FM-250 Vampire

Flight Manual

TABLE OF CONTENTS

5. Performance

5.1 Introduction
5.2 Speed
5.3 Rate of climb and loss of height during stall
5.4 Take off and landing distance
5.5 Flying range
5.6 Gliding ratio
5.7 Cruise
5.8 Fuel consumption

6. Airplane Handling, Service & Maintenance Information

6.1 Anchoring an airplane
6.2 Manipulation with an airplane
6.3 Rigging and de-rigging
    6.3.1 De-rigging
    6.3.2 Rigging
6.4 Washing and cleaning of an airplane
6.5 Filling the fuel
6.6 Placards and their locations
6.7 Stepping up on an airplane

7. Service life of an airplane and maintenance cycles

7.1 Service life of an airplane
7.2 Maintenance
    7.2.1 Lubrication
    7.2.2 Disassembly of the nose wheel
    7.2.3 Disassembly of the main wheel
    7.2.4 Tire repairs
    7.2.5 Electrical installation
        7.2.5.1 Electrical installation inspection
    7.2.6 Spark plugs
    7.2.7 Special tools
    7.2.8 Minor repairs
    7.2.9 Changing the fuel filter in the engine area
    7.2.10 Propeller maintenance
    7.2.11 Jacking points on an airplane
7.3 Introductory inspection
7.4 Periodic inspection after every 50 hours
7.5 Periodic inspection after every 100 hours
7.6 Periodic inspection after every 200 hours
7.7 Periodic inspection after every 300 hours
7.8 Placards and their locations

8. Repairs

8.1 Replacement of screws
8.2 Repairs of rivet joints
8.3 Controls repairs
8.4 Airframe repairs
8.5 Fuel system repairs
8.6 Engine repairs
8.7 Electrical system and electrical appliances repairs

9. Rotax 912 / 912S engine maintenance

9.1. Oil change
9.2 Spark plugs
9.3 Fuel
9.4 Liquid coolant
9.5 Service life and engine inspections
9.6 Service life of rubber parts of engine

This manual uses the following expressions to emphasize particular information:

WARNING	**Indicates an obstruction which, if not followed, may cause serious injury or even death.**
ATTENTION	**Indicates an obstruction which, if not followed, may cause severe damage to an airplane or its components.**
NOTE	**Indicates additional information which may be required**

1. General

1.1 Introduction

This flight manual describes performance and flight characteristics of **FM-250 Vampire** and contains necessary information and instructions for pilots.
Every pilot of **FM-250 Vampire** must read this flight manual thoroughly before the first flight as a pilot in command.
It will not teach you to fly or build the airplane but it provides important information to fly the airplane safely. It must remain in the aircraft during all flights.

OPERATIONS AUTHORIZED

FM-250 Vampire is certified as an ultralight aircraft and is equipped for day VFR operations.

The airplane must be operated in accordance with all rules valid for UL aircraft. If there is any information in this document, which contradicts such rules, it is to be disregarded.

MANEUVERS - ULL CATEGORY

FM-250 Vampire is certified in the UL (Ultralight) category. The UL category is applicable to ultralight airplanes intended for non-aerobatic operations. These include any maneuvers incidental to normal flying and turns in which the angle of bank is not more than 60° and pitch attitude nose up or down not more than 30° from horizontal.

NOTE

Operation of this airplane is at your own risk.

1.2 Description

1.2.1 Airframe

FM-250 Vampire is an all composite ultralight low wing airplane with two seats.
The fuselage has sandwich composite construction, with oval cross section shaped to achieve the propitious proportion considering rigidity, weight and aerodynamic drag.
The landing gear consists of two main wheels and a nose wheel. The main wheels are equipped with hydraulic disk brakes. The nose wheel is steerable.
The brakes are hand-operated from both seats using a lever on the center console. The lever can be locked in the full back position; therefore it can be used as a parking brake.
The wheels can be equipped with fairings.
The cockpit is arranged with side by side seating. It is covered with large, clear or tinted forward-hinged canopy, which provides an exceptional view. The canopy is held open using a gas strut and it has two locks on both sides of the canopy. The cockpit is equipped with ventilation and heating.

FM-250 Vampire has full dual controls consisting of two control sticks, rudder pedals, trim-tab lever, throttle, landing flaps and brake levers.

The wing has cantilever all composite construction with one main and one rear auxiliary spar, which holds ailerons and split landing flaps. The main spars of both wings are joined by two bolts and rear auxiliary spars are connected to the fuselage by two screws, all fitted in bearings.
The entire empennage is also all composite construction. The right elevator contains trim-tab.

1.2.2. Fuel system

The fuel system consists of an integrated composite fuel tank in the right wing with fuel level sender, fuel lines, fuel valve, filter, fuel screen in the tank, drain valve and mechanical fuel pump. This applies for the engines Rotax 912 and 912S series.
Fuel tank is equipped with a fuel cap located on the top of the right wing.

1.2.3 Engine

Aircraft is powered by Rotax 912 UL or 912 ULS engine, which ensures the airplane's excellent dynamic and flying characteristics. Engines Rotax 912 UL and 912 ULS are four-stroke four-cylinder opposed type engines with liquid-cooled cylinder heads and air-cooled cylinders.
The engine has an integrated reduction gear and two carburetors. More information about the engine is enclosed in the engine manual.

WARNING
None of the above mentioned engines are certified for aviation use. Even though a maximum attention is paid during their production, engine failure can occur at any time. Pilot of the airplane is solely responsible for the consequences.
The obligation of the pilot is to be able to glide and land safely to preselected area in the case of engine failure.

1.2.4 Propeller

It is possible to use non-adjustable, ground adjustable, in flight adjustable or constant speed propellers. The description of the propeller is provided with your airplane and is included in the instructions for assembly and maintenance of the propeller.

1.2.5 Landing gear

Landing gear consists of two main composite legs and a welded front leg. The tricycle gear configuration, steerable nose wheel and hydraulic brakes all combine make the aircraft easy to handle on the ground.

1.2.6 Controls

Controls are made of AlCu4PbMg and AlCuMg1 aluminum alloys. All controls are fitted in bearings.

