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FLIGHT MANUAL

for the

LAK-17B sailplane

Model: LAK-17B

Serial Number: _____

Registration: _____

Date of Issue: _____

It is a preliminary manual. The sailplane is not certified and has not shown compliance with airworthiness requirements.

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

This Manual should always be kept on board of the sailplane

0.1 Record of revisions

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

The new or amended text in the revised page will be indicated by a black vertical line in the left hand margin, and the revision number and date will be shown on the bottom left hand of the page.

Rev. No.	Affected Chapter	Affected Pages	Date of Issue	Approval	Date of approval	Date of Insertion	Signature

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Chapter 1
GENERAL

1.1 Introduction

The sailplane flight manual has been prepared to provide pilots and instructors with information for the safe and efficient operation of the LAK-17B sailplane.

This manual includes the material required to be furnished to the pilot by CS-22. It also contains supplemental data supplied by the sailplane manufacturer.

1.2 Certification basis

This type of sailplane has been designed in accordance with **CS-22 Certification Specifications for Sailplanes and Powered Sailplanes**, Amendment 2, 5 March 2009.

Category of Airworthiness: Utility.

1.3 Warnings, cautions and notes

The following definitions apply to warnings, cautions and notes used in the flight manual.

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 by which is important or unusual.*

1.4 Descriptive data

The LAK-17B is a modification of the single seat high performance sailplane of FAI 15m - 18m class LAK-17A designed according to JAR-22, category "U" specifications. It is a mid-wing glider with flaps, T-tail, retractable main landing gear, wings water ballast tanks of 188 ltr /49,6 US gal capacity (inner wings-158 ltr / 41,7 US gal, outer wings (18m)- 30 ltr / 7,9 US gal) and (optionally) fuselage water ballast tank of 55 ltr/ 14,5 US gal. The inner wing water ballast is filled through the holes at the top of the inner wings. The outer wing water ballast is filled in through the hole in the end rib and poured out through the hole at the bottom of the outer wing.

The sailplane is made of hybrid composite materials (Kevlar, carbon and fiberglass). The wing spar is made of modern carbon rods GRAPHLITE SM315 and has a double T section. The airbrakes are located on the upper wing surface only. The wing airfoils:

18m-

s (m)	c (m)	Profile
0.0	0.741	LAP7-150
1.2	0.711	LAP7-131/17
4.6	0.625	LAP7-131/17
6.5	0.5	LAP7-129/18
8.0	0.38	LAP7128/19
8.855	0.226	LAP93/148

15m-

s (m)	c (m)	Profile
0.0	0.741	LAP7-150
1.2	0.711	LAP7-131/17
4.6	0.625	LAP7-131/17
6.7	0.38	LAP7-128/19
7.355	0.226	LAP93/148

The cockpit is of monocoque construction. The manually controlled seat back and an adjustable head rest together with optimally arranged controls offer notable comfort for the long flights. The one piece Plexiglas canopy hinges forward. On the left side there is a sliding window for additional ventilation. The instrument panel folds up together with a canopy.

The retractable landing gear with shock absorbers has a 5.00-5 6PR ply tire. The mechanical main wheel brake is actuated via the handle on the stick or via the airbrake control handle/ with the BERINGER wheel and brake system. The rudder pedals are adjustable in flight. All controls, including the water ballast system, hook up automatically or semi-automatically. Towing hooks are mounted: near the main landing gear (C.G. / winch / auto-tow hook) and/or in front of the pilot cockpit at the bulkhead (aero tow hook). Both towing hooks are operated by the same handle. The wings incorporate fork-type spar tips, joined with two pins.

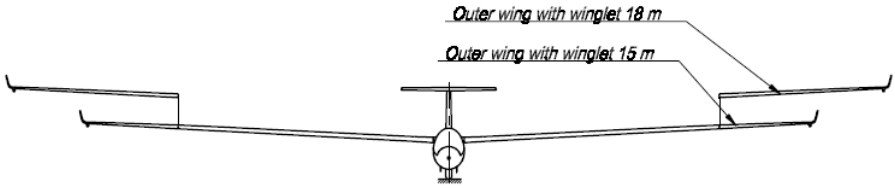
The T-tail (fixed stabilizer with elevator) of the LAK-17B provides stable and responsive pitch characteristics. The elevator hooks up automatically during assembly. The glider is fitted with a fin ballast tank of 8 ltr (2,11 US gal) capacity in order to adjust the optimum C.G. position.

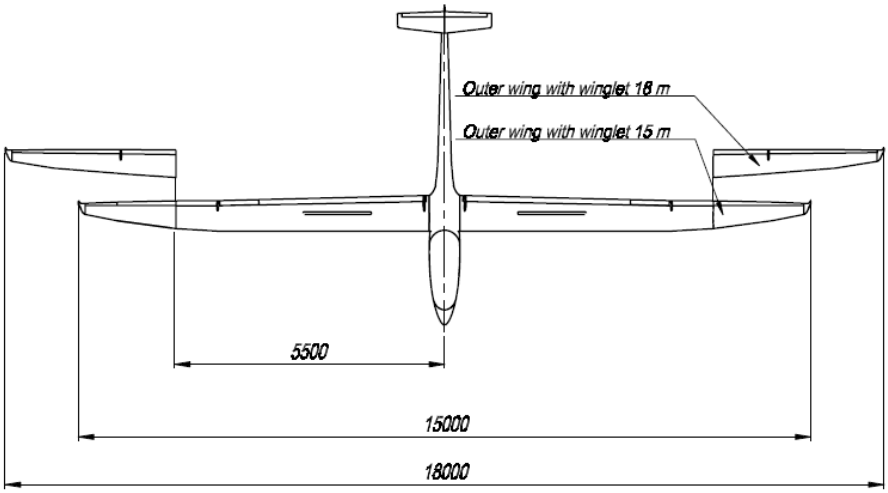
The antenna is mounted in the vertical fin.

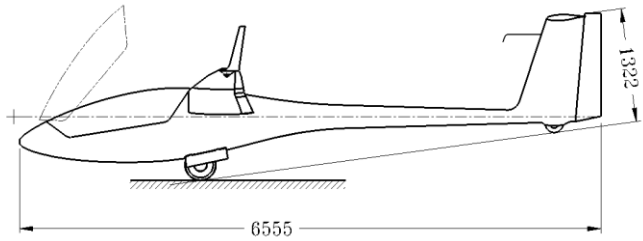
Technical data of the LAK-17B

Wing span	15 m (49,2 ft)	18 m (59,06 ft)
Fuselage length	6,555 m (21,51 ft)	
Height	1,29 m (4,23 ft)	
Max gross weight	550 kg (1212,5 lbs)	600 kg (1322,8 lbs)
Mean aerodynamic chord	0,6281 m (24,73 in)	0,6072 m (23,905 in)
Wing area	9,18 m^2 (98,81 ft^2)	10,32 m^2 (111,08 ft^2)
Wing loading:		
minimum	37,14 kg/m^2 (7,6 lbs/ft^2)	33,81 kg/m^2 (6,92 lbs/ft^2)
maximum	59,91 kg/m^2 (12.27 lbs/ft^2)	58.13 kg/m^2 (11,90 lbs/ft^2)

1.5 Three-view drawing







1.6 Abbreviations

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
C.G. - center of gravity
daN - decanewton
h - hour
IAS - indicated airspeed means the speed of a sailplane as shown on its pitot – static aircraft indicator and is uncorrected for the system error
m - meter
kg - kilogram
km - kilometer
s - second
ltr - liter

1.7 Unit conversions

1 bar = 14,5 pounds per square inch (psi);
1 decanewton (daN) = 2,25 pounds force;
1 kilogram (kg) = 2,2 pounds (lbs);
1 meter (m) = 39,4 inches (in.) = 3,28 feet (ft.);
1 millimeter (mm) = 0,0394 inches (in.);
1 liter = 0,2642 U.S. gal;
1 square meter (m^2) = 10,764 sq.ft;
1 kg/m^2 = 0,204 lbs/sq.ft;
1 m/s = 1,944 knots (kts);
1 km/h = 0,5396 kts;
1 kW = 1,34 HP.

