Allstar PZL Glider
Sp. z o.o.

FLIGHT MANUAL
for a sailplane

Model: **SZD-54-2 „Perkoz”**

Serial No.:

Registration:

THIS FLIGHT MANUAL IS A DIRECT TRANSLATION FROM THE EASA APPROVED POLISH VERSION

TRANSLATION OF THIS DOCUMENT AND CONVERSION OF TECHNICAL DATA HAVE BEEN DONE BY BEST KNOWLEDGE AND JUDGMENT

IN ANY CASE OF DISCREPANCIES IN TRANSLATION THE POLISH VERSION SHOULD BE USED

THIS SAILPLANE IS TO BE OPERATED IN COMPLIANCE WITH INFORMATION AND LIMITATIONS CONTAINED HEREIN. THIS DOCUMENT SHOULD BE ALWAYS STORED ON BOARD.

Doc No. 542.4.01

Issue II – April 2014

corrected

Note to English version, Issue II – April 2014, corrected:

By the way of the Revision No. 2 implementation, the whole Flight Manual in English was checked and corrected in order to eliminate mistakes found and to be in line with Polish version. The corrections are not indicated to achieve compatibility with Polish version, however all pages are marked with “corrected” in the footer to distinguish them from previous not corrected editions. Therefore this edition of the Flight Manual replaces the previous one as a whole.

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SECTION 0.

ISSUANCES

0.1. Record of revisions

Any revision of the present Manual, except actual weighing data, must be recorded in the following table and endorsed by the Agency (EASA).

The new or amended text in the revised page will be indicated by a black vertical line in the outer margin and the Revision No. The number and date of the last revision will be shown in the footer of the page.

With every revision implementation, the pages affected with this revision and listed in the following table must be replaced.

Rev. No.	Affected Section	Affected Pages	Date of Issue	No. and Date of Approval	Insertion Date & Signature
1	0 4	0.2, 0.4 4.2, 4.4, 4.5	July 2015	10056004 14.12.2015 Valid for serial number 542.A.15.010 and next as well as for previous S/N with a change implement-ed acc. to am. Approval	
2	0 1 2 3 4 5 6 7	0.2, 0.4 1.4 2.2, 2.3, 2.4, 2.5, 2.6, 2.8, 2.9, 2.10 3.5 4.14, 4.15, 4.17 5.5 6.3, 6.8, 6.9 7.4, 7.8, 7.10, 7.11, 7.12, 7.13	May 2017	10062739 10062741 26.07.2017	

Rev. No.	Affected Section	Affected Pages	Date of Issue	No. and Date of Approval	Insertion Date & Signature

corrected

0.2. List of effective pages

	Section	Page	Date of Issue
	0	0.1	April 2014
2		0.2	May 2017
		0.3	April 2014
2		0.4	May 2017
		0.5	April 2014
		0.6	April 2014
	1	1.1	April 2014
		1.2	April 2014
		1.3	April 2014
2		1.4	May 2017
		1.5	April 2014
		1.6	April 2014
	2	2.1	April 2014
2		2.2	May 2017
2		2.3	May 2017
2		2.4	May 2017
2		2.5	May 2017
2		2.6	May 2017
		2.7	April 2014
2		2.8	May 2017
2		2.9	May 2017
2		2.10	May 2017
	3	3.1	April 2014
		3.2	April 2014
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1		4.4	July 2015
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		4.7	April 2014
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		4.9	April 2014
		4.10	April 2014
		4.11	April 2014
		4.12	April 2014
		4.13	April 2014
2		4.14	May 2017
2		4.15	May 2017
		4.16	April 2014

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	4	4.17	May 2017
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	6	6.1	April 2014
		6.2	April 2014
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		6.4	April 2014
		6.5	April 2014
		6.6	April 2014
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		6.8	May 2017
		6.9	May 2017
		6.10	April 2014
	7	7.1	April 2014
		7.2	April 2014
		7.3	April 2014
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		7.11	May 2017
		7.12	May 2017
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	8	8.1	April 2014
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		8.3	April 2014
		8.4	April 2014
	9	9.1	April 2014
		9.2	April 2014
		9.3	April 2014
		9.4	April 2014

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List of pages for Supplements is enclosed in page 9.3

0.3. Table of contents

0.4. Table of figures

SECTION 1.

GENERAL

1.1. Introduction

The flight manual has been developed to provide pilots and instructors with information for the safe and efficient operation of the SZD-54-2 "Perkoz” sailplane.

This manual includes primarily the material required to be furnished to the pilot by Certification Specifications CS–22 Subpart G. It also contains supplemental data supplied by the sailplane producer.

1.2. Certification basis

The SZD-54-2 „Perkoz” sailplane model has been approved by European Aviation Safety Agency (EASA) in accordance with CS–22, Amendment 2 of 5 March 2009, and has gained Type Certificate No. EASA.A.574.

Category of Airworthiness:

U - Utility

A - Aerobatic

1.3. Warnings, cautions and notes

The warnings, cautions and notes used in the Flight Manual are defined as follows:

WARNING : means that the non-observation of the corresponding procedure leads to an immediate or considerable 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. Description and technical data

SZD-54-2 „Perkoz” is a two-seat sailplane for primary schooling and training, including basic and advanced aerobatics and cloud flying in the scope allowed by operation rules.

The sailplane is made of composite: primary structure in glass-epoxy, with some components (exchangeable wingtips, canopy frame, rudder) in carbon-epoxy.

Monocoque structure fuselage, integral with fin. The cockpit with tandem seats arrangement equipped with one-piece canopy, side-opening to the right. Emergency jettison mechanism located on canopy frame, on the right hand side. The canopy equipped with “Röger hook”.

Seated pilot attitude in a cockpit. Fixed back rest at front seat with no regulation. Seat pan of rear seat adjustable on ground (vertical position and distance from pedals). Pedals at front seat adjustable in-flight, pedals at rear seat – fixed. At both seats additional back cushions are provided, not fastened to back rest, to enhance comfort for short pilots. Both seats equipped with 5-point safety harness, plus optional second set of lap belts.

Monorail, fixed landing gear. Main wheel equipped with shock absorber and hydraulic brake. Nose and tail wheels non-cushioned, without brakes.

Two-panel wings of tapered outline with exchangeable wingtips: plane type (Category U and A), winglets (Category U only) or long with winglets (increasing wing span to 65,62 ft; Category U only). NN-8 laminar aerofoil, sandwich skin composite-foam-composite. Wing spar flanges of glass roving reinforced composite.

Two-plate airbrakes protruding from wing top surface only. Ailerons of 20 % wing chord ratio, sandwich structure. Long wing tips ailerons with constant chord.

Tail unit in conventional arrangement, with horizontal tailplane shifted slightly to the rear. Stabilizer and fin of sandwich structure. Elevator of sandwich structure, mass balanced. Composite carbon-epoxy rudder with horn type balance – aerodynamic and mass. In a fin an antenna for radio transceiver is provided.

Instrument panels located at front and rear seat, the latter – optional. Efficient cockpit venting is ensured by nose air intake with adjustable dumper, and by side windows with deflectable ventilation tabs.

Control systems for elevator, ailerons and airbrakes – pushrod type. Rudder control system mixed: cable/pushrod. Longitudinal trim control – spring type. Tow release control – cable type. Wheel brake operated with Bowden cable.

BASIC TECHNICAL DATA:

Span		57,42	65,62	[ft]
Length		27,69		[ft]
Height (fin with tail wheel)		6,73		[ft]
Wing aerofoil		NN8		
Root chord		4,27		[ft]
Mean standard chord (MSC)		38,976	37,756	[in]
Wing area		176,10	186,22	[ft^2]
Aspect ratio		18,70	23,135	
Tailplane span		11,15		[ft]
Sailplane empty mass (new sailplane with minimum equipment)		827 + 22	838 + 22	[lb]
Maximum in-flight mass	Category „U”	1356	1356	[lb]
	Category „A”	1301	----	[lb]
Maximum wing loading		7,70	7,28	[lb/ft^2]

2

corrected

1.5. Three-view drawing

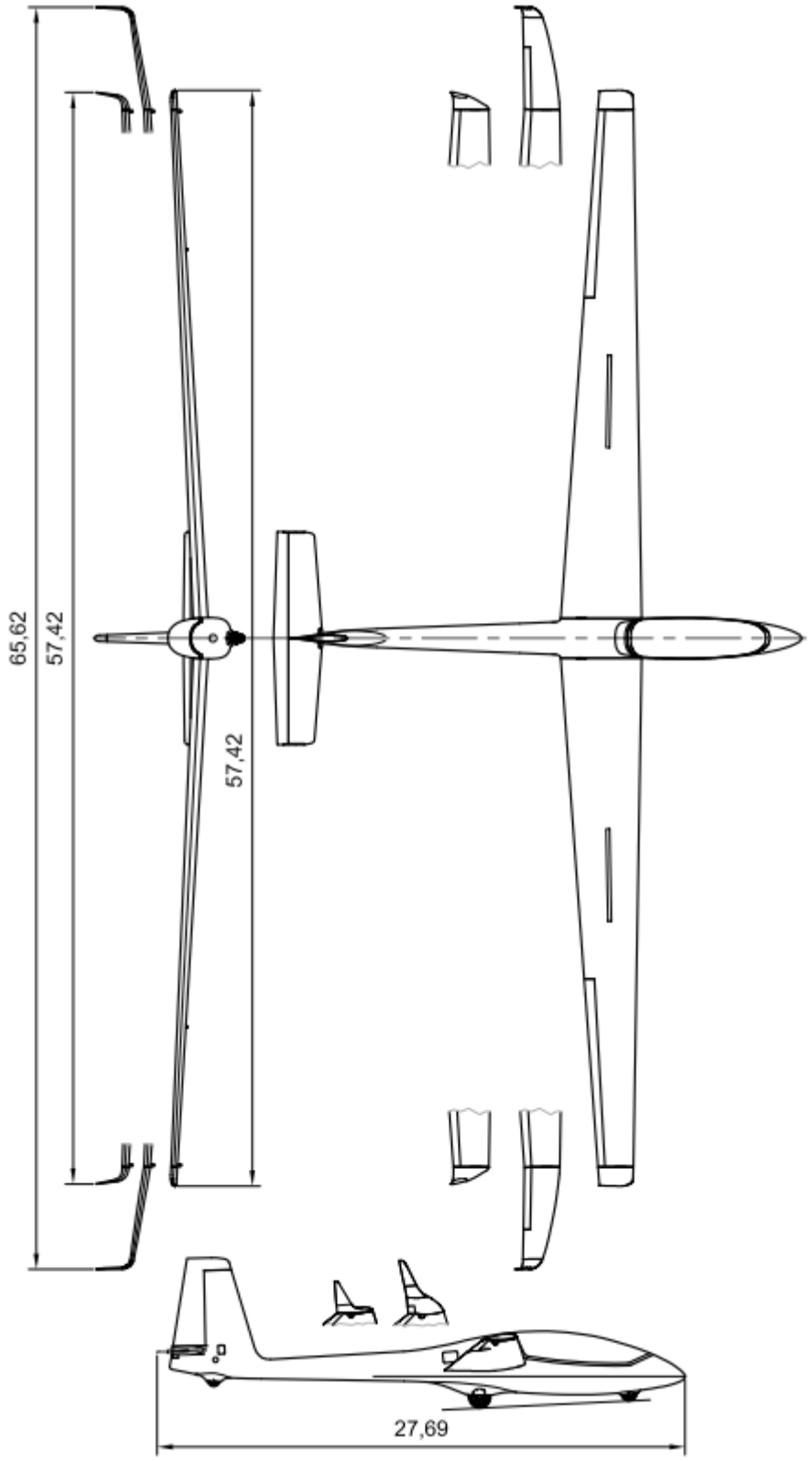

Fig. 1-1. 3-view drawing

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SECTION 2.

LIMITATIONS

2.1. Introduction

Section 2. includes operating limitations, instrument markings, and basic placards necessary for safe operation of the sailplane, its standard systems and standard equipment.

The limitations included in this section and in Section 9. are subject to approval (by EASA).

2.2. Airspeed limitations

Airspeed limitations and their significance for sailplane operation are defined as follows:

	SPEED	kn (mph) IAS Category:		REMARKS
		U	A	
V_{NE}	Never exceed speed	132 (152)	145 (167)	Do not exceed this speed in any operation and do not use more than 1/3 of control deflection.
V_{RA}	Rough air speed	90 (103)	105 (121)	Do not exceed this speed except in smooth air, and then only with caution. Examples of rough air are lee-wave rotors, thunderclouds etc.
V_A	Manoeuvring speed	90 (103)	105 (121)	Do not make full or abrupt control movement above this speed, because under certain conditions the sailplane may be overstressed by full control movement.
V_T	Maximum aero-towing speed	89 (102)	89 (102)	Do not exceed this speed during aero-towing
V_W	Maximum winch-launching speed	78 (89)	78 (89)	Do not exceed this speed during winch-launching

2

In the following table the allowed V_{NE} values for various flight altitudes are given:

	Flight altitude [1000 ft]	**0 ÷ 9,8**	**13,1**	**16,4**	**19,7**	**23,0**	**26,2**	**29,5**	**32,8**
U	**V_{NE} IAS** kn (mph)	**132 (152)**	**125 (144)**	**119 (137)**	**112 (129)**	**106 (122)**	**100 (115)**	**94 (109)**	**89 (102)**
A	**V_{NE} IAS** kn (mph)	**145 (167)**	**138 (158)**	**131 (150)**	**124 (142)**	**117 (135)**	**110 (127)**	**104 (120)**	**98 (113)**

2

corrected

2.3. Airspeed indicator markings

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

Marking	IAS value or range kn (mph)	Significance
GREEN arc	46 (53) ÷ 90 (103) - Cat. „U” 46 (53) ÷ 105 (121) - Cat. „A” from 90 (103) dashed line	Normal operating range. Lower limit is $1.1 \cdot V_{S1}$ at maximum mass and most forward CG upper limit is rough air speed.
YELLOW arc	90 (103) ÷ 132 (152) to 145 (167) - dashed	Manoeuvres must be conducted with caution and only in smooth air.
radial RED line	132 (152) Category „U” 145 (167) Category „A”	Maximum speed for all operations for the given sailplane Category.
YELLOW triangle	57 (65)	Approach speed at maximum mass

2

V_{S1} = sailplane stalling speed at given mass, with airbrakes retracted.

2

Fig. 2-1 Airspeed indicator colour marking

2.4. Mass

2

			[lb]
Maximum take-off mass:	Category Utility (U)		**1356**
	Category Aerobatic (A)		**1301**
Maximum mass of non-lifting parts (with pilots)	Cat. U	57,42 ft	**959**
		65,62 ft	**937**
	Cat. A		**904**
Maximum mass in baggage compartment: (with battery and standard equipment tools)			**44**

2.5. Centre of gravity

Limits for centre of gravity range (in flight allowed) are defined as follows:

2

- front limit **10,16 in** aft of Datum (22,0% MSC – 57,42 ft and 21,6% MSC – 65,62 ft),
- rear limit **19,49 in** aft of Datum (46,0% MSC – 57,42 ft and 46,4% MSC – 65,62 ft),

"MSC" stands for Mean Standard Chord

NOTE:

Size and position of MSC are different for short and long wingtips.

Datum is the plane perpendicular to wing root aerofoil chords plane, passing through points on leading edge of root aerofoils.

Method of CG position calculation is given in the item 6.3. Limits of CG position for sailplane without pilots are given in the item 6.2.

NOTE:

Observation of all limitations relating to sailplane load plan, as well as these relating to CG range limits of sailplane without pilots, ensures to maintain the sailplane CG within the range allowed for flight.

2.6. Approved manoeuvres

SZD-54-2 „Perkoz” sailplane is approved for operation in Utility (U) and Aerobatic (A) Categories.

