



Callsign: OK-RUL 91

## AEROPILOT Ltd.

Jeníkovská 1815  
28601 Čáslav  
Phone +420 605 296 563  
Fax +420 327 371 352  
[www.aeropilotcz.com](http://www.aeropilotcz.com)  
CIN: 27108431 TIN: CZ27108431

# LEGEND 540

## Flight and Operating Manual



## TABLE OF CONTENTS

1	Introduction.....	4
1.1	Ten Rules of Safe Flying .....	4
1.2	Instructions for use .....	5
1.3	Important information .....	5
1.4	Location of decals .....	5
2	Flight manual data .....	8
2.1	Data on commissioning .....	8
2.2	Record of aircraft operator / owner .....	9
2.3	Aircraft data.....	10
2.4	Aircraft drawing .....	11
2.5	Brief technical description.....	12
2.6	Controls .....	13
2.7	Engineering data.....	13
2.8	Aircraft equipment .....	14
3	Operating limits .....	18
3.1	Speeds.....	18
3.2	Wind speed limits .....	18
3.3	Powerplant limits.....	18
3.4	Weights .....	19
3.5	Allowed turns .....	19
3.6	Load factors (per UL-2 regulation) .....	19
3.7	Types of operation .....	19
4	Emergency procedures.....	19
4.1	Engine failure .....	19
4.2	In case of fire .....	21
4.3	In case of vibrations .....	22
4.4	Landing gear failure .....	23
4.5	Recovering from unintentional spin .....	23
4.6	Using the rescue system .....	23
5	Standard procedures.....	24
5.1	Pre-flight inspection .....	24
5.2	Refueling .....	25
5.3	Checks on entering the cabin.....	26
5.4	Starting the engine.....	26
5.5	Engine test .....	27
5.6	Taxiing.....	27
5.6	Mandatory actions before take-off – on runway holding point.....	27
5.8	Take-off .....	28
5.9	Climbing.....	28
5.10	Mandatory actions after take-off.....	29
5.11	During flight .....	29
5.12	Flying in turbulent air .....	29
5.13	Descent .....	29
5.14	Final approach .....	29
5.15	Landing.....	30
5.16	Go-around.....	30

*Serial Number: 1203*

5.17	Actions after landing.....	30
5.18	Stopping the engine .....	30
5.19	Stopping the aircraft, parking .....	31
5.20	Flying in rain, snow .....	31
5.21	Assembly and disassembly of the aircraft .....	31
5.22	Long-term storage and transport.....	32
5.23	Determining the location of centre of gravity.....	33
6.1	25-hour inspection.....	35
6.2	100-hour inspection.....	35
7	Performance.....	37
7.1	Speed measurement system calibration.....	37
7.2	Stall speeds .....	38
7.3	Take-off performance .....	38
7.4	Landing performance .....	38
7.5	Climbing performance.....	39
7.6	Flight .....	39
7.7	Endurance and range .....	40
7.8	Verified performance with crosswind.....	40
7.9	Optimum gliding speed .....	40
7.10	Ceiling.....	40

# 1 Introduction

## 1.1 Ten Rules of Safe Flying

- I. Observe all regulations applicable to operation of ultralight (UL) aircraft.
- II. Do not overestimate your piloting skills and never show off in front of spectators. Quite to the contrary, practice emergency landing at suitable locations.
- III. Watch the weather and its development all the time. Do not attempt long flight if storms, clouds or icing are likely to occur.
- IV. Monitor fuel level frequently, not only by watching the needles, but also by comparing the flight time with actual fuel consumption.
- V. Always choose your bearing and altitude so that you will be able to make emergency landing.
- VI. Always fly with a sufficient speed margin, especially during the take-off and landing.
- VII. Do not perform nor mimic any aerobatic figures (e.g. stall turns) even if you feel that your piloting skills and aircraft handling qualities would allow aerobatic manoeuvres.
- VIII. Under no circumstances, not even for a very short period of time, exceed the never-exceed speed  $V_{ne}$ .
- IX. Do not minimize navigation. Do not fly into unknown areas without appropriate navigation preparation and aids (map, compass).
- X. Fly only when you are in good physical and mental condition.

## 1.2 Instructions for use

- 1) This Manual is issued by aircraft manufacturer and it is recommended being kept on board of the aircraft during each flight.
- 2) Records shall be made legibly and indelibly, no page may be torn out of the Manual.
- 3) Manual with complete records forms a part of the aircraft technical documentation.
- 4) Total number of take-offs and operating time shall be transferred from old into new logbook, along with the information about latest service bulletin performed.
- 5) The aircraft's owner is responsible for correctness of operation records.

## 1.3 Important information

### Changes and Amendments to this Manual

Any changes to applicable regulations or to this aircraft's construction will be published in the form of a bulletin (e.g. in the Pilot magazine). It is the responsibility of each aircraft owner to implement the change (or to have it implemented) and to record the change in the respective part of this Manual.

**Owner of the aircraft and every operator of the aircraft shall read this Manual carefully and familiarize themselves with its contents.**

**This aircraft is not subject to the certification by the Civil Aviation Authority of the Czech Republic and it is operated entirely on the user's own risk. Deliberate spins, falls and aerobatics are prohibited.**

Any damage to the aircraft shall be reported to applicable inspector-technician. The inspector-technician will recommend the method of repair, supervise the repair and will make a technical inspection after the repair has been completed. A record shall be entered into the aircraft documentation.

## 1.4 Location of decals

A) SLZ decal (English translation of the text is in bold frame on previous page)

TENTO VÝROBEK NEPODLÉHÁ SCHVALOVÁNÍ  
ÚŘADU PRO CIVILNÍ LETECTVÍ ČR A JE PROVOZOVÁN NA  
VLASTNÍ NEBEZPEČÍ UŽIVATELE.  
ÚMYSLNÉ VÝVRTKY, PÁDY A AKROBACIE JSOU ZAKÁZÁNY.

Location: right part of instrument panel, above center.

**B) Operating data and limitations**

<b><u>OPERATING DATA AND LIMITATIONS</u></b>	
Call Sign	OK-RUL 91
Type/Name	LEGEND 540
Serial No./Year of manufacture	1203/2011
Empty weight	322kg
Max. take-off weight	472.5kg
Payload	143kg
Stall speed	63kmph
Never exceed speed	255kmph
Max. speed in turbulent air	170kmph
Max. speed with 30° flaps	135kmph
Max. speed with 40° flaps	135kmph
Fuel tank capacity	100L

Location: left part of left instrument panel.

Serial Number: 1203

C) Registration decal

SLZ REGISTRATION DECAL	
Call Sign	OK-RUL 91
Type/Name	LEGEND 540
Manufacturer	AEROPILOT Ltd.
Serial No./Year of manuf.	1203/2012
Empty weight	322kg
Max. take-off weight	472.5kg
Payload	143kg

Location: center tunnel, in front of central control.

D) Payload decal

Fuel tank capacity / Max. payload		
	L	Payload / kg
Full tanks	100	80
3/4 of tanks	75	97
1/2 of tanks	50	115
1/4 of tanks	25	133
30min. fuel reserve	10	143

Location: right part of right instrument panel.

*Serial Number: 1203*

## **2 Flight manual data**

### **2.1 Data on commissioning**

Ultralight aircraft, aerodynamically-controlled.

Name/Model:

<b>LEGEND 540</b>
-------------------

The aircraft has obtained ULL type certificate.