Chapter 2
LIMITATIONS

2.1 Introduction

Chapter 2 includes operation limitations, instrument markings and placards necessary for safe operation of the LAK-17B sailplane, standard systems and standard equipment.

The limitations have been approved. Compliance with these limitations is mandatory.

2.2 Airspeed

Airspeed limitations and their operational significance are shown below:

Speed		IAS; km/h / (kts) 15 m & 18 m	Remarks
V_{NE}	Never exceed speed		Do not exceed this speed in any operation and do not use more than 1/3 of control deflection at:
		275 / (148)	0 - 4 000 m (0 - 13 100 ft)
		260 / (140)	up to 5 000 m (16 400 ft)
		245 / (132)	up to 6 000 m (19 680 ft)
		220 / (119)	up to 8 000 m (26 250 ft)
		195 / (105)	up to 10 000 m (32 800 ft.)
V_{RA}	Rough air speed	190 / (102)	Do not exceed this speed except in smooth air and then only with caution. Rough air is in lee wave rotor, thunderclouds, etc.

Speed		IAS; km/h / (kts) 15 m & 18 m	Remarks
V_A	Manoeuvring speed	190 / (102)	Do not make full or abrupt control movement above this speed, because under certain conditions the sailplane may be over stressed by full control movement
V_{FE}	Maximum flap extended speed. Flap setting: -1 up to 0 +1 up to L	 275 / (148) 190 / (102)	Do not exceed these speeds with the given flap setting
V_W	Maximum winch and auto tow launch speed	140 / (76)	Do not exceed this speed during winch or autotow-launching
V_T	Maximum aero towing speed	160 / (86)	Do not exceed this speed during aero towing
V_{LO}	Maximum landing gear operations speed	205 / (110)	Do not extend or retract the landing gear above this speed

Warning: *At higher altitudes the true airspeed is higher than the indicated airspeed , and V_{NE} is reduced with altitude.*

2.3 Airspeed indicator markings

Airspeed indicator markings and their color code significance are shown below:

Marking	IAS value or range km/h / (kts)	Significance
White Arc	99…190 / (53…102)	Positive Flaps Operating Range: Lower limit is 1,1 V_{SO} in landing configuration at maximum weight. Upper limit is maximum speed permissible with flaps extended positive
Green Arc	108…190 / (58…102)	Normal Operating Range: Lower limit is 1,1 V_{S1} at maximum weight and most forward C.G. with flaps neutral. Upper limit rough air speed
Yellow Arc	190…275 / (102…148)	Manoeuvres must be conducted with caution and only in smooth air
Red Line	275 / (148)	Maximum speed for all operations
Yellow Triangle	90 / (47)	Approach speed at maximum weight without water ballast

2.4 Mass (weight)

Maximum take-off mass of the LAK-17B is:

with water ballast-
for 15m…… 550 kg (1212,5 lbs);
for 18m……..… 600 kg (1322,8 lbs).

Maximum landing mass:

for 15m……..… 550 kg (1212,5 lbs);
for 18m……. 600 kg (1322,8 lbs).

Note: *When landing on a rough and hard surface always dump all water ballast before to land.*

Maximum mass of all non lifting parts 276.3 kg (609,14 lbs);
Maximum mass in baggage area 7 kg (15,4 lbs).

Caution: *Heavy pieces of baggage must be secured to the baggage compartment floor.*

2.5 Center of gravity

Position of C.G. in flight:

- front limit:	206 mm aft of wing root rib leading edge;
- rear limit:	328 mm aft of wing root rib leading edge.

Warning: *The sailplane may be safely operated only when loaded in the range defined in the Chapter 6 of this manual.*

2.6 Approved manoeuvres

This sailplane is certified for normal gliding in the "Utility" category according to CS-22. Aerobatic manoeuvres are not permitted.

2.7 Manoeuvring load factors

Limit load factors are:

- for V_A =190 km/h (102 kts) airspeed +5,3 / -2,65;
- for V_{NE}=275 km/h (148 kts) airspeed +4,0 / -1,5;
- for V_{NE}=275 km/h (148 kts), air brakes extended +3,5 / 0;
- for V_F =160 km/h (86 kts), flap +1, +2, L +4 / 0;

2.8 Flight crew

LAK-17B is a single seat glider. Load in a pilot seat must be as follows:

Max load in the seat 110 kg (242 lbs.);
Min load in the seat see placard in cockpit and weighing report.

With these loads, the C.G. range given in 2.7 will be in the limits if the empty glider weight and C.G. is in the limits (see empty center of gravity chart in Chapter 6).

Caution: *With low pilot weight lead ballast must be added to the nose of the cockpit.*

2.9 Kinds of operation

Flights must be conducted under Day / VFR conditions.

Where permitted by national regulations, cloud flying may be conducted but only with 15m wings (including 15m winglets) and without water ballast. Consider the different national legal requirements (for e.g. additional equipment) for cloud flying (see also point 2.11).

Aerobatic maneuvers are not permitted.

2.10 Minimum equipment

As minimum equipment only the instruments and equipment specified herein and in the equipment list (see Maintenance Manual Section 2) are admissible:
- airspeed indicator, scale 50…300 km/h (27…162 kts), with range markings (see Chapter 2.3);
- altimeter with altitude corrector and fine range pointer;
- magnetic direction indicator (compensated in an aircraft);
- four point symmetrical seat harness;
- power supply;
- outside air temperature (OAT) gauge (if water ballast is carried);
- emergency locator transmitter (ELT) (if required by national regulations);
- required placards, check lists and flight manual.

For cloud flying the following additional equipment is required:

- variometer;
- turn and bank indicator, non-icing.
- transceiver ready for operation;
- parachute, automatic or manual opening type;
- non-icing airspeed system.

The minimum equipment must correspond with national regulations.

2.11 Aero tow, winch and auto tow launching

The maximum launch speeds for both 15 m and 18 m wing are:

Aerotow……	160 km/h (86 kts);
Winch / auto-tow launch …….	140 km/h (76 kts).

For all of the above launching methods a weak link of 780 daN (1753 lbs) must be used in the launch cable or towrope.

For aerotow, the towrope must be at least 20m (66 ft.) long.

Warning: *For winch or auto-tow launch, only the C.G. hook can be used.*

Warning: *Aerotow launches are only allowed at the aerotow hook.*

2.12 Other limitations

Crosswinds

The maximum demonstrated crosswind component according to the airworthiness requirements for take-off and landing is 15 km/h (8 kts).