WARNING:

Performing aerobatic manoeuvres approved for Category A is allowed on the sailplane equipped with short plane wingtips only (without winglets)

In Aerobatic (A) Category – total mass limited to 1301 lb – sailplane is approved to perform the following manoeuvres (and derivative thereof): **2**

spin	inverted spin
loop	inverted loop
stall turn	inverted stall turn
Immelman turn	lazy eight
slow roll	barrel roll
half roll half loop	controlled half roll half loop
climbing turn	tail slide
Cuban eight	inverted Cuban eight
eight	steep turn
flick roll	inverted flick roll
flick roll downward	inverted flick roll downward
flick roll in downward angle	inverted flick roll in downward angle

In Utility (U) Category – total mass limited to 1356 lb – sailplane is approved to perform the following manoeuvres: **2**

loop	stall turn
spin	climbing turn
lazy eight	steep turn

The recommended entry speed for particular manoeuvres is given in Section 4. (item 4.6.9.).

2.7. Manoeuvring load factors

The allowed manoeuvring load factors are:

Aerobatic Category:

2

	up to V_{NE} = 145 kn (167 mph)
allowable positive load factor	+ 7,0
allowable negative load factor	- 5,0

Utility Category:

2

	up to V_A = 90 kn (103 mph)	up to V_{NE} = 132 kn (152 mph)
allowable positive load factor	+ 5,3	+ 4,0
allowable negative load factor	- 2,65	- 1,5

NOTE :

The above data refer to configuration with airbrakes retracted.

With airbrakes protruded, the maximum limit manoeuvring load factors are: positive **+3,5**, negative **-1,5** – over the whole range of operation speed.

2.7.1. Accelerometer markings

Marking	Value	Significance
Red line	+ 7,0 - 5,0	Allowable manoeuvring load factors for Aerobatic Category sailplane

2.8. Flight crew

Flight crew of the sailplane consists of one or two pilots.

Pilot + parachute (or alternative back cushion) mass on front seat (**m_1**) must be within the following limits:

- minimum **121 lb**
- maximum **242 lb**

Pilot + parachute (or alternative back cushion) mass on rear seat (**m_2**):

- maximum **242 lb**
- maximum for seat position No. 1 **165 lb**

WARNING:

Solo flying allowed on front seat only.

WARNING (for solo flying):

In solo flying, at m_1 mass within 121÷139 lb range, two balancing weights 13,2 lb each must be used, to be mounted on a floor in front of front seat.

At m_1 within the range 139÷154 lb, at least one balancing weight 13,2 lb must be used.

At m_1 beyond 154 lb, the use of balancing weights is not necessary but it is acceptable.

WARNING (for two-person crew):

In flights with two-person crew, at m_1 beyond 209 lb, use of balancing weights is forbidden.

At m_1 below 154 lb and m_2 below 121 lb one or two balancing weights 13,2 lb must be used, similarly as for solo flying.

WARNING:

If parachute is not used, it is obligatory to use a back cushion of 3,2 in thickness.

Carry-on baggage in two-person crew can be taken at the expense of limitation on pilots mass, and fixed in baggage compartment. In solo flying – placed in the side pocket or on the rear seat and fixed with safety harness.

2.9. Kinds of operation

Sailplane is approved in accordance with requirements of Utility and Aerobatic Categories. It is intended for VFR flights by day, including training flights to obtain pilot license, or ratings entered in the license. Allowed are cloud flights – in accordance with applicable national rules.

WARNING:

The following are forbidden:

- **night flying,**
- **flying in known icing conditions.**

2.10. Equipment

The minimum equipment comprises two tow releases (front and CG), two sets of 5-point safety harness and the following instruments in the instrument panel at front seat.

2

- airspeed indicator with range of indications 0 ÷ 160 / 200 kn
- altimeter with range of indications 0 ÷ 30 000 ft
- accelerometer with range of indications from -5 to +7 g
- *(item removed)*

2

The models of minimum and additional equipment, allowed for installation on the SZD-54-2 „Perkoz” sailplane, are specified in Section 8. of the Technical Service Manual. The equipment installed on the sailplane specific S/N must be listed in the “Equipment list”, the sample of which is enclosed in the item 18.1. of the Technical Service Manual.

Additional equipment can be installed on the sailplane as described in items 8.2 and 8.3 of the Technical Service Manual.

2.11. Aero-tow and winch-launching

2.11.1. Aero-tow

The following maximum aero-towing speed is allowed: V_T = **89** kn (102 mph) | **2**

Towing cable must be equipped with a weak link of strength not greater than: **1521 +10%** lbf.

For aero-towing, minimum length of towing cable cannot be less than: **66** ft.

WARNING:

Aero-towed take-off allowed with use of the front tow release only.

For aero-towing only textile ropes must be used.

2.11.2. Winch-launched take-off

The following maximum winch-launching speed is allowed: V_W = **78** kn (89 mph). | **2**

Winch-lunching cable must be equipped with a weak link of nominal strength: **1521 ±10%** lbf.

WARNING:

Winch-launched take-off allowed with use of the CG tow release only.

2.12. Other limitations

WARNING:

Aerobatics in rough air are forbidden.

NOTE:

Flying in weather conditions conducive to lightning is to be avoided.

2.13. Limitation placards

Airspeed limitations:

2

Aero-towing and winch-launching allowed airspeed IAS kn (mph)	V_T	89 (102)
	V_W	78 (89)

Manoeuvring loads and sailplane loading limitations

2

SZD-54-2 „Perkoz” MANOEUVRING LOADS AND LOADING			CATEGORY U	CATEGORY A
Manoeuvring load factor limits		n =	+5,3 -2,65	+7,0 -5,0
Maximum in-flight mass		[lb]	1356	1301
Pilot with parachute mass	front seat (m_1)	max	242 lb	
		min	121 lb	
	rear seat (m_2)	max	242 lb	

Application of balancing weights	m_1	m_2	weights
One Pilot on Board	121÷139 lb	-	26,4 lb
	139÷154 lb	-	min. 13,2 lb
	≥154 lb	-	acceptable
Crew – 2 People	121÷139 lb	<121 lb	26.4 lb
	139÷154 lb	<121 lb	min. 13,2 lb
	<154 lb	≥121 lb	conditionally
	154÷209 lb	any	conditionally
	≥209 lb	any	forbidden

Maximum mass in baggage compartment: 44 lb
Solo flying on front seat only
Maximum total load on both seats and in baggage compartment – see Individual Loading Plan for this sailplane!

conditionally – means: allowed, provided the maximum in-flight mass of the glider in a given category is not exceeded.

NOTE:

All placards and their location are presented in the item 7.10.

SECTION 3.

EMERGENCY PROCEDURES

3.1. Introduction

Section 3. provides checklist and amplified procedures for coping with emergencies.

CHECKLIST

EMERGENCY PROCEDURES

1. CANOPY JETTISON
   - push handles of canopy locks and emergency jettison forward, simultaneously
   - push the canopy upwards
2. BAILING OUT
   - jettison the canopy
   - release the safety belts
   - pull up the legs and exit cockpit
   - watch the wings and tail surfaces
   - open a parachute
3. SPINNING
   - aileron neutral
   - rudder – full deflection, opposite to rotation
   - control stick forward, slightly beyond neutral
   - pause until rotation ceases
   - move back the rudder to neutral
   - pull out of ensuing dive

3.2. Canopy jettison

To jettison the canopy in emergency:

- simultaneously open the canopy locks (move forward the white/red handle on left hand side of canopy frame) and activate the canopy jettison mechanism (move forward the red handle on right hand side of canopy frame)
- resolutely push the canopy in the direction „upward”.

Opening and jettison of the canopy is possible both from front, and from rear seats (handles are coupled).

NOTE:

If the canopy cannot be jettisoned, break out the perspex starting at the side window. Use the leg force, if necessary.

3.3. Bailing out

Bailing out is the last resort, mandatory emergency action, if it is not possible to bring the sailplane to the safe landing.

To bail out:

- jettison the canopy – acc. to item 3.2.,
- release the safety belts,
- pull up the legs and bail out (if the glider is rotating e.g. spinning - bail out towards rotation centre),
- open the parachute with a delay (depending on circumstances), acc. to its operation instruction.

NOTE:

If bailing out takes place below 650 ft of altitude, the parachute should be opened immediately after leaving the cockpit, avoiding (as far as possible) collision with the glider.

3.4. Stall recovery

3.4.1. Recovery from stall in normal flight

The stalled sailplane pitches nose down symmetrically, or with a tendency to bank. Recovery is troubleless and reliable by „releasing” the stick forward. For recovery from stall with pitch beyond 30º, normal operation of controls is sufficient.

3.4.2. Recovery from stall in inverted flight

The sailplane pitches symmetrically. Recovery ensues troubleless and reliably by pulling the control stick. In recovery from stall with pitch beyond 30º normal operation of controls is sufficient.

3.5. Spin recovery

3.5.1. Recovery from normal spin

The sailplane performs safe, steep spinning. Recovery is to be accomplished as follows:

- ailerons neutral,
- rudder full deflection, opposite to rotation,
- release control stick forwards, slightly beyond neutral,
- maintain above mentioned control position until rotation ceases,
- move back the rudder to neutral and pull out sailplane from dive.

Recovery ensues with delay of 1/4 through 1/2 turn.

Altitude loss, between initiation of recovery and regaining level flight, is 623 ft.

WARNING

With CG front positions (e.g. flight in 2-person crew or 1 heavy pilot with balancing weights) sailplane can automatically stop spinning, passing into spiral dive and accelerating.

Be conscious of such condition, and in case of occurrence follow recommendations in the item 3.6. Recovery from spiral dive.

3.5.2. Recovery from inverted spin

The sailplane performs safe, steep spinning. Recovery is to be accomplished as follows:

- ailerons neutral,
- rudder full deflection, opposite to rotation,
- pull control stick back, slightly beyond neutral,
- maintain above mentioned control position until rotation ceases,
- move back the rudder to neutral and pull out sailplane from dive.

Recovery ensues without delay.

Altitude loss, between initiation of recovery and regaining level flight, is 984 ft.

3.6. Recovery from spiral dive

Depending on CG position and aileron setting, specifically in the phase of transient releasing the control stick forward in steady normal spinning, sailplane can pass into spiral diving nose down. Recovery from this flight condition is to be accomplished as follows:

- efficiently and smoothly go on to diving by:
  - stop turning by relatively extensive deflecting the control stick forward and
  - pick up the sailplane's nose with the rudder ("upper leg");
- in the same time bring the wings to the horizontal position with ailerons (opposite to the bank angle);
- retract from diving by pulling the elevator, keep the direction and lateral orientation;

2

CAUTION

Pay attention on the speed increase in dive! "Efficiently and smoothly" going on to diving (the first phase of retracting from spiral) is to prevent against excessive overspeeding.

3.7. Other emergencies

3.7.1. Transition from inverted to normal flight

Transition from inverted to normal flight is to be accomplished with half-roll manoeuver, deflecting the control stick to the left or to the right side. In necessity, reduce the airspeed with airbrakes, in advance.

Avoid transitions with normal half-loop downward, for the sake of possible exceeding the allowed speed and large loss of altitude.

3.7.2. Landing with ground loop

If, during landing, it is necessary to shorten the ground run (e.g. to avoid collision with an obstacle), than the controlled ground loop should be made following the instructions:

- bank the sailplane on wing until contact of wing tip with ground (opposite to obstacle, and in case of cross-wind component – against the wind, as far as possible),
- while turning, maintain with control stick longitudinal balance to keep the nose and tail wheels above the ground, and deflect rudder opposite to the turn.

3.7.3. Break or inadvertent release of towing cable

In case of inadvertent release or break of towing cable at low altitude:

- maintain safe airspeed,
- disengage tow from release hook (if the cable remains attached to sailplane),
- tighten shoulder belts,
- select place for landing,
- land off-field or - if at all possible – on the airfield.

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SECTION 4.

NORMAL PROCEDURES

4.1. Introduction

Section 4. provides description of sailplane rigging, checklist and amplified procedures foreseen in normal operation.

4.2. Rigging and de-rigging

Five persons are necessary for sailplane rigging and de-rigging. Before rigging, all mating surfaces of rigged assemblies should be cleaned with a rag and greased.

4.2.1. Wings rigging

The following description together with Fig. 4–1. define the procedure for sailplane wings rigging. Rigging of the wings to the fuselage is to be done with wingtips disassembled.

Sequence of operations in rigging:

1 1. Put the assembly key (21) through the guide (19) and screw it into locking pin (18), causing falling outward of locking claws (17), and then with the same assembly key, remove locking pins from wing rear fittings.
2. Insert the root of RH spar into fuselage, aligning pins (3) and (16) with fitting sleeves (4) and (14). In parallel, bring the terminals on torque tubes of aileron control (5) and airbrake control (6) to enter latch pins (7) and (8) in root rib of RH wing panel.
3. Insert the root of LH wing into fuselage. Manoeuvre with wing tips so to align the pins (3) and (16) and corresponding sleeves (4) and (14), and insert the conical portion of pins (1) in the sleeves (2).
4. Pull the spar roots to each other by means of special mounting wrench (12). In case of jamming over the final phase of movement, align the torque tubes terminals (5) and (6) with latch pins (7) and (8) by movements of the control stick and airbrake control pushrod.
5. Connect the spar roots with the main bolt (10), inserting simultaneously the bolt in the ball socket (9) fastened in the frame.

1 6. Lock the fuselage rear pins (16) by means of locking pins (18) with the assembly key (21) screwed in, inserting them through guides (19). Screw out the assembly key – in the final stage of screwing out (2 coils) check the efficiency of pin protection against protruding. In addition, visually check through the guide hole if locking claws (17) are blocking the locking pin – view “W”.
7. Secure the main bolt (10), connecting the handle of main bolt (11) with fuselage frame by means of safety pin (13).
8. Secure the wing front pins (3) by means of cotter pins (20).

Connection of control systems at the wing/fuselage junction is accomplished automatically. During operation of wing/fuselage rigging process the terminals of torque tubes in aileron (5) and airbrake (6) control systems are aligned with corresponding rotary latch pins (7) and (8) of controls mounted in wing root ribs. Connecting the spar roots with main bolt (10) ensures adequate protection of control systems against disconnection.

4.2.2. Wings de-rigging

Disassemble wingtips before de-rigging wings from fuselage.

De-rigging is to be made in reverse sequence.

To remove the main bolt (10), move the wing tips up and down. Disconnection of controls at wing/fuselage junction occurs automatically.

4.2.3. Assembling wingtips: plane or winglet

Operation sequence in assembling (see Fig. 4–2.):

1. Insert spar root of wingtip in a spar socket on wing side.
2. Pull down the bolt (3) onto stop by means of screwed-in key (6), hold in the „unlocked” position and shove the wingtip, mounting the spar pin (1) in the nest socket (2), as well front and rear pins (4) in sleeves (5).
3. Release bolt (3) up – onto stop, locking in this way the spar pin (1).
4. The bolt should hide completely in the wing. Unscrew the key (6).

4.2.4. Disassembling wingtips: plane or winglet

Pull down the bolt (3) onto stop, by means of screwed-in key (6), hold in the „unlocked” position and shove-out the wingtip from wing socket.