## 2.2 Record of aircraft operator / owner

Aircraft owner: AEROSPILOT Ltd.  
Name: Jaromír Smékal, Ing.  
Address: Jeníkovská 1815, 28601 Čáslav  
Birth Certificate (CIN): CZ27108431  
Date, from – to:  
Call Sign: OK–RUL 91

Change of Owner: .....  
Name: .....  
Address: .....  
Birth Certificate (CIN): .....  
Date, from – to: .....  
Call Sign: OK–.....

Change of Owner: .....  
Name: .....  
Address: .....  
Birth Certificate (CIN): .....  
Date, from – to: .....  
Call Sign: OK–.....

Change of Owner: .....  
Name: .....  
Address: .....  
Birth Certificate (CIN): .....  
Date, from – to: .....  
Call Sign: OK–.....

Change of Owner: .....  
Name: .....  
Address: .....  
Birth Certificate (CIN): .....  
Date, from – to: .....  
Call Sign: OK–.....

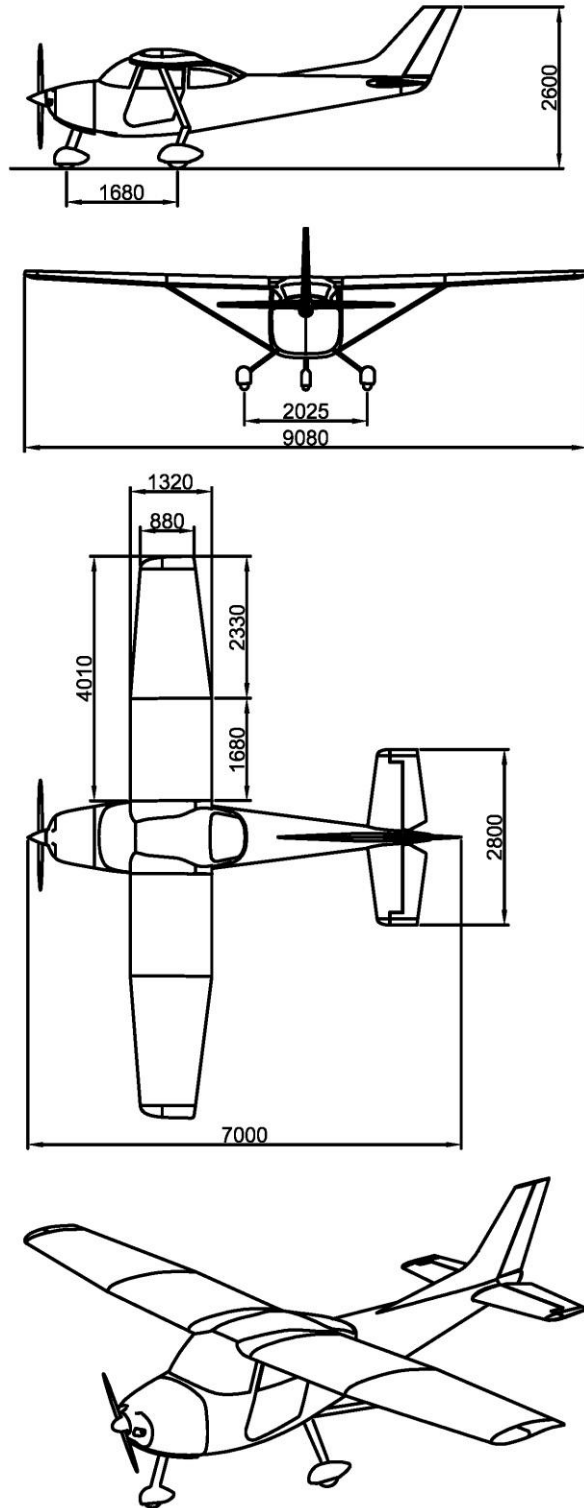
Serial Number: 1203

## 2.3 Aircraft data

<b>Aircraft data</b>				
<b>Model</b>	<b>Airframe ULLa</b>	<b>Engine</b>	<b>Propeller</b>	<b>Rescue System</b>
<b>Manufacturer</b>	AEROPILOT Ltd.	Rotax 912 ULS	Woodcomp Varia 170/2R	GALAXY 5/560
<b>Serial No.</b>	1203	6.779.011	22042	1909.11.1415 5662
<b>Place &amp; Year of Manufacture</b>	2012	2011	2012	2011
<b>Other Data</b>				

Serial Number: 1203

## 2.4 Aircraft drawing



## 2.5 Brief technical description

### Characteristic

The Legend ultralight aircraft is a two-seat, strut high-wing monoplane of all-composite structure designed for sport, recreational or tourist flying. Favourable flight characteristics make the aircraft suitable for flight training. Sufficient performance allows glider towing. The aircraft features spacious crew and baggage compartments. Large doors provide for comfortable boarding of crew and loading of baggage. Adjustable seats allow the pilots of all heights to find comfortable position. A stiff Kevlar cabin, four-point seat harnesses and rocket assisted rescue system provide maximum safety of crew in emergency situations.

### Technical description of aircraft components

#### A) Airframe

1. The fuselage is made of carbon composite. Bulkheads are bonded into integrally stiffened skin to receive forces from the landing gear, rescue system, stabilizer, rudder, safety harnesses, and wings. There are two doors with a central-lock system mounted on flush hinges on the sides of fuselage, opening against flight direction.
2. Sandwich-type single-spar wings made of carbon-composite house two fuel tanks within leading section. Wings are fitted with a slotted Fowler flaps. Wings have rectangular centre section with trapezoidal tips. MS 313 wing profile is used. Banking control by ailerons with differentiated deflection  $10^\circ$  down and  $23^\circ$  up. With aileron deflection up, a nose rises from profile, providing favourable yawing moment. The wing strut is made of aluminium profile.
3. Trapezoidal fixed part of elevator is fixed into the fuselage bulkheads by pins and screws. Aerodynamically balanced elevator has electrically servo-actuated trim tab. The elevator deflection is  $21^\circ$  up and  $13^\circ$  down.
4. Fixed part of trapezoidal swept vertical tail is offset from a longitudinal axis to eliminate an angular propeller flow. The elevator deflection is approximately  $24^\circ$ .
5. Rudder and ailerons have dual cable control, elevator is rod-operated. Yoke controls. Rudder and nose landing gear are operated by pedals with top-mounted shafts, which greatly improves the kinematics of controls. Combined central controller allows control of the engine, landing gear brakes, parking brake, and wing flaps, the flaps being driven by central actuator through Bowden cables.
6. Tricycle landing gear with steerable nose wheel. Main wheels – size 15x6-6 - are provided with hydraulic disc brakes. Amortization by composite legs. The nose wheel fitted with spring and hydraulic shock absorber. The front wheel has size 12 x 4 – 4. All wheels provided with fairings. Tire inflation of all wheels is for 2,3 bar pressure.

#### B) Powerplants

Rotax 912 and 912S engines are used most frequently, providing excellent dynamic and flight characteristics. Rotax 912 and 912S engines are four-stroke, four-cylinder engines of “boxer” configuration, having air-cooled cylinders with water-cooled heads, integrated reduction gearbox, and two carburetors. For more information, see the engine instructions for use.

### **Caution!**

**Neither of the engines mentioned above is certified as an aircraft engine. Even with utmost attention during engine manufacture, engine failure may occur at any time during flight and the pilot bears full responsibility for the consequences. According to UL1 regulation, the pilot must always select bearing and altitude allowing him/her to glide down and land safely at suitable location.**

#### **C) Propeller**

Fixed-pitch PESZKE propeller as well as VARIA 170/2R adjustable-pitch propeller may be used. For the description of the propeller delivered with your aircraft, see the instructions for the propeller installation and maintenance, delivered along with the aircraft.