Water Ballast

Filling of the wing water ballast tanks must result in the symmetrical loading condition only. After filling, balance the wings by dumping enough water from the heavy wing to achieve lateral balance. Flight with leaking water ballast is not permitted as this may result in asymmetrical loading. For maximum permissible water ballast see paragraph 6.9.

Warning: *Flight with water ballast must be conducted at an OAT greater than +2°C (36 °F). Otherwise jettison both wing and fin water ballast in order to prevent structural damages due to freezing of water.*

Warning: *Maximum take-off weight must not be exceeded.*

2.13 Limitation placards

The following limitation placards are installed in a glider:

Air speed data and loading placard in a cockpit:

LAK-17B 15/18m - AIR SPEED DATA & LOADING PLACARD						
Speed IAS:		km/h	kts	**Masses and loads**	kg	lbs
Never exceed	V_{NE}	275	148	Max mass with water ballast	550/600	1212,5/1322,8
Rough air	V_{RA}	190	102	Maximum cockpit load	110	242
Manoeuvring	V_A	190	102	Minimum cockpit load		
Aerotow	V_T	160	86			
Winch-launch	V_W	140	76	Recommended weak link	780 daN	1753 lbs
Landing gear oper.	V_L	205	110	**Aerobatic manoeuvres are not permitted**		

m - **Altitude** - ft		km/h - **V_{NE}, IAS** - kts	
4000	13100	275	148
5000	16400	260	140
6000	19680	245	132
8000	26250	220	119
10000	32800	195	105

High altitude flights V_{NE} limitations - on a right-side canopy rail, for the pilot in flight visible place.

Nose ballast limitations placard - located at a bulkhead at the nose of the glider (optional).

Nose ballast Max permitted 6,0 kg (13,2 lbs.)	
Reduction of the min. cockpit load by:	**Lead weight required**
5 kg (11 lbs)	2,0 kg (4,4 lbs)
10 kg (22 lbs)	4,0 kg (8,8 lbs)
15 kg (33 lbs)	6,0 kg (13,2 lbs)

Max baggage weight 7 kg (15,4 lbs)

In a baggage area

Pressure in a main wheel tire from 2,3 to 2,5 bar

On a main gear door

Pressure in a tail wheel tire from 1,8 to 2,0 bar

Next to the tail wheel

Chapter 3
EMERGENCY PROCEDURES

3.1 Introduction

Chapter 3 provides a checklist and explanations for coping with emergencies that may occur. Emergency situations can be minimized by proper pre-flight inspections and maintenance.

3.2 Canopy jettison

The following steps accomplish canopy jettison:

1. Pull the red canopy jettison handle aft to the limit of its travel.
2. Release the handle.

The canopy jettison handle is located on the instrument panel and has an icon describing its function. A compression spring in the canopy hinge pushes the canopy upward and lets the airflow to lift the front of the canopy upward while the rear of the frame pivots about a small lip on the fuselage. This system is designed to lift the canopy up and away from the flying glider to allow the pilot a quick bailout from the cockpit.

If necessary, you have to push the canopy upwards with both hands on the Plexiglas.

Warning: *The red handle of the spring-type mechanism on the canopy hinge must be in the unlocked (working) position.*

3.3 Bailing out

First jettison the canopy then unlock the safety harness and bail out. The low walls of the cockpit allow for a quick push-out exit.

It is recommended that bail out procedures be practiced on the ground at the beginning of each flying season.

3.4 Stall recovery

Stall recovery is accomplished by easing the stick forward and if necessary picking up a dropping wing with sufficient opposite rudder.

3.5 Spin recovery

In every possible configuration when the sailplane enters a spin after one rotation it lifts its nose upwards or turns the nose down and goes to the second rotation. The second rotation is steep and the rotation speed is quite high.

Apply full opposite rudder against the direction of rotation, keep the control stick pulled backwards and ailerons in the neutral position until rotation stops. As the rotation stops centralize the controls and carefully pull out of the dive.

When recovering from stall, with the control stick pushed forwards, the recovery speed may reach the V_{NE} and the limiting positive maneuvering factor for the sailplane.

Recovery from unintentional spins should be done immediately.

Caution: *In all the possible configurations the recovery from the spin is not more than ¼ ÷ ½ additional turn independently of the flap position. The loss of altitude from the point at which recovery is initiated to the point at which horizontal flight is first regained in all cases is 90 ÷ 150 m. Maximum speed during recovery is 190 km/h (103 kts).*

3.6 Spiral dive recovery

To recover from a spiral dive, apply rudder and aileron in the direction opposite to the spiral dive rotation and carefully pull out of the dive

3.7 Recovery from unintentional cloud flying

At speeds below 190 km/h (102 kts), extend the dive brakes fully. At higher speeds, up to V_{NE}, pull out the dive brakes very carefully and expect high aerodynamic forces and g-loads. Enter the descent and fly normally until leaving the cloud. When clear of the cloud, retract the dive brakes and reduce speed. Spins are not to be used to lose altitude.

3.8 Flight with asymmetrical water ballast

If you suspect that the water ballast is not dumping symmetrically you should close the dump valves immediately to avoid greater asymmetry. Asymmetry can be verified by the necessary aileron deflection in straight flight at low airspeeds.

When flying with asymmetric water ballast you must increase your airspeed, especially in turns, so that you can avoid stall at all costs. Should the aircraft enter a spin under these conditions, aggressive stick forward spin recovery will be necessary. Fly the landing pattern and touch down with approximately 10 km/h (5,4 kts) faster than normal and after touch down attempt to control the bank angle to avoid the heavy wing from touching the ground too early.

3.9 Emergency wheel up landing

An emergency wheel up landing is not recommended since the absorption capability of the fuselage is much smaller than that of the landing gear. If the landing gear cannot be extended the landing touchdown should be at slow speed.

3.10 Ground loop

If there is a risk of overshooting the landing area after touchdown an intentional ground loop may be initiated by forcing a wing tip to the ground and at the same time you should PUSH the stick forward to lighten the load on the tail wheel and apply the opposite rudder.

3.11 Ditching landing on water

Our experience shows that in ditching the cockpit area likely will be forced downward under water. Therefore an emergency landing on water is recommended only with the landing gear extended and then only as a last resort.

Chapter 4
NORMAL PROCEDURES

4.1 Introduction

This chapter provides checklists and explanations of procedures for conducting normal operating procedures. Normal procedures associated with optional equipment can be found in Chapter 9.

4.2 Rigging and de-rigging, filling the water tanks

4.2.1 Rigging and de-rigging

The following procedures are recommended for rigging and de-rigging the LAK-17B sailplane:

1. Clean and lubricate all pins, bushings and control connections. Inspect the pins and bushings for burrs and gouges.

2. Support the fuselage and keep it upright, open the canopy and lower the landing gear. Place the control stick in the center of its travel. Position the dive brake handle near it most forward position, flaps handle in "-1" position. Put the water ballast control in the forward, closed position.

3. Be sure the dive brake system in the wings is not locked. Remove any supports or locks over the ailerons.

4. Insert the left wing spar fork into the fuselage. As the wing root approaches the fuselage look to be sure the automatic hook ups for the aileron, flaps and dive brake properly engage. Look to see if the water ballast control is engaging correctly. After the wing is pushed into position support the wing tip.