1.2.6.1 Movement of flight controls

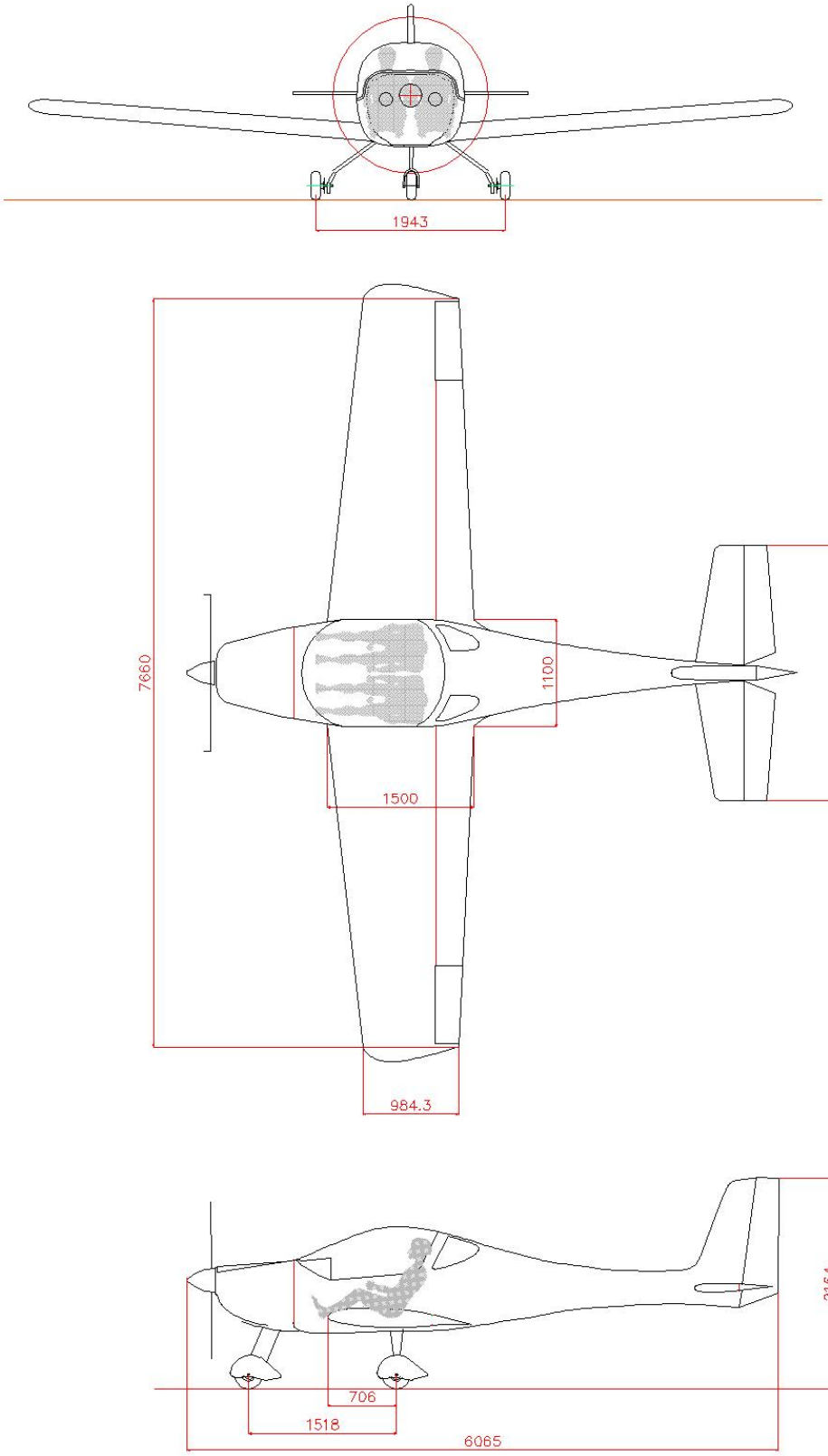
Pitch control is effected by fore-aft movement of the control stick. Its movement is transmitted to elevator using rods.
Pitch trimming is effected by lever installed between the seats right to the throttle. Its movement is transmitted to trim-tab using cables.
Roll control is effected by sideward movement of the control stick. Its movement is transmitted to ailerons using rods.
Yaw control is effected by rudder pedals. Their movement is transmited to the rudder using cables.
Braking is effected by foot operated brakes located on the rudder pedals.
Landings flaps are actuated by a lever installed between the seats behind the throttle and pitch trim. The most forward position of the lever corresponds to the flaps up position, the most rearward position of the lever corresponds to the flaps full down position.
Throttle lever is located between the seats left to the pitch trim. The most forward position of the lever corresponds to full power of the engine, the most rearward position of the lever corresponds to idle setting of the engine.

1.2.7 Equipment

FM-250 Vampire can be equipped with a wide variety of the instruments ranging from basic instruments for monitoring flight and engine parameters to the "glass cockpit" incorporating the latest EFIS's and MFD's. The instruments in this airplane contain:

EFIS DYNON D-10A
Digital Engine Monitoring System
fuel level indicator
transceiver Becker

1.2.8 Technical drawing



Basic dimensions of **FM-250 Vampire**

length	6,26 m
height	2.16 m
span	7.8 m
wing area	10.05 m^2
fuel capacity	68 l
tire pressure	1.8 kPa

1.2.9 Detecting the position of the center of gravity, permitted limits

Keeping the center of gravity in its limits is a must for the stability and manageability of the airplane. That's why it is necessary for every airplane operator/user to know how to diagnose the center gravity position of the airplane for actual occupancy. Flying outside of the permitted CG limits at either extreme is potentionally dangerous and should not be attempted in any circumstance.
When calculating the center of gravity it is necessary to know the length of the central aerodynamic chord. Calculated center of gravity must be inside the range given by the producer.

Mean aerodynamic chord (MAC) of the wing **1312 mm**
Allowed range of the center of gravity in % MAC **22 - 32 %**

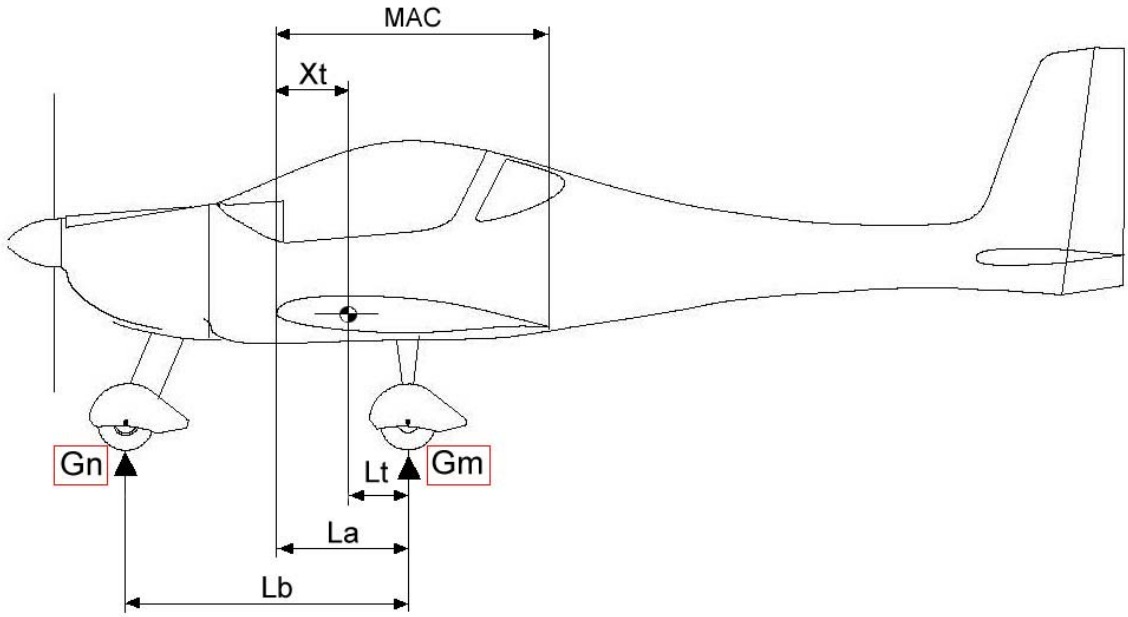
The actual CG must always be within permitted limits.
When detecting the center of gravity and making subsequent calculations, let the airplane stand in flying position at three weighing-machines and proceed following these instructions:

1.2.9.1 Weighing the airplane for the headmost position of the center of gravity

- pilot's seat is occupied with a pilot with the lowest allowed weight
- there can not be any load in the plane, the fuel tank must be empty
- at the scales read the weight Gm under the main wheels; it is the total weight under both main wheels Gml+Gmr
- at the scales read the weight Gn under the nose wheel
- total weight of the airplane Gtotal is equal to the sum of Gm+Gn
- measure the distance from the axle of the main undercarriage to the axle of the front wheel Lb in millimeters
- measure the distance from the leading edge of the wing (using plummet) to the axle of the main undercarriage La in millimeters
- calculate the distance of the center of gravity from the axle of main undercarriage Lt by the formula: Lt = Gn x Lb / Gtotal
- calculate the distance of the center of gravity from the leading edge of the wing Xt by the formula: Xt = La - Lt
-calculate the headmost position of the center of gravity in percents by the formula
X% = Xt x 100 / MAC

1.2.9.2 Weighing the airplane for the backmost position of the center of gravity

Both seats must be occupied with maximum weight of the crew, fuel tank must be full and the useful load must be of maximum allowed value
The procedure of measuring and weighing is the same as detecting the headmost position of the center of gravity.



Gn =	kg
Gml =	kg
Gmr =	kg
Gtotal =	kg

La =	706 mm
Lb =	1518 mm

Center of Gravity

Lt = Gn x Lb / Gtotal Lt = ... x 1518 / ..... = ...

Xt = La - Lt Xt = 706 – .... = ...

X% = Xt x 100 / MAC **X%** = ... x 100 / 1312 = **....%**

2. Limitations

2.1 Introduction

This chapter contains operational limitations and parameters of the airplane and engine.

2.2 Airspeed indicator markings

The airspeed indicator is color coded to emphasize important airspeed limitations.

Green Arc: Normal Operating Range	*78km/h – 240 km/h*

The green arc shows the normal operating range of the airplane. The speed at the bottom of the green arc, abbreviated Vs, is the stall speed with the flaps and landing gear retracted, power at idle, and the airplane at maximum gross weight. The top of the green arc shows the high end of the normal operating range, the maximum structural cruising speed, abbreviated Vno.

Yellow Arc: Caution Range	*240 km/h – 270 km/h*

The yellow arc represents the caution range—speeds appropriate only in smooth air. The top of the yellow arc coincides with Vne, the never-exceed speed of the airplane.