Legend to Fig. 4–1.:

1. Spar root pin,
2. Sleeve,
3. Wing front pin,
4. Front sleeve,
5. Terminal of torque tube in aileron control,
6. Terminal of torque tube in airbrake control,
7. Aileron driving latch pin,
8. Airbrake driving latch pin,
9. Ball socket in the fuselage frame (for the main bolt),
10. Main bolt,
11. Handle of main bolt,
12. Mounting wrench,
13. Safety pin,
14. Rear fitting,
15. Frame tube,
16. Fuselage rear pin,

1 17. Elastic locking claws,

18. Locking pin,

1 19. Guide of the locking pin,

20. Cotter pin,

1 21. Rear fitting assembly key (Fig. 4–3. in TSM),

22. Spar fitting,
23. Socket nut,
24. Root rib,
25. Wing upper and lower skin shell,
26. Fuselage shell,
27. Wing spars.

1

1

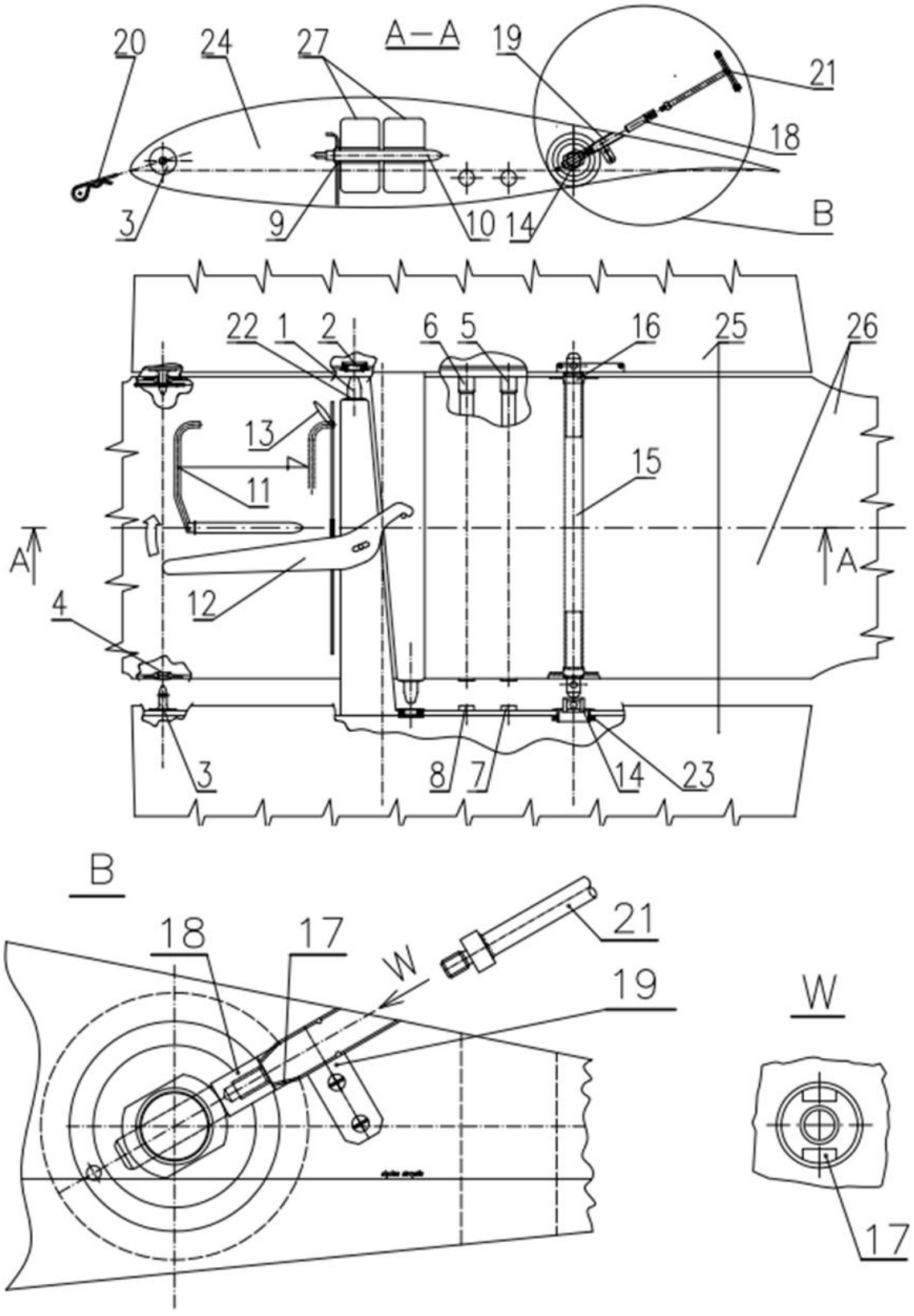

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Fig. 4-1. Wings rigging

1. Spar pin
2. Nest socket
3. Bolt
4. Pin
5. Sleeve
6. Wingtip mounting key (Fig. 4–2. in TSM)

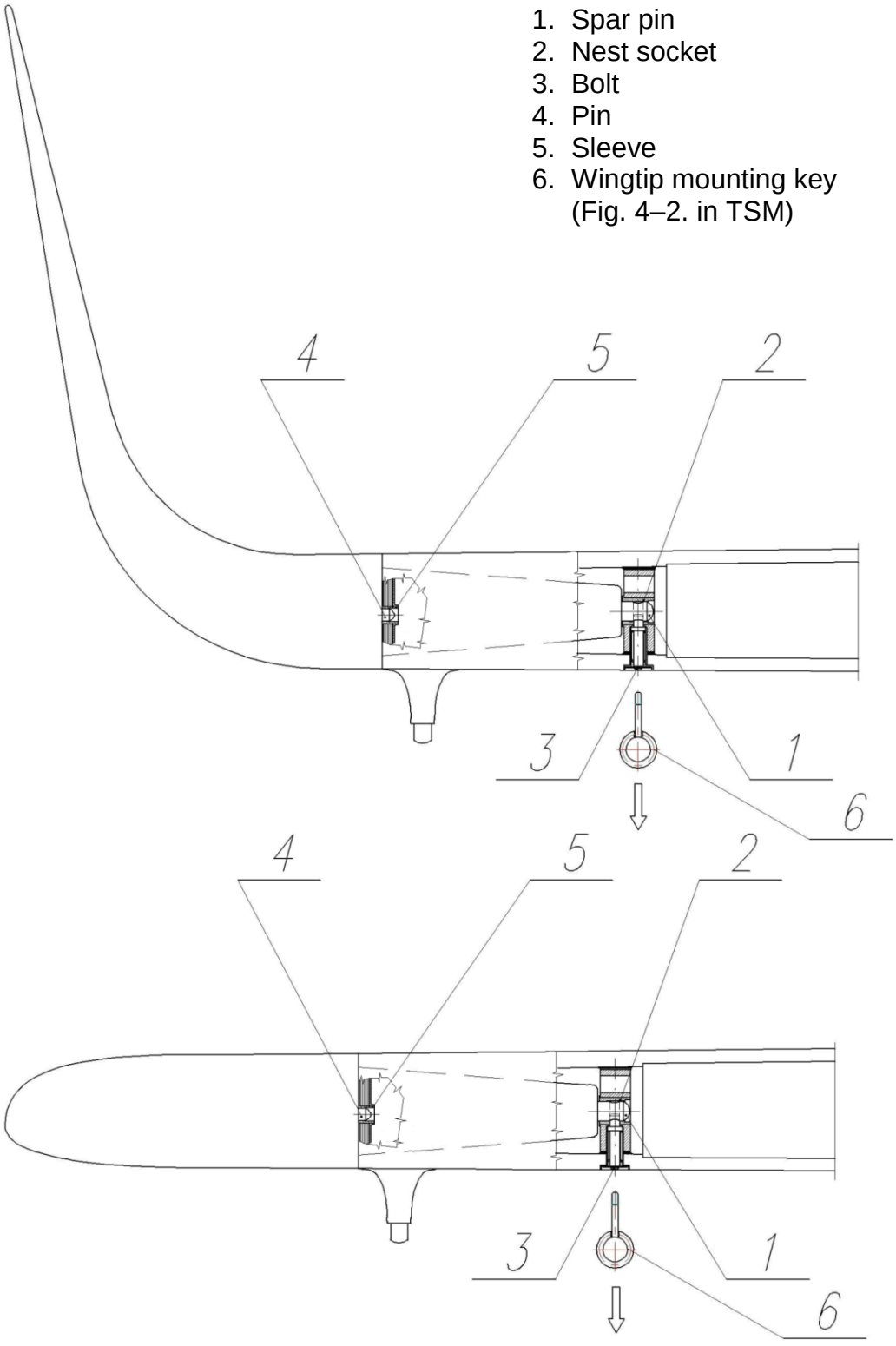

Fig. 4-2. Assembling winglets or plane wingtips

4.2.5. Assembling and disassembling long wingtips

Assembling long wingtips, extending wing span up to 65,62 ft, is shown on Figures 4–3., 4–4. and 4–5. In wingtips locking bolts (3) there are axial threaded M4 holes for screwing wingtip mounting key (10).

Long wingtip aileron drive is connected automatically via coupling joint mounted in wingtip aileron axis with socket mounted in wing aileron axis.

To assembly wingtip, do the following:

1. Insert spar root of wingtip in spar socket on wing side;
2. Set the same deflection for wing and wingtip ailerons;
3. Pull down the bolt (3) onto stop by means of screwed-in key (10), hold in the “unlocked” position;
4. Push wingtip, mounting the spar pin (1) in the socket (2), front and rear pins (4) in sleeves (5), as well as spherical ending of the outer part of aileron clutch (6) together with pin (8) into socket of the inner part of aileron clutch (7);
5. Release bolt (3) up – onto stop, locking in this way the spar pin (1);
6. The bolt should hide completely in the wing; unscrew the key (10).

To disassembly wingtip, do the following:

1. Pull down the bolt (3) onto stop, by means of screwed-in key (10), hold in the “unlocked” position;
2. Shove-out the wingtip from wing socket.

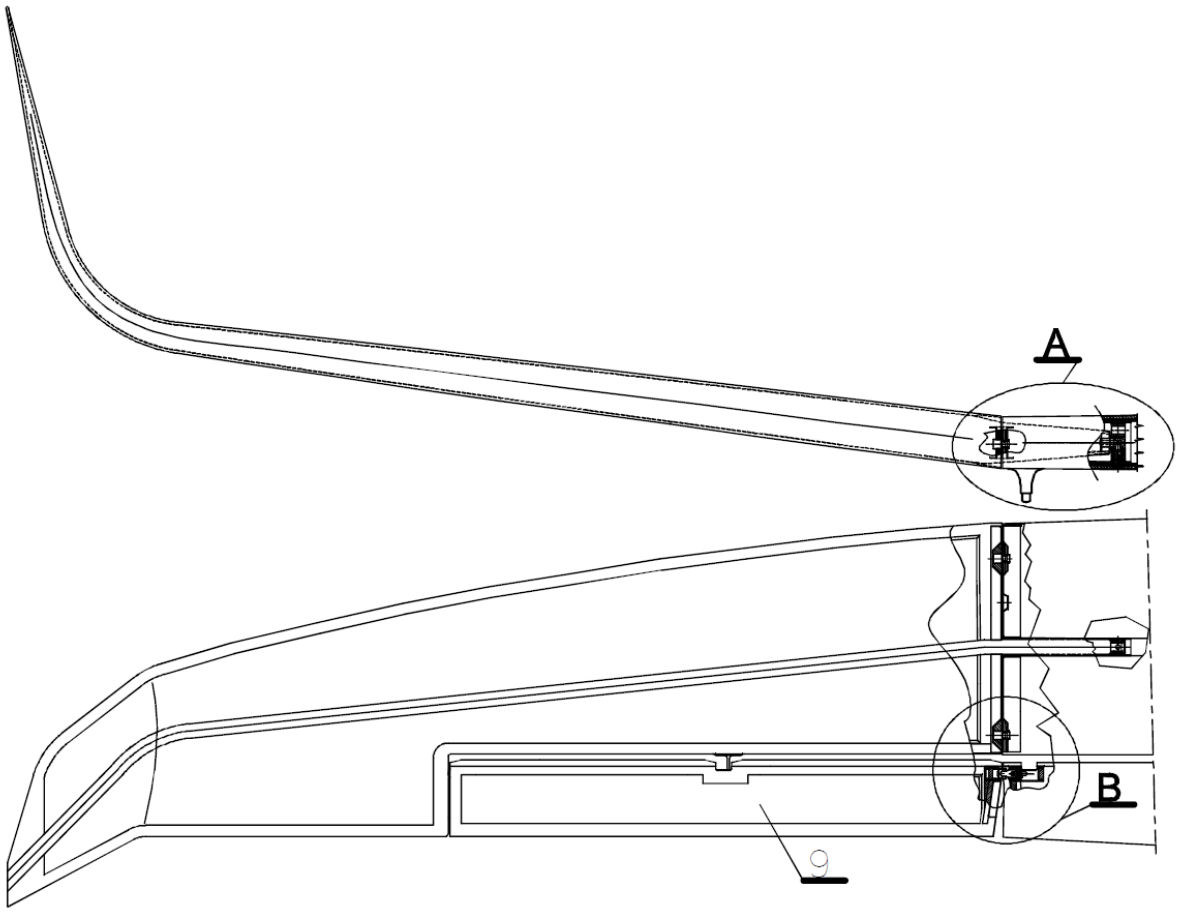

Fig. 4-3. Assembling long wingtips

Legend to Fig. 4–3., Fig. 4–4., Fig. 4–5.:

1. Spar pin
2. Nest socket
3. Bolt
4. Pin
5. Sleeve
6. Outer part of aileron clutch
7. Inner part of aileron clutch
8. Latch pin
9. Long wingtip aileron (outer)
10. Wingtip mounting key (Section 4. in TSM)

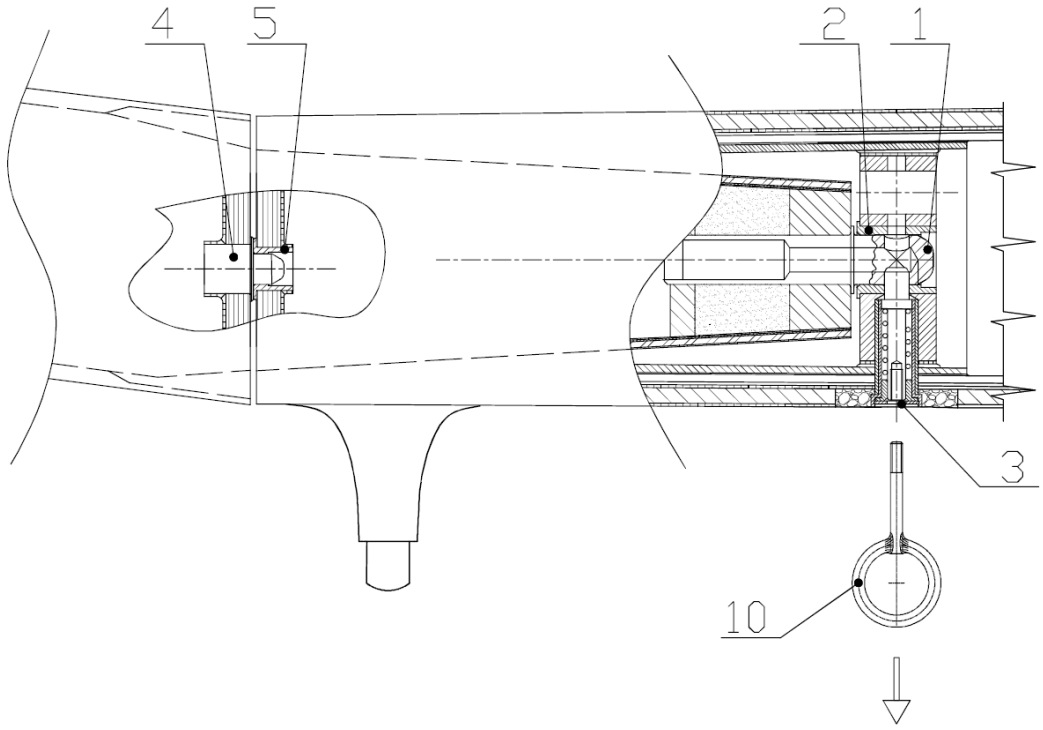

Fig. 4-4. Detail A of the wing – long wingtip connection

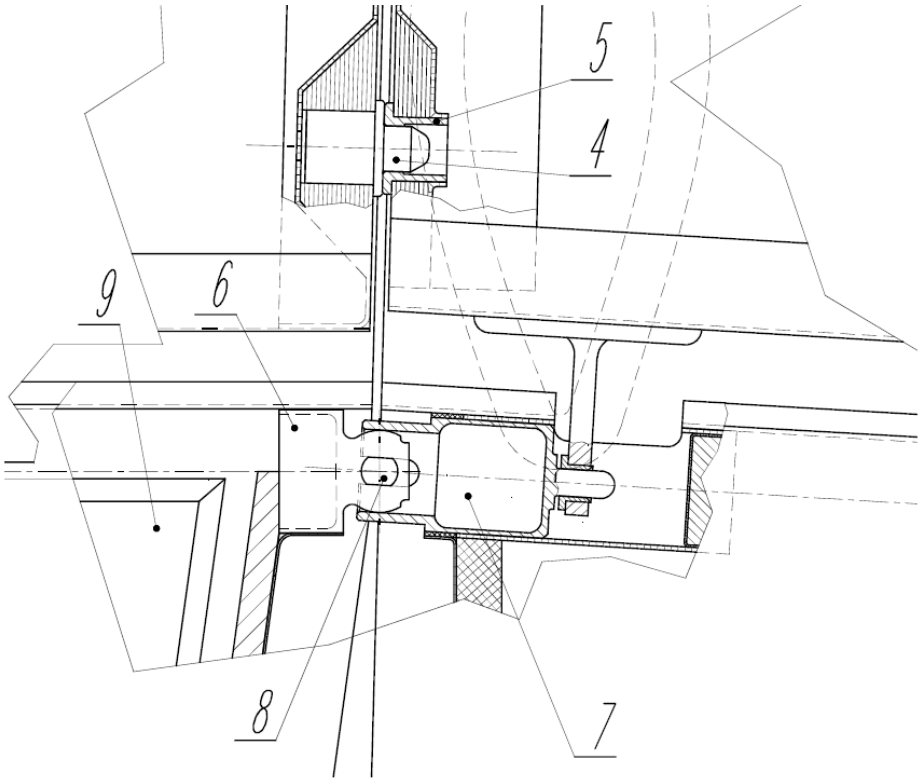

Fig. 4-5. Detail B of the wing – long wingtip connection

4.2.6. Horizontal tailplane assembling

Operation sequence in assembling (see Fig. 4–6.):

1. Set trimming device to NH (nose heavy) position, deflect rudder fully to right or left side.
2. Shove in the tailplane, inserting pins (4) in sleeves (5) (to be done by two persons), **with elevator deflected fully down**. Maintaining the lever (8) in upper and the elevator in lower position facilitates automatic connection of elevator control by aligning cut-out in the lever (9) with lever roll (8). Correct connection between levers (8) and (9) must be verified through transparent glass-sight (10).

