SPACEK s.r.o.
Lesní 25
695 01 Hodonín
Tel: +420 605 409 539
info@sdplanes.com
www.sdplanes.com

Pilot´s operating handbook and Flight Manual

SD-2 SportMaster with R912 ULS

(MTOM=600 kg)

Aircraft type : **SD-2 SportMaster**

Manufacturer : **Spacek s.r.o.**

Serial Number:

Registration mark:

Date of issue:

Manufacturer – stamp and signature:

Airplane must be operated in compliance with information and limitations stated in this manual.

This manual must be available to pilot during flight.

LIST OF THE REVISIONS AND REPAIRS

11.4. 2006

Ordinal No.	Number of document - bulletin	It concerns to pages Nr:	Date of issue	Signature

Contents

1. General

1.1. Introduction

This flight manual provides the information necessary for safe and effective service of **SD-2 SportMaster** light airplane.

The manual contents information considered by the Manufacturer as important.

1.2. Personal Data of the Owner

Owner of aircraft: .....

Address: .....

Telephone No: .....

E-mail: .....

Date of ownership from: ..... **to:** .....

Owner of aircraft: .....

Address: .....

Telephone No: .....

E-mail: .....

Date of ownership from: ..... **to:** .....

Owner of aircraft: .....

Address: .....

Telephone No: .....

E-mail: .....

Date of ownership from: ..... **to:** .....

1.3. Important information

Attention!

This product is not liable to be approved by Civil Aviation Authority, and it is operated at someone's own risk. Intentional spins, stalls and aerobatic maneuvers are prohibited.

Any damage of the airplane must be reported to an approved inspector – technician. He will recommend the way how to repair the damage and then he will provide the check - out and technical inspection. In the airplane documentation must be made a report about the case.

1.4. Warnings, cautions, notes

The following information applies to warnings, cautions and notes used in the Flight manual:

WARNING

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

CAUTION

THAT MEANS THAT NON-OBSERVATIONS OF THE CORRESPONDING PROCEDURE LEADS TO A MINOR OR TO A MORE OR LESS LONGTERM DEGRADATION OF THE FLIGHT SAFETY.

NOTE

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

1.5. Description of the airplane

The SD-2 is an aerodynamically controlled, low-wing cantilever two seat monoplane of mixed wood-composite construction, equipped with front placed engine and fixed undercarriage of tri gear type. The airplane is equipped with a parachute emergency system. The airplane is designed according to the LTF-UL 2019 regulation, and is intended for recreational and cross country flying in the VFR conditions.

1.6. Modifications and changes

If the Manufacturer makes any structural or operational modification necessary to be advised to the owner, a related documentation will be delivered to the owner, who is obliged to record them into this Manual. Such documents are published in ascending numerical series.

In his own interest, the owner of the aircraft should regularly check manufacturer´s or its authorized representative´s websites, where current information and bulletins are published. In the case that owner sells the aircraft to another person, the owner shall announce this fact

to the competent authority who has this aircraft in its registry. The manufacturer should be also announced about the contact details of the new owner.

1.7. Main technical data

1.7.1. Dimensions

Wing span…...……...…8,7 m
Fuselage length..……....5,81 m
Wing area …….9,1 m^2
Wing aspect ratio…..…….….8,3
MAC depth b_{mac}……1,05 m
Horizontal tail span……..…….....2,44 m

1.7.2. Weights and tanks volume

Empty weight……..…….. kg
Maximum take-off weight……600 kg
Payload……..... kg
Maximum weight pilot/passenger…… 110 kg
Max. load in the luggage compartment. 15 kg

Fuel tanks volume…….……..100 l

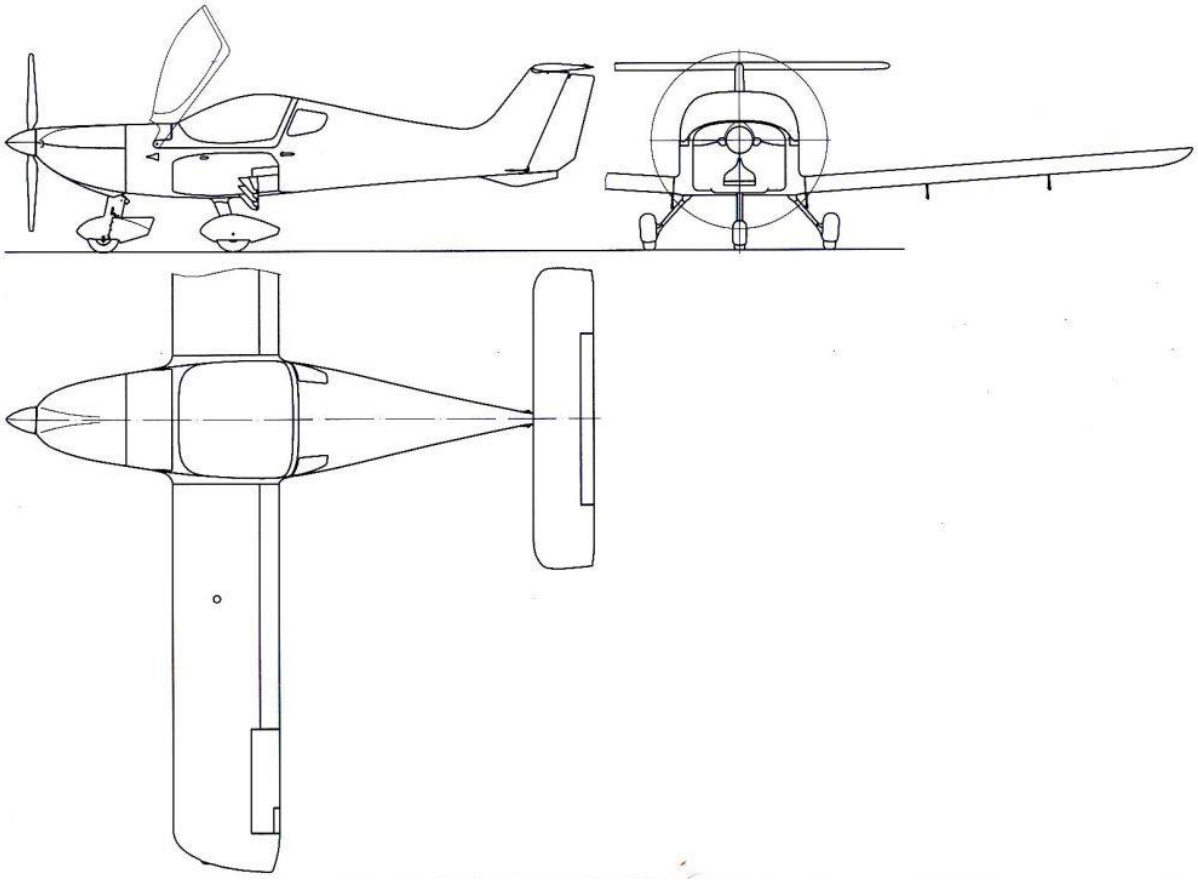
1.7.3. Landing gear

Landing gear track…….1,26 m
Wheelbase……..1,76 m
Tire dimension (main wheel)…….14x4 (350x120)
Tire dimension (nose wheel)……..12x4 (300x100)
Tire pressure ……. 200 kPa /2 atp
Suspension main gear…….composite spring
Suspension nose gear……steel spring
Brakes…….……..hydraulic disc brakes (DOT 4 brake fluid)

1.7.4. Ballistic rescue system

Type…….GRS 6/600 SPEEDY DULV
Max deployment speed……335 km/h

1.8. Three – view airplane drawing



1.9. Engine and propeller

The SD-2 is equipped with the engine Bombardier Rotax 912 ULS. The maximum power is 100 HP/73,5 at 5800 RPM (5 minutes limitation) and maximum continues power is 92 HP/69 kW at 5500 RPM.

The airplane is fitted with a 3 blade in flight adjustable propeller NEUFORM of 1,66 m diameter.

2. Operation Limitation

2.1 Airspeed limitation

	Speed	IAS (km/h)	Meaning
V_{NE}	Never exceed speed	**288**	Do not exceed this speed in any operation
V_A	Maximum maneuvering speed	**200**	Do not make full or abrupt control movement above this speed, because under certain conditions the aircraft may be overstressed by the full control movement.
V_{FE}	Maximum flap extended speed	**140**	Do not exceed this speed with the given flap setting.

