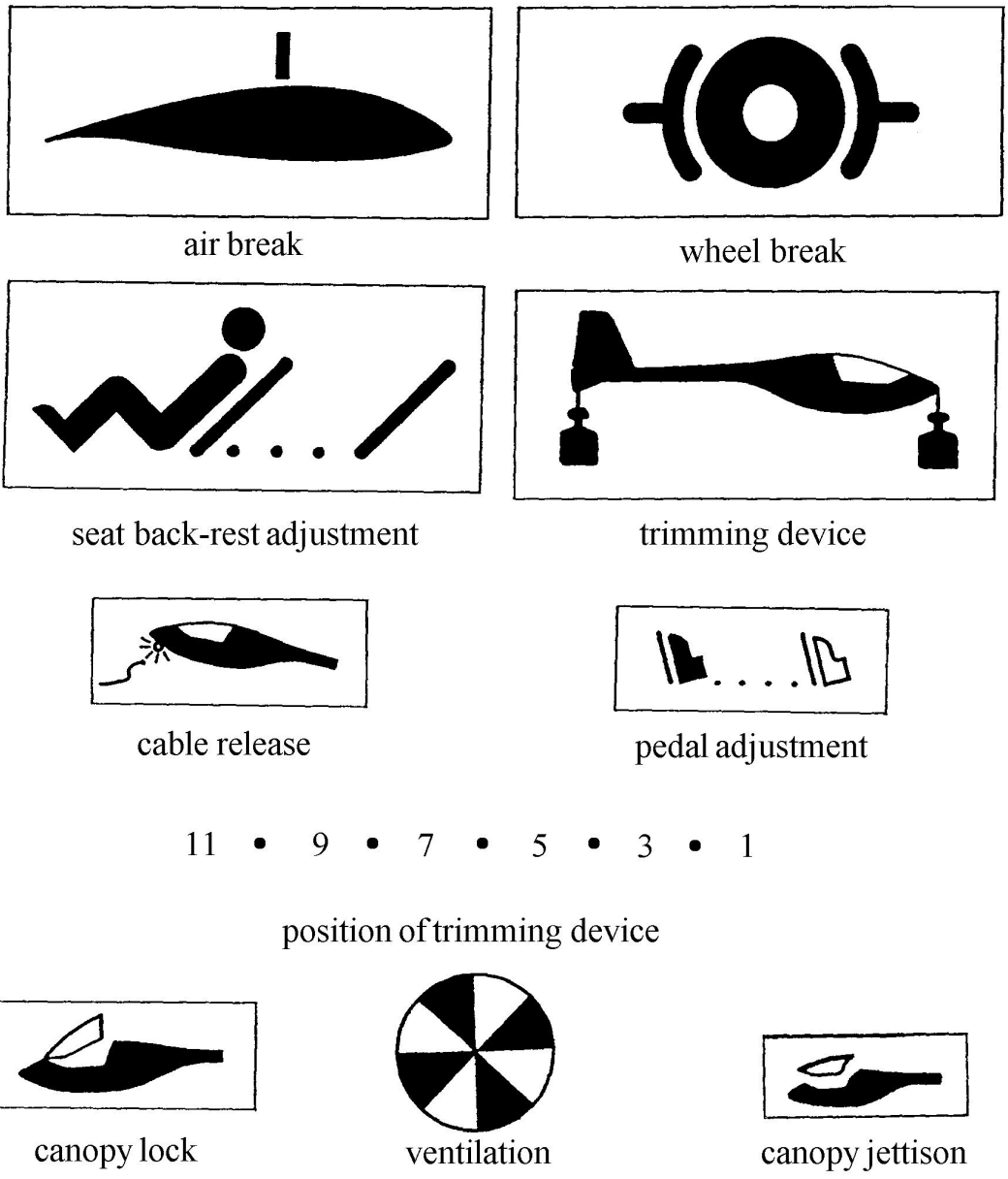
Cockpit devices
Fig. 7 - 1



Special ballast bay marks.
(top view without pilot's cushion)
Fig. 7 – 2

7.4 INFORMATION PLACARDS IN COCKPIT

The operation limitations placards are described in Section 2. Rigging and de-rigging placards and location of the placards are described in MAINTENANCE MANUAL.



