The Sole Manufacturer and Distributor in Czech Republic:
ATEC v.o.s.

Factory address: ATEC v.o.s., Opolanská 350, 289 07 Libice nad Cidlinou
Czech Republic

ATEC 321 FAETA NG with ROTAX 914 UL

Flight and Operations Manual

Libice nad Cidlinou, May 2019

Type of aircraft: **ATEC 321 FAETA NG**

Serial number:

Registration/call sign:

Type Certificate of LAA Czech republic: **ULL 06/2020** **Issued:** **16.11.2020**

The ultralight aircraft (Sport Flying Device) is not a subject of CAA authorization and is to be operated at own risk of the user.

The aircraft must be operated according to information and limits described in this manual.

Contents Chapter

Enclosures:

1. Log Book (example)

2. Records of Revisions

3. Service and Maintenance Book

Chapter 1

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1.1. Introduction

Informations provided within this manual are necessary for an effective and save operation of the **ATEC 321 FAETA NG** aircraft. 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. Aircraft Description

ATEC 321 FAETA NG is an ultralight, two-seater, cantilever, low-wing aircraft of carbon composite construction. The landing gear is a fixed tricycle undercarriage with steerable nose wheel. The propulsion unit is in pulling configuration and consists of ROTAX 914 UL engine and three-blade adjustable FITI propeller.

1.4. Modifications and Changes

If the Manufacturer makes any structural or operating changes 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 actual informations and bulletins are published. In case the 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.

1.5. Aircraft Technical Data

Dimensions

Wing span	9,6 m
Length of fuselage	6,2 m
Total height	2,0 m
Wing area	10,1 m^2
Depth of mean aerodynamic chord	1,11 m
Span of horizontal tailplane	2,6 m

Defined deflections of controls

Flap position	I	12 °	55 mm +-5 mm
	II	22 °	105 mm +-5 mm
	III	32 °	145 mm +-5 mm
Ailerons deflection	up	18 °	80 mm +-3 mm
(measured towards end bow)	down	14 °	60 mm +-3 mm
Max. hinge moment			250 g (0,6 Nm)
(measured on the trailing edge in the distance of 250 mm from the turning point)			
Elevator deflection	up	24 °	80 mm +-2 mm
(measured towards end bow)	down	18 °	60 mm +-2 mm
Max. hinge moment			130 g (0,3 Nm)
(measured on the trailing edge in the distance of 250 mm from the turning point)			
VT Rudder deflection L/R	+/-32°		120 mm +-5 mm
(measured at the bottom of the trailing edge)			
Max. hinge moment			600 g (2 Nm)
(measured on the trailing edge in the distance of 350 mm from the axis of turning)			

Airfoil Section

Root section	SM 701
End section	SM 701

Landing Gear (tricycle with nose gear)

Wheel spacing	1,9 m
Wheel base	1,4 m
Tyre dimension (main wheels)	14 x 4 (350 x 120 mm)
Tyre dimension (nose wheel)	12 x 4 (300 x 100 mm)
Tyre pressure	0,16 MPa / 1,6 atp

Suspension

Main gear	composite springs
Nose gear	rubber springs

Brakes	hydraulic disc brakes on the main gear (synthetic brake fluid DOT 3 or DOT 4)

Ballistic Rescue System	USH 600 V_{MAX} = 300 km/h

Propulsion Unit and Engine Parameters

Propeller manufacturer	FITI design s.r.o., Řevnice, Czech Republic
Type of propeller	**FITI ECO COMPETITION - 2 blades or 3 blades**
Engine manufacturer	BRP - ROTAX GmbH, Austria
Engine type	**ROTAX 914 UL**

Engine Performance

Take-off power	84,5 kW / 115 HP / 5800 RPM
Maximum continuous power	73,5 kW / 100 HP / 5500 RPM
Cruising power	54,0 kW / 72 HP / 5000 RPM

Engine Speed

Maximum take-off engine speed	5800 RPM / for max. 5 minutes
Max. continuous engine speed	5500 RPM
Cruising engine speed	5000 RPM
Min. engine idle speed	1400 RPM approx.

Turbo control unit (TCU) – critical flight altitude

Up to the stated critical flight altitude the respective manifold pressure is available:

Take-off performance	up to max. 2450 m (8000 ft) AMSL
Continuous performance	up to max. 4875 m (16000 ft) AMSL

Oil Temperature

Minimum	50 °C
Maximum	130 °C
Operating	90 °C - 110 °C

Exhaust Gas Temperature (EGT)

Maximum	950 °C

Coolant Temperature

Maximum	120 °C

Cylinder head temperature (CHT)

Maximum	135 °C

Oil Pressure

Minimum	0,8 bar (below 3500 RPM)
Maximum (short-term operated when cold start-up)	7,0 bar
Operating	2,0 – 5,0 bar (above 3500 RPM)

Fuel Pressure

Minimum	0,15 bar
Maximum	0,35 bar
Operating	0,25 bar

Fuel Type Recommended motor unleaded petrol of minimum octane number RON 95, 97 MOGAS EN228 Super or Super Plus, with max. 10% content of ethanol

Oil Type Use only oil with RON 424 classification or **AeroShell Sport Plus 4 10W-40** as an option. Use of multi-viscosity grade oils is recommended.