Note: *It's not allowed to rig or de-rig wings with 15m or 18m outer wings with or without winglets installed.*

5. Insert the right wing spar into the fuselage. As the wing root approaches the fuselage look to be sure the automatic hook ups for the aileron, flap and dive brake properly engage. Look to see if the water ballast control is engaging correctly. Line up the main pin bushings. Insert both spar pins fully. Lock the main wing pin handles.

Warning: *Lock the main wing pin handles with fixing studs.*

6. Install outer wing 15m or outer wing 18m, lock and secure. To connect left and right winglets: screw bolt M5 into the wingtip/winglet fixator and pull it out until it reaches the stop. While holding fixator in lifted position, push the winglet completely into the wing. Release fixator, push it down flush with the wing surface, remove the bolt. Pull on the winglet to make sure it is locked.

7. Install the batteries into the batteries box.

8. Slide the stabilizer onto the drive pins and look to make sure the automatic hook-ups for the elevator properly engage. Push the stabilizer all the way onto the drive pins. Screw the locking bolt in and make sure, that the bolt is fixed. After removing the assembly tool, place a piece of glider tape over the locking bolt.

Warning: *for de-rigging, before unscrew mounting bolt, unfix it by pulling out locking pin.*

9. Apply sealing tape to the wing/fuselage gaps.

10. Perform a positive control check for all controls**.**

11. Install total energy tube and temporary equipment (barographs etc.)

12. Perform Daily Inspection.

13. De-rigging follows the reverse order of rigging. Confirm that water ballast has been dumped before de-rigging. Also see Maintenance Manual Section 3.

Note: *Remove the stabilizer before removing the wings.*

4.2.2 Filling the water tanks

If water ballast is necessary, fill each wing tank according to the loading chart (see Chapter 6) and confirm symmetrical loading by balancing at the wing tip. The inner wing ballast is filled through the hole at the top of the wing using special filling equipment. A light coating of waterproof grease applied to the dump valve seat will help insure the valve is leak free. The outer wing ballast is filled through the filling opening at the end wing rib.

Fin water ballast is filled through the filling opening at the top of the fin. This can be done with or without stabilizer installed. Fill fin tank according to the loading chart (see Chapter 6).

Fuselage water ballast is filled through the filling opening on the fuselage skin.

Warning: *allow tanks to vent while filling. Do not fill with pressure exceeding 1 psi / 0,06 bar as the structure could be damaged. Check for proper*

dump valves operation prior to flight. Do not exceed the maximum gross weights.

4.3 Daily Inspections

Please keep in mind the importance of the inspection after rigging the glider and respectively each day prior to the first take off. As a minimum check the following items. If any problems are found they must be corrected before flying.

1. Airworthiness documents, placards and markings.
2. Check fore part of fuselage.
3. Check a pilot cockpit:
   - cockpit area for lose objects or damaged components;
   - the pilot cockpit canopy glass;
   - operation of pilot cockpit canopy lock, canopy jettison system;
   - unlock canopy jettison system if locked;
   - wings connection pins locked;
   - operation of towing hook(s);
   - operation of water ballast system;
   - operation of control systems: ailerons, flaps, elevator, rudder and airbrakes (confirm that air brakes lock when closed);
   - operation of pilot cockpit ventilation, seat back adjustment;
   - operation of a trimmer;
   - batteries and oxygen bottle for condition, properly secured;
   - operation of flight instruments (especially pneumatic);
   - radio communication;
   - safety belts.

4. Check main and tail wheel tires pressure and operation of the main wheel brake.
5. Check the left wing:
   - upper and lower wing surfaces;
   - leading edge;
   - upper and lower surfaces of ailerons and flaps;
   - deflections of ailerons and flaps and their clearances;
   - airbrakes for proper function and locking;
   - ailerons and flaps attachment to the wing;
   - clearance between the wing and the fuselage;
   - winglets installed, locked and secured.
6. Check function of control systems (of an ailerons, flaps, airbrakes), their connections to corresponding control systems in the fuselage.
7. Check the fuselage exterior surface.
8. Check a stabilizer, an elevator and a rudder:
   - surfaces;
   - deflections and clearances of controls;

- fixing of joint of the stabilizer attachment to the fin;
- clearance of the stabilizer with respect to the fin.

9. Check the right wing (same as for the left wing according to point 5).

Caution: *After a hard landing or if high loads have been experienced, a complete inspection according to the Maintenance Manual Section 5.5 must be performed. Contact the manufacture for assistance if required.*

4.4 Pre-flight inspection

1. Main spar pins installed and locked.
2. Controls checked for operation and freedom of movement.
3. Lead or water ballast for underweight pilot installed or filled.
4. Tail dolly removed.
5. Unlock canopy jettison system if locked.
6. Batteries and oxygen bottle installed, properly secured.
7. Pilot safety harness connected and properly adjusted / tightened.
8. Seat back and rudder pedals adjusted.
9. All control knobs within reach.
10. Water ballast checked, dump valve closed and vents open.
11. Airbrakes closed and locked.
12. Trim set to take-off position.
13. Flaps set to take-off position.
14. Check wheel brake.
15. Altimeter set correctly
16. Check direction of wind component.
17. Close and lock canopy.
18. Max mass not exceeded.

4.5 Normal procedures and recommended speeds

Normal flight operation procedures and the corresponding recommended air speeds are as follows.

4.5.1 Aero tow launch

Before taking off adjust the flaps to the "0" position. When the speed V=50km/h is reached or when it is felt that the ailerons have sufficient effective, adjust the flaps to the "+2" position without water ballast, and position "+3" with water ballast, simultaneously gently push the stick forward.

When aerotowing in higher turbulence, sailplane must be in the axis of the or higher than the towing plane, to facilitate the control of the flight. When aerotowing in smooth air: being on the right, left, higher or lower sides of the towing plane, does not impede the control of the sailplane.

When aerotowing in a crosswind it is recommended to park the sailplane approximately two meters on the left or right side from sailplanes axis to the side of the wind.

Warning: *aerotow launches are only allowed at the aerotow hook.*

Warning: *when water tanks are partially filled, keep wings horizontal before take off to avoid uneven water distribution.*

Weak link in tow cable max 780 daN (1753 lbs). Use wheel brake during tightening of tow cable to avoid rolling over tow cable.

Minimum aero tow speed:

without water ballast……120 km/h (54 kts).
with water ballast…….125 km/h (65 kts).

4.5.2 Winch- launch or auto tow

Adjust trimmer to neutral. Flaps in the "0" position, when in air (V=75÷80 km/h) adjust the flaps to the "+1" position without water ballast. With water ballast, initially, flaps should be set to "+1", and when in air the flaps should be set to "+2" position.

When V=90km/h is reached slowly increase the angle and gain altitude at speed V= 100÷115km/h.

Caution: *Do not decrease the speed up to V=100km/h because the auto-release mechanism on the hook will function.*

When there is no thrust of the winch, push the stick forward and release the cable.

Warning: *for winch or auto-tow launch, only the C.G. hook can be used.*

Warning: *it is prohibited to use the aerotow hook for winch or auto-tow launches.*

Warning: *when water tanks are partially filled, keep wings horizontal before take off to avoid uneven water distribution.*

Weak link in tow cable max 780 daN (1753 lbs). Use wheel brake during tightening of tow cable to avoid rolling over tow cable. Pronounced forward stick pressure is required during transition arc.