White Arc: Flap Operating Range	*65 km/h – 120 km/h*

The white arc shows the range of speeds in which it's safe to extend full flaps. The upper limit of the white arc is called Vfe, maximum flap extended speed. Extending the flaps at higher speeds could cause their structural damage. The lower limit of the white arc, abbreviated Vso, is the stalling speed or minimum steady flight speed at maximum gross weight with the flaps and landing gear in the landing position.

Red Line: Never-Exceed Speed	*270 km/h*

A red line near the top of the airspeed range marks Vne. Exceeding this speed even in smooth air could damage the airplane structure.

2.3 Operating speeds

	Airspeed	km/h IAS *	Warning
Vne	Never exceed speed	270	Do not exceed this speed in any circumstance!
Vno	Maximum cruising speed	240	This speed can be exceeded only in smooth air, use max. 1/3 of full deflections of the controls.
Vb	Maximum speed in turbulence	216	Maximum speed for the flights in turbulence and wind gusts
Va	Maximum maneuvering speed	156	Do not use full deflections of flight controls, the airplane could be overstressed.
Vfe	Maximum flap extended speed	120	Do not exceed this speed with the flaps extended
Vs	Stall speed / clean	78	Minimum speed with the flaps retracted
Vso	Stall speed / landing configuration	65	Minimum speed with the flaps full extended

***** Indicated Air Speed

2.4 Weight and load factors

2.4.1 Maximum and minimum weights

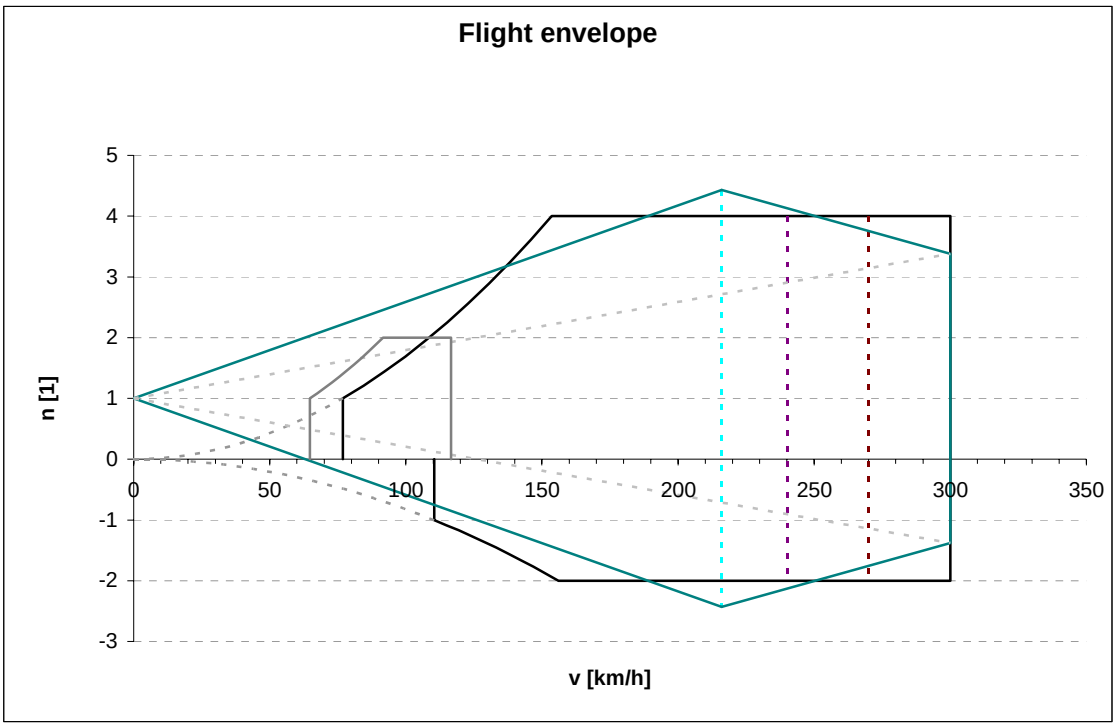
Maximum take off weight	450 kg
Maximum landing weight	450 kg
Maximum weight of the fuel	49 kg
Maximum load of one seat	100 kg
Maximum weight of load behind the seats	8 kg
Minimum weight of the crew	70 kg

2.4.2 Load factors, flight envelope

Load factors express the load of the airplane while operating with inertial and aerodynamic forces in respect to its total allowed maximum weight. Airplane **FM-250 Vampire** is certified for maximum take off weight 450 kg. The regulation UL 2 also demands the following load factors.

N1	+4.0
N2	+4.0
N3	-1.5
N4	-2.0

N1, N2, N3, N4 ..... load factors by the diagram V-a (flight envelope)



Flight envelope of the aircraft **FM-250 Vampire**

2.5 Engine operating limitations

WARNING

Engines Rotax 912 UL and 912 ULS are not certified for aviation use and sudden failure can occur at any time. That can lead to an emergency landing. Do not attempt to fly when safe landing in the case of engine failure is not possible. There is no life service or safety certificate issued to these engines. These engines are for use in experimental and ultralight uncertified aircraft only and only in circumstances in which an engine failure will not compromise safety.

WARNING

All risks and the responsibility concerning using and operating these engines are on the side of the user. We inform you - as the user, that there is a possibility of sudden engine failure.

Minimum outside temperature for take off	-25˚C
Maximum outside temperature for take off	+50˚C
Take off RPM (5 minutes max.)	5.800 RPM
Maximum continuous RPM	5.500 RPM
Idle speed	1.400 RPM

This data can slightly differ during actual operation of the engine, for details look in the engine operator's manual.
The installed engine must be operated in accordance with all instructions of its manufacturer. If there is any information in this document, which contradicts the manufacturer's instructions, it is to be disregarded.

2.6 Fuel and lubricant oil

Rotax 912 UL and 912 ULS engines use many approved fuel types. Details are enclosed in the engine maintenance manual. In our conditions we recommend using the Natural 95 gasoline. Peruse the demands for the fuel prescribed by the producer in detail. If the situation demands it's good to know what other fuel types are possible to use.

There are also conditions prescribed by the producer for the oil used in the engine. These conditions are also enclosed in the engine maintenance manual. In our conditions we recommend the oil Castrol GTX 3. There are types of oil which can shorten the oil and oil filter change period from 100 to 50 flight hours. These details are included in the engine maintenance manual.

2.6.1 Fuel supply

Volume of tank	68 liters
Unusable amount of fuel	3 liters
Minimum amount of fuel for take off	8 liters

Unusable amount of fuel is such amount of fuel in the tank at which the first symptoms of the lack of the fuel can occur at normal conditions.

2.6.2 Consumption of fuel

The consumption of fuel depends on the type of used propeller, engine, flying technique, total weight of the airplane, flight altitude, flight regime and the consumption is also influenced by the meteorological conditions (consumption increases with higher temperatures). In general, flight with heavier airplane requires higher engine output.
Aerodynamic drag increases with the speed of the flight and that's why the consumption of the fuel increases with higher speed. The consumption - output curve of the engine is enclosed in the engine maintenance manual. Used propeller influences the consumption as well. Adjustable propeller can be a compromise among various flight regimes. By using an adjustable propeller consumption can decrease by 10-15%.
By using the fuel computer, which shows immediate consumption of the fuel, you can optimize flight regime and achieve another reduction in the consumption.

2.7 Crew

2.7.1 Minimum and maximum weight of the crew

FM-250 Vampire has two seats and there are three restrictions considering the weight limits.

First is the minimum weight of the crew, which is 70 kg. This minimum weight ensures that the center of gravity is kept in the limits and so the good controllability and the stability of the flight are preserved. If this condition is not fulfilled it is necessary to fasten respective amount of weight to the other seat.

Second restriction is not to exceed the maximum take off weight of the airplane, which is 450kg.

Third restriction is the maximum load of one seat, which is not more than 100 kg.

NOTE
Remember- it is usually not a problem to take off with an airplane exceeding the maximum take off weight but it is the problem of landing such an airplane.