2.1.1. Airspeed indicator marking

Airspeed indicator markings and their color meanings are shown in the table below:

Marking	Value (IAS) Range (km/h)	Meaning
White arc	**84 – 140**	Operation range with extended flaps. (The lower limit is 1.1 V_{SO} in landing configuration and maximum weight. The upper limit is maximum permitted speed with extended flaps.)
Green arc	**110 – 236**	Normal operation range. (The lower limit is 1.1 V_{S1} when maximum weight, maximum front position of C.G., and retracted flaps. The upper limit is maximum rough air speed V_{RA}.)
Yellow arc	**236 – 288**	Maneuvers must be conducted with caution and in a smooth air only
Yellow line	**206**	Maximum maneuvering speed
Red line	**288**	Maximum airspeed

2.2. Limitation of the maximum acceptable wind speed

The maximum acceptable nose wind speed for take-off and landing is **15 m/s.**

The maximum acceptable cross wind for take-off and landing is **7 m/s.**

2.3 Engine limitation

Engine type		ROTAX 912 ULS
Max. power- take-off (kW)		73,5
- continuous (kW)		69
Max. engine speed (5 min)	5 800 RPM	
Max. engine speed (continuous)	5 500 RPM	
Max. cylinder head temperature (°C)		115
Max. oil temperature (°C)		130
Oil pressure minimum (bar)	0,8 below 3500 RPM, 2,0 above 3500 RPM	
Oil pressure maximum (cold start only, bar)	7	
Oil pressure normal operation (bar)	2,0 – 5,0	
Fuel pressure (min-max, bar)	0,15 – 0,4	
Operation outside temperature range	-25°C	
	50°C	

For more details see Operator's Manual for all versions of Rotax 912 supplied with the engine.

Warning

ROTAX 912 ULS is not certified aviation engine. Any engine failure may occur at any time.

The pilot is fully responsible for the operation of the engine and accepts all risks and consequences of an engine failure. The correct operation of this aircraft is the sole responsibility of the pilot.

The pilot of sport flying device is obliged to plan the flight track and altitude so that to be able to make safety landing at any time in case of engine failure.

Warning

FLYING WITH THIS AIRCRAFT MUST BE ALWAYS PERFORMED WITH THE POSSIBILITY OF SAFE LANDING DUE TO LOSS OF ENGINE POWER.

2.3.1. Engine instrument marking

The aircraft is equipped with DYNON HDX EFIS. All measured values are marked directly on the display.

2.4. Weights

Maximum take-off weight...…….600 kg
Empty weight …….…… kg

Approved centre of gravity positions:
Empty airplane C.G. position……...13,1÷16,1% MAC
Operating C.G. range…….. 21,4÷36,1% MAC

Minimum pilot weight…….. 70 kg
Maximum pilot weight……..110 kg
Maximum passenger weight……..110 kg
Maximum fuel weight……...74 kg = 100 l

Maximum luggage weight……15 kg

2.5. Loading

Maximum crew weight (kg) Depending on the fuel tanks filling and baggage						
Fuel tank filling →	**Fuel gauge reading** →	Full	3/4	1/2	1/4	30 min. of flight
	Total fuel volume in litres →	100	75	50	25	8
Baggage weight →	Max: 15 kg	**189**	**208**	**220**	**220**	**220**
	2/3: 10 kg	**194**	**213**	**220**	**220**	**220**
	Without baggage	**204**	**220**	**220**	**220**	**220**

2.6. Approved maneuvers

SD-2 is approved as FAI UL. Following maneuvers are approved to be performed:

- **Steep turns up to bank angle of 60° -** recommended entering airspeed is **170** km/h.
- **Horizontal eights -** recommended entering airspeed is **170** km/h.
- **Climbing turns -** recommended entering airspeed is **190** km/h.

Warning
AEROBATICS AS WELL AS INTENTIONAL SPINS ARE PROHIBITED!

2.7. Maneuvering load factors

Maneuvering speed	**Airspeed IAS km/h**	**Load factor**
V_A- maneuver with maximum deflection of a control surface	**200**	**+ 4**
V_{NE} – maximum acceptable airspeed	**288**	**+ 4**
V_A – maneuver with maximum deflection of a control surface	**200**	**-2**
V_{NE} – maximum acceptable airspeed	**288**	**-2**
V_{FE} – with extended flaps	**140**	**+ 2**

2.8. Other limitations

SMOKING IS PROHIBITED ABOARD!

2.9. Limitation labels

Airspeed IAS		
Maximum airspeed	V_{NE}	**288 km/h**
Maximum maneuvering speed	V_A	**200 km/h**
Maximum rough air speed	V_{RA}	**236 km/h**
Maximum flap extended speed	V_{FE}	**140 km/h**

AEROBATICS AS WELL AS INTENTIONAL SPINS ARE PROHIBITED!

Flights according to IFR and intentional flights under icing conditions are prohibited!

2.10. Fuel

2.10.1. Approved fuel types

Premium unleaded auto fuel (Super RON 95- Standard Spec. for Automotive Spark-Ignition Engine Fuel, ASTM D 4814) or AVGAS 100 LL.

Note: Due to the higher lead content in AVGAS, the wear of the valve seats, the deposits in combustion chamber and lead sediments in the lubrication system will increase. Therefore, use AVGAS only if you encounter problems with vapor lock or if other fuel types are not available.

For more details see Operator's Manual for all versions of Rotax 912 supplied with the engine.

2.10.2 Fuel capacity

Fuel tank capacity (each wing tank)	**50** liters
Total fuel capacity	**100** liters
Unusable fuel	2 liters

3. Emergency procedures

3.1. Engine failure

Engine failure at take-off below 50 m

1. Increase the airspeed to **130** km/h
2. Choose an area for landing straightaway, only in a case to prevent from frontal crash change the direction
3. Ignition off
4. Fuel valve off

Engine failure during take-off when at least 50 m above ground

1. Correct the airspeed to **130** km/h
2. Choose an area for landing straightaway in a free space without obstacles
3. Ignition off
4. Fuel valve off
5. Flaps for lift increasing according to your need

3.2. Smoke and fire on board

1. Fuel selector OFF
2. Throttle lever FULL
3. When the engine stops master switch OFF
4. Extinguish fire by slip. Do not start the engine again
5. Make a safety landing

3.3. Emergency and safety landing

Emergency landing

1. Airspeed adjust to **130** km/h
2. Choose landing area – free space without obstacles
4. Tighten up the safety harness
5. Flaps – according to your need
6. Fuel selector OFF
7. Ignition OFF
8. Master switch OFF

Safety landing

1. Choose an area for landing – against the wind direction
2. In the altitude 50 m above ground make a fly-over with extended small flaps to check the chosen area for its surface and obstacles
3. In the altitude 150 m above ground make a circle with small flaps. Make downwind checklist.
4. Do not lose the chosen landing area from your view in case of a lower visibility.
5. Approach for landing made in landing configuration with higher engine power.
6. Correct the glide path to be able to touch-down immediately after flying over the edge of the chosen area.
7. After touch-down use brakes for prompt stop.

8. After stopping shut off the engine and master switch, close fuel valve and safe the airplane.

3.5. Recovery of unintentional spin

Standard procedure of recovery from spin:

1. Throttle lever - idle
2. Control stick - trim, ailerons – neutral position
3. Pedals - push down the pedal against the sense of rotation
4. Control stick - push forward and hold until rotation stops
5. Pedals - immediately after rotation stops return the pedal from the deflection to the neutral position
6. Control stick - recover the diving by smooth pull back

Warning
Intentional spins are prohibited!

3.6. Unlocked canopy after take off

After observation that canopy is not locked, reduce speed to max. 140 km/h and finish the full circuit. Do not try to lock canopy in flight. It is not possible due to strong suction. Perform full stop landing and lock the canopy thereafter.

3.7. Rescue system activation

In case of distress, when definitively losing control of flight, activate the rescue system.

1. Switch off the ignition
2. Fasten the safety belts
3. Put off foot of pedals
4. Activate the rescue system

In case of landing on limited space, and when collision with an obstacle is inevitable, use the balistic rescue system as a braking device of the aircraft.