Minimum winch launch / auto tow speed:

without water ballast……100 km/h (54 kts).

with water ballast…….120 km/h (65 kts).

4.5.3 Free flight

Circling flight (thermalling) with flaps position "+2", stick forces to zero. Best gliding ratio is between 95 and 105 km/h (51 and 57 kts.).

For high speed flight up to 275 km/h (148 kts.) position flaps between "0" and "-1" according to speed.

Due to flap control forces, flaps position "+2" may not be set above 160 km/h (86 kts.).

Recommended flaps positions:

Flap position	Speed, km/h / (kts.)	
	without water ballast	with maximum take off weight
L	landing	landing
+3	≤90 / (49)	≤110 / (60)
+2	90…120 / (49…65)	110…150 / (60…81)
+1	100…150 / (54…81)	130…190 / (70…102)
0	130…180 / (70…97)	170…230 / (92…124)
-1	≤275 / (148)	≤275 / (148)

4.5.4 Low speed flight and stalling behavior

The LAK-17B behaves normally in slow and stalled flight.
With a forward C.G. position is a clear and distinct stall warning. The stall characteristics are very gentle and large aileron deflections can be applied without dropping the wing.

At rearward C.G. positions airflow separation over the fuselage results in buffeting and gives warning to an impending stall.

Full and sudden aileron or rudder deflections will result in a spiral dive, spin entry or slide slip depending on the C.G. position.

Caution: *Altitude loss due to an incipient spin from straight flight with prompt recovery is approximately 30 m (100 ft.), increasing for circling flight.*

4.5.5 Approach and landing

Recommended flaps position is "L" (landing).

In light winds and without water ballast the approach to landing should be flown at about 90 km/h (47 kts.). Stronger winds require increased airspeeds. The very effective dive brakes make a short landing possible; however, do not approach too slowly with fully extended dive brakes as the aircraft may drop during the flare out. The glider should touch down on the main and tail wheel. The main wheel brake can then be applied for a shortened ground roll. When flying with inside - slip with airbrakes extended vibrations of the sailplane occurs. The control stick should be in aft position. Due to side - slip control force decrease or reversal is possible.

4.5.6 Flight with water ballast

Flight in excess of the maximum gross weight 550 kg (1212,5 lbs) for 15m wing and 600 kg (1322,8 lbs) for 18m wing is prohibited. The maximum amount of water allowed depends on the empty weight of the sailplane combined with the total cockpit load (see Chapter 6.9).

Warning: *Flight with water ballast must be conducted at an OAT greater than +2℃ (36℉). If there is a risk of freezing temperatures, all water ballast, including fin water ballast must be dumped before freezing temperatures are reached. The flight conditions must comply with the following table:*

Ground Temperature	C°	10	15	20	30	40
	F°	50	59	68	86	104
Max. flight altitude	m	1200	2000	2700	4300	5800
	ft.	4000	6500	9000	14000	19000

Filling and dumping the water ballast:

After filling the ballast tanks either full or with partial loads the wings should be leveled and checked for symmetrical loading. Flight with leaking ballast valves is prohibited. Open ballast valves fully to dump water ballast.

A time to drain water ballast tanks:
- wing tanks ~ 4 min 30 sec;
- tail tank ~ 1 min 30 sec;
- fuselage tank ~ 4 min.

Warning: *A filling ballast tank with pressurized water is prohibited. Always allow space for the displaced air to escape.*

4.5.7 High altitude flights

Indicated airspeed readings are progressively under-stated of true airspeed with higher altitudes. The limitations apply to high altitude flights as indicated at the placard given in a Chapter 2.14 of this manual.

Special care should be taken to ensure that there is no moisture on any section of the control junctions that could lead to freezing at high altitudes.

4.5.8 Flight in Rain

With light rain the stall speed and sink rate increase slightly, therefore landing approach speeds in rain must be increased. Rainwater on wings should be removed before take-off. Do not fly into icing conditions with a wet sailplane.

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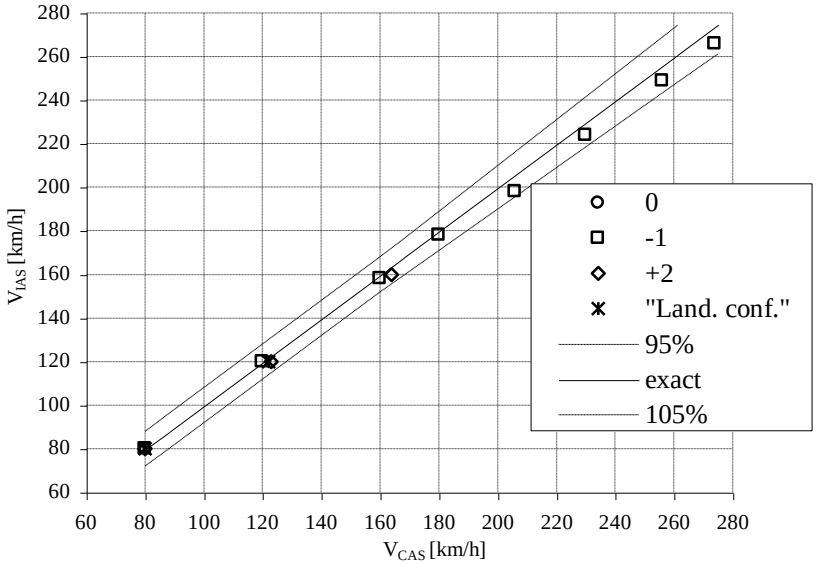
Chapter 5
PERFORMANCE

5.1 Introduction

This Chapter provides EASA approved data for airspeed calibration, stall speeds and take-off performance and non-approved further information. The data in the charts have been computed from actual flight tests with the sailplane in good condition and using average piloting techniques.

5.2 Data approved by EASA

5.2.1 Airspeed indicator system calibration



Caution: *The airspeed indicator is to be connected to the pitot source from the fuselage nose and static source from the aft fuselage part.*

Color coding of the plastic tubing is as follows:

- red - pitot;
- yellow - tail static;
- TE tube-green.

5.2.2 Stall speeds

Flap position	Stall speed in level flight, km/h (kts)	
	without water ballast	with maximum take off weight
L	80 (43.2)	83 (44.8)
+2	82 (44.2)	85 (45.9)
+1	83 (44.8)	87 (47)
0	84 (45.3)	90 (48.6)
-1	85 (45.9)	95 (51.3)

The loss of height for wings level stall recovery is approximately 30 m (100 ft) if recovery is immediate.

The loss of height for turning flights stall recovery is up to 50 m (164 ft) if recovery is immediate.

5.3 Additional information

5.3.1 Demonstrated crosswind components

The demonstrated crosswind velocity is 4,16 m/s (15 km/h) (8 kts) according to the airworthiness requirements.