WARNING:

Other than NH position of trimming device and elevator not complete deflection down results in lack of connection in elevator control.

3. Insert the vertical bolt (1) in the fitting (3) and tighten with M = 7,38÷8,85 lbf·ft torque, by means of torque wrench. The bolt head is to be positioned so to enable mounting of the special safety pin (2).
4. Check correct connection of elevator controls by gentle deflections of control stick fore and aft onto stop. Elevator deflections should follow these of control stick.
5. Secure bolt (1) with special safety pin (2) against loosening. The safety pin is to be inserted in level position, as per Fig. 4–6., to avoid collision with the rudder.

NOTE:

If the safety pin will be set to vertical position, it might be disconnected by the rudder.

Disassembling is to be accomplished in reverse sequence.

Legend to Fig. 4–6.

1 - Stabilizer fastening vertical bolt
2 - Special safety pin
3 - Fuselage fitting
4 - Stabilizer pin
5 - Sleeve
6 - Stabilizer mounting web
7 - Rudder
8 - End lever
9 - Elevator lever
10 - Transparent glass-sight
11 - Stabilizer
12 - Elevator
13 - Rear web
14 - Elevator mass balance
15 - Screw
16 - Castellated nut
17 - Cotter pin

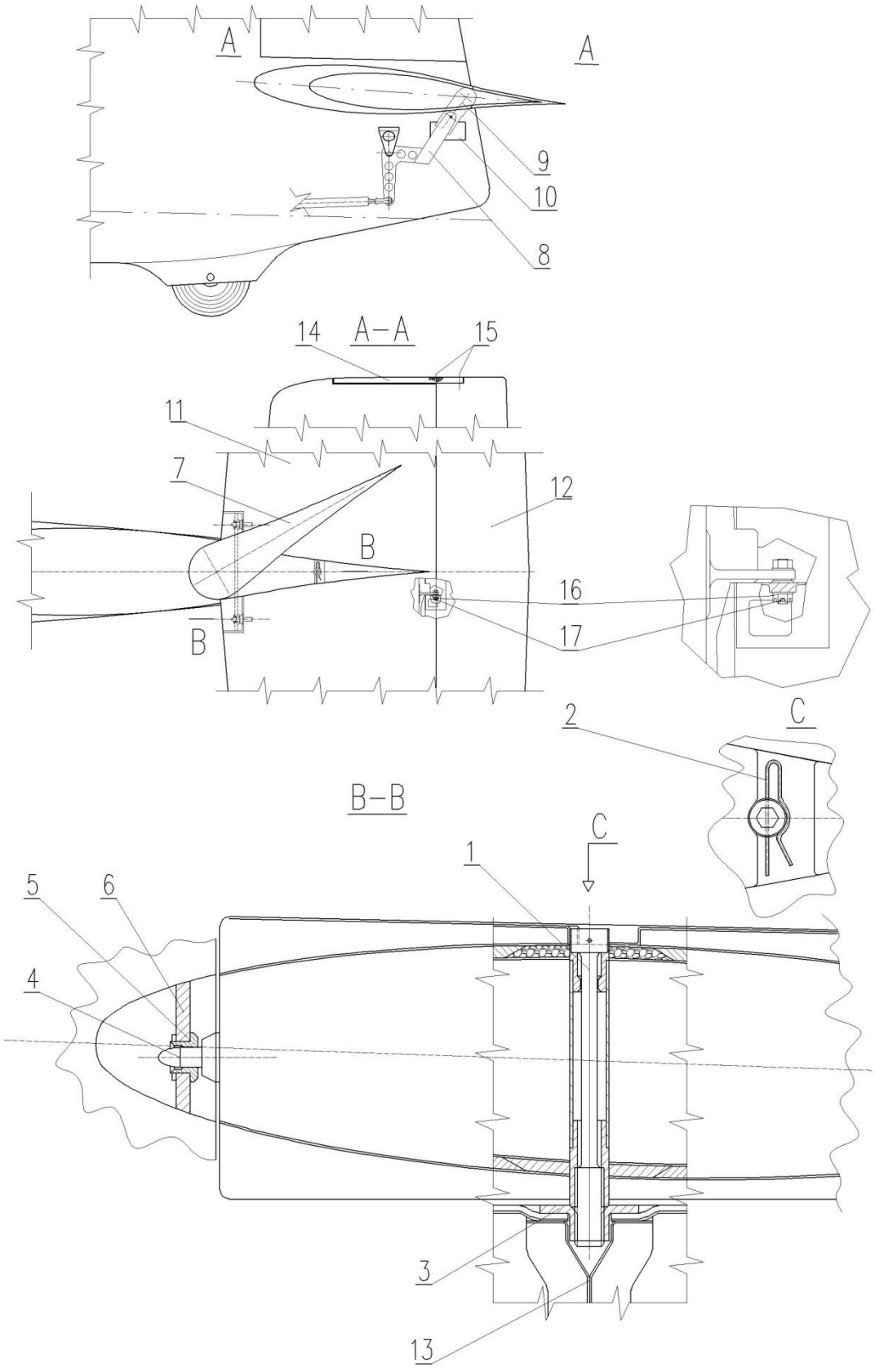

Fig. 4-6. Horizontal tailplane assembling

4.3. Daily inspection

Before flying, the sailplane is to be inspected carefully. This also applies to sailplanes stored in a hangar.

During the inspection, the followings are to be checked:

- Sailplane documents, validity of Airworthiness Documents (ARC, PtF), completeness of records in documents.
- Condition of fuselage, wing and tailplane structure and skin, securing of connections (airbrake plates, hinges and actuation of aileron, elevator hinges, actuation of rudder) – visual inspection.
- Reliable securing of the wing and tailplane bolts.
- Condition of canopy, correct closing and opening, condition of emergency jettison system.
- Cockpit interior, position of pedals, back rest locking, safety belts, no loose items.
- Pulling rod anchorages to pedals and cotter pins in pulling rod connecting bolts.
- Unrestricted deflection and play in control system of aileron, rudder, elevator and airbrakes.
- Correct operation of longitudinal trim system.
- Undercarriage condition, wheel roll ability, wheel tyre pressure (visually), deflection of shock absorber.
- Operation and efficiency of wheel brake.
- Condition and operation of tow releases.
- Instruments, pressure ports, battery connection.
- Transceiver (if installed), make a communication test.

4.4. Pre-flight inspection

Prior to flight, check the sailplane as follows:

- Securing the assembly bolts connection and elevator controls.
- Unrestricted deflection of control surfaces over the full range of deflection angle and control force.
- Check if sailplane loading complies with limitations (items 2.4., 2.5., 2.8. and 6.5. individual loading plan – placard on RH cockpit side), in necessity calculate the resultant CG position (item 6.3.).
- Correct installation of balancing weights (if installed).
- Back rest correct installation and securing.

4.5. Procedure before take-off

The checklist of pilot's inspections to be done directly before take-off has been provided on a cockpit RH side, at front and rear seats

PRE-FLIGHT CHECKLIST	
1. No loose items in a cockpit	CHECK
2. Parachutes	PUT-ON
3. Safety belts	FASTEN
4. Controls full deflection	CHECK
5. Airbrakes	CLOSE AND LOCK
6. Trimming device for take-off	SET
7. Accelerometer to „0”	SET
8. Altimeter set	CHECK
9. Canopy	CLOSE AND LOCK
10. Transceiver	CHECK
11. Stall warning device	ON
12. Towing cable connection	CHECK

4.6. Normal procedures and recommended speeds

4.6.1. Winch-launched take-off

In winch-launched take-off:

- avoid take off from high grass, especially with cross wind,
- take off against the wind, in case of cross wind - take-off allowed with cross wind component not exceeding 8 kn (9,3 mph),
- inform winch operator about sailplane all-up mass.

Procedure recommended for take-off and climb:

- set the trimming device to:
  „nose heavy” – light crew,
  mid of range – heavy crew,
- set control stick to aileron neutral,
- keep left hand close to release handle,
- when starting keep the stick pushed slightly forward, ground roll on main wheel, after lift-off pass gradually to climb,
- in steep, stabilized climb the control stick forces can be trimmed.

Recommended winch-launching speed: **54 ÷ 62** kn (59÷68 mph).

4.6.2. Aero-towed take-off and climb

In aero-towed take-off:

- use towing cable of 65 ft length, at minimum,
- avoid take off from high grass, especially with cross wind,
- take off against the wind, in case of cross wind - take-off allowed with cross wind component not exceeding 8 kn (9,3 mph).

Procedure recommended for take-off and climb:

- set the trimming device to:
  „nose heavy” – light crew,
  mid of range – heavy crew,
- set control stick to aileron neutral,
- keep left hand close to release handle,
- over the first phase of ground roll, keep the stick pulled slightly backward, until lifting nose wheel, continue ground roll on main wheel,
- after lift-off and stabilizing flight parameters in climb, trim the stick control forces.

Recommended aero-towing speed: **59÷65** kn (68÷75 mph).

4.6.3. Low speed flight and stall characteristics

SZD-54-2 „Perkoz” in flight at low speed, down to and including stall, behaves normally in a way representative for most sailplanes. When stalled, falls down symmetrically or with a tendency to bank on wing.

Over the whole range of CG positions, sailplane warns against stall by appearance of buffeting. As an option, on customer’s demand, the stall warning device may be installed. 2

In flight operation of stall warning device.

Immediately before take-off, switch on the stall warning device observing occurrence of acoustic warning signal and readiness indication lamp. Intermittent light of lamp indicates to low supply voltage and necessity for supply source replacement. Warning signal should disappear during take-off, immediately after lift-off, and appear again during landing, preceding directly touch down. The device should remain switched on (active) over the whole flight.

Complete service by the pilot for SP3 stall warning device is described in document “Stall Warning Device ANTI-STALL SP3, Flight Manual, Issue 1, dated 23.03.1995”, to be provided together with Fight Manual, in case of installation of anti-stall device. 2

4.6.4. Side-slip

The sailplane performs a flat (bank angle up to 20 deg), low efficient side slip. Side slip in a landing configuration (airbrakes protruded) is inefficient as a manoeuvre aimed to increase sink speed. This may be safely performed over the airspeed range from the recommended approach speed up to the V = 108 kn (124 mph). Control force reversal does not appear in any configuration. Releasing the controls in side-slip results in sailplane transition to symmetrical flight. Airspeed indicator readings in a slip are approx. 11 kn (12 mph) below true values.

4.6.5. Approach

Decision on landing should be taken early enough, despite sailplane high glide ratio. Airbrakes should be used to control flight path in approach.

Approach at approx. 54 kn (62 mph) airspeed, increased in case of turbulence by approx. 5 kn (6 mph).

4.6.6. Landing

Efficiency of airbrakes is sufficient, allowing for accurate landing under every conditions. Touch-down on the main wheel. End of landing run is to be accomplished on main and nose wheels, which facilitates to maintain directional control. Use wheel brake, as necessary. | 2

4.6.7. High altitude flight

Be conscious that in line with increasing flight altitude the true airspeed is higher than the indicated value. Therefore the maximum allowed airspeed V_{NE} must be reduced in accordance with the table in item 2.2. of this Manual.

4.6.8. Flight in rain

When flying in rain, a degradation of sailplane performances should be taken into account. In circling and in approach, maintain airspeed increased by approx. 5 kn (6 mph). In poor visibility or with canopy glassing foggy, open the side window and cockpit ventilation valve.

It is recommended to dry the rain-soaked sailplane after flight, and before take-off – when soaked in standstill.

4.6.9. Aerobatics

Sailplane performs correctly and in conventional manner the manoeuvres listed in a table. The table gives entry airspeed recommended for particular manoeuvres. The general rules of sailplane aerobatics must be observed. Be conscious of prompt airspeed increase in diving, and specially in inverted flight. It is recommended to make introduction to aerobatic flying (in particular these including autorotation and inverted flight) at elevated altitude.

Prior to aerobatic flight, in every case the following must be re-checked:

- reliability of cockpit canopy locking (correct position of canopy locking lever on canopy LH side),
- airbrakes lock,
- correct fastening and tightening of pilot safety belts,
- closing of both side windows, with ventilation tabs,
- loose items fastening,

and sailplane should be trimmed at 65 ÷ 81 kn (75÷93 mph) airspeed.

WARNING:

Remember on limitations to sailplane mass in Aerobatic Category.

WARNING:

Advanced and competition aerobatics in calm air only.

Aerobatic manoeuvres recommended entry speed:

Aerobatic manoeuver	airspeed kn (mph)	acceleration [g]
spin	-	+ 3 ÷ + 5 (in recovery)
inverted spin	-	- 3 / + 4,5 (in recovery)
loop	92 (106) ÷ 97 (112)	+ 4
inverted loop	124 (143) ÷ 135 (155)	- 3,5
stall turn	97 (112) ÷ 108 (124)	+ 4,5
inverted stall turn	124 (143) ÷ 135 (155)	- 3,5
half roll half loop	76 (87) ÷ 81 (93)	+ 3,5
controlled half roll half loop	81 (93)	+ 4,5
climbing turn	97 (112) ÷ 108 (124)	+ 3
lazy eight	86 (99) ÷ 97 (112)	+ 2,5
steep turn	65 (75) ÷ 81 (93)	+ 2,5
Immelman turn	113 (130) ÷ 130 (149)	+ 5,5
slow roll	min. 86 (99)	+ 3,5 / - 2,5
flick roll	76 (87) ÷ 86 (99)	+ 5
flick roll in downward angle	65 (75) ÷ 76 (87)	+ 5
flick roll downward	65 (75) ÷ 70 (81)	+ 5
inverted flick roll	76 (87) ÷ 86 (99)	- 3,5
inverted flick roll downward angle	65 (75)	- 4,5 / + 4,5
inverted flick roll downward	65 (75)	- 3 / + 4
Cuban eight	min. 108 (124)	+ 5
inverted Cuban eight	min. 124 (143)	- 2 / + 3,5
tail slide	-	+ 4 / - 2
eight	108 (124)	+3
barrel roll	97 (112)	+2

2

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SECTION 5.
PERFORMANCE

5.1. Introduction

Section 5. provides approved data for airspeed indicator system errors, and stall speed values. It contains also further information, for which approval is not required.