ATTENTION
Maximum weight of 450 kg can not be exceeded in any case

2.7.2 Pilot's qualification

FM-250 Vampire is aerodynamically controlled airplane. The requirements can change in time and that's why it is important to know the valid version of the regulations. The following applies at the time of publishing this manual:
- pilot in command must have the qualification of at least "pilot of aerodynamically controlled UL airplanes"
- pilot of an airplane can hold the qualification of student pilot ULLa if an instructor ULLa is on board
- student pilot ULLa can fly on board alone during his (her) solo flights in training under supervision of an instructor
- pilot can have another person with no pilot's qualification on board after logging at least 50 hours on UL airplanes including at least 5 hours on **FM-250 Vampire.**

2.7.3 Pilot's place in the plane, age of the crew, using the seat belts

The airplane **FM-250 Vampire** has full dual controls and all instruments can be seen and operated from both seats. The pilot of the plane seats in the left seat.
The age of the pilot is not confined in any way and is derived of the requirements concerning the minimum age of the pilot or student pilot by the regulation UL3. The upper limit of the age is given by the health capability, so is the holding of a valid pilot license.
The age of another person on board is not determined by any LAA regulation, but regarding the minimum age we can generally recommend that the second person of the crew should be at least the size to be able to use the seat belts.
On basis of this general requirement with reference to the regulation UL1, section 3, paragraph 3.3., it is necessary for the pilot to decide if he (she) will accept another person on board, taking in account his (her) age, physical and mental ability.
As producers we can not give any recommendation or restriction. We emphasize the crew to use the seat belts which must be correctly fastened.

2.8 Maximum flight altitude

Technically speaking, aircraft's service ceiling is the density altitude at which its maximum rate of climb is no greater than 0.5 m/s. Its absolute ceiling is the highest altitude at which it can maintain level flight. In real situation, this technical ability depends on actual weight of the airplane, conditions of engine, propeller output, meteorological conditions, etc.
Concerning the legislative, the flight altitude is influenced by many restrictions which can change in course of time. Make sure you get to know these restrictions completely.

2.9 Meteorological restrictions

Operating the airplane is restricted by meteorological conditions and a pilot of an airplane must observe the meteorological minimums and the rules of flights. Technical and flying attributes need to be considered as well. There are following restrictions in effect:

Maximum outside temperature	+50 degrees Celsius
Minimum outside temperature	-25 degrees Celsius
Maximum wind components for take off and landing	
Maximum headwind component	6m/s
Maximum crosswind component	3m/s
Maximum tailwind component	1m/s

Operating an airplane at low temperatures is restricted mostly by the possibility of ice formation. Do not attempt to fly during conditions that increase the probability of ice formation.

2.10 Carriage of goods restrictions

Transport of load is restricted by the valid regulations and by the technical abilities of an airplane. Valid regulations prohibit the transport of some kinds of load, for example weapons, explosives, volatile and caustic agents, etc.
Regarding technical ability of an airplane, a pilot can transport the goods in the cockpit only by maintaining the following:
- maximum weight of the airplane can not be exceeded
- the load can be transported only if it does not interfere with the controls, if it does not obstruct the movement and the view of the pilot in any way and lastly the load must be fasten to the seat
- small sized objects can be stored in the side pockets of padding
- objects in the baggage compartment can be transported only while keeping the center of gravity in its limits. At the same time, the load must be secured so it will not obstruct the pilot's view and controllability of an airplane during all flying conditions (for example flying into turbulent air).

2.11 Type of traffic

Flying rules and the equipment of the airplane determine the operation of the airplane only for flights under the VFR conditions in the daylight.
FM-250 Vampire must be flown in VMC conditions with sight of the surface. Other flights are strictly prohibited. Do not fly into icing conditions. Aerial work is prohibited.

2.12 Restriction of maneuvers

Regulations for UL airplanes allow only **non-aerobatic operations.** There are also technical restrictions of the airplane.

Non-aerobatic operations include all turns during normal flying and turns in which the angle of bank is not more than 60° and pitch attitude nose up or down not more than 30° from horizontal.

ATTENTION
We highly stress that the airplane FM-250 with its exceptional attributes tempts a pilot to try aerobatic maneuvers, however this airplane is not an aerobatic airplane and intentional stalls, spins and other aerobatic maneuvers are strictly prohibited.

2.12.1 Allowed turns

- steep turns up to 60° and sideslips at the speed between 120 - 130 km/h
- non-aerobatic operations in sense of definitions proposed in the regulation UL2
- steep turns are not recommended at speed lower than 140 km/h
- use maximum 1/3 of full deflection of the controls at the speed over 200 km/h
- +4g, -2g load factors

For the flight envelope see section 2.4.2.

2.13 Other restrictions

Smoking on board of this airplane and its close vicinity is prohibited

3. Normal Procedures

3.1 Introduction

Chapter 3 contains normal procedures and checklists.

3.2 Pre-flight inspection

This is a minimum pre-flight inspection checklist.

1. Cockpit	
Main switch	OFF
Magnetos	OFF
Fuel valve	OFF
Fuel level	Check
Instruments	Check
Safety belts	Check
Linkage	Check connections and safety pins
Flight controls	Check that all controls operate properly and
Trim	check for the freedom of movement
Canopy	Check general conditions
2. Landing gear	
Legs	Check general conditions
Tires	Check for wear, cuts and proper inflation
Brakes	Check blocks and discs for wear and damage
3. Wings	
Bolts	Check safety pins
Surface	Check for external damage
Ailerons	Check for external damage and operational
Flaps	interference of control surfaces or hinges
	Check for external damage and functionality
Pitot-static tube	Remove cover and check that holes are unobstructed
Fuel cap	Check fuel level and secure
4. Fuselage	
Surface	Check for external damage
5. Empennage	
Safety pins	Check for proper position
Rudder	Check for external damage and operational interference of control surfaces or hinges
Elevator	Check for external damage and operational interference of control surfaces or hinges
Trim-tab	Check for external damage and operational interference of control surfaces or hinges
6. Propeller	
Blades	Check for defects, dirt and cracks
Spinner	Check for defects, dirt and cracks
7. Engine	Check for foreign matter in the intake
	Check for fuel and oil leaks
	Check cowling and inspection covers

The pre-flight inspection starts on the left side of the cockpit and proceeds clockwise. Perform these inspections and check outs:

Engine: remove engine cowling; check the bolts of the attachment of the engine bed. Check the cable and line attachments, connection of connectors, attachments of the battery. Check the tightening of the fuel lines, air filters, exhaust system attachments (tcheck out the integrity of the exhaust pipe springs), and check the tightness of oil and the cooling liquid radiators.
Check the looseness of the sparks which could signalize their slacking. Check the level of oil, cooling and brake fluids, and also the level of battery solution in the accumulator. The cooling liquid should reach 2/3 of the maximum volume of the tank (cold engine). The oil level must be between the min and max marks. Prior to longer flights it must be at least in the middle between the min and max marks.
Check for possible fouling of the fuel filter; replace it if necessary. If you recognize the fuel filter fouling in the engine area, perform an extra inspection or replace the fuel filter. Watch for possible worn out spots on the fuel lines especially at attachment points, or at locations where they are connected to metal parts of the engine.
Carefully check the linkage of the carburetors. If you detect that some of the lines get loose at the neck of the carburetor, even though it had been tightened, it is necessary to take it off and replace it. Install the engine cowling.

ATTENTION
If a line is worn out conically, there is a possibility that small parts of rubber could have gotten in to the carburetor stirrup. Let an authorized technician clean it.

Propeller: check the attachment, possible damage, propeller cone attachment; if the propeller is electronically adjustable check if it repositions

Nose wheel: check the symmetry, malformation and gaps, fairing of the nose wheel, the integrity of varnish of the nut of the safety bolt of the front wheel; tighten the nuts of the nose wheel.

Right wing: check the bolts, screws and safety pins in the fuselage of the airplane (after removing the seats from the cockpit), flaps and ailerons attachments (you will have to kneel or lie down, the attachment points are not visible from the top), check the gaps and free movement, check the conditions and safety pins at all flap and ailerons hinges. Check the same position of both landing flaps at all positions on both wings. Check the fuel cap.

Fuselage: check the surface of the fuselage, possible flaws on the surface or in the varnish.

Empennage: check freedom of movement, surface damage, position of the elevator and the rudder (geometry). Check for the gap of the elevator and for the gap of the rudder at hinges. Check the connection of the elevator rod, rudder and trim-tab cables.

Left wing: the same as the right wing

The interior of the cockpit: check the cleanness, the conditions of controls, instruments and avionics functioning, the completeness of the documents required on the board of an airplane

Tires: check the pattern of the tires, pressure and check for cracks and bulges. The prescribed pressure for both tires is 1.8 kPa.