#### **D) Equipment**

The aircraft may be equipped with traditional analogue instruments, together with GPS navigation or a glass cockpit incorporating flight, engine and navigation instruments, including a transponder.

## **2.6 Controls**

Pedals – pressing left pedal turns aircraft left both on the ground and in the air, and vice versa.

Hand controls – pulling the yoke backwards, towards the pilot, raises the nose of aircraft (the angle of attack increases) and the aircraft climbs. Pushing the yoke forward dives the aircraft. Turning the yoke to the left banks the aircraft to the left, and vice versa.

Engine throttle – moving combined controller located on the middle-panel forward from its central position, in the flight direction, increases engine output, and vice versa.

Brake control – pulling combined controller backwards, in the opposite direction of taxiing, brakes the aircraft. Moving the controller backwards and pressing the detent locks the brake (parking brake). To release the parking brake, pull brake lever or combined controller backwards.

## **2.7 Engineering data**

### **(a) Dimensions**

Wing span	9.1m
Length	7.05m
Height, total	2.6m
Wing surface	10.84m <sup>2</sup>
Wing aspect ratio	7.64
Depth of MAC (mean aerodynamic chord)	1200mm
Wing profile	MS 313 B
At root	1300mm
At tip	880 mm
Wing flaps surface	1.75m <sup>2</sup>

Serial Number: 1203

Flaps deflections	15° / 30° / 45°	
Horizontal tail plane span	2.8m	
Horizontal tail plane surface	2.24m <sup>2</sup>	
Vertical tail plane surface	1.04m <sup>2</sup>	
Control surface deflections:		
Ailerons	up ..... 23°	down ..... 12°
Elevator	up ..... 21°	down ..... 10°
Rudder	left ..... 23°	right ..... 25°

(b) Weights

Empty weight, per UL-2	320,5kg
Take-off weight, maximum	472.5kg

(c) Engine

Type (brief description): Rotax 912S 100HP – four-stroke, four-cylinder engine, air-cooled cylinders with water-cooled heads, integrated reduction gearbox, dual electronic ignition.

Swept volume	1400ccm
Take-off power, max.	73.5kW@5800rpm
Cruising power, max.	69.0kW@5500rpm
Dry weight	56kg
including accessories	72kg
Fuel (fuel grade, octane index)	Natural 95
Oil (type)	SHELL HELIX H x 7AV 10W-40
Oil capacity	3L
Reduction gear (gear ratio)	2.43:1
Fuel tank volume – main tank	100L

(d) Propeller

Diameter / pitch at 75%	In-flight adjustable propeller SR-3000/3N
Weight	5kg
Material	Composite

**The propeller shall be sent to the manufacturer for inspection in case of even the slightest damage or if crack is found. Flying with damaged propeller may endanger life and limb and is prohibited.**

## 2.8 Aircraft equipment

(a) Instruments

	Type	Serial No.
Speed indicator	LUN 1106	673
Altimeter	BG-3E	1316
Compass	CM-13	016
Climb & descent indicator	BC10-1B	1605
Tachometer	VDO COCKPIT	333025015 x
Cylinder temperature gauge	CHT/100 ROAD	0542
Oil-temperature gauge	R 2011	0561
Oil-pressure gauge	ROAD	0531

Serial Number: 1203

	<b>Type</b>	<b>Serial No.</b>
Exhaust-gas thermometer	x	x
Fuel-pressure gauge	EMRS	.....
Manifold pressure gauge	x	x
GPS	.....	.....
Radio	ATR 500	505867 11
Transponder	EM 800	908094-11

(b) Ballistic Rescue System

Model, manufacturer, serial No.	GALAXY 5/560
Activation	By pulling the handle on central panel
Descent speed, max. (m/s)	6,6m/s
At take-off weight	560kg
Speed at activation, max.	310kmph

(c) Battery (type, parameters)

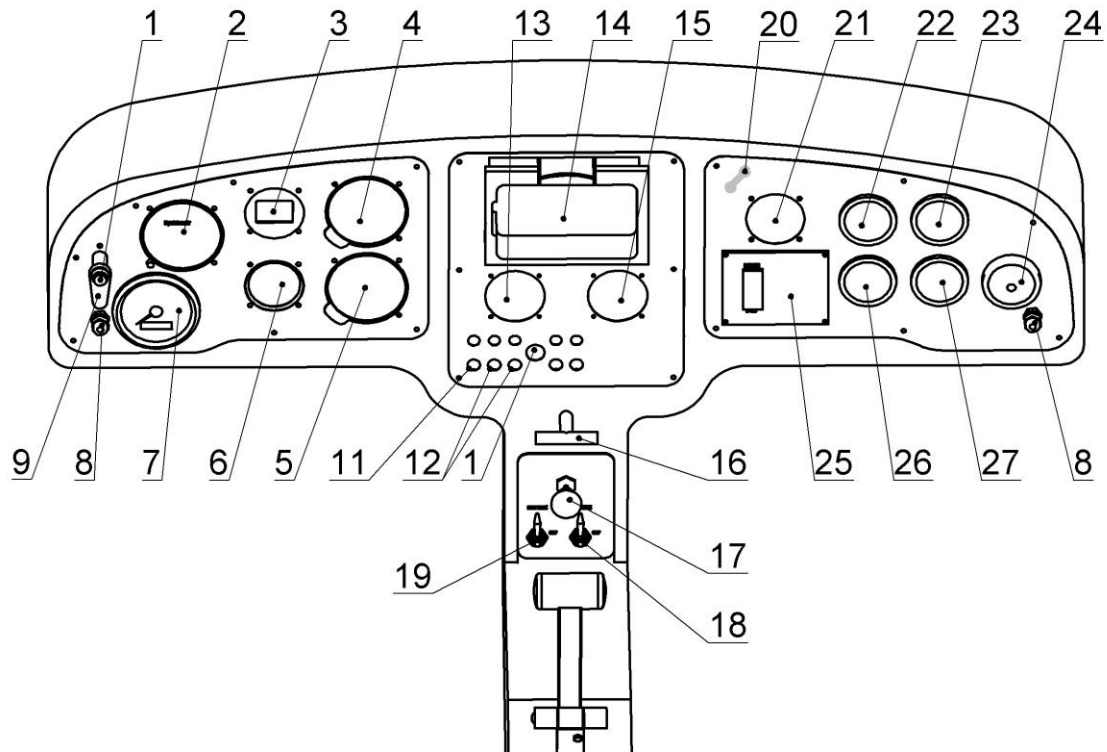
Type	508 901
Voltage	12V
Ah rating	8
Weight	2.9kg
Location	On firewall, at the highest point of engine compartment
Notice	Only the charger designed for gel batteries may be used to charge the battery. Use of other charger will destroy the battery.