The data in the tables has been computed from actual flight tests with the sailplane in good condition and using average piloting techniques.

5.2. Approved data

5.2.1. Airspeed indicator system calibration

Diagrams in the following pages present CAS versus IAS, in normal and inverted flight.

CAS - *Calibrated Airspeed* - instrument reading corrected for instrument error and aerodynamic calibration error.

IAS - *Indicated Airspeed* – instrument reading corrected for instrument error only.

IAS values presented in this Manual are given assuming zero instrument error.

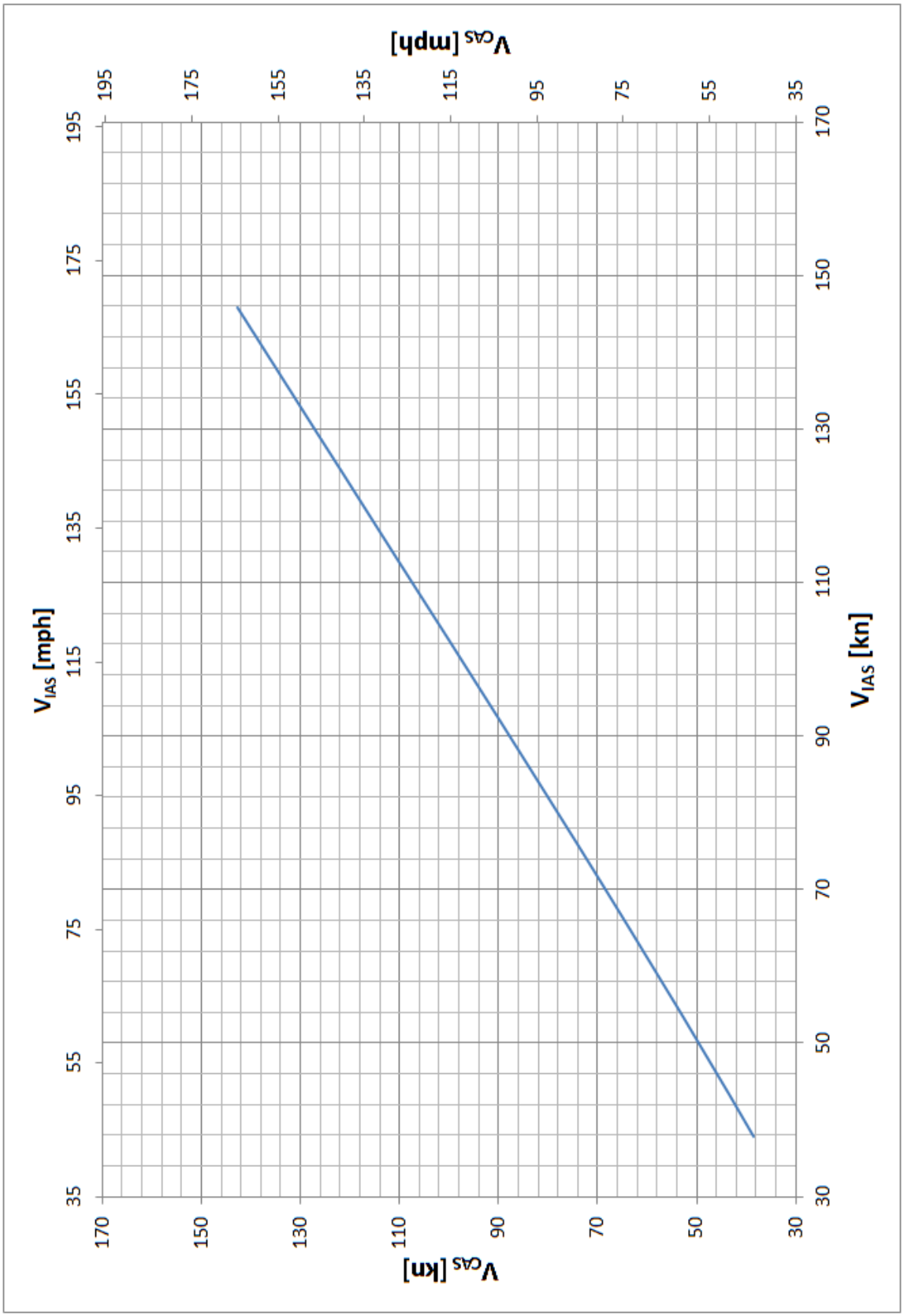

Fig. 5-1. AIS calibration – normal flight

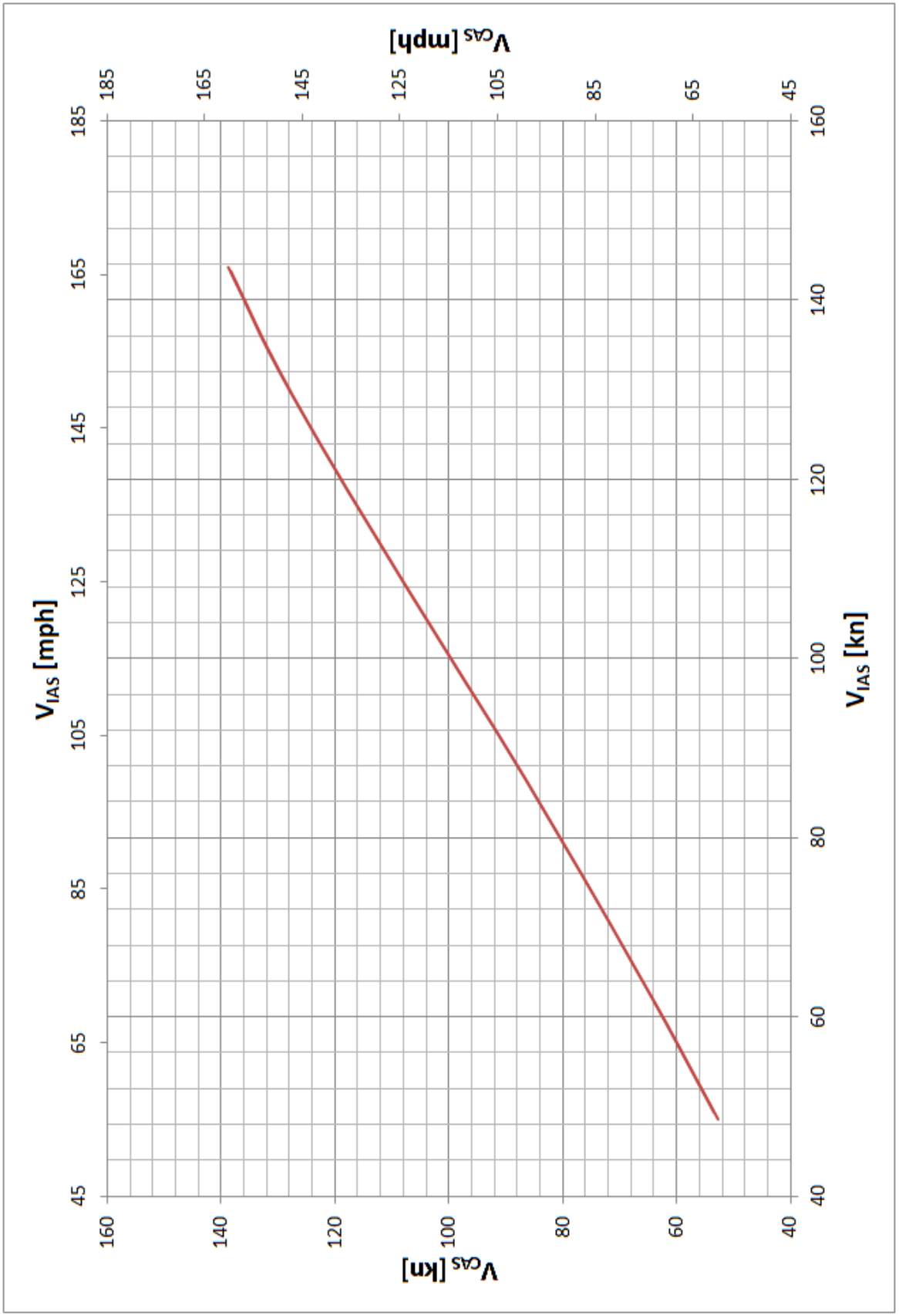

Fig. 5-2. AIS calibration – inverted flight

5.2.2. Stall speeds

In the following table the stall speed values [km/h] IAS (airspeed indicator readings) are given, both in wing level flight and in circling (φ = 45°), in loading configuration with the centre of gravity in front:

span	57,42 ft				65,62 ft		
mass	1074 lb		1356 lb		1356 lb		2
flight	wing level	circling	wing level	circling	wing level	circling	
normal	37 (42)	41 (47)	43 (50)	45 (52)	42 (48)	46 (53)	2
inverted	41 (47)	50 (58)	-	-	-	-	

Altitude loss in recovery from stall depends on actual sailplane loading, and is equal to:

below 131 ft in normal flight,

below 197 ft in inverted flight.

5.3. Additional, non-approved information

5.3.1. Demonstrated cross wind performance

The correct sailplane characteristics in take-off and landing have been demonstrated at cross wind component of:

in aero-towed take-off ..... 8 kn (9,3 mph),

in winch-launched take-off ..... 8 kn (9,3 mph),

in landing ..... 8 kn (9,3 mph).