5.3.2 Glide performance

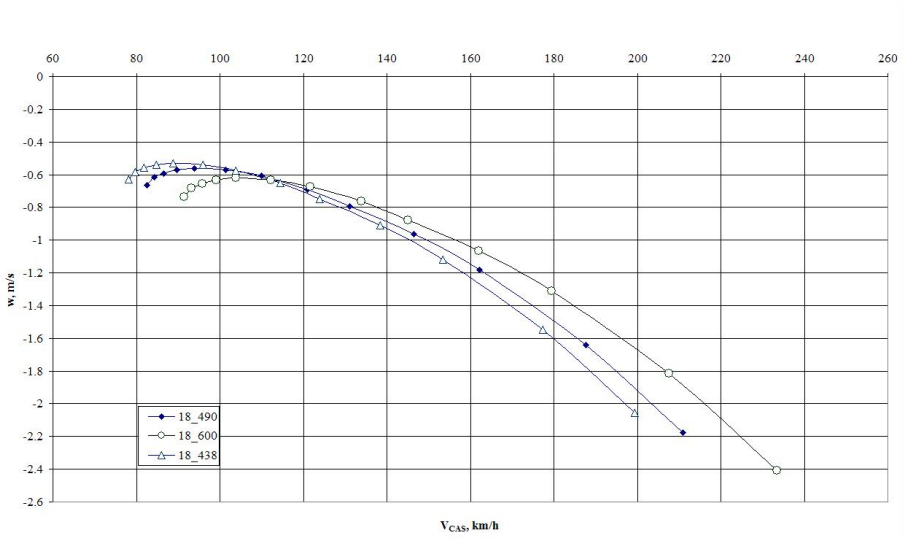
Data evaluated by comparison flights.

For optimum performance the aircraft should be flown with a C.G. position between medium and the rear of the allowable range. However, the aircraft will be more pitch sensitive at aft C.G. positions.

The wing fuselage joint and the tailplane locking ***pin*** should be taped ***over*** and the aircraft thoroughly cleaned to obtain maximum performance.

The polar apply to a clean aircraft. With dirty wings or flight in rain the performance drops accordingly.

5.3.3 Flight polar



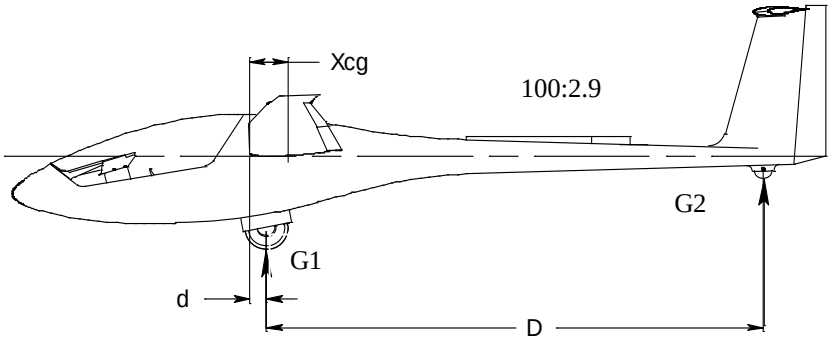
Chapter 6
WEIGHT AND BALANCE / EQUIPMENT LIST
1

6.1 Introduction

This Chapter contains the payload range within which the sailplane can be safely operated. Procedures for weighing the sailplane and the calculation method for establishing the permitted payload range are also provided. A comprehensive list of all equipment available for this sailplane is contained in the Maintenance Manual.

6.2 Weighing procedures

The Weight and Balance Report for the LAK-17B must be calculated in accordance with the currently valid weighing data. The weighing must be established according following picture:



6.3 Weighing record

The result of each C.G. weighing is to be entered in the Weight and Balance Report in Chapter 6.4. The current minimum cockpit load must also be entered on the cockpit placard. When adding or changing instruments or equipment the new weighing report may be produced by a C.G. calculation using the following formula:

$$\text{Xcg} = \frac{G2 * D}{G1 + G2} + d, \text{ mm}$$

6.4 Empty weight and C.G.

Approved in flight C.G. positions are:

No.	Parameter	Approved limit, mm
In flight:		
1	Foremost position of C.G.	206
2	Rearmost position of C.G.	328

Weight and balance record

Date	Empty weight of the sailplane [kg]	C.G. location [mm]	Approved	
			Date	Signature

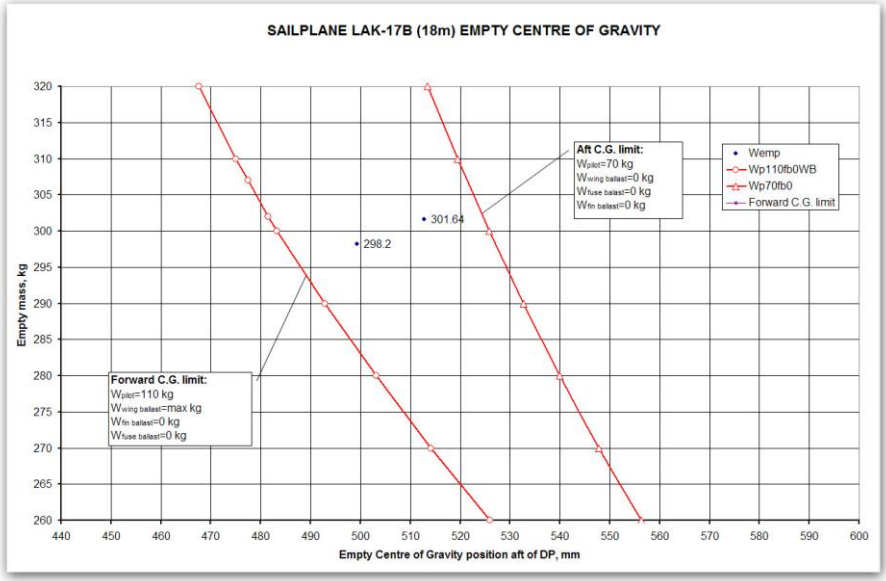
Date	Empty sailplane weight [kg]	C.G. location [mm]	Approved	
			Date	Signature

Empty weight center of gravity of the LAK-17B is defined for the 15m/18m wing configuration, water ballast tanks empty, glider ready to fly, excluding weight of pilot and parachute.

Warning: *due to flatter reasons it is not allowed to add additional masses to the fin battery or the fin battery compartment.*

Removable ballast used to supplement the weight of an occupant and parachute (when lower as minimum cockpit load) in order to keep C.G. position within limits is fastened in fuselage nose. The 2.0 kg (4.4 lbs) of removable ballast equals a pilot weight of 5 kg (11 lbs).