(d) Location of Controllers

Ignition switch	Center panel, left-hand side
Starter	Center panel, left-hand side
Choke	Central controller – left instrument panel
Throttle	Central controller – bottom part of middle panel
Brakes	Central controller – bottom part of middle panel
Longitudinal trim	Control yokes
Wing flaps	Engine throttle + right instrument panel
Closing of the cabin	Front section of the door
Rescue system	Central bottom panel
Radio	Central dashboard panel
GPS	Central dashboard panel

**Equipment layout**

**Drawing:**

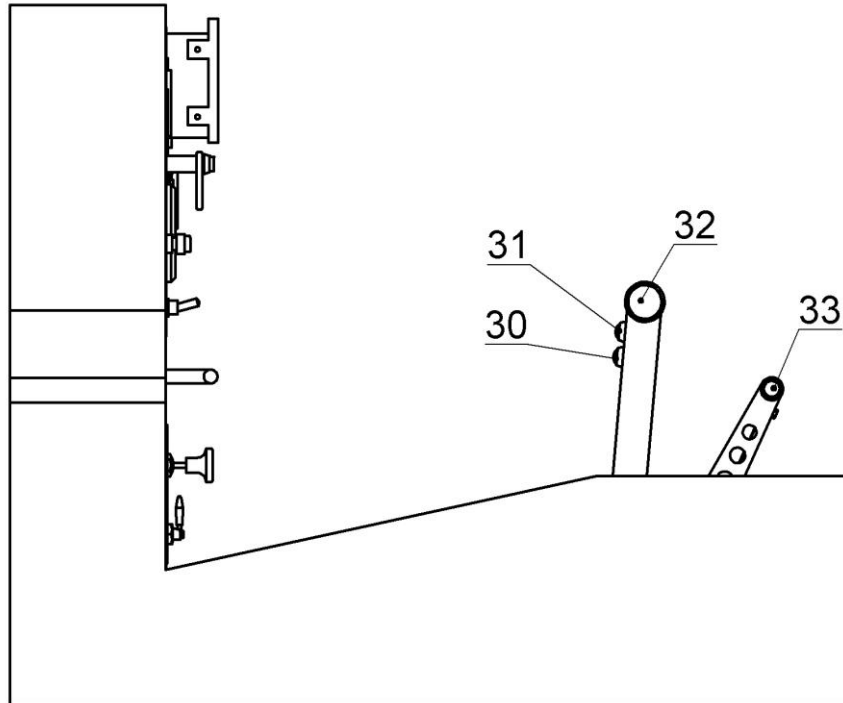


- |    |                               |    |                               |
|----|-------------------------------|----|-------------------------------|
| 1  | - Starter button              | 15 | - Transponder                 |
| 2  | - Speedometer                 | 16 | - Rescue system               |
| 3  | - Compass                     | 17 | - Oil cooler flap             |
| 4  | - Altimeter                   | 18 | - Right fuel tank cock        |
| 5  | - Climb and descent indicator | 19 | - Left fuel tank cock         |
| 6  | - Ball                        | 20 | - Propeller pitch crank       |
| 7  | - RPM                         | 21 | - Two-needle fuel level gauge |
| 8  | - Heating control             | 22 | - Fuel pressure gauge         |
| 9  | - Choke control               | 23 | - Oil pressure gauge          |
| 11 | - Main switch                 | 24 | - Voltmeter                   |
| 12 | - Ignition switch             | 25 | - Trim indicator, flaps       |
| 13 | - Radio                       | 26 | - Engine temperature gauge    |
| 14 | - GPS                         | 27 | - Oil temperature gauge       |



**Central controller functions**

Drawing



- 30 - Flaps extend
- 31 - Flaps retract
- 32 - Engine throttle
- 33 - Wheel brake/parking brake

### 3 Operating limits

#### 3.1 Speeds

**All speeds stated in this Manual are Indicated Air Speeds IAS!**

Never-exceed speed,  $V_{NE} = 255\text{kmph}$

**This speed must not be exceeded under any circumstances!**

Stalling speed at maximum take-off weight and at the landing configuration, $V_{SO}$ :		60kmph
Maximum allowed speed with flaps fully deflected, $V_{FE}$ :		135kmph
Flaps deflection:		
Degrees/Use	1 – 15° / Take-off	135kmph
Degrees/Use	2 – 30° / Landing	135kmph
Degrees/Use	3 – 40° / Landing	135kmph
Maximum speed in turbulent air:		202kmph
Maximum manoeuvre speed, $V_A$ :		180kmph

**Do not apply full deflections above this speed**

#### 3.2 Wind speed limits

Maximum allowed headwind speed	10m/s
Maximum allowed crosswind speed:	4m/s

**Tailwind take-off and landing should be avoided.**

#### 3.3 Powerplant limits

Maximum allowed speed:	5800rpm for 5 minutes
Maximum continuous speed:	5500rpm
Idling speed, approximately:	1400rpm
Maximum cylinder head temperature:	130°C
Maximum oil temperature:	135°C
Minimum air temperature at starting:	-25°C
Maximum air temperature at starting:	50°C
Oil pressure:	1.15 – 4.0bar

### 3.4 Weights

Minimum crew weight:	60kg
Maximum payload:	143kg
Maximum take-off weight:	472.5kg
Empty weight	322kg
Maximum COG locations from front edge of wing:	
Forward limit	21.6% bMAC
Aft limit:	35.6% bMAC
Max. baggage weight	15kg

### 3.5 Allowed turns

**Tight turns up to 60° banking angle, climbing and diving up to 30° from horizontal plane. Intentional spins, falls and aerobatics are PROHIBITED!**

### 3.6 Load factors (per UL-2 regulation)

Maximum positive load factor in the centre of gravity:	4.0
Maximum negative load factor in the centre of gravity:	-2.0

### 3.7 Types of operation

<p><b>Only daylight flights are allowed, under VFR (ground-contact) rules. All other flights are prohibited.</b></p>
--

## 4 Emergency procedures

This section describes recommended procedures for resolving emergency situations which could occur during operation.

Strict adherence to inspection and maintenance schedule prescribed by the manufacturer reduces the probability of a failure to absolute minimum.

### 4.1 Engine failure

#### 1) During take-off run

- Throttle to idle
- Ignition switch off
- Brake according to actual conditions

## **2) During take-off (in air)**

- Maintain speed 120kmph minimum
- Less than 300ft above terrain – land in the direction of flight, manoeuvring the aircraft out of obstructions
- Detect wind direction and speed
- Apply flaps as necessary
- Shut off fuel cock
- Shut off the ignition
- Tighten safety harnesses
- Main switch off

## **3) In flight**

- Dive and glide, maintain speed 120kmph minimum
- More than 300ft above terrain – :select suitable landing location
- If cause of engine failure is discovered (e.g. empty fuel tank) and flight altitude allows it, try restarting the engine according to the procedure below:
- If engine does not restart or if flight altitude drops below safe level, select suitable landing location and proceed according to previous section.

## **4) Restarting engine in flight**

May be only performed at safe flight altitude to allow safe emergency landing with engine off.

- Fuel cock                    open, check amount of fuel in selected tank
- Fuel pump                    switch on
- Ignition                      switch on
- Throttle                      up to 1/3 of throttle, not more
- Flight speed                  120–140kmph
- Press start button

### **Flying with engine off**

**If engine fails, it is necessary to maintain speed 120kmph.**

## **Safety landing**

Safety landing is generally made in case of loss of orientation, worsening of weather, low fuel, and/or sudden incapacitation of pilot. Always follow the recommendations listed below:

- Select suitable landing location depending on wind direction and terrain/cover
- If possible, communicate your intention to land
- Fly above right side of selected landing area in the direction of planned landing, maintaining horizon at approx. 150ft altitude.
- Apply “take-off” flaps, maintain speed 120kmph.
- Carefully check the location.
- Climb a little, fly small left circuit.
- Perform landing approach and then land.