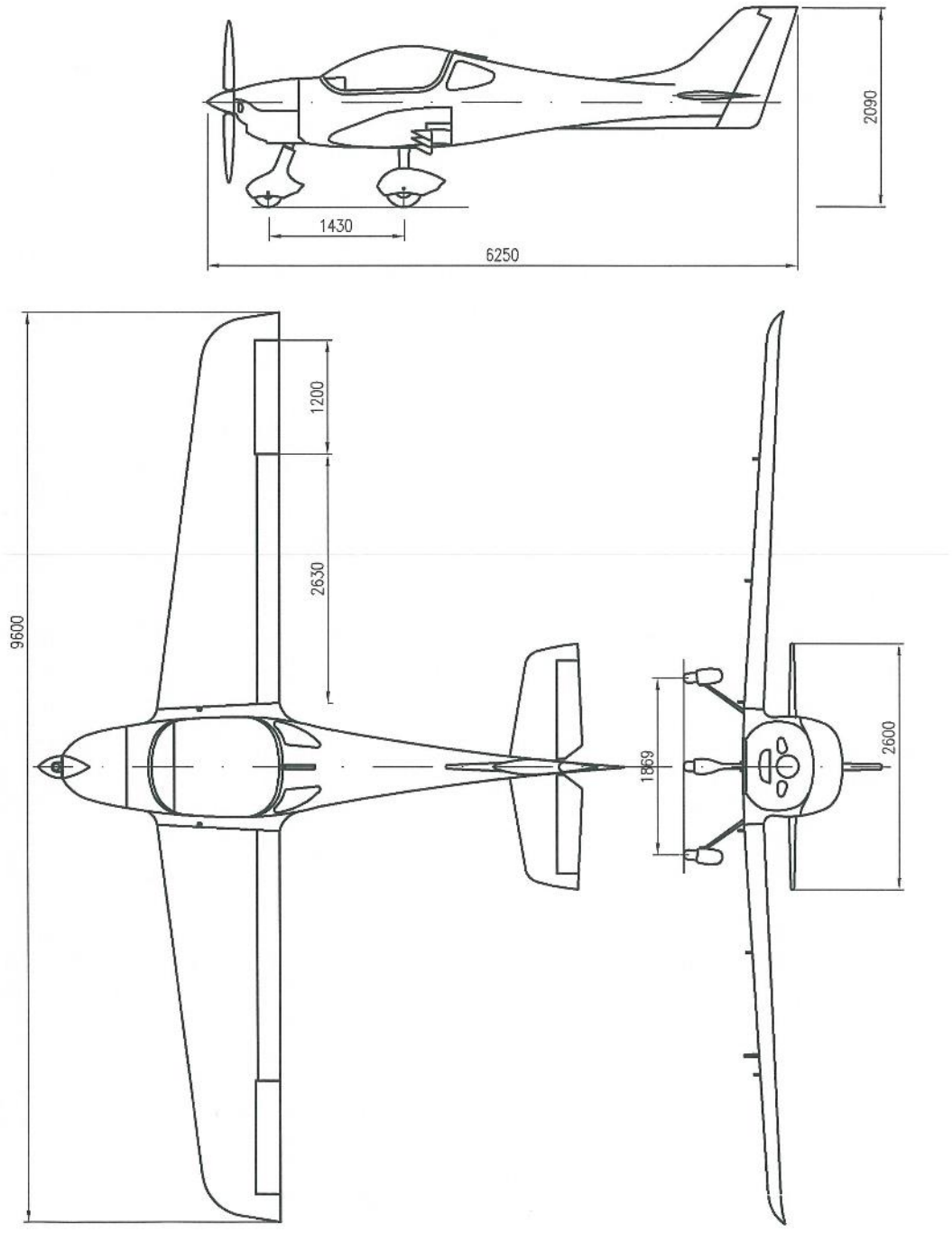
Coolant Type Conventional coolant for aluminium engines, mixed with water (mix ratio 1:1) – see Rotax operation manual. In case of mix ratio is 1:1, the freezing point is -38°C. Water-less coolants e.g. Evans or Aero Cool 180 can be applied as an option. These coolants can not be mixed with water!

The engine characteristics, operation and maintenance instructions are preferentially directed by Rotax Operation Manual. Informations listed in appropriate Rotax engine manual are preferential to this manual.

ROTAX 914 UL 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 anytime in case of engine failure.

1.6. Three-View Sketch

(mm)



Chapter 2

2. Operating Limits

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2.1. Introduction

The Chapter 2 contains operating limits necessary for safe operation of the aircraft.

2.2. Air Speed (IAS)

Never exceed speed	V_{NE}	**272 km/h**	**147 kt**

Do not exceed this speed in any case!

Design manoeuvre speed	V_A	**190 km/h**	**102 kt**

After exceeding this speed, do not use full deflection of any control surfaces and do not make any sudden control operations. An overload of the aircraft may occur!

Max. continuous cruising speed	V_C	**242 km/h**	**131 kt**

Do not exceed this speed except the flight in smooth air, but with caution!

Max. cruising speed at severe turbulence	V_{RA}	**215 km/h**	**116 kt**

Do not exceed this speed at severe turbulence!

Never exceed speed for flaps extended to III.	V_{FE}	**117 km/h**	**63 kt**
Recommended speed for flaps extended to III.	V_{FIII}	**90 km/h**	**49 kt**

Do not exceed speed limits for flaps extended!

Stall speed, flaps retracted	V_{S1}	**75 km/h**	**40 kt**

Flying this speed when flaps retracted results in loss of lift force and stall!

Stall speed in landing configuration	V_{S0}	**56 km/h**	**30 kt**

Flying this speed with flaps extended in the position III. results in stall due to loss of lift force!

2.3. Speed Indicator Markings

Speed (km/h) IAS	Speed (kt) IAS	Colour marking	Note
56 - 117	30 - 63	White section	The speed from V_{S0} up to the speed defined for flaps extended to max. position V_{FE}
75 - 215	40 - 116	Green section	From the speed V_{S1} up to the max. cruising speed
215 - 272	116 - 147	Yellow section	From the max. cruising speed up to the never exceed speed V_{NE}
272	147	Red section	Never exceed speed V_{NE}

2.4. Weight

Empty weight ..... kg

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

Useful load ..... kg

Max. load in the luggage compartment ..... 20 kg
(for specific permissible max. load see Chapt. 8)

Do not ever exceed maximum take-off weight of the aircraft!