5.3.2. Speed polar

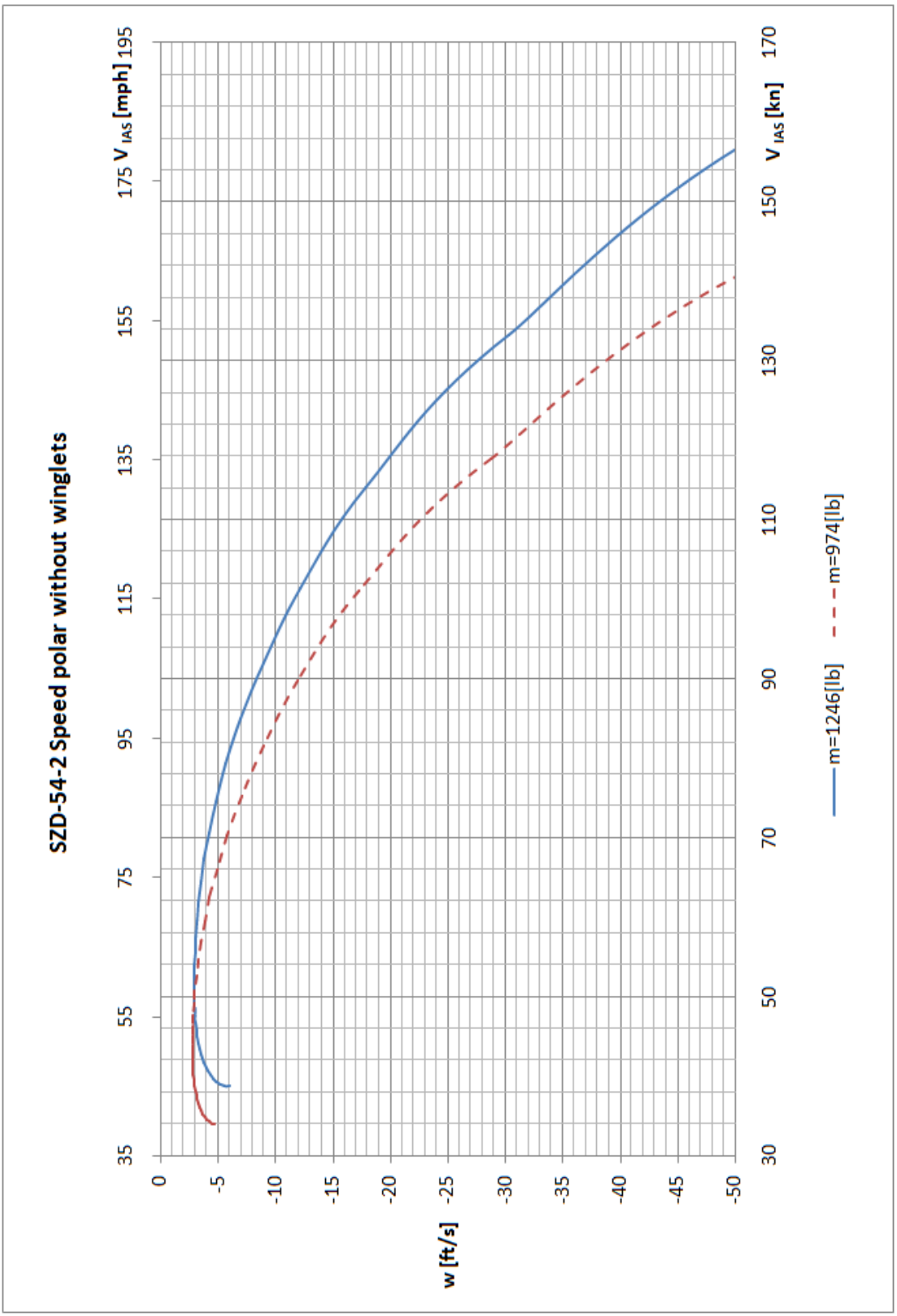

Fig. 5-3. Speed polar without winglet

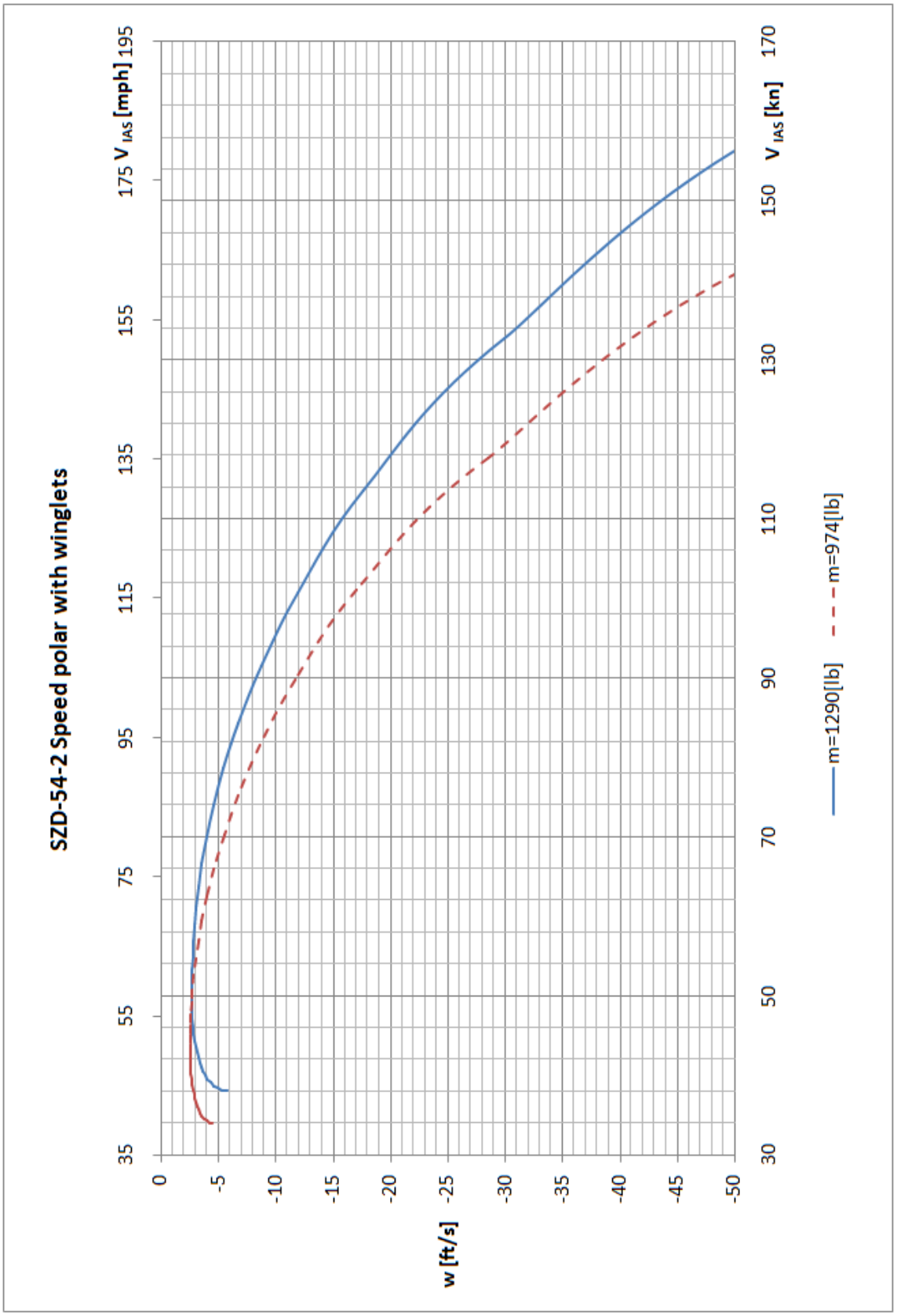

Fig. 5-4. Speed polar with winglet

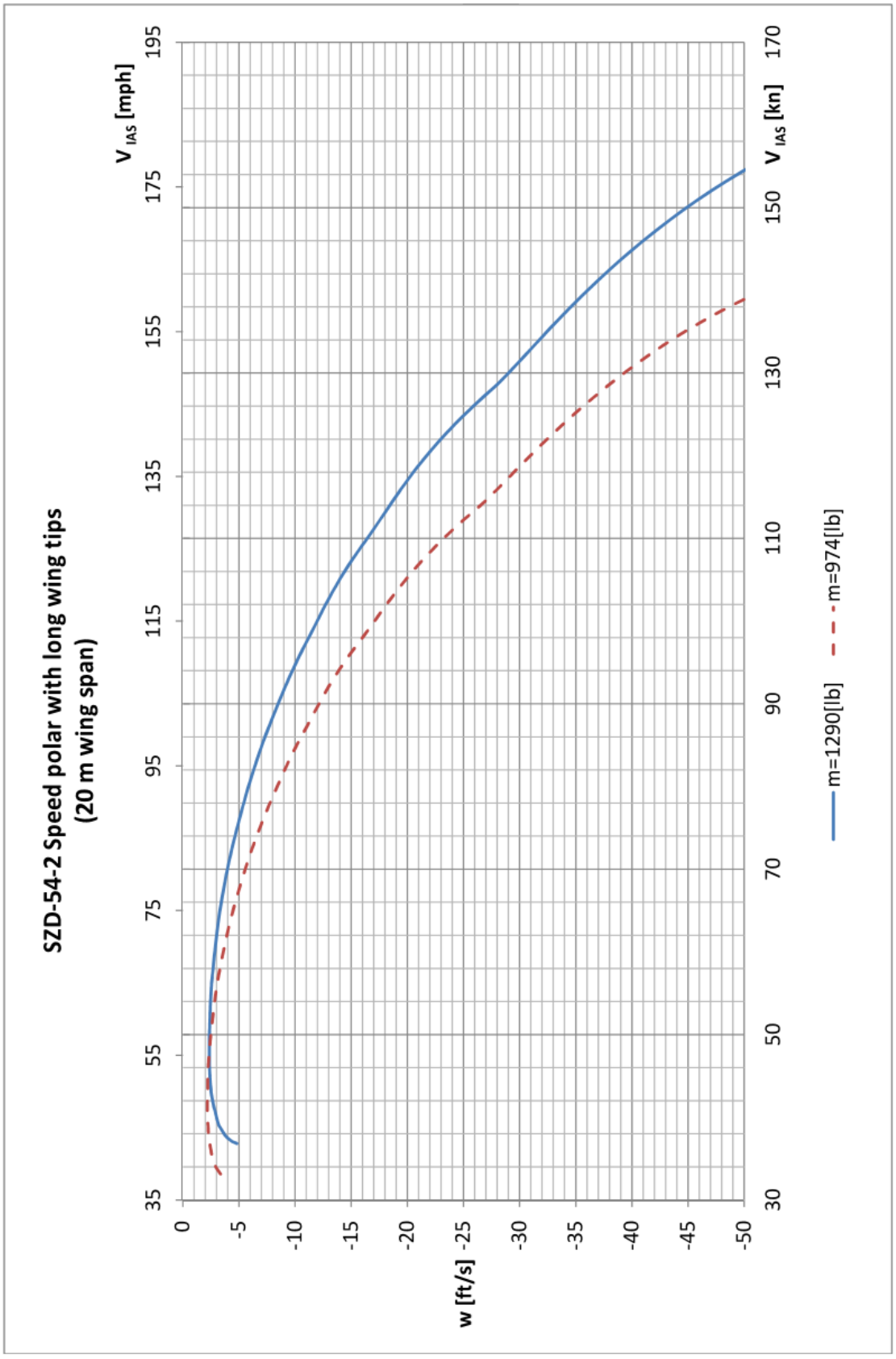

Fig. 5-5. Speed polar with long wingtips (65,62 ft wing span)

SECTION 6.

MASS AND BALANCE

6.1. Introduction

Section 6. contains information on mass and CG range of sailplane without pilots and on payload range, within which the sailplane may be safely operated.

Procedure for weighing the sailplane and the calculation method for establishing the actual CG position are contained in Section 7. of the Technical Service Manual for SZD-54-2 “Perkoz” sailplane.

6.2. Mass and CG position of sailplane without pilots

Term „sailplane without pilots” corresponds to sailplane with any equipment in instrument panels and in baggage compartment, conforming to the TSM and actual Equipment list, ready for flight but not including pilots, parachutes, balancing weights and hand luggage.

Allowed range of mass (m_{bp}) and CG position (X_{bp}) of sailplane without pilots is given in a diagram (Fig. 6–1.) – dashed area.

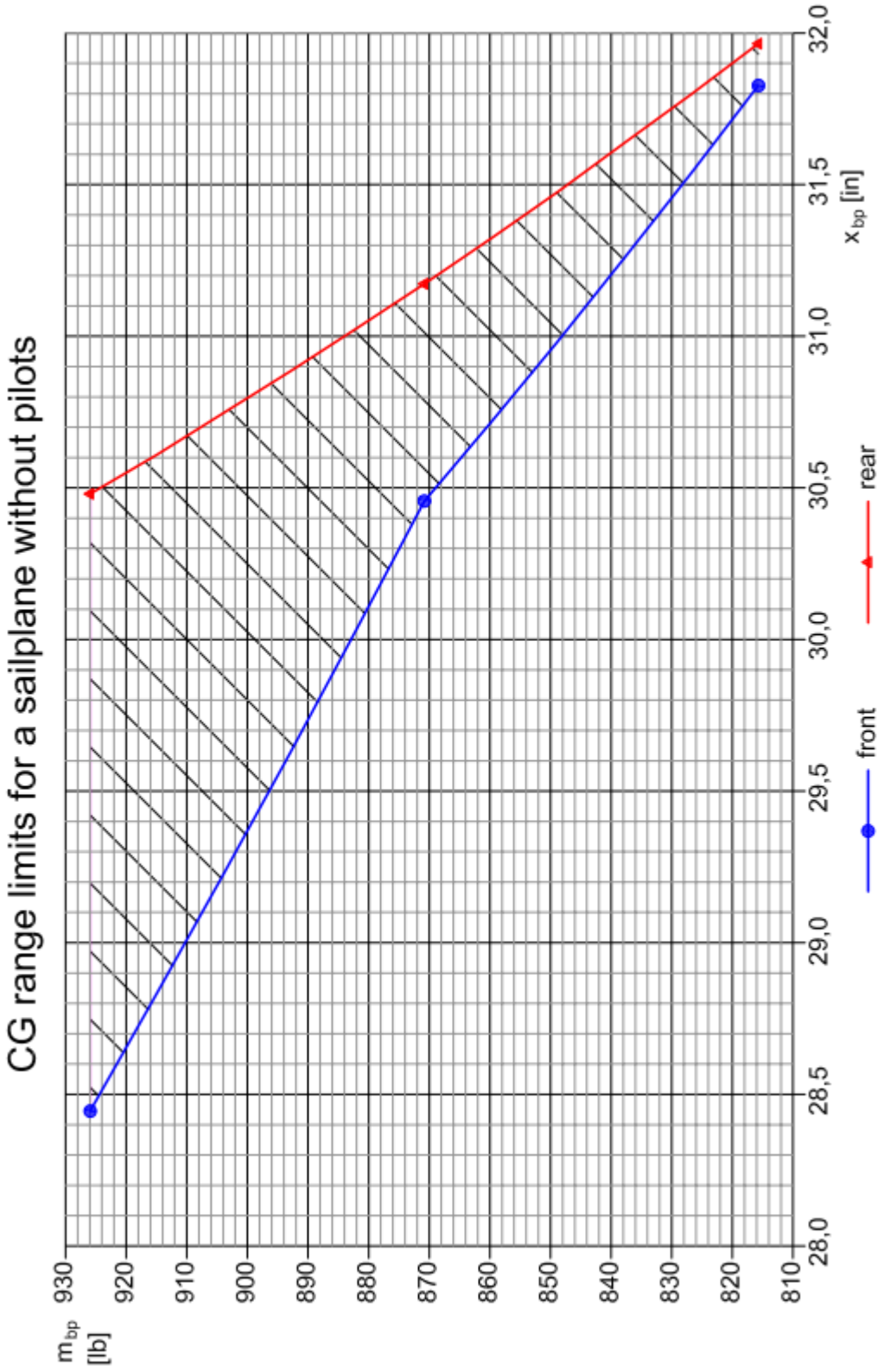

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Fig. 6-1. CG range limits for a sailplane without pilots

6.3. Method for calculation of sailplane CG position

Individual loading plan table (item 6.5.) provides loading conditions in cockpit that ensure safe operation of the sailplane. Sailplane CG position can be determined independently in flight by the following procedure.

CG position of loaded sailplane is to be calculated with the formula:

$$X_{SC} = \frac{m_{bp} \cdot X_{bp} - m_1 \cdot X_1 - m_2 \cdot X_2 - m_w \cdot X_w + m_b \cdot X_b}{m_{bp} + m_1 + m_2 + m_w + m_b}$$

where:

m_{bp} - mass of sailplane without pilots
(acc. to actual weighing results, see item 6.4.)

X_{bp} - CG position of sailplane without pilots
(acc. to actual weighing results, see item 6.4.)

m_1 - mass of pilot on front seat

X_1 - CG position of pilot on front seat
(X_1 depends on m_1 – see table below)

m_2 - mass of pilot on rear seat

X_2 - CG position of pilot on rear seat
(X_2 depends on seat pan position – see table below)

m_w - mass of balancing weights (m_w = 0 / 13,2 / 26,4 lb)

X_w - CG position of balancing weights (X_w = 66,22 in)

m_b - mass of luggage

X_b - CG position of luggage (in baggage compartment : X_b = 31,50 in,
for luggage on rear seat X_b = 3,94 in)

m_c - total mass of sailplane loaded ($m_c = m_{bp}+m_1+m_2+m_w+m_b$)

X_{SC} - CG position of loaded sailplane

m_1 [lb]	X_1 [in]
121 ÷ 154	46,46
154 ÷ 209	$46,46+1,2\cdot(m_1-154)$
209 ÷ 242	47,64

position of rear seat pan	X_2 [in]
1	6,30
2	5,32
3	4,33
4	3,35

When using back cushion for a short pilot, the cushion thickness must be added to the X_1 or X_2 value – respectively.

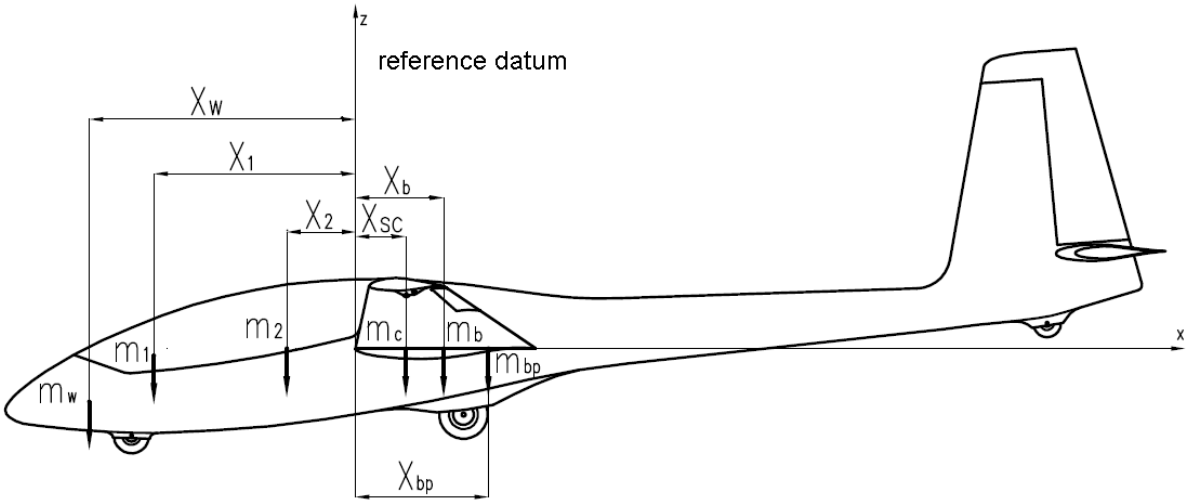

Fig. 6-2. Scheme to sailplane CG calculation

Reference datum is a plane perpendicular to plane made by root aerofoil chords, and passing through points on leading edge of root aerofoils.

Position of sailplane CG, expressed as a percentage of Mean Standard Chord ($X_{MSC\%}$), can be calculated from following formula:

$$X_{MSC\%} = \frac{X_{SC} - X_n}{SCO} \times 100\%$$

where:

- For 57,42 ft wing span version:

  SCO = 38,976 in – length of MSC,

  X_n = 1,575 in – distance of MSC leading edge point from reference datum.

- For 65,62 ft wing span version:

  SCO = 37,756 in – length of MSC

  X_n = 1,969 in – distance of MSC leading edge point from reference datum.

6.4. Weight and balance record

Results of sailplane weighing and corresponding CG position of sailplane without pilots (m_{bp} i X_{bp}) should be recorded in the following table. For every weighing, a reference must be made to the list of equipment, with which weighing has been made. Weighing is to be done in sailplane configuration with plane (not winglet) wingtips.

At the modification to equipment, the corresponding mass of sailplane without pilots and CG position must be determined again on a way of repeated weighing or calculation.

Samples of “Record of sailplane weighing and determining of CG”, „Calculation record of sailplane without pilots CG” and „Equipment list” are enclosed in Section 18. of the Technical Service Manual.

CG position of sailplane without pilots must be within the range given in Fig. 6–1. in the item 6.2.

The entries to the following tables are valid only for the sailplane with Serial No. listed on the head page of this Flight Manual.

TABLE OF WEIGHING
sailplane without pilots

57,42 ft wing span

Weighing or CG calculation record		mass m_{bp} [lb]	CG position X_{bp} [in]	made by name / signature
Document type	Date			

For a glider in configuration with long wingtips increasing wing span to 65,62 ft, a separate table of weighing (below), specifying the weight and CG position of the glider without pilots in this configuration, is obligatory. Numerical values can be determined on the basis of weighing or calculations.

TABLE OF WEIGHING
sailplane without pilots

65,62 ft wing span

Weighing or CG calculation record		mass m_{bp} [lb]	CG position X_{bp} [in]	made by name / signature
Document type	Date			

6.5. Individual loading plan

The following table is placed on cockpit RH board at front and rear seat. This contains information on sailplane allowed loading conditions for flight in Utility or Aerobatic Categories, as well as necessity of balancing weights installation, for one- and two-person crew.