Information placards in cockpit
Fig. 7 - 3

SECTION 8

SAILPLANE HANDLING, CARE AND MAINTENANCE

8.1 INTRODUCTION

8.2 SAILPLANE INSPECTION PERIODS

8.3 SAILPLANE ALTERNATIONS OR REPAIRS

8.4 GROUND HANDLING, ROAD TRANSPORTATION

8.5 CLEANING AND STORING

8.1 INTRODUCTION

This Section contains manufacturer's recommended procedures for proper ground handling of the sailplane. It also identifies the inspection and ground handling requirements, which must be followed to retain the performance and condition of new sailplane.

8.2 SAILPLANE INSPECTION PERIODS

The sailplane inspection periods and range are contained in MAINTENANCE MANUAL.

8.3 SAILPLANE ALTERNATIONS OR REPAIRS

It is essential that the responsible airworthiness Authority shall be contacted prior to any alternation on the sailplane to ensure that the airworthiness of the sailplane is not compromised.

For repairs refer to MAINTENANCE MANUAL.

8.4 GROUND HANDLING, ROAD TRANSPORTATION

TAXIING

The sailplane should be moved on an airfield by means of motor, car or other device using the nose hook at the maximum speed 6 km/h observing the generally applicable rules.
During taxing the canopy should be closed and the control stick secured with pilot's belts.
For taxing, the sailplane should be balanced to stay on the nose wheel. Removing the tail ballast or putting additional weight on the pilot’s seat should do balancing.

NOTE:

Pushing the sailplane on the wing tips or tailplane tips as well as the control surfaces is prohibited.

PARKING ON AIRFIELD

When parking on the airfield the canopy should be locked and protected with a cover.

NOTE:

The non-anchored sailplane cannot be left without supervision.

ANCHORING

- place the sailplane to have the wind blowing side-back,
- place the wing down against the wind,
- anchor the sailplane on the wing tip, nose hook and fuselage end,
- immobilize the control stick by means of pilot's belts.

ROAD TRANSPORTATION

To prepare the sailplane for a transportation:

- check the sailplane to be complete,
- emptyfy the cockpit,
- immobilize the control stick by means of pilot's belts,
- lock the canopy and close the window,
- put the cover on the canopy,
- secure against knocking the ends of control systems elements protruding out of the wings,
- immobilize the ailerons and rudder by means of fixators,
- fix the sailplane components on trailer in a way to avoid damages and permanent deformations (see: storage - the tailplane may be positioned level).

NOTE:

When the opened trailer is used secure the sailplane with covers.

8.5 CLEANING AND STORING

CLEANING

The sailplane should be washed with water and normal detergents using the sponge or a soft rag. After washing check the drainage holes to be not clogged and dry, if necessary, the structure inside (it concerns especially the air brake boxes). For washing the textile parts the washing agents acc. to the procedure's directions should be applied. The cockpit should be regularly cleaned with a vacuum cleaner.

NOTE:

The use of organic solvents (gasoline, nitro, etc.) for perspex cleaning is prohibited.

STORING

The sailplane should be stored in dry and ventilated room. In case of prolonged storage it is necessary to protect the fittings against a corrosion (e.g. with a grease).
When stored in de-rigged condition the sailplane components should be positioned in a way to avoid the permanent deformations to be got:

- wings - leading edge down, resting on spar root (near root rib) and on trapeze part end using the soft, fitted support,
- fuselage - on wheels, supported under the tailskid; under the fuselage cockpit portion a soft fitted support may be used,
- tailplane - leading edge down, resting on both tips on a soft, fitted support.

NOTE:

The sailplane, after parking in the open air, must be inspected to ensure it is free of water. Then dry, clean and vent the whole structure.

SECTION 9

SUPPLEMENTS

9.1 INTRODUCTION

9.2 LIST OF INSERTED SUPPLEMENTS

9.1 INTRODUCTION

This Section contains the appropriate supplements necessary for the safe and efficient operation of the sailplane when equipped with various optional systems and equipment not provided with the standard sailplane.

9.2 LIST OF INSERTED SUPPLEMENTS

Date of insertion	Document No	Title of the inserted supplement