Drain valve: drain a little amount of fuel to a vessel and check its content for contaminants and water.

BRS: if your airplane is equipped with rescue system, unlock it before flight

3.3 Checklists and stages of flight

3.3.1 Before starting the engine

Check outs which need to be carried out, especially before the first start of the engine in the day, or in the case the engine had cooled down, are written in detail in the engine maintenance manual of your airplane, which was delivered to you with other documents. Here are some of the basic principles.
- before attempting to start the engine, make sure all conditions for the safe start are maintained
- if the engine is cold, by manually turning propeller several times, turn the engine in the direction of engine shaft rotation
- if the airplane is equipped with an adjustable propeller, set it to the smallest angle of attack

WARNING
Always use chocks and parking brake to stop the airplane and turn both ignition circuits OFF during this procedure

• propeller (cold engine)	Turn 5x **(ignition OFF, main switch OFF!!!)**
• radio	OFF
• transponder	OFF
• fuel valve	OPEN
• choke	OPEN (cold engine), CLOSE (warm engine)
• throttle	full back (cold engine), 1 cm open (warm engine)
• main switch	ON
• ignition	ON
• brakes	apply
• control stick	pull back, hold between your knees
• situation around airplane	PROP CLEAR
• starter	crank engine
• instruments	check - oil pressure within 10 sec. min 20 kPa
	ON
• radio	ON

If the engine does not start, let the starter cool down for about 2 minutes and then repeat the start up. Overheated starter loses its output very quickly and the engine is hard to start because it does not rev up to the sufficient engine revolutions.
After starting the engine, set the warm up RPM and slowly remove the choke.

3.3.1.1 Engine run up

The engine run up is performed after the engine has warmed up with the goal to verify its operating efficiency. The procedure for the engine warm up and performing the test of ignition is again introduced in its full length in the engine manual. Follow the procedures enclosed there.
We will mention only the basic principles:
- let the engine run for about 2 minutes at 2000 RPM and then continue to warm up at 2500 RPM until the oil temperature reaches 50˚ Celsius. Check the temperatures and the pressures and also check if all operating values have been reached.
- at 4000 RPM carry out the test of ignition, the drop of the revolutions for each circuit cannot be more than 300 RPM; the difference in the RPM between both circuits cannot be more than 120 RPM.

If you find out that there is no drop of the RPM, it can mean that interruption of the short circuit cable, which turns off the ignition circuit, has occurred. In this case try to turn off the engine. If the engine will not stop after turning off both ignition circuits, shut off the fuel valve and let the engine stop. Check the connection of the connectors of ignition circuits (under the engine cowling)

- set the throttle to 5 000 RPM and run it for about 3 seconds
- set the idle speed
- if you have the adjustable propeller, re-examine its correct functioning by re-positioning it and then set the propeller to small angle of attack

No irregularity of the RPM or rough running during the engine run up can occur. None of the operating pressure and temperature limits can be exceeded.

The throttle lever should be set slowly and smoothly.

3.3.2 Before take off

Taxi at maximum speed of 15 km/h and while taxiing check the brakes and nose wheel steering. If taxiing with a crosswind component apply the into-wind ailerons.

• flight controls	check
• instruments	check, set (engine instruments “in green”)
• seat belts	fasten
• canopy	secure
• trim	middle
• flaps	open 12 degrees
• choke	check (CLOSE)
• fuel	check (level and fuel valve OPEN)
• radio	communicate

Take off:
Release the brakes and smoothly apply full throttle, you should count with the efficient engine increasing the revolutions of the propeller very quickly and its reaction moment that tries to turn the airplane from the straight direction to the left (engines Rotax 912 series)
Keep the aircraft straight and with the control stick slightly reduce the weight on the nose wheel. Rotate at 50 km/h and lift off at 70-85 km/h. Let the aircraft accelerate at a shallow angle to 120 km/h and start climbing holding this airspeed.

3.3.3 After take off

• airspeed	120 km/h
• engine instruments	check (in the green)
• landing flaps	retract (50 m AGL)
• throttle	set (reduce power)

3.3.4 Climb

• RPM	5800 (5 min. max) – 5500 continuously
• airspeed	120 km/h
• engine instruments	check

3.3.5 Cruise

FM-250 Vampire will cruise at a wide range of speeds. After leveling off at your flight level set the power for appropriate speed and re-trim the aircraft. While making turns do not forget that the stall speed increases with the bank angle.

ATTENTION
Do not perform any steep turns at speed lower than 130 km/h. Do not make any abrupt movements with flying controls at speed over 200 km/h and use the maximum of 1/3 of their full deflection.

3.3.6 Descent

Avoid setting idle RPM during longer descents to prevent undercooling your engine. Instead plan your descent well ahead with slightly higher than idle RPM.

Sideslip
The sideslip should be performed at the speed between 120 and 130 km/h.

3.3.7 Downwind

• airspeed	120 km/h
• engine instruments	check
• safety belts	fasten
• base leg situation	check
• runway situation	check
• radio	communicate

3.3.8 Base

• airspeed	105 -115 km/h
• landing flaps	extend to 1. position (12°)
• trim	retrim

Try to align for the final approach as far as possible so you will have enough time to concentrate on the landing. If you are not aligned with the runway after the final turn, do not tighten it but rather finish the turn with the same angle of bank and then correct it with the opposite turn.

3.3.9 Final

• airspeed	100 -110 km/h
• landing flaps	extend to 2. position (30°)
• airspeed	increase to 110 -115 km/h
• trim	retrim
• radio	communicate

3.3.10 Landing

At the speed 100 - 110 km/h start round out about 5 meters above the ground and at a height of 0.5 – 1 meter start the flare. After touching down on the main wheels continue to control the aircraft and keep the nose wheel up as long as possible.

3.3.11 Shut down

• engine instruments	check
• radio	OFF
• transponder	OFF
• ignition	OFF
• main switch	OFF
• fuel valve	shut off

WARNING
Before leaving an airplane and locking the cockpit secure the ballistic rescue system handle.

3.4 After flight inspection

Check
- surface of
  - wings
  - fuselage
  - empennage
  - landing gear
- fuel system for leaks
- electrical system
- if fuel valve is shut off
- if all electric switches are off
- clean the airplane

3.5 Flying with a crosswind component

If you will be flying while maintaining meteorological minimums, the allowed values do not present any expressive barrier in order to take off or land.
If you have to land with stronger crosswind component use the technique of glide against the wind or sideslip against the wind.
You can also choose the possibility of landing with higher than idle RPM, which noticeably decreases the stall speed.
If the adjustable propeller is provided, do not forget to set the minimum angle of attack prior to landing. If the landing runway is wide enough you can reduce the effect of crosswind component by landing diagonally to the runway axis.

3.6 Flight in turbulent air

In the turbulent air, do not exceed the speed of 216 km/h and do not let your airspeed drop below 120 km/h. Wind gusts cause greater force during high speed flights; small speed increases the danger of stalling the airplane while flying into the decreasing current of air.
If your propeller is adjustable, set it to a smaller angle of attack and fly with higher RPM of the engine, you will have the disposal of full output of the engine. Be ready to quickly add power and release the throttle. The flight in turbulence is stressing for the pilot and also for the airplane. If possible, fly at higher altitudes, where turbulence often disappears.

4. Emergency Procedures

4.1 Introduction

This chapter contains the emergency procedures and checklists. Maintaining your aircraft and engine properly will avoid many of these possible situations. The following are only basic emergency procedures and checklists.

4.2 Engine failure

4.2.1 Engine failure during take off

- throttle — idle
- ignition — OFF
- direction — maintain (keep off obstacles)
- brakes — apply after all 3 wheels are down on the ground

4.2.2 Engine failure after take off

- airspeed — 110 -120 km/h
- landing site — land straight ahead (do not turn back while under 100 m GND)
- ignition — OFF
- fuel valve — shut off

- keep the airspeed in the range of 110-120 km/h
- at an altitude below 100 m GND perform the emergency landing strait ahead because turns at a small height above the ground at low speed can be dangerous and an airplane can fall into a spin

4.2.3 Engine failure during flight

- airspeed — 120 -130 km/h
- landing site — select
- ignition — OFF
- main switch — OFF
- fuel valve — shut off
- flaps — extend as required
- seatbelts — fasten

If time permits check for the possible cause of engine failure, attempt to restart the engine and make an emergency radio call. If possible, land against the wind.