**Check selected area throughout the safety landing procedure.**

## **4.2 In case of fire**

### **a) On ground, during starting**

- Release starter button
- Shut off fuel cock
- Switch off ignition
- Main switch off
- Exit the aircraft
- Try to extinguish the fire

### **b) On ground, engine running**

- Shut off fuel cock
- Switch off ignition
- Main switch off
- Exit the aircraft
- Try to extinguish the fire

### **c) On ground, during take-off**

- Speed 120kmph
- Shut off fuel cock
- Switch off heating, if switched on
- Switch off ignition
- Main switch off
- Land and exit the aircraft
- Try to extinguish the fire

**d) In flight**

- Speed 120kmph
- Shut off fuel cock
- Open the throttle as much as possible
- Switch off heating, if switched on
- Switch off ignition after all fuel in the carburetors is consumed and engine stops
- Main switch off
- Perform emergency landing and exit the aircraft
- Try to extinguish the fire

**Consuming all fuel in the carburetors takes approx. 30 seconds.**

**Do not try to restart the engine in this situation.**

**4.3 In case of vibrations**

Proceed as follows should any unnatural vibrations occur:

- Adjust engine speed to a value which minimizes the vibrations
- Land at nearest airport or perform safety landing
- If vibrations keep increasing, turn engine off and land with engine off

**Icing of carburetor**

Icing of carburetor manifests itself by reduced engine power and increased temperature; sometimes, light vibrations also occur.

The following procedure is recommended to try to restore engine power:

- Flight speed                    140kmph
- Throttle                         adjust to 1/3
- Carburetor heating         switch on
- Fly away from icing area – if possible.
- After 1-2 minutes, gradually increase throttle to cruising pose

If engine power cannot be restored, land at nearest airport (if possible), or perform safety landing.

Only switch on carburetor heating for minimum time necessary to fly away from icing location. Switching on carburetor heating leads to reduced engine rpm (by 100–200rpm) and thus to reduced engine power.

**This aircraft is approved for VFR flights only.  
Flights without sufficient visibility and IMC flights are prohibited.**

#### **4.4 Landing gear failure**

- If main gear leg is damaged, land with the lowest speed possible, keeping the aircraft on undamaged leg for as long as possible. Begin braking intensively as soon as the damaged leg touches the ground, trying to relieve it as much as possible.
- If nose gear leg is damaged, use elevator to keep the nose up for as long as possible, without braking if possible.
- Always try to land with headwind and with engine off.

#### **4.5 Recovering from unintentional spin**

**Intentional spins are prohibited. The aircraft has never been tested in this flight regime.**

Legend 540, if flown in normal conditions, keeping with operating limits and with careful piloting, does not exhibit tendency to spinning.

##### **Recovering from unintentional spin**

- Throttle            idle
- Rudder            fully opposite to spin direction
- Ailerons            maintain center position
- Elevator            gradually push fully forward (dive) without moving the ailerons
- Rudder            neutral position immediately when rotation stops
- Elevator            gradually pull back to recover from steep dive

#### **4.6 Using the rescue system**

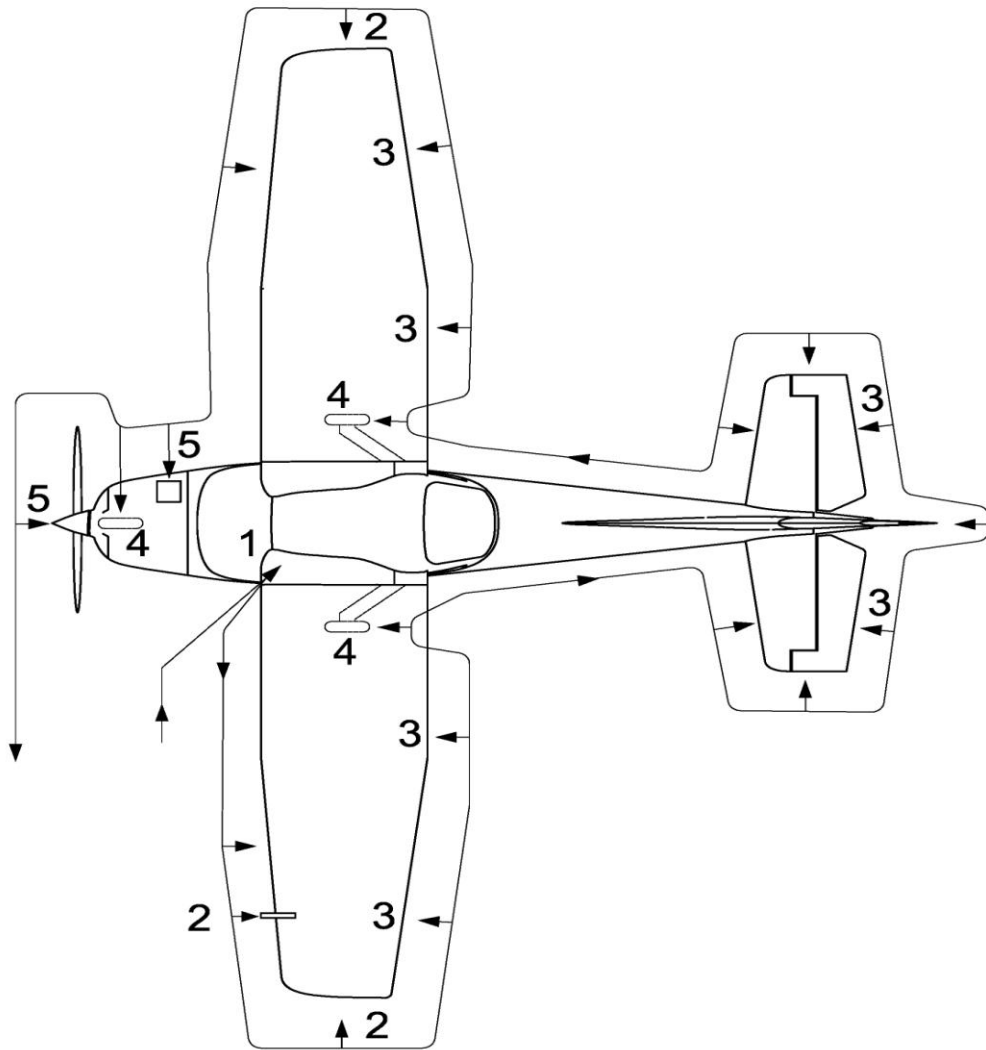
(1) In emergency, when you lose the control of the aircraft:

- Switch off the ignition
- Tighten up safety harnesses
- Activate the rescue system

(2) In case of landing with very short distance available, when there is imminent danger of crashing into obstacle at high speed, activate the rescue system to decelerate the aircraft. In such case, damage to aircraft is likely.

## 5 Standard procedures

### 5.1 Pre-flight inspection





- 1 - Cabin
  - Ignition off
  - Main switch on, check fuel level, check instruments
  - Main switch off
  - Check range of movement of all controls, condition of safety harnesses
  - Remove loose objects from cabin, check canopy – cleanliness
  - Check rescue system – must be locked to prevent inadvertent activation
- 2 - Fuselage, wings and tail surfaces
  - Check surface condition, leading edges
  - Check Pitot tube
- 3 - Control surfaces, wing flaps
  - Range of movement and free play of all control surfaces
- 4 - Landing Gear
  - Check wheels for free rotation, tire inflation (2,3 bar), attachment to airframe, check brakes, attachment of wheel fairings, check tire slipping on rims
- 5 - Engine, propeller, fuel system
  - Check fuel level and cleanliness, check propeller and attachment to engine
  - Check oil level (according to engine manufacturer's manual), check coolant
  - Check engine cowling
  - Check tightness of fuels hoses, tank caps, fuel filters
  - Check fuel filter for impurities and water

## **5.2 Refueling**

- Rotax 912 engines are designed for automotive lead-free gasoline (BA95 Natural). Temporary limited use of AVGAS is possible. See Rotax 912 UL, Rotax 912 ULS Operating manual for more details.
- The aircraft has two fuel tanks, capacity 50L each.
- There are two methods of refueling LEGEND aircraft.