Carry-on baggage in two-person crew can be taken at the expense of masses of pilots and fixed in baggage compartment. In solo flying – placed in the side pocket or on the rear seat and fixed with safety harness.

Below enclosed is a table with **sample values**. For every new produced sailplane Producer will prepare the table with individual loading plan, while after every change to the mass of sailplane without pilots (resulting of equipment modification or airframe repair) the new table must be prepared – using the sample and method of filling given in next page (you can use the file “Individual loading plan.xlsx” available at producer).

2

SZD-54-2 Perkoz INDIVIDUAL LOADING PLAN			
Sailplane mass without pilots [lb]		57,4[ft]	860
		65,6[ft]	882
Max. mass of the load (crew + baggage + ballancing weights)	Utility	57,4[ft]	496
		65,6[ft]	474
	Acro		441

One Pilot on Board		
Balancing weights (13,2[lb] each)	Pilot mass with parachute [lb] front seat	
	min.	max.
2	121	139
1÷2	139	154
0÷2	154	242
date signature		

Crew - 2 People Balancing weights - see plackard "Manoeuvering loads and loading" Pilot mass with parachute [lb]			
rear seat	front seat -max.		
	Utility		Acro
	57,4[ft]	65,6[ft]	
121	242	242	242
132	242	242	242
143	242	242	242
154	242	242	242
165	242	242	242
176	242	242	242
187	242	242	242
198	242	242	242
209	242	242	231
220	242	242	220
231	242	242	209
242	242	231	198

Fig. 6-3. Table of individual loading plan with sample values

Method for filling the table

- In the middle-top box enter the registration marks of the sailplane.
- Below (blue box) enter the mass of sailplane without pilots (m_{bp}) basing on actual weighing or calculation record (separate for 57,42 ft and 65,62 ft wing span).
- In next rows (yellow and pink boxes) enter maximum payload mass calculated with formulas:

  for Utility Category $\mathbf{m_{LUmax} = 1356 - m_{bp}}$
  (separate for 57,42 ft and 65,62 ft wing span)

  for Aerobatic Category $\mathbf{m_{LAmax} = 1301 - m_{bp}}$

2

- For two person crew calculate maximum mass of pilot on front seat at given mass of pilot on rear seat (m_2), with formulas as follows:

  for Utility Category $\mathbf{m_{1max} = m_{LUmax} - m_2}$
  (separate for 57,42 ft and 65,62 ft wing span)

  for Aerobatic Category $\mathbf{m_{1max} = m_{LAmax} - m_2}$

  where $\mathbf{m_{1max}}$ cannot be more than 242 lb (if the formula result exceeds 242, than **242** must be used). The results are to be entered in corresponding box of the table (yellow or pink).

SZD-54-2 Perkoz INDIVIDUAL LOADING PLAN			
Sailplane mass without pilots [lb]		57,4[ft]	
		65,6[ft]	
Max. mass of the load (crew + baggage + ballancing weights)	Utility	57,4[ft]	
		65,6[ft]	
	Acro		

One Pilot on Board		
Balancing weights (13,2[lb] each)	Pilot mass with parachute [lb] front seat	
	min.	max.
2	121	139
1÷2	139	154
0÷2	154	242
date signature		

Crew - 2 People			
Balancing weights - see plackard "Manoeuvering loads and loading"			
Pilot mass with parachute [lb]			
rear seat	front seat -max.		
	Utility		Acro
	57,4[ft]	65,6[ft]	
121			
132			
143			
154			
165			
176			
187			
198			
209			
220			
231			
242			

2

Fig. 6-4. Sample of individual loading plan table

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SECTION 7.

SAILPLANE AND SYSTEMS DESCRIPTION

7.1. Introduction

Section 7. contains description of sailplane systems, and provides information on operation of these.

Details of additional systems and equipment are given in Section 9.

Components of control systems and cockpit equipment are presented in photo (Fig. 7–1.).

Legend to Fig. 7–1.

1 - control stick
2 - grip of longitudinal trim device
3 - rudder control pedals at front seat
4 - rudder control pedal at rear seat
5 - handle of airbrakes control
6 - grip of tow release - yellow
7 - grip for control pedals in-flight adjustment (at front seat only)
8 - instrument panel at front seat
9 - instrument panel at rear seat
10 - cockpit ventilation blower
11 - handle of cockpit ventilation control
12 - cockpit canopy locking lever
13 - lever of canopy emergency jettison
14 - handle for canopy lift
15 - lock trigger of longitudinal trim device
16 - lever of wheel brake
17 - microphone
18 - push to talk button
19 - document pocket
20 - telescopic slide

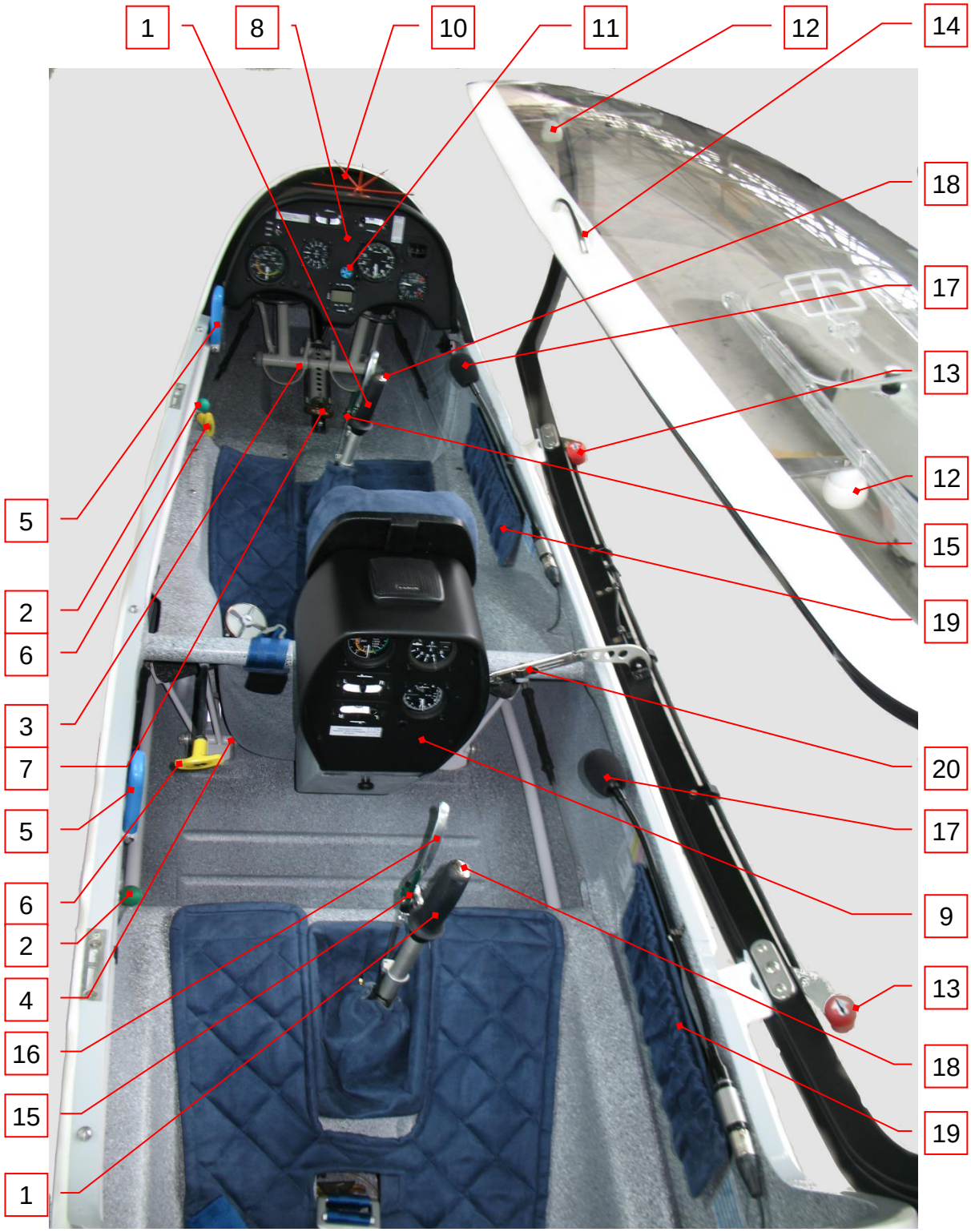


Fig. 7-1. Cockpit equipment and controls

7.2. Cockpit controls

7.2.1. Aileron & elevator control

Ailerons and elevator are actuated with control sticks of conventional arrangement, connected to each other. The transceiver „push to talk” buttons are installed on control sticks.

7.2.2. Rudder control

Rudder is actuated conventionally with pedals. The pedals at front seat are in-flight adjustable. Pedals adjustment grip is located in front of control stick (brown).

To move pedals forward:

- pull the grip to un-lock the mechanism,
- press pedals forward with both feet,
- when pedals reach the desired position, release the grip,
- continue pressing pedals with feet until locking mechanism engages.

To move pedals backward:

- pull the grip to un-lock the pedals,
- pull back with feet at pedal loops,
- when pedals reach desired position, release grip and press pedals with both feet until locking mechanism engages.

Pedals at rear seat are not adjustable.

7.2.3. Longitudinal trim

Sailplane manufacturer developed two versions of longitudinal trim system control solutions.

1. Longitudinal trim control lever on a cockpit LH side board.

2 | Un-locking of trimming device is achieved by rotating the lever.
Setting up the longitudinal trim is done by moving the lever forward or backward.
Locking of mechanism is accomplished in desired position after releasing lever which returns to the original position influenced by the spring.

2. Longitudinal trim locking trigger on control stick and trimming device adjustment grip on a cockpit LH side board.

   Un-locking of trimming device is achieved by pressing the trigger on control stick. Setting up the longitudinal trim is done by moving the control stick forward or backward. Use the adjustment grip on a cockpit LH side board to accurate positioning. Locking of mechanism is accomplished automatically after releasing trigger on control stick.

NOTE:

Pay attention to sequence of actions in case of un-locking trimming device trigger on control stick. First un-lock the trigger, then move the control stick to avoid substantial trimmer spring tension.

7.2.4. Airbrakes control

Airbrakes are actuated in conventional way, with blue handle on cockpit LH side board at front and rear seat.

7.2.5. Tow release grips

Grips (yellow) for tow release actuation are located on cockpit LH side in the area of pilot left knee, at front and rear seat. On pulling the grip both hooks are released.

To connect the tow cable:

- pull one of yellow grips,
- insert the cable link and release the grip,
- check correct connection of towing cable.

7.2.6. Wheel brake

Hydraulic brake on main wheel is actuated with levers mounted on control sticks.

NOTE

Do not actuate wheel brake during inverted flight and aerobatics with negative loads – this may cause air to enter the brake and therefore brake failure.

7.3. Instrument panels

Presented below (Fig. 7–2. and 7–3.) are sketches with typical arrangement of instruments in panels at front and rear seat. Depending on equipment completion for particular sailplane, instrument arrangement can be different from this scheme.

Minimum equipment is specified in the item 2.10. Models of minimum and additional equipment approved for installation on SZD-54-2 “Perkoz” sailplane are defined in Section 8. of the Technical Service Manual.

Legend:

AS - airspeed indicator
B - bank indicator
C - compass
G - accelerometer
S - switch of SP3 stall warning device
H - altimeter
R - transceiver
T - turn indicator
V - variometer

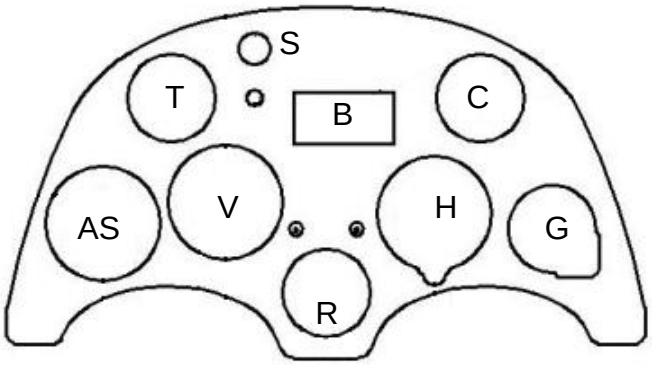


Fig. 7-2. Instrument panel at front seat

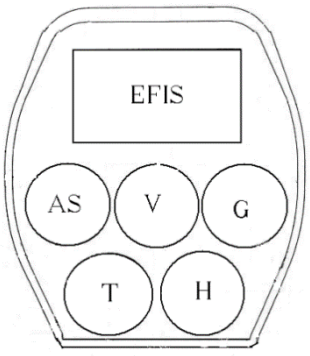


Fig. 7-3. Instrument panel at rear seat

corrected

7.4. Board instrument system

Board instrument system scheme is provided in Section 2. of the Technical Service Manual.

7.5. Landing gear

SZD-54-2 „Perkoz” is equipped with fixed monorail landing gear comprising shock-absorbed main wheel (∅350×135) and non-cushioned nose (∅255×110) and tail (∅200×50) wheels. On main wheel the hydraulic brake is provided.

Details of landing gear construction and its assembling/disassembling are contained in Section 2. of the Technical Service Manual.

7.6. Cockpit, canopy, seats and safety belts

Canopy opening (to RH side) is possible after moving forward the locks (white/red) located on LH side board. The canopy in opened position is supported with telescopic slide.

Cockpit is roomy enough for pilots up to 6,5 ft in height, with back parachute. Adoption of cockpit size to pilot is achieved by adjustment of pedal position at front seat and adequate positioning (on ground only) of rear seat pan.

Positioning of rear seat pan is to be done as follows:

- unlock the pan, rotating the locking knob located in the mid part of suspension tube until bolts hide inside the tube,
- position the pan in desired place,
- lock the pan again, extending bolts by means of locking knob.

NOTE:

Pay attention to position of pins visible in cut-outs in upper part of tube and to insert the locking bolts correctly in fuselage side sockets.

Using a back cushion for low height pilot is acceptable.

Sailplane standard equipment includes 5-point safety harness for both crew members, with optionally, 2nd lap belt.

7.7. Baggage compartment

Baggage compartment, accessible from the cockpit, is located behind rear seat. Hand luggage up to 4,4 lb mass is fastened with straps to lugs provided in baggage compartment, while additional equipment - according to the item 2.19. of the Technical Service Manual. Maximum mass in baggage compartment (standard equipment not included) is 44 lb. 2

CAUTION:

Carriage of dangerous, or flammable materials in baggage compartment – forbidden.

7.8. Electric system

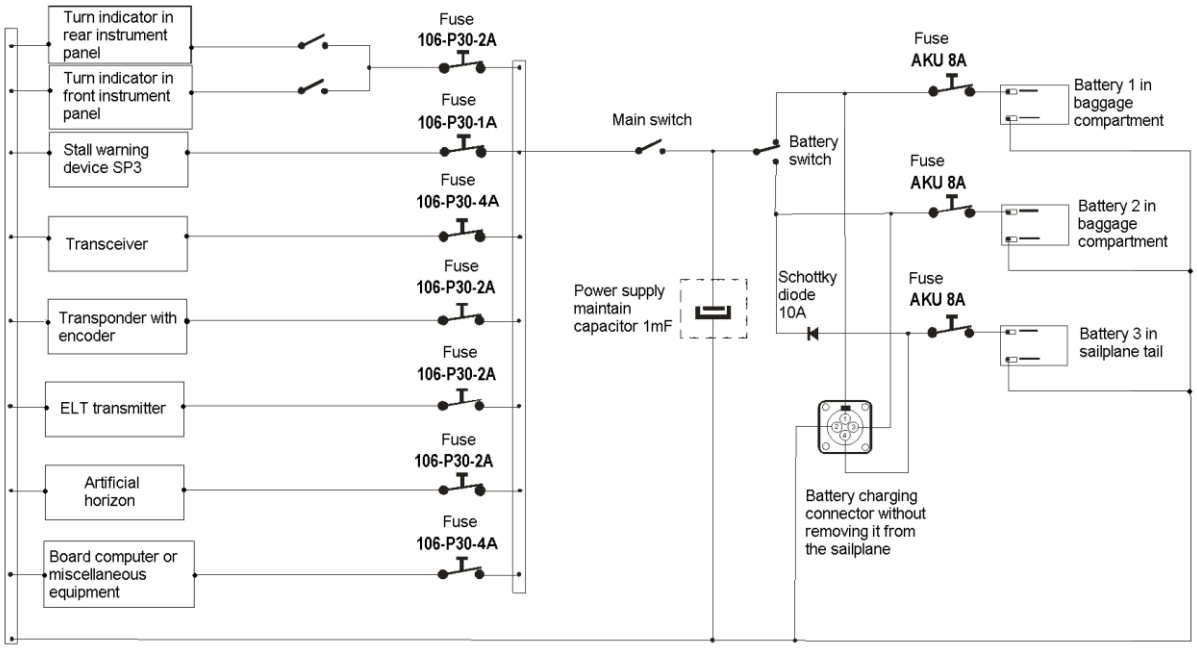


Fig. 7-4. Scheme of electric installation

Description of the installation is contained in the item 2.17. of the TSM.