2.5. Centre of Gravity (CG)

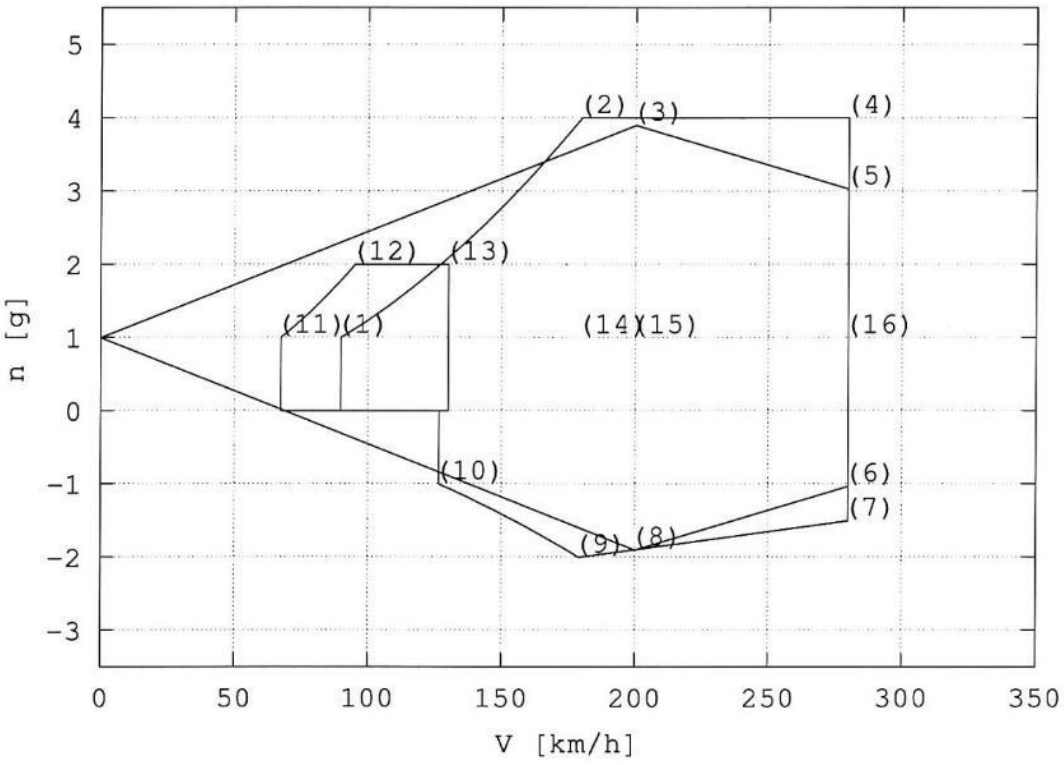
CG of the empty aircraft ..... % MAC

CG range in flight ..... 25-36 % MAC

2.6. Manoeuvre and Gust Envelope (CAS)

Envelope point	Speed	390,0 kg	460,0 kg	530,0 kg	600,0 kg
(1)	89,9 km/h	+1,00 g	+1,00 g	+1,00 g	+1,00 g
(2)	179,8 km/h	+4,00 g	+4,00 g	+4,00 g	+4,00 g
(3)	200,0 km/h	+5,00 g	+4,55 g	+4,19 g	+3,90 g
(4)	280,0 km/h	+4,00 g	+4,00 g	+4,00 g	+4,00 g
(5)	280,0 km/h	+3,80 g	+3,48 g	+3,23 g	+3,03 g
(6)	280,0 km/h	-1,80 g	-1,48 g	-1,23 g	-1,03 g
(7)	280,0 km/h	-1,50 g	-1,50 g	-1,50 g	-1,50 g
(8)	200,0 km/h	-3,00 g	-2,55 g	-2,19 g	-1,90 g
(9)	178,9 km/h	-2,00 g	-2,00 g	-2,00 g	-2,00 g
(10)	126,5 km/h	-1,00 g	-1,00 g	-1,00 g	-1,00 g
(11)	67,3 km/h	+1,00 g	+1,00 g	+1,00 g	+1,00 g
(12)	95,2 km/h	+2,00 g	+2,00 g	+2,00 g	+2,00 g
(13)	130,0 km/h	+2,00 g	+2,00 g	+2,00 g	+2,00 g
(14)	179,8 km/h	+1,00 g	+1,00 g	+1,00 g	+1,00 g
(15)	200,0 km/h	+1,00 g	+1,00 g	+1,00 g	+1,00 g
(16)	280,0 km/h	+1,00 g	+1,00 g	+1,00 g	+1,00 g

Manoeuvre and Gust Envelope / m = 600,0 kg



2.7. Permitted Manoeuvres

Category of the aircraft: Normal

Operations are limited to non-aerobatic manoeuvres that include:

- Any manoeuvres necessary for normal flight
- Training of stalls
- Steep turns with the bank angle not more than 60°

Aerobatic manoeuvres are prohibited!

2.8. Load Factors (600 MTOW)

Maximum positive load factor in CG	+ 4,0 g
Maximum negative load factor in CG	- 2,0 g

2.9. Type of Operation

Only VFR day flights are permitted (flight by visual reference to the ground during the daytime)

IFR flights (instrumental flights) and flights by ice formation are prohibited!