### **1) Refueling from fuel station (dispenser)**

- Fuel station must be certified for aircraft refueling.
- Always neutralize electric potentials of aircraft and station.
- LEGEND aircraft has two grounding points for this purpose. One of them is copper grounding strip at landing gear leg. The other is exhaust manifold, which is better suited for attachment of grounding clip of refueling station. **Do not handle fuel tank before completing the grounding.** Open fuel cap and insert filling nozzle into tank. It is not necessary to use strainer, as certified refueling stations always include it.

## 2) **Refueling from storage containers**

- Position stairs or chair next to wing.
- Protect wing surface by suitable mat.
- Fuel containers, if made of metal, must be connected to grounding point of aircraft.
- Open fuel tank.
- Use hose with built-in strainer and self-priming pump (ball valve) to pump fuel from container to fuel tank.
- If hose is not used, use a funnel with wire strainer (mesh).

**Physically measure amount of fuel before each flight. Never rely on the gauges to assess the amount of fuel necessary for safe completion of the flight.**

During flight, fuel consumption from tanks is not regular. Better leave both fuel cocks on.

If **one of the tanks becomes empty – 10 liters or less** (marked on the fuel gauges) - always close its fuel cock and continue flying on the other tank, until fuel levels in both tanks equalize.

If **both fuel tanks become empty – 10 liters or less** (marked on the fuel gauges) - always leave both fuel cocks open and **switch on secondary fuel pump**.

**It is not recommended to take-off when both tanks contain less than 10 liters of fuel.**

**If the procedures above are not adhered to, air may enter the fuel system and the engine may stop.**

## 5.3 **Checks on entering the cabin**

- Check free movement of pedals and hand controls, check brakes and fuel level
- Check the instruments, set up the altimeter
- Fasten and tighten seat harnesses
- Check that the ignition switch is in OFF position
- Close and latch cabin doors

## 5.4 **Starting the engine**

- Apply parking brake
- Main switch on
- Both fuel cocks ON
- Set minimum pitch of (in-flight adjustable) propeller
- Choke - activate only when starting cold engine; close gradually when engine warms up

- Throttle - idle setting when starting cold engine; up to 10% throttle when engine is warm
- Electric fuel pump on
- Check area in front and around propeller
- Switch ignition on.
- Start the engine.
- **Only press starter button for 10 seconds or less; if engine does not start, wait 2 minutes before starting attempts**
- **As soon as engine starts, set it to 2000 – 2300rpm – it should run without vibrations**
- **Check oil pressure – it must reach normal operating value within 10 seconds**

## **5.5 Engine test**

- Always start to warm up the engine at approx. 2000rpm for approx. 2 minutes. Continue at 2500rpm until cylinder head and oil temperature reaches 50°C minimum.
- Test maximum rpm; check transition from minimum to maximum rpm and back.
- Check function of both ignition circuits by switching off the first and then the second circuit at 4000rpm. Max. permitted drop of rpm when switching is 300rpm.
- Fuel pressure must not drop below 0.2bar throughout the test (with secondary fuel pump switched off); oil pressure must not drop below 0.8bar.
- Note: it is recommended to have a fire extinguisher available.

**Nobody is allowed to be present in the vicinity, especially not in the propeller rotation plane.**

Do not perform the engine test with the aircraft placed on the loose ground. Loose material, if drawn in by the propeller, may cause personal injury and/or damage to propeller.

## **5.6 Taxiing**

- Taxi at speed 10kmph maximum (fast walking speed)
- Keep the yoke pulled back
- Taxi very slowly when turning at a small radius and control the engine with care (to prevent overloading of nose landing gear leg)
- Under crosswind conditions, keep ailerons “up the wind”.
- Communicate your taxiing intentions and re

## **5.6 Mandatory actions before take-off – on runway holding point**

- Check free movement and function of all controls
- Check fuel level, open cocks
- Check instruments, adjust altimeter if necessary.
- Check engine operating values (temperatures and pressures).
- Check the cabin – tighten seat harnesses, unlock rescue system, close door, remove/secure loose objects.

- Apply flaps – 15° position
- Center the trim
- Set propeller to low pitch
- Unlock rescue system
- Switch on secondary fuel pump
- Check that the runway, including final approach, is clear
- Switch transponder to STAND BY mode
- Radio – check frequency setting, report readiness for take-off
- GPS – switch on, activate planned route

## **5.8 Take-off**

- Set throttle to full take-off power
- Engine rpm: 5500rpm minimum
- Instruments: check values
- Keep yoke control in central position
- Pull yoke control slightly on reaching 60kmph to lift off nose wheel
- On reaching 80kmph, lift the aircraft off the ground and hold in level flight just above the runway
- On reaching 110kmph, start climbing, maintaining this speed

### **Do not take off when:**

- Engine does not run smoothly
- Instrument readings are not within prescribed operating limits
- Wind speed is not within prescribed operating limits
- Runway or final approach is not clear

## **5.9 Climbing**

- Best climbing speed is 120kmph
- If cylinder head temperature or oil temperature reaches maximum operating limit, you must reduce engine power and climbing rate
- Climb to altitude necessary for subsequent flight

### **5.10 Mandatory actions after take-off**

(height above terrain 150ft)

- Retract flaps
- Switch off electric fuel pump and check fuel pressure
- Radio - communicate
- Reduce engine throttle to approx. 5000rpm
- Adjust the propeller pitch to “level flight”

### **5.11 During flight**

- Check that flaps have retracted
- Trim aircraft to cruising speed
- Flight speed 150–200kmph
- Instrument – normal operating values

### **5.12 Flying in turbulent air**

- In strong turbulence, we recommend maintaining flight speed above 110kmph but less than 170kmph
- When making a turn, do not bank more than 30°.
- Do not use more than 1/3 rudder deflection at speed above 175kmph; or reduce speed accordingly

### **5.13 Descent**

- During descent from higher altitude and/or during approach, it is not recommended to reduce engine rpm to idle; this could lead to excessive temperature drop and reduced engine power. Glide at increased idle, approx. 3000rpm, and maintain engine temperatures within operating limits.

### **5.14 Final approach**

Speed	120–130kmph
Throttle	As necessary
Flaps	15° position and continue to the final maintaining speed 110–120kmph
Propeller	Set minimum pitch
Trim	As necessary

### 5.15 Landing

Speed	90–100kmph
Flaps	30° position
Trim	As necessary

- At approx. 5m height above runway, start pulling the yoke to reduce descent rate; at approx. 0.5m above runway, let the plane to loose speed gradually, until the touch down.
- Always touch down on main landing gear wheels.
- Pull up yoke gradually to maintain nose gear above ground for as long as possible.
- When nose gear finally touches down, apply brakes as necessary.
- If runway is short or clearway is high, extend the flaps to 40°. With the flaps in this position, descend rate increases markedly. Maintain speed 90km/h.

### 5.16 Go-around

Throttle	Full engine power (5700rpm max.)
Flaps	Retract to “take-off” position
Start climbing	Speed at least 100km/h IAS
Trim	As necessary
Adjust speed for climbing	120kmph IAS
Flaps	Retract, min. height above ground 150ft
Trim	As necessary
Go around	

### 5.17 Actions after landing

Flaps	Retract
Trim	Middle position
Engine rpm	As necessary
Observe taxiing rules	Speed up to 10kmph

### 5.18 Stopping the engine

Engine rpm	Idle
Instruments	Engine instrument needles within limits
Avionics	Switch off
Ignition	Switch off
Section switches	Switch off
Main switch	Switch off
Fuel cocks	Close

## **5.19 Stopping the aircraft, parking**

- Taxi very carefully before stopping the aircraft, paying attention to obstacles and terrain
- Brake the aircraft and shut off the engine
- Secure the rescue system
- Secure the aircraft against movement (use wedges, anchors, brakes)

## **5.20 Flying in rain, snow**

There are no special requirements during flying in rain or snow. Aircraft handling and performance do not change. After landing, always check for water in speed measurement system, and empty the water trap if there is water present.