The permissible range of empty glider center of gravity is given below:



6.5 Calculation of C.G. position

Center of gravity position after loading glider (additional instruments, equipment, water ballast, pilot) is defined as:

$$X_{CG} = \frac{\sum_{n} G_n * X_n}{\sum_{n} G_n}, \text{ mm}$$

Where: G_n = the glider component mass, kg;

X_n = distance between glider component mass C.G. and wing root leading edge, mm;
distance "-", if mass C.G. is ahead of the wing root leading edge;
distance "+" if mass C.G. is behind of the wing root leading edge;
n = number of glider components;
ΣG_n = sum of all glider components masses;
$\Sigma G_n * X_n$ = sum of moments of all glider components masses;

The C.G. calculation table

No	Component	Weight G_n kg	Distance X_n mm	Moment $G_{n*} X_n$ kg * mm
1.	Empty glider*			
2.	Pilot			
3.	Battery in fin	3,5	4192	
4.	Battery in baggage compartment	2,6	157	
5.	Water ballast in wings		168	
6.	Water ballast in fin		4003	
7.	Water ballast in fuselage		776	
8.	Instrument N1 in instrument panel		-1010	
-	Instrument N2 in instrument panel			
n-1	Removable ballast in fuselage nose		-1785	
n	Baggage weight		150	
	ΣG_n=		**$\Sigma G_n * X_n$=**	

***** - *these data for columns Weight G_n and Distance X_n should be taken from current "Weight and balance record" table (paragraph 6.4) as G_n ="Empty weight of the sailplane" and X_n = "C.G. location".*

Note: *The glider empty weight and empty weight center of gravity are defined by weighting data.*

- Pilot: actual pilot weight with parachute:
  - distance X = -520 mm, when pilot seat is in the rearmost position;
  - distance X = -670 mm, when pilot seat is in the foremost position.
- Water ballast in a wings: actually filled water ballast weight.
- Water ballast in a fin: weight of actually filled water ballast in to the fin tank.
- Baggage weight: weight of baggage in a baggage compartment weight.

6.6 Weight of all non-lifting parts

Weight of non-lifting parts of the sailplane includes weight of pilot, fuselage, stabilizer with elevator, rudder, instruments and equipment.

Maximum weight of non-lifting parts of the LAK-17B is 276,3 kg (609,14 lbs).

6.7 Maximum weight

The maximum approved take-off and landing weight is 550 kg (1212,5 lbs) for 15m wing and 600 kg (1322,8 lbs) for 18m wing.

6.8 Useful loads

The maximum useful load of the LAK-17B is equal to the maximum approved take-off and landing weight minus the empty weight of the aircraft plus the weight of any added water ballast.

6.9 Water ballast loading table

The max permissible water ballast weight (kg) is given in the following table.

Wing span: 18 m Saiplane maximum take-off mass- 600 kg

Mass of pilot with parachute, kg	Sailplane empty weight, kg +fin ballast weight, kg + fuselage water ballast weight, kg							
	300	**305**	**310**	**315**	**320**	**325**	**330**	**335**
70	230	225	220	215	210	205	200	195
75	225	220	215	210	205	200	195	190
80	220	215	210	205	200	195	190	185
85	215	210	205	200	195	190	185	180
90	210	205	200	195	190	185	180	175
95	205	200	195	190	185	180	175	170
100	200	195	190	185	180	175	170	165
105	195	190	185	180	175	170	165	160
110	190	185	180	175	170	165	160	155

Wing span: 15 m Saiplane maximum take-off mass- 550 kg

Mass of pilot with parachute, kg	Sailplane empty weight, kg +fin ballast weight, kg + fuselage water ballast weight, kg							
	290	**295**	**300**	**305**	**310**	**315**	**320**	**325**
70	190	185	180	175	170	165	160	155
75	185	180	175	170	165	160	155	150
80	180	175	170	165	160	155	150	145
85	175	170	165	160	155	150	145	140
90	170	165	160	155	150	145	140	135
95	165	160	155	150	145	140	135	130
100	160	155	150	145	140	135	130	125
105	155	150	145	140	135	130	125	120
110	150	145	140	135	130	125	120	115

Maximum capacity of inner wing tanks…..158 liter (41,7 US gal).
Maximum capacity of outer wing tanks……30 liter (7,9 US gal).
Maximum capacity of fuselage tank……..…55 liter (14,5 US gal).
Maximum capacity of fin tank…….……...8 liter (2,11 US gal).

6.10 Determining possible loading of the glider

The allowed fin water ballast depending on a pilot weight must be calculated (LAK-17B_CG_calculator.xls).

Fin water ballast is only usable to compensate the pilots moment.

Warning: *It is not allowed to use the fin water ballast to bring back a heavy pilot into the allowed C.G. range. In that case jettisoning the fin water ballast will cause a C.G. position out of the allowed range.*

The example how to determine possible loading of the glider:

Sailplane empty weight……..……..	293 kg;
Empty weight center of gravity ……..	490.83 mm;
Pilot with parachute weight…….…	80 kg;
Wing span……..……..	18 m.

According to the graph "Sailplane LAK-17B empty center of gravity" - the empty weight C.G. is in permissible range.

According to the "Water ballast loading table" – the max permissible wing water ballast weight is ≈ 225 kg.

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Chapter 7
SAILPLANE AND SYSTEMS DESCRIPTION

7.1 Introduction

This Chapter provides a description of the sailplane, its systems and provided standard equipment with instructions for use.

7.2 Airframe construction

The LAK-17B is a single seat high performance sailplane designed to meet FAI 15m and 18m Class requirements. The wings are constructed with glass and carbon fiber reinforced plastic over a plastic foam core with carbon rod spar caps. The ailerons are from carbon fiber reinforced plastic. The fuselage is made using glass fiber reinforced plastic with Kevlar and carbon for local stiffness. The stabilizer, elevator and rudder are glass fiber reinforced plastic over plastic foam core.

Cockpit layout description is given below and at the pictures page 7-3:

1. Seat back adjustment handle.
2. Trim control knob.
3. Flaps control handle.
4. Airbrakes control handle.
5. Tow release knob.
6. Canopy latching handle.
8. Cockpit ventilation knob.
9. Canopy jettison handle.
10. Instrument panel.
11. Rudder pedals.
12. Landing gear control handle.
13. Water ballast control handle.
14. Rudder pedals control handle.
17. Tail water ballast control handle (optional).
18. Side pocket.
20. Wheel brake control lever.
21. Control stick.
22. Safety harness.


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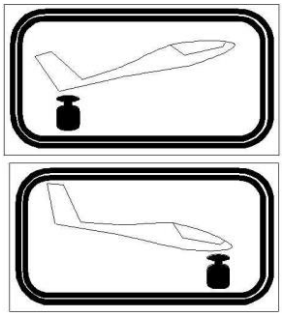
7.3 Flight controls and trim

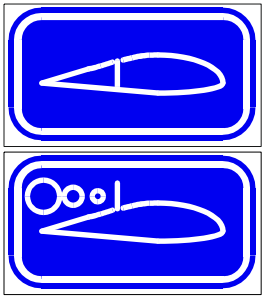
The ailerons and elevator are operated from the central control column (control stick).



The trim adjustment control knob is located ***in the left armrest*** and controls the elevator trim select position. See Maintenance Manual Section 2. To set the trim, simply move the adjustment knob to the desired trim position.

The rudder pedals control the rudder by a cable system and are adjusted using the gray knob located in the right armrest. Pull the knob to loosen the rudder pedal lock, make the adjustment, and release the knob to lock the rudder pedals in the desired position.

7.4 Airbrakes and wheel brake

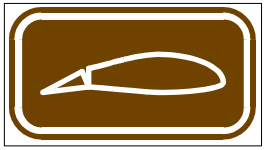


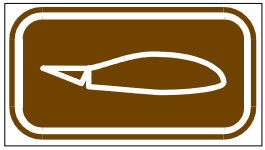
The airbrakes are operated by the blue control handle located on the left cockpit wall. Pull the handle back to extend the airbrakes and push forward to retract and lock.

The wheel brake is actuated via the handle on the control stick. See Maintenance Manual Section 2.