4.2.4 Airstart

- speed — 140 - 160 km/h
- landing site — select
- fuel valve — OPEN
- throttle — 1/3 open
- main switch — ON
- ignition — ON
- start the engine

Attempt to airstart the engine only if your height is more than 300 m AGL. If you are under this height make an emergency landing as in section 4.2.3

4.3 Fire, fume and smoke

4.3.1 Engine fire on the ground

- fuel valve — shut off
- brakes — apply
- throttle — full power
- ignition — OFF after remaining fuel in carburetor is used up
- main switch — OFF
- vacate aircraft

4.3.2 Engine fire during take off

- throttle — idle
- fuel valve — shut off
- make landing
- brakes — apply
- throttle — full power after aircraft stops
- ignition — OFF after remaining fuel in carburetor is used up
- main switch — OFF
- vacate aircraft

4.3.3 Engine fire in flight

- fuel valve — shut off
- throttle — full power
- landing site — select
- ignition — OFF after remaining fuel in carburetor is used up
- main switch — OFF
- emergency landing
- vacate aircraft

4.3.4 Cabin fire

- fire — localize
- main switch — OFF (in the case of electrical fire)
- ventilation — close
- extinguish fire
- land — as soon as possible

4.4 Vibrations

Vibrations can occur due to flight in bad weather, incorrect flight regime, or due to the technical failure on the airplane.
If unnatural vibrations occur, make sure you are not flying at a speed close to the stall speed. The airplane vibrates while flying at the stall speed. In this case perform the change of flying regime - fly at higher speed.

If you notice unusual vibrations during flight:

- set RPM for the lowest vibrations
- land at the nearest airfield or make precautionary landing
- if the vibrations are getting worse make an emergency landing

4.5. Precautionary landing

If you for any reason, such as rough engine running, sickness or disorientation need to make an off airport landing proceed as follows:

- select a long enough and suitable landing site
- make a pass at 100 km/h at the height of 50 m AGL to check for obstructions and inspect the surface conditions
- fly a traffic pattern
- land in 1/3 of the landing area
- before touch down turn magnetos and main switch OFF

4.6. Landing gear and tire failure

4.6.1 Main landing gear failure

Using the ailerons perform a one wheel landing and try to land on the functioning leg. Try to keep the damaged leg up as long as possible.

4.6.2 Nose landing gear failure

In the case of nose landing gear failure, try to keep the nose up as long as possible. If possible do not use brakes, because while applying brakes the inertia force actuating on the center of gravity of the airplane is trying to bring the nose of the airplane down. Try to land in an appropriate area and if possible against the wind, to slow down the landing speed against the ground.

4.6.3 Tire failure

The landing procedure is the same as in the case of landing gear failure, depending on which tire failed.

4.7 Using the ballistic recovery system – BRS (parachute)

If your airplane is equipped with the ballistic recovery system, among other documents you have received the Ballistic recovery system manual elaborated by its producer. Go through this document in its full length and keep the procedures which are introduced there.
The handle which activates the rescue system is located in the upper part of the cockpit between the seats.
Do not forget to unlock the rescue system prior to take off and to lock it after the flight.
Generally speaking, the rescue system is recommended to use in the case of definite loss of control of the airplane, for example in the case of its destruction. In that case perform the following:
- turn off the ignition
- fasten your seat belts
- activate the BRS
- if the airplane is equipped with the radio perform a distress call

When the airplane is dropping steadily, the airplane is in the position wheels down. After the impact with the ground it is necessary to count with a damage of an airplane.

WARNING
The ballistic recovery system (BRS) is constructed for the maximum speed of flight 240km/h. If situation, which requests to use the BRS happens, act quickly. Practice the movement of your arm activating the BRS and make sure there are no barriers, seat belts or clothing restricting the activation. Introduce the BRS to the fellow-traveler before the flight, explain the activation process and let him (her) try the movement of the arm.

5. Performance

5.1 Introduction

This chapter contains information and data concerning performance.

5.2 Speed

Remember, that the maximum speed of the horizontal flight considerably decreases with the flight altitude. Maximum horizontal speed is also influenced by weight of an airplane.

• Stall speed in the landing configuration Vso	65 km/h
• Stall speed - flaps retracted	78 km/h
• Never - exceed speed Vne	270 km/h
• Cruise	120-220 km/h

5.3 Rate of climb and loss of height during stall

The values of a rate of climb apply for maximum take off weight of the airplane, which is 450 kg and maximum continuous power output of the engine calculated to the MSA standards. With increasing altitude the rate of climb decreases.

• Rate of climb for the engine Rotax 912UL	7 m/s

The loss of height from the beginning of stall initiated from horizontal flight to the complete recovery by performing standard stall recovery is 15 m.
The loss of height from the beginning of stall initiated from a turn at 30 degrees of bank to the complete recovery by performing standard stall recovery is 20-25 m.

5.4 Take off and landing distance

• take off distance	90 m
• take off distance over 15 m obstacle	200 m
• landing distance using brakes	100 m
• landing distance without using brakes	180 m

5.5 Flying range

• flying range	800 km

5.6 Gliding ratio

• gliding ratio with engine not running	15.3
• gliding ratio with engine set to idle	16,9

5.7 Cruise

• cruising speed	120 - 220 km/h
• never exceed speed	270 km/h

5.8 Fuel consumption

• fuel consumption	11 -15 l/h

6. Airplane Handling, Service & Maintenance Information

When parking an airplane follow these instructions:
- shut off fuel valve
- turn off both ignition circuits and the main switch
- secure the BRS
- lock the cockpit
- use wheel chocks to secure the airplane
- during longer stands, or if the wind is expected with the speed over 6 m/s, anchor the airplane as explained in section 6.1, cover the blades of the propeller and cover the Pitot tube
- if an airplane stands in the sun, cover the canopy with suitable cover

6.1 Anchoring an airplane

Tie down the airplane using a sufficiently strong anchors (screw anchors are recommended) with cables and straps. Tie down the airplane at these locations:
- tie down rings for attachment of straps at lower side of the wing skin
- fork of the front wheel
- back part of the airplane fuselage by a strap

To tie down back part of the airplane fuselage, use a strap which is wide enough and underlay it by a soft pad so the strap would not slide on the body of the airplane and damage the varnish.

6.2 Manipulation with an airplane

Due to the airplane's low weight manipulation is easy even for only one person. It is allowed to manipulate with the airplane this way:
- push on the leading edge of the wings at a max. distance of 2 meters from the fuselage
- pushing the back side of the fuselage down, lift the nose wheel and turn the airplane

While going through narrow places, assistance provided by informed persons ensuring the manipulation with the airplane at the ends of the wings is necessary.

6.3 Rigging and de-rigging

Rigging and de-rigging can be performed only by trained persons. Rigging and de-rigging is recommended to perform only in unavoidable situations; connecting elements get easily worn out.

6.3.1 De-rigging

To de-rig the airplane help of two persons is necessary. Proceed as follows:
- remove the seats
- disconnect the aileron connecting rod
- disconnect fuel line
- disconnect Pitot-static tube line
- disconnect landing flaps rod
- screw out the bolt of the rear auxiliary spar
- pull out the bolts in the main wing spar
- pull out the wings of the fuselage
- disconnect and disassemble rudder
- disconnect and disassemble the trim-tab cable and elevator rod

Work carefully and use only little force.

6.3.2 Rigging

The rigging should be performed with the help of 2 persons in reversed order as the de-rigging.

ATTENTION
Self-locking nuts with the nylon rings can be used only once. Safety metal nuts can be used at most 3 times after compressing the safety ring with tongs.

After the assembly, perform the following:
- check the whole construction, the geometry of the wing and elevator, check that they are not damaged and no unnatural force or stress occurs during movement of flaps, ailerons, rudder or elevator
- gently move both wings at the wingtips up and down, watch for the undesirable occurrence of noise, cracking, gaps or deformations
- perform the pre- flight inspection in its full length

6.4 Washing and cleaning an airplane

After each flight day, or if necessary during the day, it is essential to clean the airplane in this range:

- wash and wipe off the blades of the propeller
- wash, wipe off and polish the glass parts of the canopy, use only buckskin; wash it often in clean water
- wash and wipe off the leading edges of the wings and empennage
- clean the bottom part of the fuselage behind the front undercarriage leg
- remove grass which can be trapped in the undercarriage
- clean the interior of the cockpit and vacuum the dirt from the storage compartments
- if needed, clean other parts of the airplane, especially the upper sides of the wings and air inlets of the engine

Use lukewarm water to wash the airplane, change it often. First, wash the parts of the airplane and then wipe them off. For cleaning the parts of the airplane from flies, use the same detergents that are used for cars for such purposes.
About once a month conserve the airplane with the agents used for cleaning and conserving car bodies, including the glass parts and the propeller. Clean the cockpit with vacuum-cleaner and check if there are no undesirable objects in the baggage compartment.
With a new airplane wait about one month until you conserve it so the varnish could solidify.