## **5.21 Assembly and disassembly of the aircraft**

### **1) Elevator Assembly**

- Check condition of rubber sealing edge
- Check elevator hinges and condition
- Slide the elevator into the fuselage from a side and insert elevator pins into fuselage bulkhead
- Screw on the rear bulkhead and secure the screws using wire
- Connect elevator control rod and apply a drop of paint onto new self-locking nut
- Connect the trim control connector
- Check rudder control
- Screw-on rudder control cover
- Check function of rudder controls

### **2) Wing Assembly**

- Check and grease strut and wing pins, remove the locking of the wing flap Bowden cable, check condition of rubber edges at wing
- Thread aileron control cables and flaps Bowden cable into the fuselage.
- Insert wing attachment forks into the fuselage. Ensure correct position of wing fittings by moving wing top. Use the auxiliary pointed pin first, then replace it with M8 screw. Check that no cables nor hoses are pinched during assembly.
- Connect strut to the wing. Install two aerodynamic covers on the strut and then insert pin connecting the strut to the fuselage.
- Secure all pins using self-locking nuts
- Install strut fitting covers and fix them using adhesive tape
- Connect tank breathing and fuel take-off hoses (and fuel gauge hoses, if used)
- Repeat the procedure at the other wing
- Connect the aileron control cable turnbuckles, adjust tension of cables and central position of ailerons. Secure turnbuckles using a drop of paint and wire.
- Fix the ends of the wing flap Bowden cables and rods. Check by looking from behind

that both flaps are in the same position.

- Install cabin ceiling covers, check function of ailerons and flaps, screw-on anchoring lugs

### **3) Disassembly**

- Drain all fuel
- Remove ceiling covers
- Remove and move strut covers
- Perform disassembly in reverse order of assembly. Disassembled wings may only be placed on soft rests or hanged on stands using their fittings as anchors. Remove elevator using similar procedure.

## **5.22 Long-term storage and transport**

### **Before long-term storage**

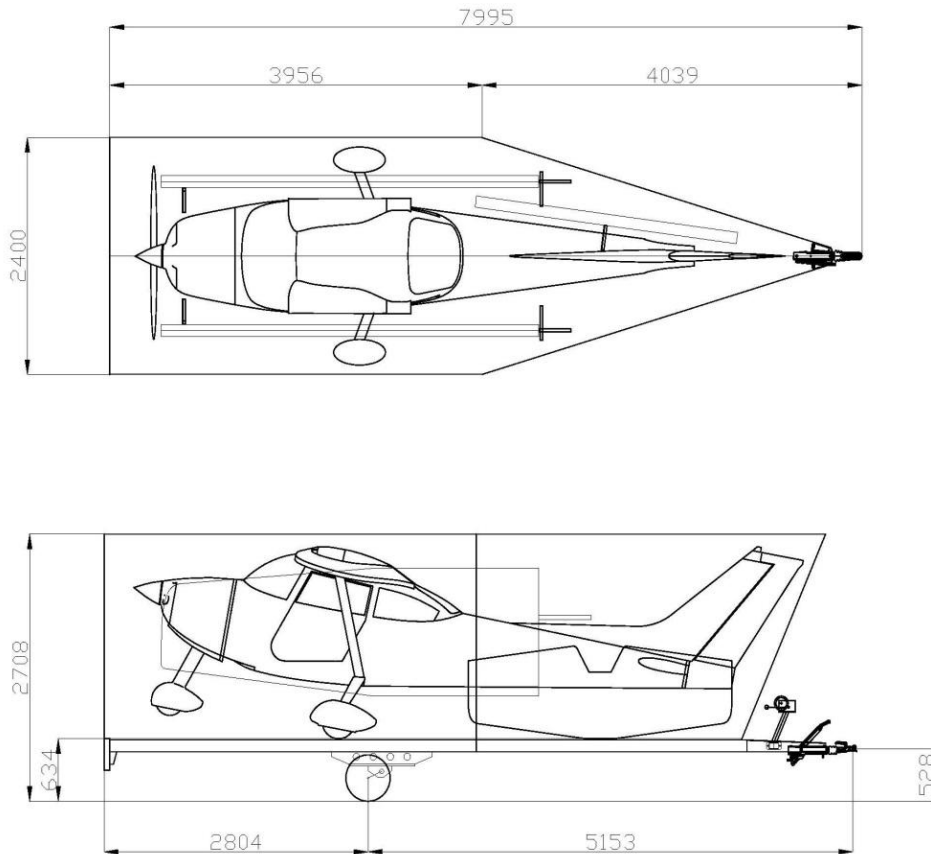
- Remove battery and connect to maintenance charger
- Drain all fuel from the tanks through drain valves
- Apply preservation to the engine following manufacturer's instructions
- Cover glass parts of cabin and/or wings and tail surfaces
- Support main landing gear legs using assembly stands or ensure periodic checking of tire inflation
- Put protective covers on propeller blades

### **Transport**

- The aircraft may only be transported with wings removed. When transporting over longer distance or in closed cargo bay of a truck, elevator must be removed. If elevator is not removed, it must be fitted with red pennants, or accompanying vehicle must be procured.
- During the transport, the fuselage must be connected to truck or trailer by landing gear legs and possibly also by tail bumper. The wings must be anchored using their central-section fittings and wing tip nor leading edges may contact the floor nor be leaned on anything.
- Flap controls must be fixed in position – see section Disassembly. If elevator is transported separately from the fuselage, it must only be fixed using fuselage fittings and front pins. Entire elevator must be protected by soft cover and attached to the truck or trailer using wide straps.



*Serial Number: 1203*



### **5.23 Determining the location of centre of gravity**

Place the aircraft on horizontal floor, with its wheels positioned on three scales (one scale for each wheel).

#### **1) Weighing for aft centre of gravity**

- Move seats to rearmost position
- Fill baggage compartment with maximum allowed load
- Empty fuel tanks

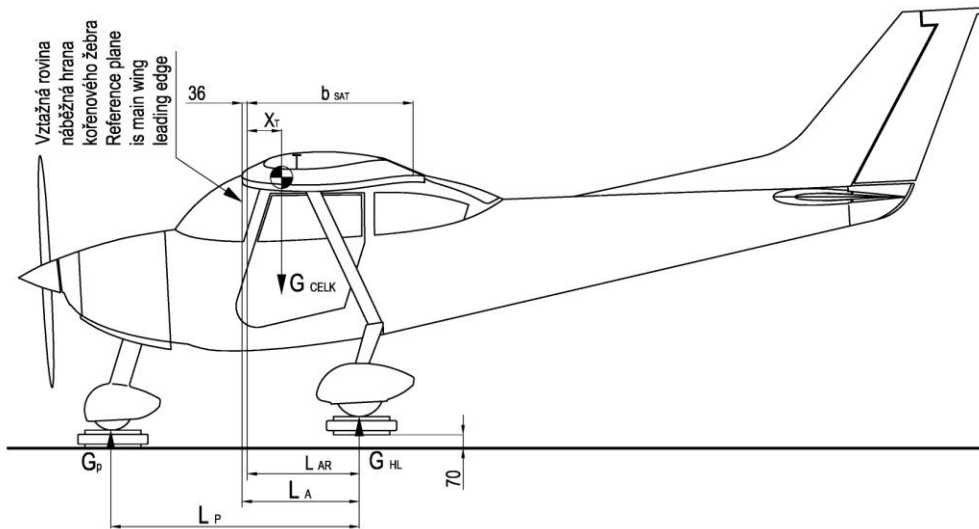
#### **2) Weighing for forward centre of gravity**