3.8. Vibrations

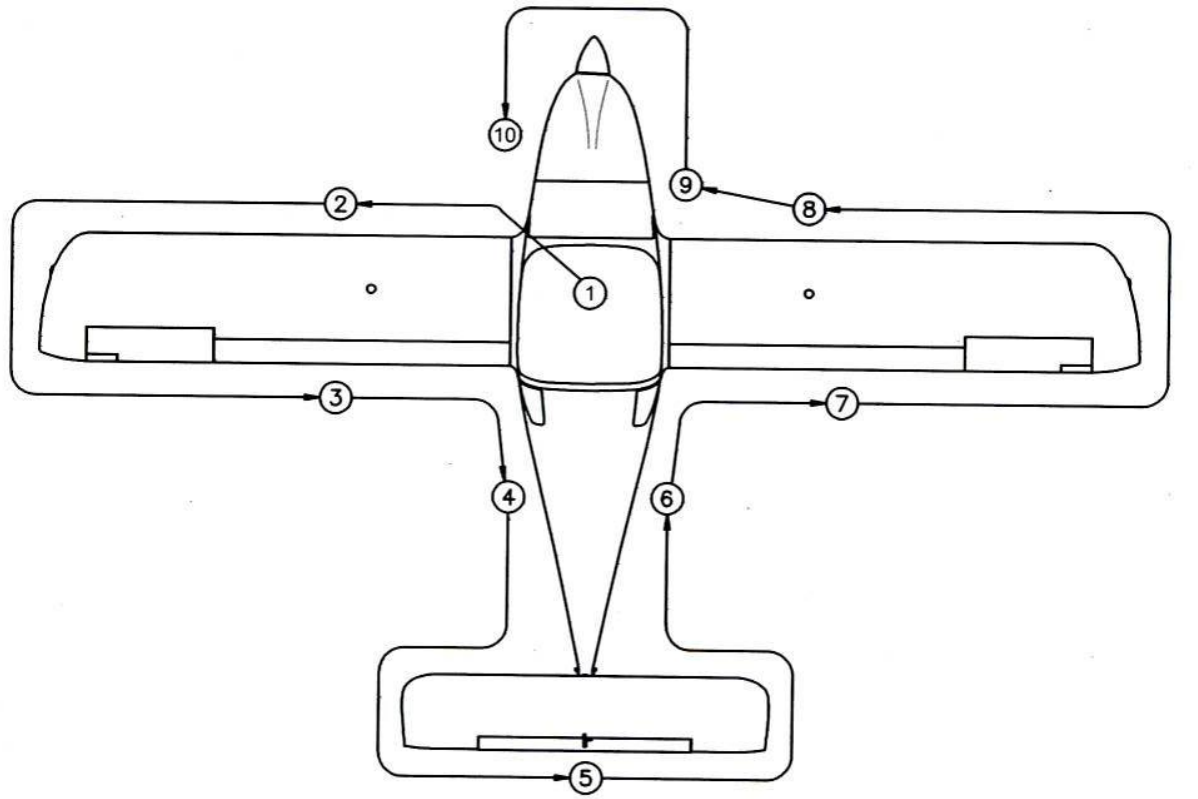
In case of unusual vibrations occure, it is necessary to:

1. Set up the engine run to appropriate RPM on which the vibrations are the lowest
2. Carry out safety landing, eventually find the nearest airfield to land

4. Normal procedures

4.2. Pre-flight check

Make the pre-flight check every flight day or before every first flight when assembled. Incomplete or reckless check may cause an accident. Make inspection in the way described in the check list.



NOTE

Word "condition" in the procedures means visual check of surface for damage, deformation, scratch, abrasion, corrosion or others events which lower the flight safety.

①	– ignition - OFF – master switch - OFF – engine master switch - OFF – instrument equipment - check on condition – fuel indicator - check on fuel condition – controls -visual check, function, allowance, free movement to its stop - check if lift flaps run – canopy - attachment condition, cleanness – check, if there are free object in the cockpit
②	– condition of engine cowlings, – condition of propeller and spinner, – condition of engine bed and exhaust system,

	– visual check on fuel and electrical system condition, – other checks according to the engine manufacturer instructions.
③	– wing surface condition, – leading edge condition, – check Pitot tube condition.
④	– wing tip - surface condition, attachment check, – aileron - surface condition, attachment, allowance, free movement. – flap - surface condition, attachment, allowance, free movement.
⑤	– landing gear - check on wheels attachment, brakes, condition and inflation of tires – condition of fuselage and wing bottom surfaces
⑥	– vertical tail unit - condition of surface and attachment, free movement, stops – horizontal tail unit - condition of surface and attachment, free movement, stops

4.3. Normal procedures and check list

4.3.1. Prior to engine starting

1. Controls .....free movement
2. Canopy .....close and lock
3. Brakes.....pull on
4. Safety harness.....fasten

4.3.2 Engine starting

1. Pre-flight inspection completed
2. Safety belts adjust and secure
3. Instruments check of values, settings
4. Canopy closed, locked
5. Master switch switch on
6. Engine master switch switch on
7. Fuel tank valve set left tank
8. Choke ON (cold engine only)
9. Throttle 1/3 of travel (idle for cold engine)
10. Control stick pulled
11. Propeller area "clear"
12. Ignition switch on
13. Starter switch on (10 sec as maximum without interruption, followed by a cooling period of 2 minutes)
14. After starting the engine, adjust speed to smooth operation – idle
15. Instruments Check out indication (oil pressure must rise within 10 seconds).

4.3.3 Engine warming up

Warm up to operating temperature - first at idle or **2000** RPM for 2 minutes, then at **2500** RPM to reach oil temperature of **50 °C**. Check temperature and pressure values must be within operating limits all the times

- Check the maximum power
  RPM must be around 4700 RPM
  - depending on propeller settings.
- Check of ignition (magnetos) – set **3 850** RPM,
  RPM drop should not exceed 300 on the either magneto nor 120 differential between magnetos.
- Check idle - **1600** RPM +-100

4.3.4 Taxiing

Use the engine power and brake according to your need. Do not use the brake continuously. Taxi carefully in the strong wind. Hold the control stick in pull position. Always check brakes functionality as soon as the aircraft starts taxiing. Modify taxiing speed in accordance the ground surface quality.

4.3.5 Before take-off

1. Altimeter.....set (QNH)
2. Trim.....set to neutral position
3. Controls.....check on free movement
4. Canopy .....check if closed properly
5. Safety harnesses .....tighten up
6. Flaps…….Set 19°

4.3.6 Take-off

Set airplane to the runway centerline. Gradually (not faster than 2 sec.) apply full throttle. Pull stick during take-off run to enlighten the front wheel. Move stick to more neutral position at rotation speed (app. 95 kph).

Let it build up speed to 130 kph in ground effect after lift-off and start to climb thereafter. Check max. CHT and OT during climbing.

4.3.7 Cruise flight

The **SD-2** has good flight characteristics within the whole range of permitted speeds and the centre of gravity position. The cruise speed is within a range of **150 – 250 km/h IAS (81 – 136 kt). In case of severe turbulence, do not exceed the speed V_{RA} 236 km/h.**

Pay attention to values displayed on flight and engine instruments. The values must not be exceeded throughout the flight. Optimal operating oil temperature shall be within a range of 90 - 110°C.

4.3.8 Approach and landing

The SD-2 is a clean and fast airplane so it is necessary to take it into account especially during approach to a short airfield. Slow down on 136 kph after 3rd circuit turn and set flaps to 2nd notch. Slow down on 120 kph and set flaps to 3rd notch on final. Then slow down on 95-100 kph depending on the direction of wind. The slotted flaps are very efficient –the descent is fast- so do not forget to flare on time.

4.3.9 Flight in rainy conditions

Intentional flights in rainy conditions are not recommended. The flights must be always performed under VFR conditions only. In case of inevitable flight in the rain is necessary to pay higher attention to aircraft control because of poor visibility and limited transparency of the canopy. In addition, a shorter hold-up position during landing, higher stall speed and extended take-off distance shall be taken into account.

Keep the following speeds in case of flight in the rain:

1. Climbing 140 km/h (75 kt)
2. Cruise flight 150 – 180 km/h (81 – 97kt)
3. Descending to land 110 km/h (59kt), flaps positions I. and II. as by Art. 2.2.

Note, that the rain can be accompanied also by other meteorological phenomena such as reduced visibility, strong wing, icing and hails. Under these conditions the flight is no longer possible!

4.3.10 Engine Shut-off

After landing and reaching the parking place, keep the engine running for a cooling period of at least 2 min. at app. 2000 RPM. If the engine was cooled down enough during descending and taxiing, it can be shut-off as soon as the aircraft stops.