2.10. Crew

Number of seats	2
Minimum weight of the crew	70 kg
Maximum weight of the crew	220 kg
Maximum load of the seat	110 kg

2.11. Fuel tank

Fuel capacity	2 x 50 L
Non-usable rest of fuel	0,82 L for each fuel tank

2.12. Wind

A safe take-off and landing is only possible if the following wind speed limits are not exceeded:

a)	take-off or landing headwind	up to 12 m/s = 23,3 kt
b)	take-off or landing tailwind	up to 3 m/s = 5,8 kt
c)	take-off or landing crosswind	up to 6 m/s = 11,6 kt

Never operate the aircraft when above listed wind limits are exceeded!

2.13. Other Restrictions

Smoking, using of mobile phones, explosives and combustible materials and transport of movable objects are prohibited on board of the aircraft.

2.14. Labels and Markings

The aircraft shall be equipped with mandatory labels and markings. These must be placed on the instrumental board in a visual field of the pilot and must contain at least following actual information:

- Identification of the aircraft
  - Identification label
  - Serial number
  - Designation
  - Empty weight
  - Maximum take-off weight

- Operating limits
  - Load and weight limits depending on weight of the crew, fuel and luggage
  - Speed limits in standard flight configuration

- Passenger Warnings
  - Definition of aircraft category, its airworthiness conditions and restrictions
  - Prohibition alert of intentional spins, stalls and aerobatics

Chapter 3

3. Emergency Procedures

3.1. Engine Failure on Take-off
3.2. Engine Failure in Flight
3.3. Rescue System Activation
3.4. Fire on Board
3.5. Engine Loss
3.6. Emergency Landing
3.7. Safety Landing
3.8. Aborted Landing
3.9. Vibrations
3.10. TCU boost lamps alerts

3.1. Engine Failure on Take-off

1. Get the aircraft to gliding flight by pushing the stick forward maintaining the airspeed of 100 km/h (54 kt).
2. Determine the wind direction, adjust flaps to appropriate position, close the fuel valve, switch off the ignition, adjust safety belts and switch off the master switch just before landing. *Note: Electric flaps actuation is only possible when the master switch is switched-on.*
   A) If altitude is below 50m (160ft), get the aircraft to landing configuration and carry on landing in take-off direction with respect to possible obstacles.
   B) If altitude is higher than 50m (160ft), choose a suitable area for emergency landing.

3.2. Engine Failure in Flight

1. Get the aircraft to gliding flight maintaining the airspeed of 100 km/h (54 kt).
2. Check the fuel level and fuel valve position
3. Make sure both A and B ignition circuits are switched on
4. Check the fuel pressure, must be within tolerated limits
5. If no significant failure on engine or its installation found, try to start up the engine again
   Proceed as follows:
   - Fuel valve ⇨ open/select for appropriate fuel tank to use
   - Master switch ⇨ switch on
   - Ignition ⇨ switch on both A+B circuits
   - Throttle ⇨ position 50% open (approx. 8mm from idle position)
   - Auxiliary el.fuel pump ⇨ switch on, wait for the fuel pressure approx. 0,3 bar
   - Starter button ⇨ press and hold (without interruption) for max. 10 seconds until the engine runs the speed 1500 RPM. The engine can be started by electric starter even though the propeller continues to rotate during flight by windmilling and its speed is not sufficient. It is not necessary to wait for standstill of the propeller.
   - Throttle ⇨ adjust to required RPM

3.3. 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. 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.
Note: Activation of the rescue system is only available from pilot´s seat.

The aircraft may be damaged or the crew may be injured when using the rescue system!

3.4. Fire on Board

1. Close the fuel valve
2. Open the throttle
3. Switch off the master switch and ignition
4. Carry out emergency landing
5. Get off the aircraft

3.5. Engine Loss

1. Speed ..... 100 km/h (54 kt)
2. Flaps retracted
3. Instruments within tolerated values

3.6. Emergency Landing

Carried out in case of engine failure:

1. Speed ..... 100 km/h (54 kt)
2. Fasten safety belts
3. Flaps position according to situation
4. Report the situation by radio
5. Close the fuel valve
6. Switch off the ignition
7. Switch off the master switch

In case of emergency landing on terrain, on a surface which is not approved for take-off/landing of sport flying device, the aircraft may be damaged or the crew may be injured!

3.7. Safety Landing

Carried out in case of orientation loss, fuel exhaustion or any other reason, while the aircraft is fully controllable.

1. Determine the wind direction
2. Choose any suitable landing surface
3. Carry out low pass headwind along the right-hand side of the landing surface and inspect the terrain thoroughly
4. Carry out pattern flight
5. Calculate the landing manoeuvre
6. Land in the first third of the landing area with the flaps in the position for landing

3.8. Aborted Landing

Carried out in case of wrong landing manoeuvre or bounce during the landing and when the pilot considers aborted landing manoeuvre as safer and decides to proceed the flight.

1. Set the engine run up to full power
2. Fluently set up flaps to take-off position – I
3. Reach the horizontal speed of 110 km/h (59 kt)
4. Pull the control stick slowly to make the aircraft climbing by the speed of 120 – 140 km/h (65 - 75 kt)
5. Retract flaps

Keep the aircraft within runway centerline by using rudder control throughout the flight.

3.9. 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

3.10. TCU boost lamps alerts

1. Red boost lamp is lighting - max. admissible boost pressure was exceeded ⇨ reduce speed and boost pressure manually to be within the operating limits
2. Red boost lamp is blinking – max. "take-off" time limitation was exceeded ⇨ reduce speed and boost pressure at least to max. continuous speed
   Attention: The boost pressure will not be reduced automatically!
3. Orange boost lamp is blinking – the boost pressure control doesn't work properly. Observe engine speed and manifold pressure.
   ⇨ If engine speed and manifold pressure are outside of the operating limits — reduce speed and boost pressure manually to be within the operating limits
   ⇨ If the manual adjustment of manifold pressure and speed is not possible anymore the servo motor of the turbo charger waste gate need to be switched OFF.
   Follow the Rotax Operation Manual for next steps.