In installation with at least two batteries, power switching should occur after voltage drop to 10,5 V. Observe the voltage indicator on VHF panel and – if installed – the stall warning device diode. 2

7.9. Miscellaneous equipment

7.9.1. Radio equipment

Sailplane standard version is adopted for installation of airborne radio station. The transceiver models approved for installation are listed in the item 8.2. of the Technical Service Manual.

As a standard, the tubular antenna is installed in the fin nose portion, with a cable led to instrument panel.

7.9.2. Ventilation

Cockpit is ventilated through side windows with deflectable tabs. Moreover, adjustable blow on canopy part above instrument panel is provided, operated with a knob in instrument panel at front seat.

7.9.3. Headrests

Both seats are equipped with headrest, adjustable on ground.

To adjust the headrest :

- unlock the mechanism rotating the locking knob,
- set the headrest to desired position,
- screw/tighten the locking mechanism.

CAUTION :

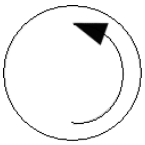
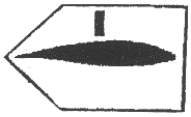
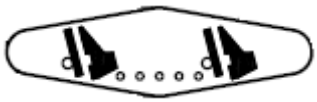
On a sailplane there is not allowed to remove the rear instrument panel cover on which a front cabin mandatory headrest is mounted.

7.9.4. Additional equipment

Additional equipment (e.g. board computer, flight data recorder) can be installed on the sailplane. Models of equipment allowed for installation on the SZD-54-2 „Perkoz” sailplane, together with requirements for such installation, are specified in the item 8.2. of the Technical Service Manual.

7.10. Information tables

7.10.1. Pictograms

Meaning	Pictogram	Location
Trimmer control		LH cockpit board by front and rear lever
Unlocking of trimmer control		Front and rear lever (Only if locking system through lever rotating)
Aerodynamic brake control		Front and rear handle of the airbrakes control pushrod
Canopy lock		LH side on canopy opening handles
Emergency canopy jettison		RH side on handles knobs
Ventilation control		Ventilation control cable handle
Foot pedals adjustment		Foot pedals adjustment cable grip
Tow hook release		Front and rear tow hook release grip
Allowed mass in baggage compartment		RH cockpit board in baggage compartment
Removable balance weights		RH cockpit board in front of front seat pan
Wheel brake		Front and rear control stick

2

7.10.2. Limitation table “ Maximum allowed airspeed”

Aero-towing and winch-launching allowed airspeed IAS kn (mph)	V_T	89 (102)
	V_W	78 (89)

2

Location :

– Front and rear instrument panel, close to airspeed indicator.

7.10.3. Table “Manoeuvring loads and loading”

SZD-54-2 „Perkoz” MANOEUVRING LOADS AND LOADING				CATEGORY	
				U	A
Manoeuvring load factor limits			n =	+5,3 -2,65	+7,0 -5,0
Maximum in-flight mass			[lb]	1356	1301
Pilot with parachute mass	front seat (m_1)		max	242 lb	
			min	121 lb	
	rear seat (m_2)		max	242 lb	
Application of balancing weights		m_1	m_2	weights	
One Pilot on Board		121÷139 lb	-	26,4 lb	
		139÷154 lb	-	min. 13,2 lb	
		≥154 lb	-	acceptable	
Crew – 2 People		121÷139 lb	<121 lb	26.4 lb	
		139÷154 lb	<121 lb	min. 13,2 lb	
		<154 lb	≥121 lb	conditionally	
		154÷209 lb	any	conditionally	
		≥209 lb	any	forbidden	
Maximum mass in baggage compartment				44 lb	
Solo flying on front seat only					
Maximum total load on both seats and in baggage compartment – see Individual Loading Plan for this sailplane!					

2

Location:

– LH cockpit board by front and rear seat

7.10.4. Table „Approved manoeuvres”

2

SZD-54-2 Perkoz ALLOWED AEROBATICS MANOEUVRES		
Acro		Utility
spin	inverted spin	spin
loop	inverted loop	loop
stall turn	inverted s.t.	stall turn
climbing turn	tail slide	climbing turn
steep turn	Immelman turn	steep turn
lazy eight	eight	lazy eight
Cuban eight	inverted C.e.	
half roll and half loop	controlled half roll and half loop	
flick roll	inverted f.r.	
flick roll downward	inverted f.r.d.	
flick roll in downward angle	inverted f.r.d.a.	
slow roll	barrel roll	

Location :

– RH cockpit board by front and rear seat.

7.10.5. Table „Pressure in tires”

17,4 psi	58,0 psi	36,3 psi
Front Wheel	Main Wheel	Tail Wheel

Location :

– painted near particular wheels on sailplane fuselage.

7.10.6. Limitation table „Allowed V_{NE} values for various flight altitudes”

	Flight altitude [1000 ft]	0 ÷ 9,8	13,1	16,4	19,7	23,0	26,2	29,5	32,8
U	V_{NE} **IAS** kn (mph)	**132 (152)**	**125 (144)**	**119 (137)**	**112 (129)**	**106 (122)**	**100 (115)**	**94 (109)**	**89 (102)**
A	V_{NE} **IAS** kn (mph)	**145 (167)**	**138 (158)**	**131 (150)**	**124 (142)**	**117 (135)**	**110 (127)**	**104 (120)**	**98 (113)**

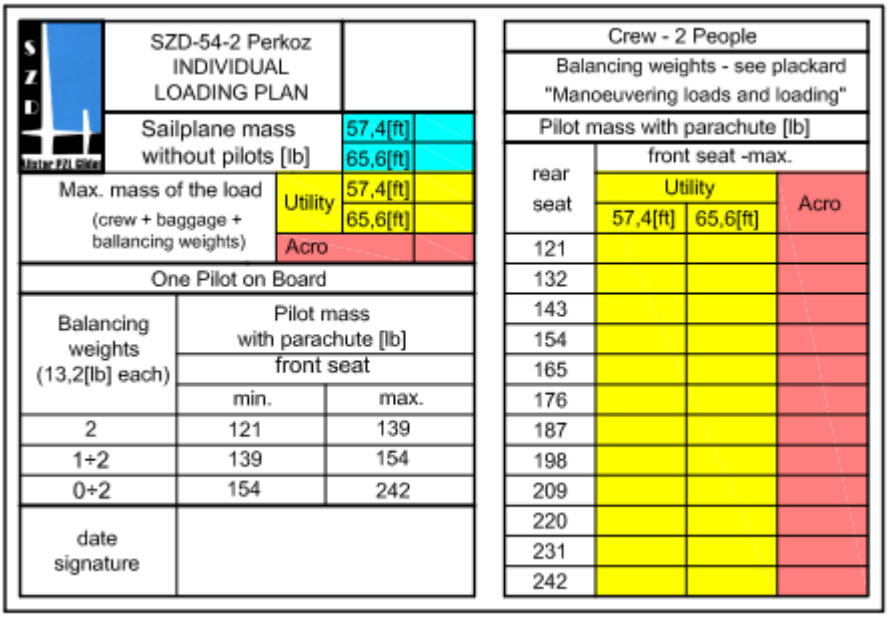
2

Location :

– Front instrument panel and LH cockpit board by rear seat

7.10.7. Table „Individual loading plan”

For every individual sailplane, after every change to the mass of sailplane without pilots (resulting of equipment modification or airframe repair) the new table must be prepared – using the sample showed below and method of filling given in the item 6.5. of the FM.



SZD-54-2 Perkoz INDIVIDUAL LOADING PLAN			
Sailplane mass without pilots [lb]		57,4[ft]	
		65,6[ft]	
Max. mass of the load (crew + baggage + ballancing weights)	Utility	57,4[ft]	
		65,6[ft]	
	Acro		

One Pilot on Board		
Balancing weights (13,2[lb] each)	Pilot mass with parachute [lb] front seat	
	min.	max.
2	121	139
1÷2	139	154
0÷2	154	242
date signature		

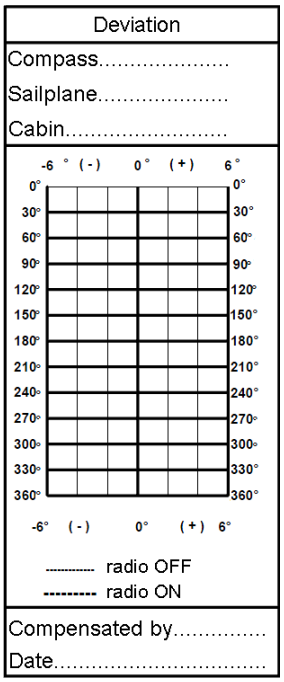
Crew - 2 People			
Balancing weights - see plackard "Manoeuvering loads and loading"			
Pilot mass with parachute [lb]			
rear seat	front seat -max.		
	Utility		Acro
	57,4[ft]	65,6[ft]	
121			
132			
143			
154			
165			
176			
187			
198			
209			
220			
231			
242			

2

Location :

– RH cockpit board by front and rear seat.

7.10.8. Compass deviation table



Location :

– Front and rear instrument panel, close to compass (if compass is installed).

7.10.9. Table „Pre-flight checklist”

PRE-FLIGHT CHECKLIST	
1. No loose items in a cockpit	CHECK
2. Parachutes	PUT-ON
3. Safety belts	FASTEN
4. Controls full deflection	CHECK
5. Airbrakes	CLOSE AND LOCK
6. Trimming device for take-off	SET
7. Accelerometer to „0”	SET
8. Altimeter set	CHECK
9. Canopy	CLOSE AND LOCK
10. Transceiver	CHECK
11. Stall warning device	ON
12. Towing cable connection	CHECK

Location :

– RH cockpit board by front and rear seat.

SECTION 8.
SAILPLANE HANDLING,
CARE AND MAINTENANCE

8.1. Introduction

Section 8. contains producer's recommended procedures for proper ground handling and maintaining of performance and dependability of the sailplane.

It is recommended to follow a planned schedule of lubrication and maintenance based on the specific climatic and operating conditions encountered.

8.2. Sailplane periodic inspections

Sailplane overhauls should be performed after first 50 flying hours and then every 12 months, or every 300 flying hours, whichever occurs first.

The scope and schedule of all inspections are listed in the Technical Service Manual of SZD-54-2 „Perkoz” sailplane, Section 16. „Periodic maintenance”.

8.3. Sailplane alterations or repairs

For the alterations or repairs rules refer to the Technical Service Manual of SZD-54-2 „Perkoz” sailplane.

It is essential that the responsible airworthiness Authority is notified prior to any alterations on the sailplane, to ensure that the airworthiness of the sailplane is not broken.

8.4. Ground handling / road transport

8.4.1. Ground handling

In reference to ground handling in the airfield: i.e. securing against wind, towing cable connection, anchoring, proceeding with a soaked sailplane, draining of the instrument pneumatic system - the generally accepted rules for composite sailplanes handling should be observed. Sailplane is to be anchored with front tow release and with wide strap at the fuselage-fin transition, as well as at the ends of main parts of both wings (anchoring holes are provided in wing supports). In case of anchoring, it is recommended to support wing ends in a place of anchoring.

NOTE:

Leaving the sailplane outside, without protection against environmental conditions and sunlight, harmfully affects durability of the lacquer coat.

Sailplane ground rolling in „tail forward” attitude is recommended. Avoid pulling at wing tips. When turning, press down the tail, or lift up fuselage nose.

For car towing „nose forward”, the front tow release is to be used and towing cable with connection link (4 meter length at minimum).

While towed, immobilize control stick with pilot safety belts.

If sailplane will be stored in a hangar in rigged completion, it is recommended to support wing at the ends.

Sailplane can be stored in a hangar through overhead trolley lift under ceiling according to the item 13.2.2. of the TSM.

NOTE:

Do not store in wet covers. The stored sailplane should not be exposed to environmental conditions, specially to moisture.

In case of prolonged pause in operation, de-rigging of sailplane is recommended. The metal fittings and elements should be greased. Put the individual covers on the sailplane main units.

Put the fuselage on supports, placed between front and rear cabin and under the fin. Set the wings chord vertical, and shore the wings with band supports at the leading edge, under end- and root ribs, or under spar root close to wing rib. Plane wingtips can be assembled on wings, wingtips with winglets should be stored separately in horizontal position. The tailplane can be stored chord vertical or horizontal, supported under tips and central portion. For carrying the de-rigged sailplane main units, these are to be supported at the a.m. place. Reduce pressure in tires.

8.4.2. Road transport

When transporting sailplane in a trailer, main units can be attached by external surfaces with wide brackets lined with soft fabric or with tape, and additionally:

- wings – by spar roots (close to rib),
- exchangeable wingtips – by spar roots and pegs,
- fuselage – by frame rear bolts, provided its front part is supported in bracket and tail boom is immobilized with bracket as well or with tape, and by its main landing and tail wheel elements.

For transport the following should be done:

- plane wingtips mounted on the wings,
- control stick immobilized by safety harness,
- airbrake handle in cockpit immobilized in „closed” position,
- aileron and airbrake control system torsional tube ends immobilized in openings in fuselage shell,

- fittings and bearings protected from dust and dirt,
- canopy covered with flannel cover.

When transporting sailplane in open trailer, main units external surfaces should be covered with individual covers and plastic foil (in case of rain).

When transporting sailplane by rail or road transport, than packing and fastening in container is to be completed in accordance with special documentation.

8.5. Cleaning and care

Sailplane storage in conditions of high moisture combined with high temperature should be avoided (e.g. poorly ventilated trailer, with accumulated moisture, exposed to sun radiation). If moisture has penetrated the hardly accessible structure areas, the sailplane should be de-rigged and its soaked components stored in a dry room - to let them dry.

In case of contamination to sailplane external surfaces (e.g. with insects) it is recommended to wash these with clean water, with additive of gentle detergent, without abrasive agent. Wipe the washed area with flannel rag (or shammy). Dry the sailplane wetted interior (airbrake boxes), make sure the drainage openings are clean.

The lifting surfaces are to be polished occasionally with a polishing paste, by chord-wise direction movement, mechanically or manually with a special slat.

NOTE:

For polishing of lifting surfaces only the non-siliceous agents are allowed.

Remains of adhesive tape are to be removed with extraction gasoline.

Canopy perspex should be cleaned with a special care agent or with a large amount of clean and warm water. For removal of dust and dirt do not use dry rag, which can scrap cleaned surface.

Protect the canopy glassing against dust or sun with a flannel cover.

The safety belts should be regularly inspected against evidence of tear, or wear, corroded fittings etc. Depending on belts model regularly check the correct functioning of belts fastener or lock.

SECTION 9.

SUPPLEMENTS

9.1. Introduction

Section 9. contains supplements necessary for the safe and effective use of the sailplane with mounted equipment and systems not supplied as standard.

9.2. List of inserted supplements

Date of issue	Supplement No.	Supplement title	Confirmation of the application on S/N

9.3. Supplements – List of actual pages

Supplement No.	Page	Date of issue

Supplement No.	Page	Date of issue

corrected

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