1. Switch off all sectional switches
2. Switch off both ignition circuits and master switch.
3. Close the fuel valve.

5. Performance

All data stated in this section are valid for MTOM=600 kg and ISA conditions. Actual performance may vary due to pilot experience, weather and aircraft condition

5.1 Calibration of pitot-static system

IAS [km/h]	CAS [km/h]
70	69
80	78
90	88
100	97
110	107
120	117
130	126
140	136
150	146
160	156
170	166
180	175
190	185
210	204
230	223
250	242

IAS - indicated airspeed, ASI reading in your airplane

CAS – calibrated airspeed, ***indicated airspeed*** *corrected for instrument errors and position error (due to incorrect pressure at the static port caused by airflow disruption)*

5.2 Stall speed

	indication	Stall speed (km/h IAS)
Flaps retracted – **Vs1**	**0**	**100**
Flaps – 2. Position **Vs0**	**II**	**74**

5.3 Take-off distance – flap position 1

Grass surface

Take off (TO) roll	TO distance over 15 m obstacle
270 m	**390 m**

Hard surface (concrete/tarmac)

Take off (TO) roll	TO distance over 15 m obstacle
240 m	**360 m**

5.4 Landing distance

Grass surface

Total landing distance over 15 m obstacle	Landing roll
400 m	**150 m**

Hard surface (concrete/tarmac)

Total landing distance over 15 m obstacle	Landing roll
420 m	**170 m**

5.5 Climb performance

Altitude	Climb speed	Airspeed for max. climb speed (km/h IAS)
0 ft	**4,6** m/s	**140**
	910 ft/min	
3000 ft	**4,1** m/s	**140**
	810 ft/min	

5.6 Airspeed

Maximum horizontal speed is 250 kph. Optimal cruise on 4800 RPM (65% of power setting) is 210 km/h.

6. Weight and balance

6.1 Introduction

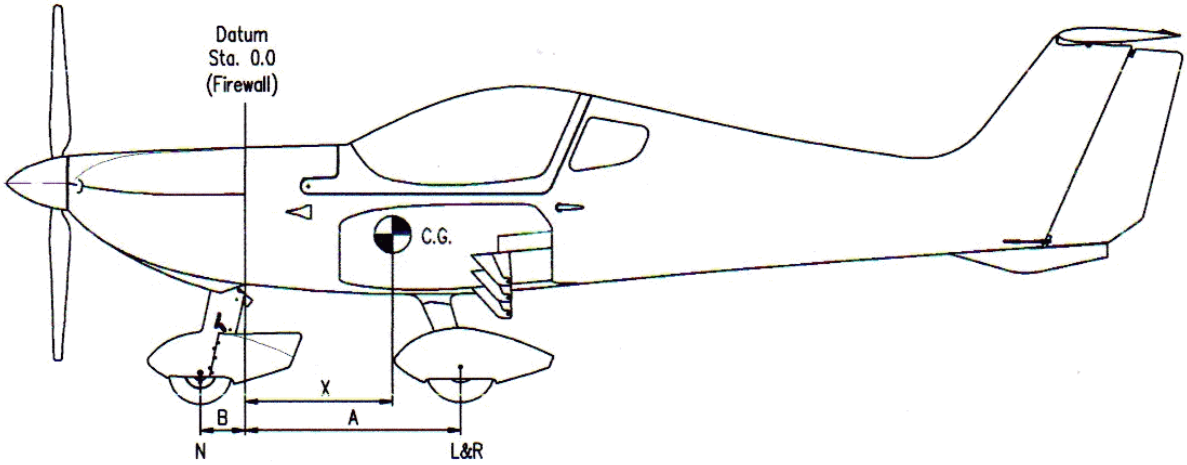
The weight, useful load and details of the centre of gravity are described in this chapter.

6.2 Empty weight

The empty weight is the weight of fully equipped, ready to operate aircraft, excluding fuel and crew.
The empty weight is a total sum of all weight values measured on all wheels of the undercarriage simultaneously.
The empty weight of the aircraft is……kg

6.3 Determination of airplane empty weight and CG position

The airplane must be weighed in horizontal position – see scheme bellow. Reference plane is airplane firewall.



All operating fluids must be filled to the maximum volume and only an inexhaustible amount of fuel remains in the tank.
The following values must be measured:

Reaction of front wheel	N =	kg
Reaction of left main wheel	L =	kg
Reaction of right main wheel	R =	kg

Distance of nose wheel from reference plane:	B =	mm
Distance of main wheel from reference plane:	A =	mm

Empty weight of airplane:

$$M = L + R + T[kg]$$

Range of approved empty weight 310-370 kg

Airplane CG:

$$X_L = \frac{A * (L + R) + N * B}{M} [mm]$$

$$\overline{X_T} = \frac{X_L - 464}{1050} * 100[\%]$$

The permissible CG range for empty airplane is:

602 – 633 mm behind reference plane, also 13,1 – 16,1 % MAC

6.4 Permissible centre of gravity (CG) position range

The correct CG position is ensured if the weight limits of the crew, baggage, fuel and equipment are respected - as defined in section 2 of this manual and the weight label on board your aircraft, which must be modified after each change affecting the weight and centering (position of the center of gravity) of the aircraft.

The permissible CG range is 690 – 847 mm behind the reference plane, i.e.

Front end point	21,4 % MAC= 226 mm from leading edge
Rear end point	36,1 % MAC= 383 mm from leading edge
MAC	1050 mm

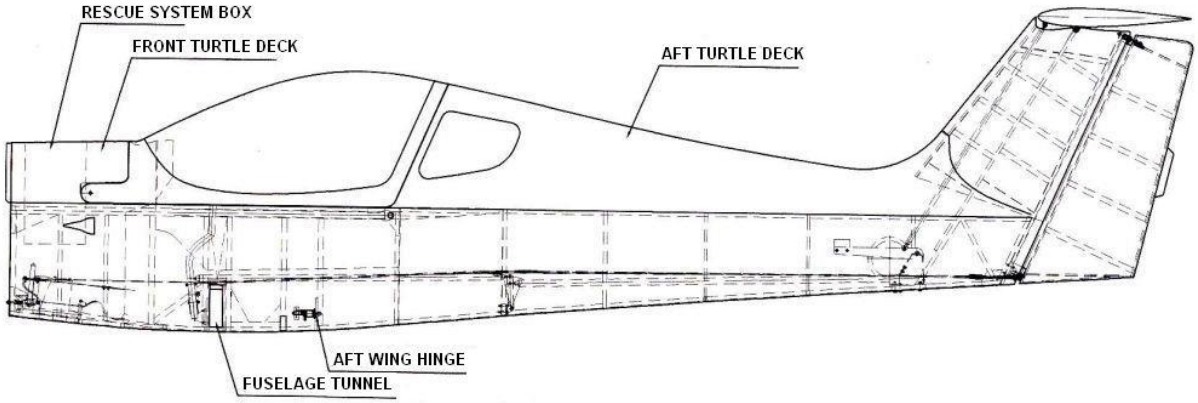
WARNING

IT IS A PILOT˝S RESPONSIBILITY TO OPERATE THE AIRPLANE IN THE ALLOWED RANGE OF THE WEIGHTS AND C.G. POSITIONS.

7. Aircraft and systems description

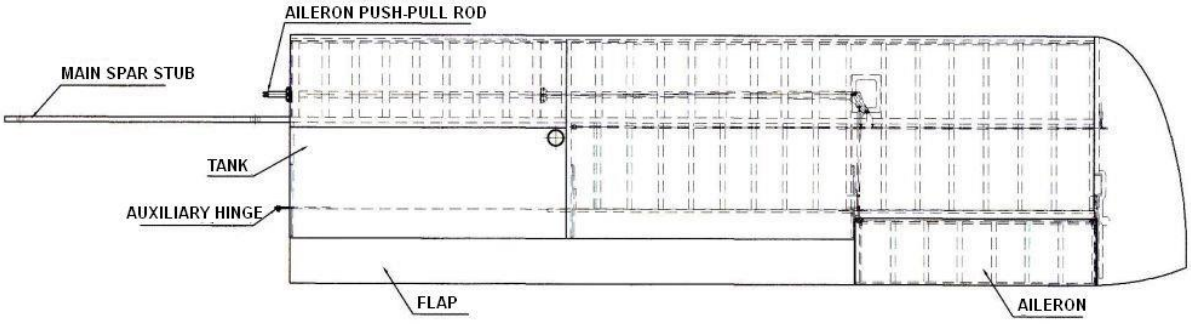
7.1 FUSELAGE

Fuselage is of wood truss design with prevalent section 15x15 mm covered with plywood of 1-3 mm thickness. The front turtle deck (round part of fuselage above longerons) is made of carbon composite. The aft turtle deck is made of sandwiched glass composite with carbon reinforced roll over protection frame. The pilot seat back is inclined under 38°. The inside width of cockpit in shoulder place is 117 cm. The plywood tunnel with wing and upper gear legs mounts is under pilot knees. The baggage compartment of 100 l volume is behind seats. The plexi glass canopy of 3 mm thickness is glued to the carbon frame, fixed in front to the fuselage via hinges. It opens up forward with the help of air springs. The ventilation NACA inlets are placed on the sides of the fuselage just in front of the canopy. The air is ducted using hoses to the eyeball outlets placed on the instrument panel.