Chapter 4

4. Standard Procedures

4.1. Pre-Flight Inspection

4.1.1. Procedures Before Entering the Cockpit

4.1.2. Procedures After Entering the Cockpit

4.1.3. Procedures Before Engine Start-up; Engine Start-up

4.2. Engine Warming up

4.3. Taxiing

4.4. Engine Check

4.5. Procedures Before Take-off

4.6. Take-off and Climbing

4.7. Cruising Flight

4.8. Flight on Traffic Pattern

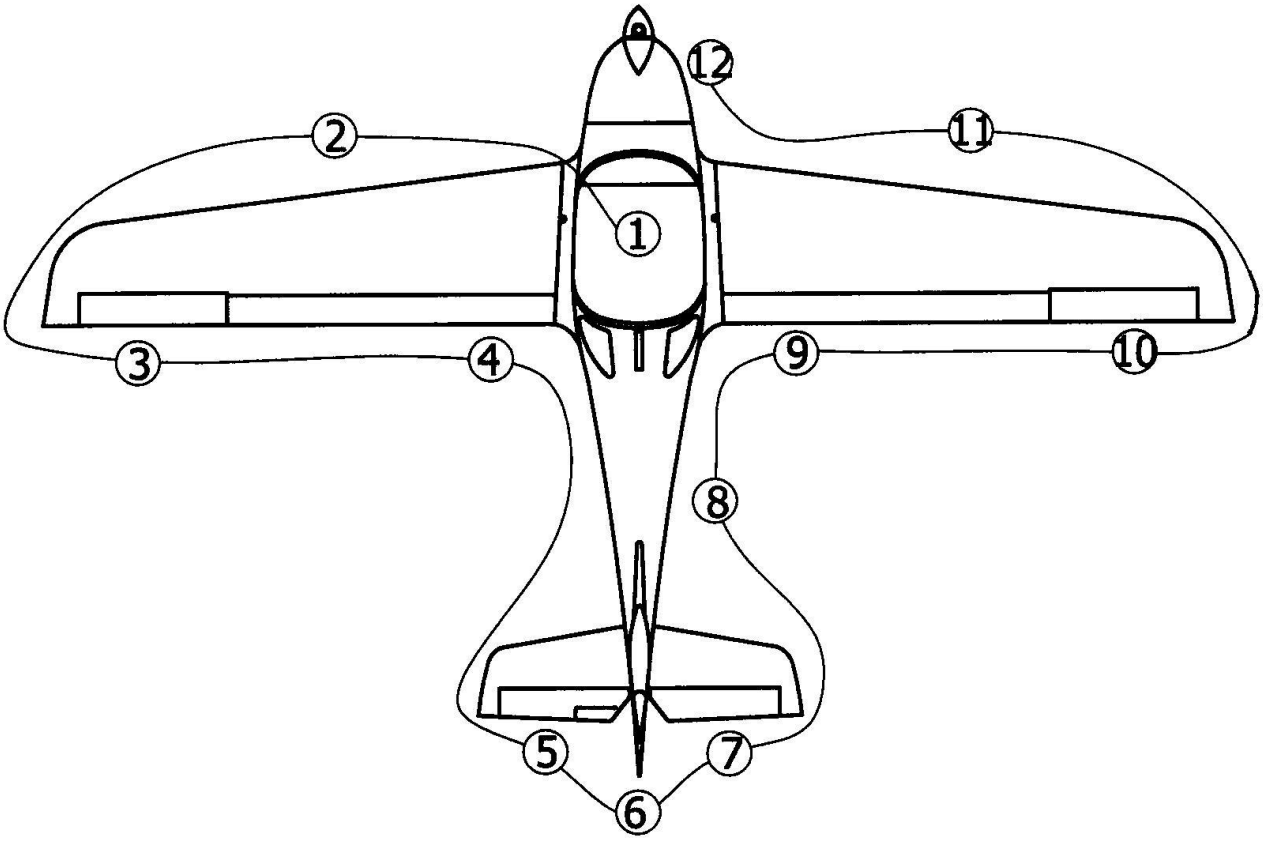
4.9. Approach and Landing

4.10. Flight in Rainy Conditions

4.11. Engine Shut-off

4.1. Pre-Flight Inspection

It is important to carry out appropriate pre-flight inspection. To perform a negligent or incomplete inspection could be a cause of an accident. The Manufacturer recommends to make the following procedure before each flight:



1/ Cockpit – switches, safety belts, instruments, seats, controls, canopy locks, canopy condition
2/ Left wing – coating, condition, plays, Pitot tube, fuel tank cap, drain valve, fuel tank ventilation
3/ Left aileron – coating, free movement, attachments, controls
4/ Left flap – coating, attachments, controls, play
Left gear leg – condition, brake fluid leak, wheel, tyre condition and inflation, wheel spat attachment
5/ Left horizontal tail and elevator – surface condition, attachment, elevator free movement, plays, trimming tab
6/ Vertical tail and rudder – surface condition, rudder attachment, plays, ropes tension
7/ Right horizontal tail and elevator – surface condition, attachment, elevator free movement, plays, check the securing of the pin of the HT control
8/ Tailplane – surface condition, radio antenna check
9/ Right flap - coating, attachments, controls, play
Right gear leg - condition, brake fluid leak, wheel, tyre condition and inflation, wheel spat attachment
10/ Right aileron - coating, free movement, attachments, controls
11/ Right wing – coating, condition, plays, fuel tank cap, drain valve, fuel tank ventilation
12/ Nose wheel – condition, play, wheel, tyre condition and inflation
12/ Engine - condition and fastening of engine cowling, engine bed, hoses intactness (fuel, oil, cooling system), clamps tightness, screws/nuts securing, exhaust pipes attachment, drain plug, oil/coolant level:

a) Oil level – Never open the oil tank when the oil is hot! Open the cover of the inspection hole on the engine cowling and unscrew the bayonet cap from the oil tank. Manually turn the propeller few times in its rotating direction to press the oil from the engine into the oil tank. Stop turning the propeller when you hear the „bubbling sound" signalizing that air is returning from the engine to the oil tank. Check the oil level with the dipstick in the oil tank and refill up to the maximum level if needed. Pay attention not to stain surrounding engine parts or its compartment by oil, otherwise remove oil spots properly. Keep the oil level within the range marked on the dipstick. Always use the same type of the oil already used in the engine. Cover the oil tank with bayonet cap. Put the cover on the inspection hole and secure with screws.

b) Coolant level – Remove the upper cowling of the engine. The engine must always be cold when checking the coolant level. Open the expansion tank and check the coolant level. Do not open the expansion tank if the coolant is hot! The max. coolant level must be flush with the bottom of the filler neck. If the level is low, refill. Cover the engine by the upper cowling. Verify the coolant level in the overflow bottle. Keep the level between „MAX.- MIN." mark.

13/ Propeller – surface condition, blades and spinner tightness

4.1.1. Procedures Before Entering the Cockpit

1. Canopy ⇨ open
2. Ignition ⇨ switched off
3. Master switch ⇨ switched off
4. Rescue system ⇨ locked
5. Pedals position ⇨ adjust to appropriate position
6. Seats position ⇨ adjust to appropriate position

4.1.2. Procedures After Entering the Cockpit

1. Cockpit ⇨ check canopy fastening and locking, proper function and condition of electric installation, instruments and flight instruments, fuel level, proper function of controls, rescue system locked to avoid unintended activation
2. Foot-operated steering ⇨ check function, proper adjustment of pedals
3. Brakes ⇨ check function, brakes on
4. Hand–operated steering ⇨ check function, free movement, stops
5. Flaps ⇨ check function, retract
6. Fuel valve ⇨ open for appropriate fuel tank to use
7. Throttle ⇨ idle
8. Fuel level indicator ⇨ check fuel amount
9. Master switch ⇨ switched off
10. Ignition ⇨ switched off
11. Instruments ⇨ check condition, zero values, altimeter setting

4.1.3. Procedures Before Engine Start-up; Engine Start-up

Do not start-up the engine if any person is in vicinity of the aircraft!

1. Safety belts ⇨ fasten
2. Canopy ⇨ close and lock
3. Parking brake ⇨ on
4. Fuel valve ⇨ open/select for appropriate fuel tank to use
5. Master switch ⇨ switch on
6. Throttle ⇨ idle (max. 10 % open)
7. Choke ⇨ turn on (only in case of cold engine)
8. TCU (servomotor turbo) ⇨ keep always in switch-on position/active *(When switching on the voltage supply, both lamps are automatically subject to a function test. For approx. 1-2 seconds both lamps illuminate and then extinguish. If not, a check as per Rotax Maintenance Manual is necessary.)*
9. El. fuel pumps ⇨ switch on both
10. EMS ⇨ switch on (wait for engine readings, fuel pressure 0,3 bar)
11. Ignition A ⇨ switch on
12. Ignition B ⇨ switch on
13. Starter button ⇨ press and hold (without interruption) for max. 10 seconds until the engine runs the speed over 1500 RPM. Release the button. *Do not press the starter button as long as the engine is running. Wait until complete stop of the engine and keep the engine cooling down for a period of 2 min. before next start-up.*
14. Choke ⇨ turn off
15. Adjust throttle to reach smooth run with approx. 2000 RPM
16. Oil pressure ⇨ check if oil pressure has risen within 10 seconds and monitor. When the oil pressure remains steady on 3 bar, increase the engine speed.
17. EMS ⇨ check the engine warning lights. If lights-on or blinking, there is a failure which must be removed. Follow the Rotax Operation Manual.
18. Continue warming-up the engine according to art. 4.2.

<u>Note:</u> Standardly keep the TCU always switch-on. In case of deactivation of TCU, the engine operation is recorded by the TCU. Exceeding of engine operating limits will null and void Rotax warranty.

Never unlock neither open the canopy when engine is running!

4.2. Engine Warming up

Start warming up the engine when 2000 RPM for approx. 2 min. and then continue warming up at 2500 RPM until reaching oil temperature of 50 °C. Check temperatures and pressure. After the engine is warmed up to the operating temperature, start taxiing and prepare to take-off without undue delay to avoid overheating of the engine.

4.3. Taxiing

Maximum recommended speed of taxiing is 15 km/h (8 kt). The direction is controlled by the nose wheel. Braking is carried out with the brake lever on the control stick. Control stick is in neutral position.
- in case of strong headwind, push the control stick forward
- in case of side wind, hold the control stick in the position opposite to wind direction.

4.4. Engine Check

1. Brakes ⇨ on
2. Throttle ⇨ engine speed 4000 RPM
3. Switch off ignition A ⇨ max. RPM drop after stabilization must not exceed 500 RPM
4. Switch on both ignition circuits ⇨ engine speed 4000 RPM
5. Switch off ignition B ⇨ max. RPM drop after stabilization must not exceed 500 RPM
   Note: While checking the two ignition circuits, only one circuit may be switched off at a time. Difference in RPM speed by use of either A or B circuit must not be more than 150 RPM.
6. Switch on both ignition circuits
7. Throttle ⇨ reduce to idle run
8. Left and right fuel tank check ⇨ during engine run, the fuel pressure must not drop below tolerated values in either of fuel tanks in use. To change-over the fuel tanks, move the fuel valve selector quickly without stop. During the change-over of fuel tanks, a short-term pressure drop may occur. After the appropriate fuel tank is selected, the fuel pressure must return to appropriate values.
9. Acceleration and power check ⇨ set the brakes on to max. braking power
   ⇨ set the full throttle for 10 seconds
   ⇨ engine speed shall reach 5000 RPM
   ⇨ set idle run

After a full-load ground test allow a short cooling run at idle speed to prevent vapour formation in the cylinder head!