ATTENTION
Cover the Pitot tube while washing the airplane to protect it from water

6.5 Filling the fuel

Due to the composite construction of the airplane, increasing occurrence of the static electricity is possible, so while filling the fuel, keep this procedure:

- make sure there is no open fire near the airplane; especially make sure no one is smoking near the cockpit
- get ready the fire extinguisher that that can be used on flammable liquids
- make sure the grounding cable located on the right undercarriage leg is reaching the ground
- use only approved gasoline cans, use only a funnel approved for gasoline. It can be grounded with the grounding pin to the ground. (Do not use plastic cans or funnels, with no certification for gasoline)
- do not wear clothes that support creation of static electricity while filling the fuel (synthetic fibers, etc.)
- check that all electrical appliances, ignition circuits and the main switch are turned off
- close the fuel valve
- unlock and screw out the fuel cap
- edge in the buckskin refill filter under the filling neck of the funnel approved for filling the airplanes

ATTENTION
Do not use filter refills from synthetic fibers

- slowly pour in fuel, pay attention and stop when you splash the fuel on the wing skin
- while filling, do not press the wing with your hands and do not put the gasoline can on the wing, the sandwich skin is not constructed to resist such a load
- after filling up the tank remove the funnel, screw down the fuel cap, lock it and wipe off the remains of the splashed fuel from the wing skin

6.6 Placards and their locations

- the placard introducing the maximum weight of the crew and the load depending on the amount of fuel in the tank is located at the left front part of the canopy
- the placard indicating which type of engine oil is used is located on the upper engine cowling

6.7 Stepping up on an airplane

When stepping up on an airplane, use the steps placed on the sides of the airplane.
Step up on the wing of an airplane one person after another. If both persons step on the step at the same time, the tail of an airplane will lower to the ground. Step on the wing only in the place where anti-slip strips are introduced.

7. Service life of an airplane and maintenance cycles

Regular and accurate maintenance is essential in terms of reliable and safe operations of an airplane. The warranty inspection and the inspections every 100 and 300 hours should be recorded in a flight book.

7.1 Service life of an airplane

The airplane consists of 3 main construction groups that are airframe, engine and propeller. They all have their own specific service life.
Wear of the airplane depends on the stress and that's why you should avoid high stress situations, especially the ones caused by high load factors. Do not de-rig the airplane very often and anchor the airplane only as prescribed in this manual. Try to avoid landings on runways with high grass, which can noticeably stress the propeller.
Regular conservation using high quality car wax considerably slows down the aging of the varnish. If possible, park an airplane in a covered hangar. If not at least cover an airplane to protect it against weather effects.
Speaking in time limits there is no service life of an engine. The engine is subject to overhaul in a service center where the service life is specified every 1500 hours.
The service life of the propeller is not fixed; it undergoes regular inspections at the producer's service center. The service life will be specified according to its actual state.

7.2 Maintenance

When buying a new airplane, especially carefully check tightening of the fuel lines in the engine area and the state of the fuel filter. Beside that carefully check all attachment points where the lines are taped to metal parts of the engine - for example suction lines.

ATTENTION
Preventively change the fuel filter after the first ten flight hours.

We can not prevent dust or other dirt from getting into the tank of the fuel system while producing an airplane. Your airplane is equipped with tank(s) in the wing(s), each equipped with independent fuel screen on the fuel feed line. Fuel filter is approachable after taking off the seats. Check this filter and change it preventively after 150 liters of fuel have been burned (from each tank).
Use filters with clear housing.

Daily maintenance consists of pre-flight inspection, engine run-up and after flight inspection. They are introduced in sections 3.2, 3.3.1.1 and 3.4.

7.2.1 Lubrication

To lubricate the engine use only the oil prescribed by the engine producer in the engine operator's manual. The oil change period is every 100 hours.

To lubricate other areas, it is possible to use any plastic lubricants or any transmission oil. For hard to reach locations (attachment points, bearings) fill a syringe with small amount of oil and for the application use a needle with a bigger diameter. It is enough to apply only 1-2 drops of oil.
Oil serves as a conservative agent so use the following table only for your orientation and base your decision on actual state of the lubricating area.

Lubricating areas:

Location	Type of lubricant	Interval
Front undercarriage leg	plastic lubricant	once a year
Aileron bearings	transmission oil	every 50 hours
Rudder bearings	transmission oil	every 50 hours
Elevator and trim-tab bearings	transmission oil	every 50 hours
Flying controls attachments	transmission oil	every 50 hours

You can access some locations after taking off the seats in the cockpit; others are approachable after disassembling the rudder.

7.2.2 Disassembly of the nose wheel

The disassembly demands co-operation of two persons.

To disassemble a nose wheel proceed this way:
- chock the wheels of the main undercarriage using wheel chocks on both sides of the wheels
- remove upper and lower engine cowlings
- by pushing down on the fuselage in front of the vertical stabilizer lift up a nose wheel
- support the nose under the engine mount
- loose the screws from the front wheel axle and screw them out
- remove the wheel

To assemble a nose wheel proceed the reversed way. The old screws should be replaced with new ones, mark the screw position with marker.

7.2.3 Disassembly of the main wheel

The disassembly demands the co-operation of two persons.

- chock undamaged wheel of the main undercarriage using wheel chocks on both sides of the wheel
- lift up a wing on the side of the disassembled wheel and support it under the main spar
- screw out a safety nut holding the wheel
- slide out the wheel from the axle

To assemble a main wheel, proceed the reversed way.

7.2.4 Tire repairs

A punctured inner tube can be fixed using the same agents as for fixing car inner tubes. Damaged tires should be replaced.

7.2.5 Electrical installation

Basic electrical installation on the plane works with voltage of 12V and two wire conductors. The electrical installation is equipped with no individual fuse. Some of the electrical appliances (for example the transceiver) are equipped with their own fuse. If the voltage in the installation decreases while switching on appliances (for example while setting angle of attack of the propeller) or the Flydat (or other EFIS) drops out check the cleanness and tightening of the connection of battery and the level of electrolyte. If the condition remains, contact the service center of the producer.

7.2.5.1 Electrical installation inspection

All electrical cable connections and the connectors must be checked if they are not damaged, loose or rusty, also check the securing to the construction. If the connectors are rusty, let the experts replace them.
Check the possible damage to the cables caused by the heat or chafing. Check if all spark plugs connectors are tightened to the body of the spark plug. Loose connector can be a reason for its burning and a malfunction of the engine.

Check the level of electrolyte in the battery and refill it with distilled water if necessary. Recharge the battery regularly if the plane is not in use for longer periods of time.

7.2.6 Spark plugs

Distance between electrodes of the spark plugs 0.7 mm

7.2.7 Special tools

Special tools are not required for normal maintenance performed by the user.

7.2.8 Minor repairs

Considering the type of the construction only minor repairs can be carried out on the surface of the airplane. For such repairs, use two-component body filler. Clean and ungrease the damaged surface with technical gasoline and patch it with the body filler mixed according to the directions for use. After hardening sand it down and varnish the surface.

7.2.9 Changing the fuel filter in the engine area

We can not determine how often the fuel filter should be changed, because it depends on how well you filter the fuel while filling the tanks.

That is the reason for using fuel filters with clear housing only so you can see the fouling of the filter. After the first replacement of the filter (maximum after 12 hours) change the filter every 50 hours.

WARNING
Perform the filter change on a cold engine only

To change the fuel filter:

- close the fuel valve
- remove the seats
- release the buckles on the fuel lines on both sides of the filter, slide them out but do not remove them completely
- remove the filter while turning the lines smoothly, take care about the fuel leaking from the lines (you can close the line temporarily by compressing it)
- slide the fuel lines on the new filter and push their ends to the body of the filter
- slide the buckles on the fuel lines in place of mouthpiece of the filter and tighten them, make sure no buckle is damaged
- secure the buckles of the filter using binding wire
- after changing the filter let the engine run for five minutes with idle setting, then shut it down and make sure the filter is filled with fuel

ATTENTION
After changing the fuel filter pay an extra attention to the engine run-up before the next flight to make sure the fuel system is functioning properly.