7.2 WING

The main spar of half wing is made of carbon composite with pultruded spar caps. The integral composite tank is bonded to the back side of spar at wing root. The XPS ribs are used on the rest of wing surface. The areas with XPS ribs are covered with 1,5 mm plywood. Wingtips are made of sandwiched glass composite. The flap hinges are bonded to the tank and plywood reinforced rib. The aileron is of plywood/XPS ribs construction. Ailerons are fully statically balanced. The left aileron could be equipped with the electric trim. The flaps are made as carbon composite/PVC sandwich. Both wing and flap hinges are made of glass composite. Connection of wings stubs to fuselage is made through two main and two auxiliary pins.



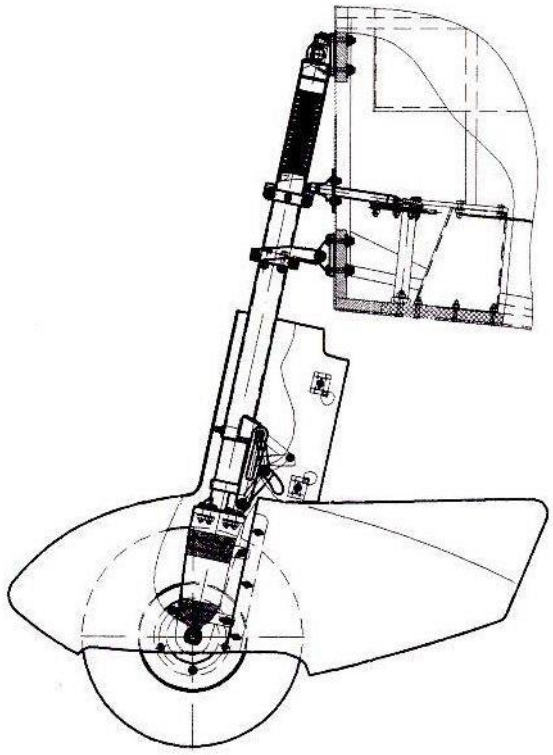
7.3 TAIL

The all - movable horizontal tail (HT) has trim/anti-servo tab and is statically balanced. Tails are of similar construction as wings- on composite spar are bonded XPS ribs and plywood skin. The trim/anti-servo tab is actuated via electric servo controlled by switch on the middle console or on the stick. Disassembly of HT is made thru disconnection of control and tab rods and pulling out of pin. The fin has main composite spar with carbon caps and HT hinge. The rest of fin is of plywood/XPS ribs construction. The rudder is of plywood/XPS ribs construction.

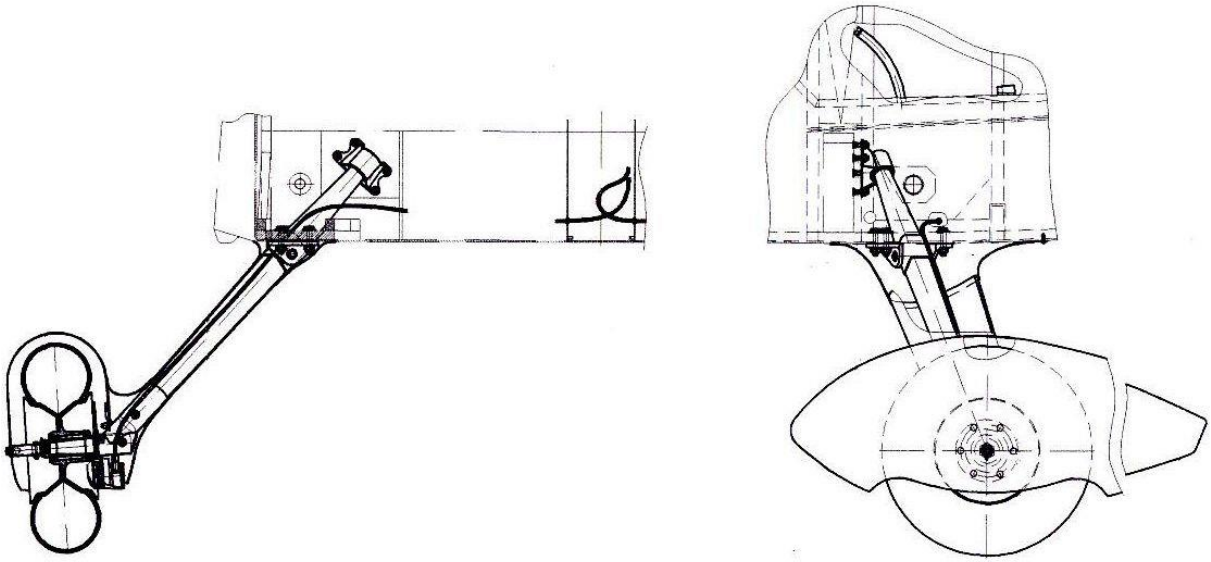
7.4 UNDERCARRIAGE

The main gear legs are made of glass roving/epoxy composite. The wheels of size 14x4 are installed on the pin made of aluminium alloy. Hydraulic disc brakes are actuated via handle placed on the cockpit middle console. The parking brake is installed behind the brake handle. The nose wheel of 12x4 size is held in the carbon composite fork. The fork is bolted to the telescopic leg made of CrMo steel tubes. The cushioning is performed via combination of steel and rubber spring.

FRONT GEAR



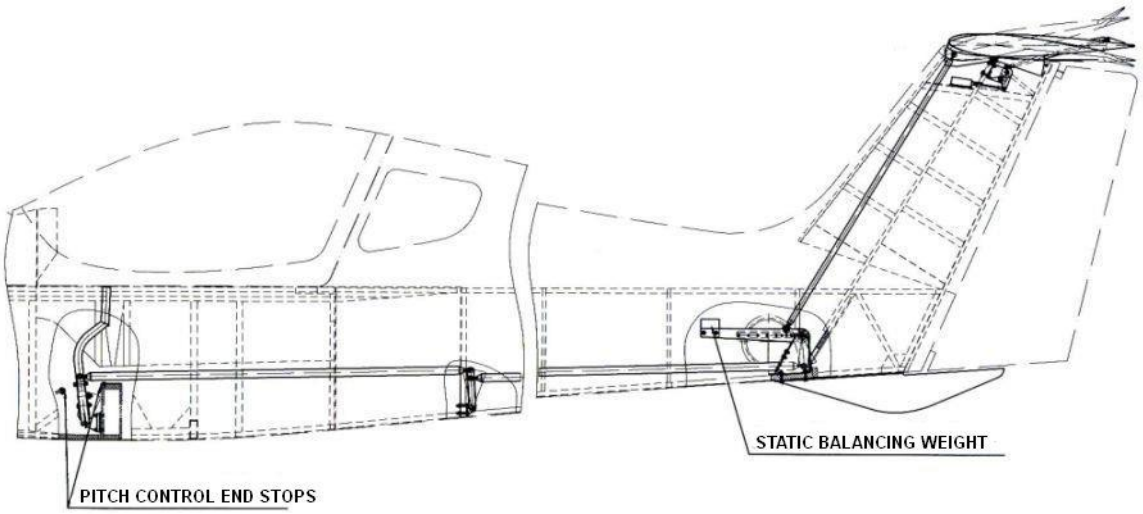
MAIN GEAR



7.5 CONTROLS

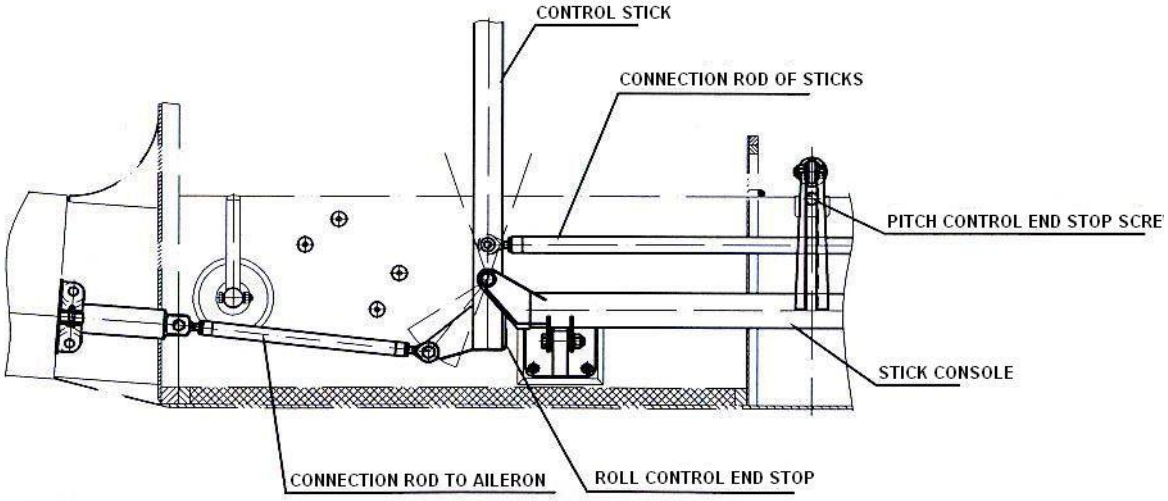
7.5.1 Horizontal tail controls

The all - movable horizontal tail is controlled via 3 pushrods and 2 bell cranks. The 2nd bell crank placed bellow the fin has incorporated lever with elevator static balancing weight. The first pushrod is actuated by the lever of control stick console.