- Empty baggage compartment
- Move seats to foremost position
- Full fuel tanks

Serial Number: 1203

**Weight and balance record of the aircraft LEGEND 540**

Configuration		Aircraft	Engine	Propeller	Rescue system
	TYPE	LEGEND 540	ROTAX 912 ULS		Galaxy 6/473SD
	Serial number				



C.G. position calculation

$$X_T[\text{mm}] = L_{AR} \cdot \frac{G_p \cdot L_p}{G_{\text{total}}}$$

C.G. Centre of gravity calculation

$$X_T[\%] = \frac{X_T[\text{mm}]}{B_{SAT}} \cdot 100$$

Weight calculation

$$G_{\text{CELK}} = G_p + G_{HL}$$

$$L_A[\text{mm}] = 568,5$$

$$L_{AR} = L_A - 36$$

$$b_{SAT}[\text{mm}] = 1200$$

$$b_k = 1300 \text{ mm}$$

	Nose wheel $G_p$	Main gear $G_{HL}$	Total weight $G_{CELK}$	C.G. from the wing leading edge	
				$X_T[\text{mm}]$	$X_T[\%]$
No fuel and no crew					
crew fuel baggage					
crew fuel baggage					
crew fuel baggage					
crew fuel baggage					

Calculated position of C.G. is within a permitted range of 21,6-35,6 %  $b_{SAT}$ .

\_\_\_\_\_ Place

\_\_\_\_\_ Date

\_\_\_\_\_ Signature

## **6 Periodic inspections**

### **6.1 25-hour inspection**

- Remove top cowling of engine
- Check condition and leaks of fuel system
- Check condition and leaks of oil system
- Check condition and leaks of cooling system
- Check exhaust system for cracks and leaks
- Check engine mount for cracks
- Check attachment of engine mount and engine
- Check attachment of propeller
- Visual check of electric installation
- Check nose wheel shock absorber and control
- Lubricate nose wheel leg
- Check carburetor control (choke, throttle)

### **6.2 100-hour inspection**

If aircraft is operated in demanding conditions, halve this interval to 50 hours.

Demanding conditions include:

- 1) Glider towing
- 2) Ambient temperatures continuously exceeding 35° C

This inspection consists of the following:

- 1) Engine and propeller service
- 2) Airframe service
- 3) Fuel system cleaning
- 4) Inspection of instruments and equipment

#### **1) Engine and propeller service**

Change engine oil and filter, check and clean spark plugs, replace as necessary, check carburetor adjustment and control, check exhaust system condition, check engine mount and attachment of all parts, propeller service, inspection, check tightening of mounting screws using prescribed torque, check condition of propeller hub and blades – concentrate on cracks; other checks prescribed by propeller manufacturer.

**Observe engine and propeller manufacturer's instructions during this work.**

## **2) Airframe service**

- a) Remove seats, remove ceiling covers, remove tail surfaces cover, remove landing gear covers.
- b) Check condition and function of control cables, rods, their securing, check for any jerks or contact between control elements and airframe parts (save for bumpers intended to limit movement range). Lubricate manual control rods using graphite grease, lubricate also aileron hinges (using only small amount of grease), lubricate nose wheel leg - in this case, it is better to apply more grease, or lubricate more often.
- c) Check condition of landing gear, concentrate on cracks and deformation. Main landing gear must not move at all. Nose leg must not be bent. This inspection is mandatory after each hard landing from height more than 0.5m. Check brakes, add brake fluid.
- d) Check proper movement and adjustment of doors.

## **3) Fuel system cleaning**

- a) Replace fuel filters; clean prefilter when necessary.
- b) Remove carburetor jars and clean.
- c) Use electric pump to pressurize fuel system, check for leaks, especially at fuel level sensors and prefilter (glass jar).

## **4) Inspection of instruments and equipment**

- a) Check Pitot tube and hoses for leaks.
- b) Verify function of all electric instruments and systems, including attachment. Visual check of cables and attachment.
- c) Check attachment of rescue system and its components (ropes, carabiners).
- d) Verify function of tow hook control cable (if installed).

## **5) Reinstall engine cowling, propeller cone, ceiling covers, seats, and tail surface cover**

## 7 Performance

### 7.1 Speed measurement system calibration

<i>km/h</i> <i>IAS</i>	<i>km/h</i> <i>CAS</i>
65	63
70	68
75	72
80	77
85	82
90	87
95	92
100	97
105	102
110	106
115	111
120	116
125	121
130	125
135	130
140	134
145	139
150	144
155	149
160	154
165	158
170	162
175	166

<i>km/h</i> <i>IAS</i>	<i>km/h</i> <i>CAS</i>
180	170
185	175
190	180
195	184
200	189
205	195
210	202
215	209
220	215
225	220
230	225
235	230
240	235
245	-
250	-
255	-
260	-
265	-
270	-

## 7.2 Stall speeds

Conditions: Max. TOW, engine at idle	Flaps deflection	km/h IAS	Height loss during recovery [ft]
Horizontal flight	0°	77	26
	15°	68	38
	30°	60	50
Turn with 30° bank angle	0°	82	36
	15°	73	50
	30°	66	60

## 7.3 Take-off performance

RUNWAY SURFACE	Take-off run [m]	Take-off distance over 50 ft obstacle [m]
PAVED	90	200
GRASS	105	225

## 7.4 Landing performance

RUNWAY SURFACE	Landing distance over 50 ft obstacle [m]	Braking distance [m]
PAVED	135	95
GRASS	135	80

## 7.5 Climbing performance

<i>Conditions: Max. continuous power 5500rpm, aircraft weight 1320 lbs</i>	Ideal climbing speed/rate	
	<i>km/h IAS</i>	<i>[m/s]</i>
<b>1500ft ISA</b>	120	5.9
<b>4000ft ISA</b>	120	4.4
<b>8000ft ISA</b>	120	3.3

## 7.6 Flight

Performance data corresponding to boost pressure 24.

Altitude [ft ISA]	Engine speed [rpm]	Flight speed
		km/h IAS
<b>1500</b>	4000	165
	4400	178
	4600	189
	4800	200
	5000	205
	5200	212
	5400	219
	5600	229
<b>6000</b>	4000	153
	4400	164
	4600	170
	4800	178
	5000	180
	5200	188
	5400	196
	5600	206

## 7.7 Endurance and range

The table lists fuel consumption, range and endurance.

<b>Altitude</b>	[ft ISA]	3000 ft				
<b>Fuel on board</b>	[L]	100				
<b>Engine speed</b>	[rpm]	<b>4400</b>	<b>4800</b>	<b>5000</b>	<b>5200</b>	<b>5500</b>
<b>Fuel consumption</b>	[L/h]	12	14	15	18	20
<b>Flight speed</b>	km/h IAS	160	180	190	195	210
<b>Endurance</b>	[hh:mm]	8:20	7:09	6:40	5:33	5:00
<b>Range</b>	[km]	1250	1195	1170	985	945

## 7.8 Verified performance with crosswind

Max. allowed headwind for take-off and landing 10m/s

Max. allowed crosswind for take-off and landing 4m/s

## 7.9 Optimum gliding speed

Optimum gliding speed 110km/h IAS

## 7.10 Ceiling

Operating ceiling 14000ft