After the engine check is finished and operating temperature is reached, carry on take-off within max. 5 min. In case the aircraft is standing on spot for a long time when engine is running, the engine and its compartment are not sufficiently cooled by the airflow. This may be a cause of overheating and damage of the engine and composite structure in its compartment.

4.5. Procedures Before Take-off

1. Brakes ⇨ on
2. Rescue system ⇨ unlock (if equipped with)
3. Foot-operated steering ⇨ free travel
4. Hand-operated steering ⇨ free travel
5. Flaps ⇨ position I.
6. Fuel valve ⇨ open/select (left/right) for appropriate fuel tank to use
7. El. fuel pumps ⇨ both switched on
8. Master switch ⇨ switched on
9. TCU ⇨ keep active
10. Ignition A and B ⇨ both switched on
11. Propeller ⇨ in “TAKE-OFF” position
12. Throttle ⇨ idle
13. Fuel indicator ⇨ fuel amount check
14. Instruments ⇨ values within operating limits
15. Safety belts ⇨ adjusted, fastened, secured
16. Canopy ⇨ closed and locked

4.6. Take-off and Climbing

Release the brakes. Make the aircraft move by opening the throttle to its maximal position 115 %.
The control is stick in neutral position. Control the nose wheel and rudder to keep the aircraft within the runway centerline.

When reaching the speed of 80 km/h (43 kt), gently pull the control stick to lift-up the aircraft and continue take-off until reaching the speed of 110 km/h (59 kt). Then, gently pull the control stick to make the aircraft climb. After reaching stable climb speed of 130 km/h (70 kt) and altitude over 50m (160 ft), fluently retract the flaps. Optimal climb speed is 140 km/h (75 kt).

During take-off, the engine operating limits must not be exceeded. **Climbing at full (take-off) power is only allowed for no longer than 5 minutes.** After reaching the altitude approx. 300 m(1000 ft.), switch off the auxiliary fuel pump. After reaching required altitude, adjust the propeller to "CRUISE" position (if equipped with adjustable propeller).

Do not exceed the time of full-throttle operation! Exceeding of admissible boost pressure will activate the red boost lamp, being continuously illuminated. The TCU registers the time of full power operation (boost pressure). Full throttle operation for longer than 5 minutes will make the red boost lamp blink. (see Rotax Operation Manual)

4.7. Cruising Flight

ATEC 321 FAETA NG has good flight characteristics within the whole range of permitted speeds and position of the centre of gravity. The cruising speed is within a range of **140 – 242 km/h (75 – 131 kt). In case of severe turbulence, do not exceed the speed V_{RA} 215 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.

When changing-over the fuel tanks, always move the fuel valve selector quickly, without stop on the middle position.

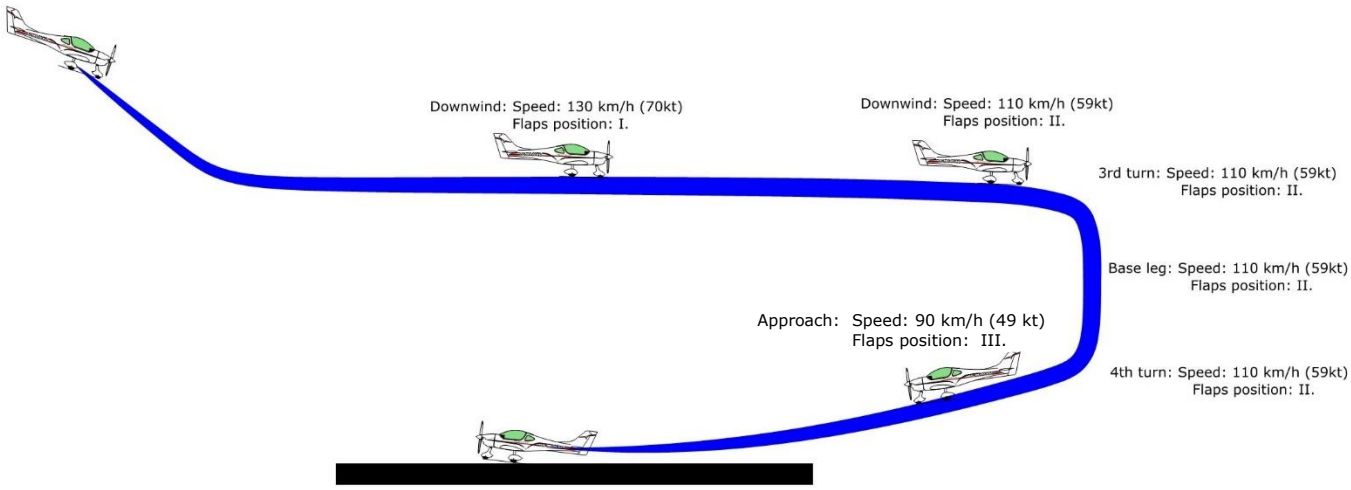
4.8. Flight on Traffic Pattern

Join the traffic pattern in the 2nd turn / follow downwind leg. In the downwind position:
- decrease the engine power - throttle on idle
- adjust the propeller to „take-off" position
- decrease the speed to 130 km/h (70 kt)
- open the flaps to position I. and continue descending in downwind direction

Before the 3rd turn and base leg:
- decrease the speed to 110 km/h (59 kt)
- open the flaps to position II. and join the base leg

Descend and continue base leg with the speed of 110 km/h (59 kt).
Before the runway centerline, make the 4th turn keeping the speed of 110 km/h (59 kt) and then:
- put the aircraft to appropriate position to approach runway centerline
- decrease the speed to 90 km/h (49 kt)
- open the flaps to position III., continue descending and approach to the runway threshold

Landing manoeuvre can be corrected by increasing the engine power or by making a side slip. In case of doing side slip when side wind, a windward wing shall be banked downwards. E.g. if on final, the wind blows from the left side, push the right pedal and ailerons are directed to the left facing opposite the wind direction.