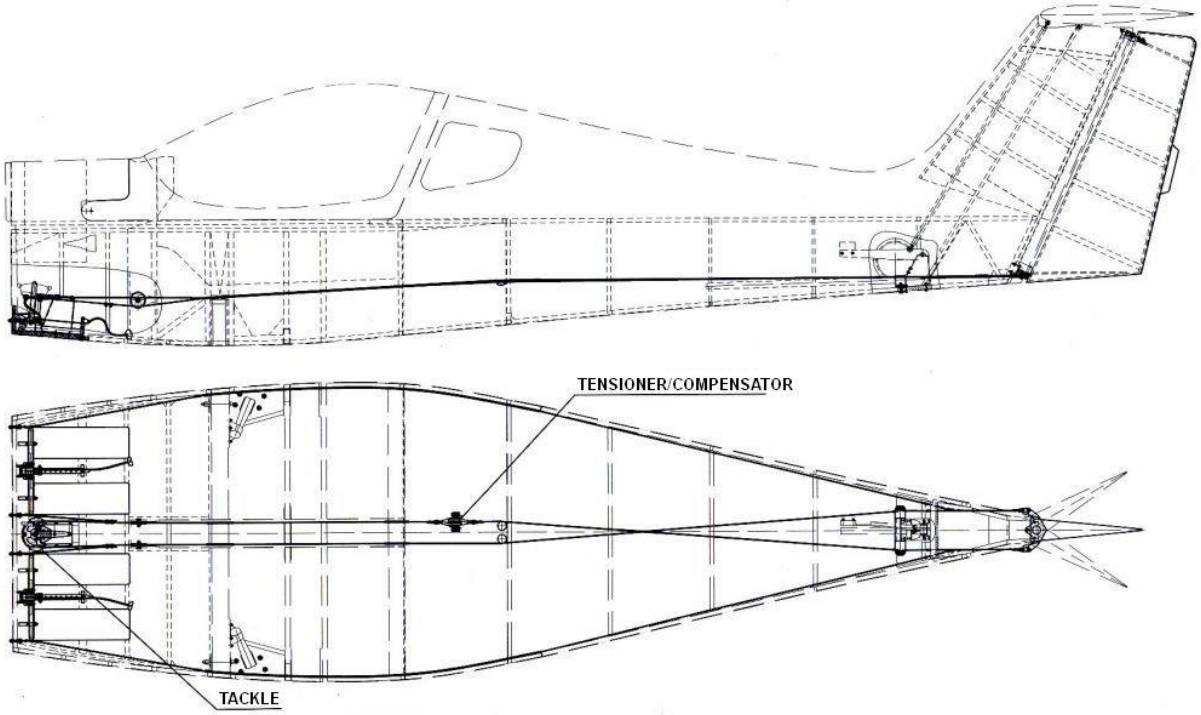
7.5.2 Aileron controls

The ailerons are controlled via 3 pushrods and 2 bell cranks bolted to the main wing spar and rib.



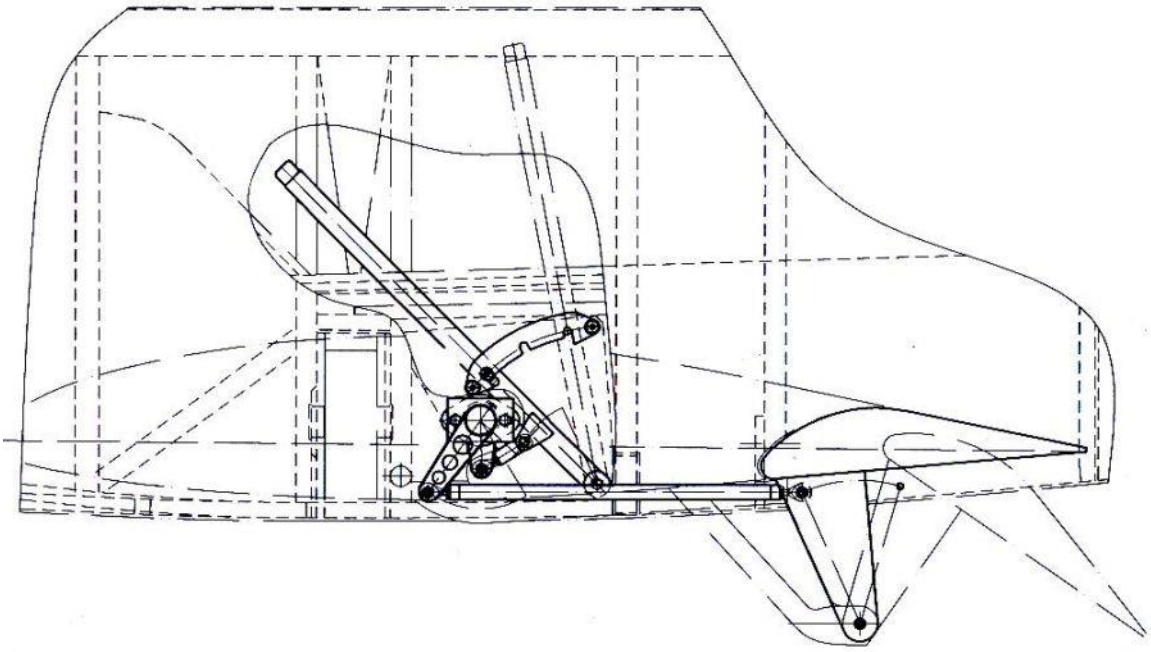
7.5.3 Rudder controls

The pedals of rudder control are independently adjustable in the 150 mm range. Due to this fact the 2 cable circuits are used. The inner cable circuit is pre-tensioned due to the pulley to which is connected the nose wheel control lever. Both circuits are connected to the rudder lever.



7.5.4 Flaps control

Flaps are controlled by the lever placed on the cockpit middle console or by the electric servo. The lever or the servo actuates the torsion tube placed bellow the seats. At the ends of the torsion tube hidden in the fuselage-wings fillets are levers which actuate pushrods connected to the flaps hinges. Electric servo could be used alternatively instead of lever.

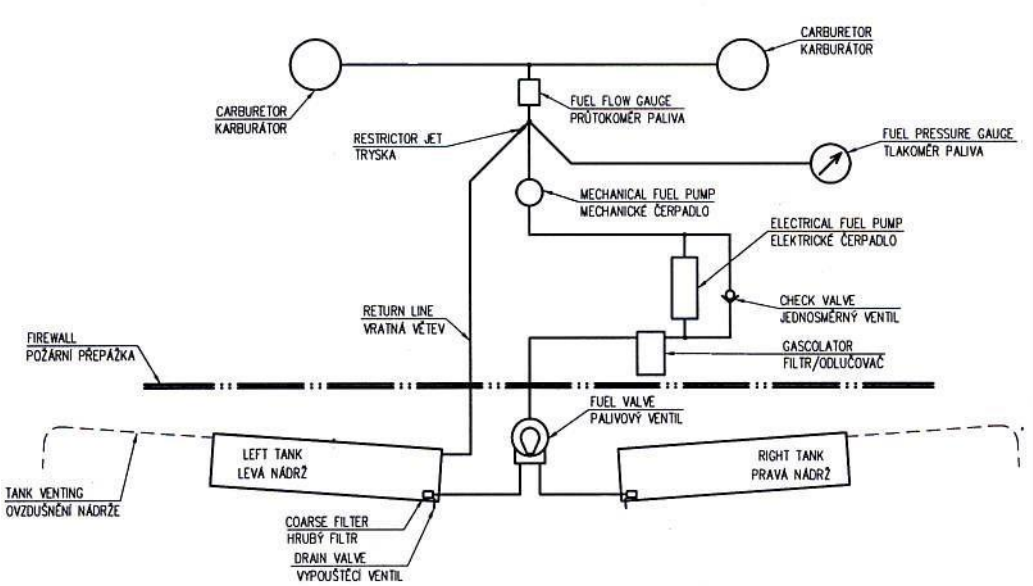


7.6 ENGINE

The airplane is driven by Rotax 912 ULS engine. Engine mount is made of 25CrMo4 steel tubing. The three blade Neuform in flight adjustable propeller is used.