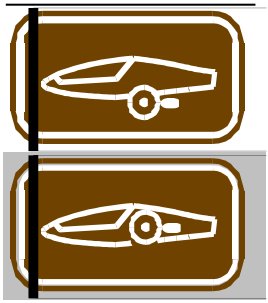
7.5 Flaps

The flaps are operated by the gray control handle located on the left cockpit wall. For more information see Maintenance Manual Section 2.





7.6 Landing gear



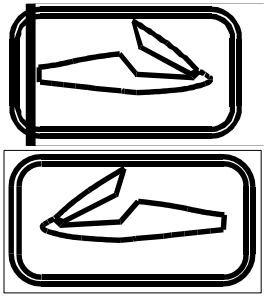
The landing gear is extended and retracted with the gray control handle located in the right hand armrest. Landing gear locked positions are located at either end of the control handle travel. Forward to extend, back to retract. The system is assisted by a nitrogen gas strut. See Maintenance Manual Section 2.

7.7 Tow release

The tow release is the yellow control knob located at the left side wall of the cockpit. Pull this control knob to open the tow release and release the knob to allow the tow coupling to snap closed and lock.

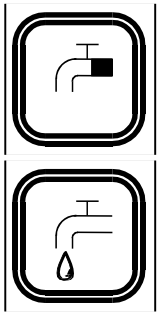
7.8 Canopy operation

To jettison the canopy pull the red canopy release handle firmly back and release it. A spring will push the front of the canopy up. This allows the airflow to lift it up and carry it away.

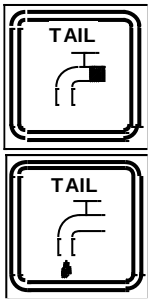


The canopy latching handles are black and are located on either side of the canopy frame. Pull the handles back to lock and push forward to un-lock.
Never use the window opening to lift or lower the canopy. Cracks in the canopy will result.
When sitting in the cockpit use the small tabs on the frame to raise and lower the canopy.

7.9 Water ballast system



In a standard configuration the tank valves for the wing and tail open simultaneously with one knob.
The water ballast valves control knob is located on the right side of the cockpit wall. To open the dump valves move the knob to the back and to close the dump valves move the knob forward.



(If the sailplane has an independent (optional) control system for the fin tank valve - the water ballast valve control knob of the fin tank is located on the right side of the cockpit wall. To open the dump valve move the knob to the back and to close the dump valve move the knob forward).

See Maintenance Manual Section 2.

7.10 Cockpit ventilation

The canopy de-mist vent control is located on the instrument panel. Pull to open, push to close.

7.11 Seat back adjustment

Seat back adjustment is accomplished by using the squeeze ring located on the left cockpit side.

7.12 Baggage compartment

Hard objects cannot be carried in the baggage compartment without a suitably designed lashing or anchorage. The baggage compartment load must not exceed 7 kg (15,4 lbs).

7.13 Safety harness

A safety harness with four fixed attachment points is provided.

7.14 Pitot and static pressure system

The fuselage-mounted tubes provide the pitot and static pressure.

Warning: *An air leak will adversely affect airspeed indication and other instruments. Make sure the probe is fully seated in the receptacle for proper operation.*

See Maintenance Manual Section 2.

7.15 Miscellaneous equipment

7.15.1 Oxygen system

The oxygen system (Aerox Oxygen, type C, D or M) must be operated in accordance with the instructions provided by the manufacturer (Aerox Oxygen, type C, D or M) of the system.

Caution: *Installation of the oxygen system (Aerox Oxygen, type C, D or M) must be accomplished by the aircraft manufacturer or by a certified aircraft mechanic, according to national rules and regulations. An authority aircraft inspector must approve the installation.*

7.15.2 Emergency locator transmitter

The system must be operated in accordance with the instructions provided by the manufacturer of the Emergency Locator Transmitter system. See the Maintenance Manual, Section 2, for recommended installation places.

Caution: *Installation of the Emergency Locator Transmitter must be accomplished by the aircraft manufacturer or by a certified aircraft mechanic, according to National rules and regulations. An authority aircraft inspector must approve the installation.*

7.16 Radio transceiver

Any of approved radio station types should be used (Becker, Filser or similar).

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Chapter 8
SAILPLANE HANDLING, CARE AND MAINTENANCE

8.1 Introduction

This chapter contains the manufacturer's recommended procedures for proper handling and servicing of the sailplane. It also identifies certain inspection and maintenance activities, which are needed to retain performance and dependability.

8.2 Inspection periods and maintenance

The Instructions for Continued Airworthiness as provided in the LAK-17B Maintenance Manual must be followed. Before each rigging, all connecting pins and bushings should be cleaned and greased. Also, at least once a year the control surface displacements and adjustments must be inspected to insure conformity with factory data. See the LAK-17B Maintenance Manual for additional information.

8.3 Alterations and repairs

It is essential that the responsible airworthiness authority be contacted prior to any major alterations on this sailplane to ensure that the airworthiness is not impaired. Major alterations without approval from the manufacturer are prohibited. Furthermore, the manufacturer will not be held liable for unapproved alterations or for damages resulting from changes in the characteristics of the aircraft due to these alterations. External loads from camera installations are to be regarded as major alterations. Repair instructions are located in the Maintenance Manual Section 8. No repair should be performed to this aircraft without referring to Maintenance Manual. When in doubt as to the suitability of a repair contact the manufacture.

Caution: *No additional color marking on the white upper surface is allowed.*

8.4 Tie down

The recommended tie down points are the tow release, wing tips and fuselage tail just ahead of the vertical fin. The cockpit always must be closed and covered when tied down.

Note: The external surfaces of the LAK-17B are finished in a durable epoxy paint **,** however long exposure to sun and humidity will lead to premature aging of any surface finish.

8.5 Sailplane trailer

A sailplane of this quality and value should be transported and stored in a high quality enclosed trailer constructed of metal or fiber glass reinforced plastics. Proper ventilation and UV blocking characteristics should be provided. The wings should be supported as close as possible to the inner most root rib and again at a point one third from the wing tip. The horizontal stabilizer may be stored vertically or horizontally. The fuselage should be supported in a fuselage dolly positioned just forward of the main landing wheel opening. Due to the angle of the fuselage in the trailer a forward stop must be provided for the fuselage dolly. Otherwise it will roll forward and leave the fuselage with no support. Forward and aft motion of the fuselage should be restricted with a felt lined nose cone support and a tail wheel well with a fuselage strap located just forward of the vertical fin.

8.6 Ground handling

Ground towing should be accomplished using the tow release and standard double aero tow ring. Ground towing should also be accomplished with a tail dolly tow bar and wing tip wheel.

8.7 Cleaning

The exterior painted surfaces should be cleaned with clear water using a sponge or soft cotton towel and chamois. These surfaces should also be protected with a silicone free hard wax reapplied at least once a year by hand or with a rotating cloth disc. Tape adhesives are best removed using pure petroleum spirits or wax containing a light polishing agent. Do not clean the exterior surfaces with alcohol, acetone or lacquer thinner.

Clean the Plexiglas canopy only as necessary using a soft cotton towel and clear water mixed with a small amount of mild detergent. Protect the canopy with anti-static cleaning agents which are made specifically for Plexiglas.

All non-painted metal surfaces must be regularly wiped clean and protected with a light coating of grease.

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Chapter 9

SUPPLEMENTS

There are no supplements