7.2.10 Propeller maintenance

It is essential to carry out a visual control of the state of the propeller, check the blades, leading edges and propeller attachment every 10 hours of operations. To perform routine maintenance, clean the blades with common cleaning detergents to get rid of the dirt.

7.2.11 Jacking points on an airplane

The jacking points on the engine mount are used for lifting the front undercarriage. These jacking points are accessible after removing the lower engine cowling. Do not forget to chock the wheels of the main undercarriage using the wheel chocks on both sides of the wheels while supporting the airplane on these points.

The jacking points used for lifting an airplane are located on the lower side of the wings in the distance of 190 cm from the fuselage. The supporting structure must be of a solid and stable construction; it must be at least 100 mm wide and 1000 mm long. The side, which supports and touches the wing, must contain a soft, at least 20 mm thick felt cover.

7.3 Introductory inspection

Introductory inspection is carried out after the first 25 flight hours by the producer in their service center. Performing this inspection by the producer is one of the requirements for keeping the warranty valid. The range of this inspection is prescribed by the internal rule of the producer. Besides other revisions, change of oil and oil filter is performed during this inspection.

7.4 Periodic inspection every 50 hours

The inspection every 45-55 flight hours is carried out by the user of the airplane if he (she) was trained for the maintenance of the airplane; otherwise the inspection is performed in the service center of the producer. The inspection consists of the following:
- the pre-flight inspection in its full length
- inspection of all screw and hinge connections
- visual inspection of the rear inside of the fuselage
- inspection of the fuel installation, control of tightness of the connections, fuel lines condition and the cleanness of the fuel filter
- inspection of the engine attachment
- setting-up the brakes
- engine maintenance according to the engine maintenance manual

7.5 Periodic inspection every 100 hours

The inspection every 95-105 hours or after 12 months from the last inspection, whichever comes first, is carried out by the user if he (she) was trained for the maintenance; otherwise the inspection is carried out in the service center of the producer.
The inspection consists of the following:
- inspection every 50 flight hours
- careful inspection of the airframe and repairs of small damages
- inspection of the canopy and cockpit
- inspection of the flight controls, gaps and deformations
- engine maintenance according to the engine maintenance manual
- change of oil and oil filter
- inspection and service of the propeller at the producer's center
- flight test by the test pilot

7.6 Periodic inspection every 200 hours

The range is the same as the inspection every 100 hours plus the ignition spark plugs are changed.

7.7 Periodic inspection every 300 hours

This inspection is carried out every 295-305 flight hours or after three years of operating, whichever comes first. The diagnostics of all stressed parts of the construction is performed and its detailed range is prescribed by the internal rule of the producer according to detected state. Here we introduce basic procedures for your information:
- inspection every 100 hours
- removing the propeller and the engine
- inspection of the construction
- inspection of the interior of the fuselage and the cockpit
- detailed inspection of the whole airframe
- flight controls inspection
- replacement of required parts
- flight test by the test pilot

ATTENTION
The 300 hour inspection is carried out only by the service center of the producer

8. Repairs

8.1 Replacement of screws

In the case of corrosion, bending or cracking of the screws, it is necessary to replace them. If thread is damaged, it is necessary to replace the screw and the nut. It is permitted to replace the screw or nut with a new one only of same quality and specifications. Safety nuts with plastic rings can be used only once. Safety metal nuts can be used at most 3 times after compressing the safety ring with tongs.

8.2 Repairs of rivet joints

When the rivet joint is damaged (loose), it is necessary to remove the damaged rivet or its remainder, check if the joint areas are not damaged and fasten the joint with rivet. If the joint is damaged, it is necessary to replace the parts or consult the repair with the producer of the airplane. Use the same quality and type of rivet when repairing a joint.

8.3 Controls repairs

Connecting rods, connection parts, control cables, bearings and other parts of flight controls can not be damaged in any way. Individual parts must be replaced only by original parts delivered by the producer. If any relevant damage to flight controls or visible gap occurs, the service center of the producer can repair them. Test flight performed by a test pilot is a must after any flight controls repair.

8.4 Airframe repairs

The damaged surface can be patched, sanded down and varnished only when it is damaged slightly. When perforation or other light damage to non load-bearing parts occurs (engine cowlings, wheel fairings) the repairs are executed by laminating one or two layers of the fiberglass, patching the outside surface, sanding it down and varnishing the surface. The patching should be done with two-component body filler according to directions for use.
Major damages to the airframe or its perforations are necessary to consult with the producer who will consider the effect of the damage on the resistance of the construction and will determine the correct repair.

8.5 Fuel system repairs

If loose connections in the fuel system are detected repair must be done immediately. Non significant failures (for example loose coupling of fuel lines or filter fouling) can be repaired by the user of the airplane. Other repairs must be done only in the service center of the producer.

8.6 Engine repairs

All engine and engine components repairs must be performed only at the service center of the producer. Engine malfunction and other flaws can be signalized by unnatural noise coming from the engine mount area, increased vibrations, engine speed fluctuation, lower power output, fire smell, if the engine operational values are not in “the green”, bad starting, etc.

8.7 Electrical system and electrical appliances repairs

In the case of an electrical system failure the user can perform repairs such as recharging the battery, cleaning the contacts and connections, etc. Other repairs of the electrical system and other electrical appliances can be performed only by the service center of the producer.

ATTENTION

All repairs must be recorded in the flight book. All damages which have influence on the stability of the construction and the flight characteristics must be reported to the producer who will determine the correct repair.

9. Rotax 912 / 912S engine maintenance

All essential information and operational instructions for the Rotax 912/912S engine are included in the engine maintenance manual which was delivered to you with your airplane. Keep the engine clean and watch for oil leaks which can indicate the necessity of expert maintenance of the engine. Here we introduce only the basic procedures for the engine maintenance.

9.1. Oil change

- when changing oil replace the oil filter as well
- oil needs to be changed for the first time after the first 25 flight hours. The oil in the gearbox has to be changed when changing engine oil
- oil has to be changed every 100 flight hours or once a year, whichever comes first
- the amount of oil refill for changing is 3 liters

The engine maintenance manual for Rotax 912 series engines requires that after each oil change the old filter before its disposal has to be cut open. The filter should be unfolded and looked through for any metallic splints, scraps, etc. which could be a presage of the engine failure.
We recommend letting this work have done by an authorized technician.

9.2 Spark plugs

The inspection and cleaning of the spark plugs should be done every 100 hours of engine operations or when the starting of engine is getting worse. The condition of the spark plugs can indicate state of the engine, improper operational values or other flaws (temperature, fouling of the air filter, untightness of valves, etc.). Correct color of the spark plugs is light colored to brown. Rough starting or increased magneto drops are signs that it is time to change the spark plugs.
Spark plugs have to be replaced every 200 hours of engine operations at the periodic inspections.
The Rotax company recommends applying heat-conducting compound to the spark plug threads prior to installing the plugs. If you do not have such compound, we recommend that you let an authorized company carry out spark plug replacement, or get spark plugs which are already covered with such paste.

9.3 Fuel

For the type of fuel that can be used refer to the engine operator's manual.

9.4 Liquid coolant

Periodically verify the level of coolant.
Refer to the engine operator's manual for details on engine liquid coolant specifications.

WARNING
Do not open the liquid coolant tank cap while the engine is still hot.
You can get burnt easily.

9.5 Service life and engine inspections

The producer prescribes the engine inspections every 25, 50, 100 and 200 hours with the tolerance ± 10 hours. The 100 hour inspection needs to be carried out at least once a year no matter how many hours have been logged.
The 25 hour inspection is carried out on a new engine and on overhauled engine.
The extent of prescribed inspections is introduced in the original handbook "Wartungshandbuch fur Rotax Motor Type 912 Serie". It is a shop handbook which is not intended for common user. There is no translation of this document and its producer supposes that the prescribed maintenance of the engine will be performed by an authorized technician.
The 25 hour inspection includes oil and oil filter change.

Work performed at the 100 or 200 hour inspection can be done by an authorized technician only.
We recommend letting an authorized service center of the engine producer to carry out this work.

WARNING
Only qualified and trained staff should carry out maintenance and repairs on this engine.

9.6 Service life of rubber parts of engine

All rubber parts of the engine should be replaced after 5 years from the date of producing the airplane.
Let an authorized service of the producer of the engine to carry out these replacements, or Flying Machines s.r.o. can perform such replacement for you.