7.7 FUEL SYSTEM

The integral tanks of 50 l capacity each are placed on the back side of main wing spars. The tanks are made of fiberglass-PVC foam sandwich. The fuel valve selector is placed on the middle console under the throttle lever. The rest of fuel installation is placed in front of the firewall – see scheme bellow.



7.8 ELECTRICAL SYSTEM

The bus is juiced by the 12 V/14 Ah lead/LiFePO battery and is charged by the engine alternator integrated in electronic ignition.

7.9 INSTRUMENTS AND PITOT-STATIC SYSTEM

The airplane is fitted with DYNON HDX EFIS. The EFIS displays both flight and engine monitoring data. The COM and XPD antennas are placed on the bottom of fuselage-just behind the wings. The pitot tube is placed on the bottom of right wing. The static ports are placed on the both sides of fuselage just behind the cockpit bulkhead.

7.10 RESCUE SYSTEM

The airplane is optionally equipped with the rescue system GRS 6/600 SPEED.
The container of the system is placed in the front turtle deck just behind the firewall. The front ropes are attached to the reinforcements on the back side of firewall. The auxiliary ropes are attached to the fuselage side gussets just behind cockpit.

7.11 RUDDER DEFLECTIONS

Rudder: Right/Left		30°, 210 mmm +/- 10 mm
Elevator:	Up	11,5°, 91 mm +/- 5 mm
	Down	6°, 47mm +/- 5mm
Aileron:	Up	23,5°, 110 mm +/- 5 mm
	Down	11,5°, 54 mm +/- 5 mm
Flaps 0:	Down	0°,
Flaps 1:	Down	19°, 90 mm +/- 5 mm
Flaps 2:	Down	38°, 178 mm +/- 5 mm

8. Ground handling, servicing, storage, transportation and the maintenance of the airplane

8.1. Introduction

This chapter contains procedures recommended by the manufacturer for the proper airplane operation.

8.2. Ground handling

For ground handling use delivered tow bar basically. If there is need of plane steering without tow bar it could be done using rudder carefully. Do not use high pressure on its skin otherwise damage could occur. When more force is needed for handling, the plane can be pushed flat with the palms of the hands on the upper wing skin.

8.3. Anchorage of the airplane

Anchorage of the airplane is necessary in order to avoid possible damage caused by wind or wind gust when parking outside the hangar. For this purpose, the airplane is equipped with anchor eyes at the wing tips.

8.4. Cleaning and care

The airplane surface should always be treated with suitable cleaning agents. Oil and grease remnants can be removed from the surface by suitable smooth active soap substances or alcohol. The canopy should be only cleaned with a sufficient tepid water flow with addition of smooth active substances. Never use petrol or chemical solvents. Do not use water jet stream for airframe cleaning and avoid water inlet into Pitot- static system, engine compartment, ventilation holes and other open areas on the airframe.

8.5. Storage

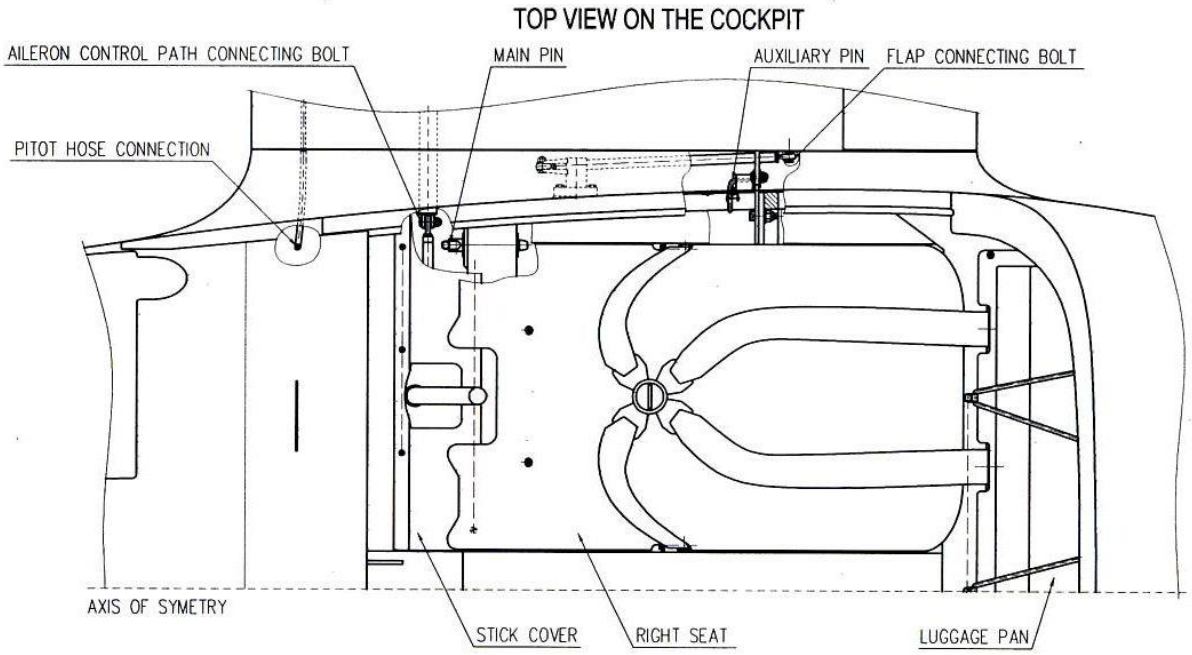
The aircraft shall be stored dry and covered by protective cloth, on a dry place or facility to be prevented from structural or surface damage, which may be also caused by extreme weather conditions, high humidity, sunshine or temperature changes etc.
A stored aircraft shall be properly fixed to avoid self-movement. All instruments, switches, magnetos and ignition shall be switched off. Rescue system shall be properly locked to avoid its activation. Pitot tube shall be covered with an appropriate cover to avoid internal pollution of the Pitot system. Any cloth cover of the canopy is recommended to avoid risk of scratches.
If the aircraft is supposed to not to be operated for longer than one month period, it is recommended to remove back-up batteries from instruments (GPS, EFIS...) and to maintain them charged. The main battery shall be maintained charged.
The tires inflation pressure shall be checked periodically.
For engine maintenance during the storage, follow the instructions of the engine manufacturer.

8.6. Transportation

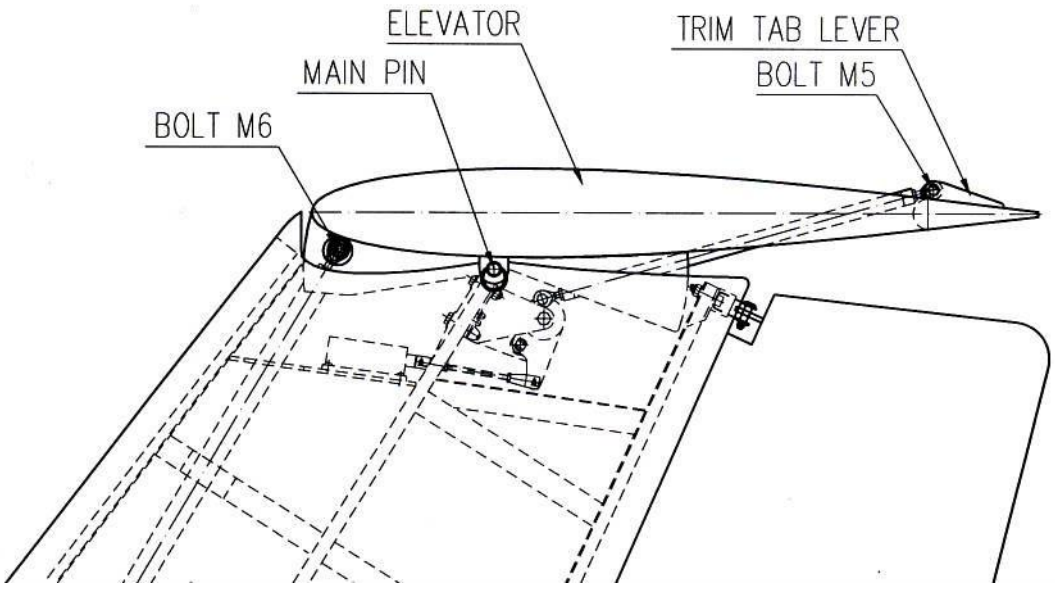
Disassembled airplane should be transported in suitable trailer if possible. In case that trailer is not available should be wings and elevator packed in soft material and fixed carefully against movement during transportation. Wheel pants should be removed and fuselage fixed thru undercarriage using anchor belts so that brake hoses and wheel pants holders cannot be damaged during transportation.

8.7. Disassembly and assembly

The tanks must be drained before the **disassembly of wings.** If there is more than 5 liters left in the single tank, use the tanking hose for draining thru the fuel cap. Be careful with the tougher hose, you can damage float of fuel sensor placed at the root of tank or inside surface of tank. The rest of fuel must be drained thru the vent on the bottom of the wing.
Remove the seat cushion held in place by Velcros in the front part of the seat so that you can get to the 2 screws holding the seat on the fuselage tunnel.



Remove screws and then the seats.
Release the knot on the rope holding the leather cover around stick. Remove all screws holding the composite stick covers in the place. Release covers over sticks and remove them from the cockpit. Dismantle bolt on the connection of wing aileron rod and stick. Connect flap with the wing using the tape so that it cannot be damaged during further wing manipulation. Dismantle the bolt connecting flap with the control rod. Remove safety pins from the main wing pins and fences of auxiliary pins. Release the auxiliary pins by pulling them in the direction of the flight and swinging currently. Disconnect all fuel hoses placed under the seats and the pitot and AOA hoses placed on the right side of the cockpit just in the front of the tunnel. Support the wings by frames or ask helpers. Remove main pins in the same manner as the auxiliary ones. Pull the wings carefully about 5 cm out of fuselage and disconnect all electric connectors. Look out for the fuel gauge wire connectors which are connected directly to the fuel sensors. Pull out the wings from fuselage when everything is released and put them on the soft underlay or into wing holders.
Fix the control stick in a fully front position while **elevator disassembly** putting some soft spacer (e.g. piece of PS) between the stick and fuselage tunnel.



Dismantle bolt M5 connecting the control rod end with the trim tab lever. Dismantle bolt M6 in the front part of elevator connecting the front hinge with the control rod. It is hidden in the composite fillet. Use the Allen wrench 5 mm on the bolt head and the socket wrench 10 on the locknut.
Remove the split pin from the castle nut of the main pin. Dismantle the castle nut, push out the main pin from the elevator hinges and fin using auxiliary installation pin. Remove the elevator from the fin with the help of another person.

The assembly of the wings and elevator should be performed in the reverse sequence. It is necessary to clean and grease **ALL** pins **before** assembly to avoid their seizing. Check proper fuel sensor connectors placing (fuel gauge reading) before final pushing of the wings into the tunnel. **Always** use the new locknuts on the elevator bolts. The castle nut must be **ALWAYS** secured with the **NEW** split pin.

8.8. Periodical inspection of the airplane

The time intervals in which is necessary to perform comprehensive inspections or maintenance depend on the service and on the whole airplane condition. Use only original parts if any exchange is necessary.
Periodical checks must be performed at least in these intervals:

a) After first 25 hours of service

b) After each 50 hours of service

c) After each 100 hours of service or minimally 1x per year.

The engine maintenance system is defined by Engine service manual.
The propeller must be serviced in accordance to its manual.

8.9. The list of work at periodical inspections

8.9.1. Inspection after first 25 hours and after 50 hours

Action Nr.	Description	Performed by	Checked by
1	**Generally** Wash whole airframe using wet sponge and suitable detergent. Remove cowling and covers and check fixing of all parts (fuel, oil, exhaust and electrical installation). Check tightening and securing of all hardware.		
2	**Controls** Check control cables on damage. Check metal parts for corrosion. Repair if necessary. Grease moving parts. Check movement smoothness and its assembly.		
3	**Undercarriage** Remove covers and check free motion in the pins of lower main leg consoles. Check free motion in the tailwheel pin. Lubricate all pins using grease.		
4	**Tyres** Check pressure in tire, its wear, discs and brake system. Exchange tire in case of excessive wear.		
5	**Engine** Check engine installation, exhaust system, oil, all hoses and controls on damage and wear. Check air filter and wash it in water with detergent if necessary.		
6	**Exhaust system** Check the guskets, tubes and exhaust muffler for cracks, leaks and missing parts.		
7	**Cowling** Check cowling for play, cracks or any damage. Check completeness of hardware.		
8	**Propeller** Check tips and leading edge on damage.		
9	**Fuel system** Check tightness of the whole system and condition of all hoses. Check smoothness of fuel valve run. Check gascolator cup for strange particles.		
10	**Battery** Check voltage. Charge if necessary.		
11	**Cockpit** Clean using wet towel. Remove dirty from floor using vacuum cleaner.		
12	**Canopy** Use agent suitable for cleaning of acryl glass. Do not use gasoline, alcohol etc.		

8.9.2. Inspection after 100 hours or year examination

Action Nr.	Description	Performed by	Checked by
1	**Generally** Wash all outside skin of an airplane. Vacuum clean all accessible internal spaces. Check on damage, wear and corrosion.		
2	**Front of airplane** Check engine (see engine manual), hoses, engine mount, propeller, battery, exhaust, firewall and rescue system. Check tightening and securing of hardware.		
3	**Fuel system** Check tube on cracks and valve function. Check fuel filter and exchange it if necessary.		
4	**Fuselage** Check outside skin on cracks and inside structure on possible fungus.		
5	**Controls** Check free movement, wear of cable, tubing, bushes in stick, brackets, mixer and rod ends. Check end stops.		
6	**Instruments** Check screws, fuses, placards, switches and pitot system. Assure that all instruments work fine.		
7	**Wing** Check skin for cracks and possible bonding failure. Check possible free movement in main and auxiliary assembly pins. Check aileron and flap hinges and possible free movement in control connection pin.		
8	**Tails** Check skin for cracks and possible bonding failure. Check possible free movement in all pins and their securing.		
9	**Undercarriage** Check in accordance to 25 hours inspection.		
10	Lubricate all moving parts-see e plan		
11	Check all hinges of control surfaces and moving parts. Perform repair action if free movement in hinge exceed 0,4 mm. The free play in hinge of horizontal tail should not exceed 0,1 mm.		

Assemble all dismantled parts after performed inspection and/or maintenance and perform engine run up.

8.9.3. Airplane repairs

Each damage, which may have an influence on airframe strength or flight characteristics must be reported to the Manufacturer. The Manufacturer determines a way of repair.
"Minor repairs" mean the repairs of those parts, which do not have significant influence on function and strength of the aircraft. Among permitted repairs belong:

- paint repairs
- worn-out parts exchange
- repairs of wheel tires

Above mentioned minor repairs can be carried out by the owner himself. Repairs of torsion box, spars, wings, tailplanes, landing gear and load-bearing structure of the fuselage must be carried out in a specialized workshop. Any repairs to be done during the warranty period shall be agreed in advance with the manufacturer or its authorized dealer.

If any surface repairs or changes, a white colour may be kept on upper side exposed to the sunshine.

8.9.4. Engine Major Overhaul

The major overhaul should be carried out after 2000 flight hours but not later than 10 years after putting the aircraft into operation, unless decided otherwise during regular technical inspections or by the Manufacturer´s bulletin. The overhaul, maintenance or service works can be only done by a special workshop authorized by the engine manufacturer. The overhaul and maintenance are carried out according to the Manual of the engine manufacturer.

8.9.5. Lubricating plan

a) Lubricant used

- Use suitable lubricating grease.

b) Lubricated places

- All rod end bearings
- Whole controls of ailerons and horizontal tail
- All pins and bushes of wing and HT at every disassembly
- Trim/antiservo tab hinges
- Rudder hinges
- Pedal set tube (use silicon based grease)
- Throttle cables
- Choke cables

Apendix 1. Log Book

Each aircraft must be equipped with the log book where all flight information are noted just after each task performed.

D-MXXX						
Date	**Pilot name**	**Task**	**Flight Time /day**	**Flight Time (total)**	**Number of Take-offs**	**Fuel filled (L)**

Apendix 2. Service and Maintenance Book

Any mandatory inspection works, works based on Manufacturer´s bulletins, repairs, changes, modifications, replacements, inspection reports or other important notes must be recorded in the following sheet.

Date	**Works performed / reason** (mandatory inspection works, bulletins, repairs, modifications, replacements, inspection reports, notes)	**Signature**

Date	**Works performed / reason** (mandatory inspection works, bulletins, repairs, modifications, replacements, inspection reports, notes)	Signature