4.9. Approach and Landing

Approach

Make an approach with the throttle on idle and the speed of 90km/h (49 kt) with flaps position III. Approach manoeuvre can be corrected by increasing the engine power. Flaps positions within limits according to Art. 2.2. Propeller in "take off" position.

Procedures on final:

1. Propeller in "take-off" position
2. Speed of 90km/h (49 kt). Minimal descending speed V_X is 85 km/h (46 kt).
   Do not ever approach by lower speed than minimal descending speed is!
3. Flaps position III (position II in case of severe turbulence or strong headwind), speed 100 km/h (54 kt)
4. Switch on auxiliary el. fuel pump
5. Throttle on idle or corrected if necessary
6. Instruments within tolerated values

Landing

The speed of the aircraft in hold-up position decreases by soft pulling of the control stick until the touch-down by the speed of 56 km/h (30 kt). After touch-down of the nose wheel, the landing distance can be shortened by using brakes.

Do not apply maximum brake power except an extreme situation occures. A frequent use of brakes results in undue wear of tyres, brake pads and discs. A frequent intensive braking may cause a mechanical over-stress of the undercarriage and other load bearing parts. This may shorten life-time of the airframe.

4.10. Flight in Rainy Conditions

Intentional flights in rainy conditions are not recommended. The flights must be always realized under VFR conditions only. In case of flight in the rain is inevitable, it 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. Cruising flight 140 – 180 km/h (75 – 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!

4.11. Engine Shut-off

After landing and reaching the parking place, keep the engine running for a cooling period of at least 2 min. with approx. 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

Keep the TCU always in switch-on/active position.
Keep the fuel valve open for any of the fuel tanks (L/R).

Chapter 5

5. Performance

5.1. Introduction
5.2. Air Speed Indicator Corrections
5.3. Stall Speeds
5.4. Altitude Loss by Stalling
5.5. Take-off Distance to reach 15m (50ft) altitude
5.6. Rate of Climb
5.7. Cruising Speeds
5.8. Flight Range

5.1. Introduction

The Chapter contents information on speed indicator calibration, stall speed and other performances of the aircraft equipped with the engine ROTAX 914 UL and the propeller FITI ECO COMPETITION 3LR/160 cm.

5.2. Air Speed Indicator Corrections

		Cruise config.		Take-off config.		Landing config.	
		Flaps retracted		Flaps position for take-off		Flaps position for landing	
Speed IAS		Speed CAS					
km/h	kt	km/h	kt	km/h	kt	km/h	kt
50	27,0					60,8	32,9
60	32,4					68,8	37,2
70	37,8					78,1	42,2
80	43,2			91,1	49,2	85,7	46,3
90	48,6	100,5	54,3	99,5	53,8	94,3	51,0
100	54,1	106,9	57,8	106,6	57,6	103,4	55,9
110	59,5	115	62,2	111,3	60,2	112,8	61,0
120	64,9	123,1	66,5	121,6	65,7		
130	70,3	131	70,8	128,5	69,5		
140	75,7	137,9	74,5				
150	81,1	147	79,5				
160	86,5	155,1	83,8				
170	91,9	163	88,1				
180	97,3	170,9	92,4				
190	102,7	180	97,3				
200	108,1	187,6	101,4				
210	113,5	195	105,4				
220	118,9	203,2	109,8				
230	124,3	212	114,6				
240	129,7	220,1	119,0				
250	135,1	228	123,2				
260	140,5	237,4	128,3				
270	145,9	245	132,4				
280	151,4	253,1	136,8				

5.3. Stall Speed (IAS)

Engine idle	*Flaps retracted*	*Flaps I (12°)*	*Flaps II (22°)*	*Flaps III (32°)*
solo flight	70 km/h 37,8 kt	63 km/h 34 kt	51km/h 27,5 kt	42 km/h 22,7 kt
600 kg	75 km/h 40,5 kt	68 km/h 36,7 kt	56 km/h 30,3 kt	47 km/h 25,4 kt

Engine off	*Flaps retracted*	*Flaps I (12°)*	*Flaps II (22°)*	*Flaps III (32°)*
solo flight	70 km/h 37,8 kt	63 km/h 34 kt	51 km/h 27,5 kt	42 km/h 22,7 kt
600 kg	75 km/h 40,5 kt	68 km/h 36,7 kt	56 km/h 30,3 kt	47 km/h 25,4 kt

5.4. Altitude Loss by Stalling

Flap position (level flight)	*Flap deflection*	*Altitude loss*	
I	12°	30 m	100 ft
II	22°	30 m	100 ft
III	32°	30 m	100 ft
0	0	30 m	100 ft

5.5. Take-off Distance to reach 15 m (50 ft) altitude, TOW 600 kg

Engine	*100 HP*	
Runway surface	*Take-off distance*	
Paved surface	335 m	1100 ft
Grass	340 m	1115 ft

5.6. Rate of Climb - when speed of 140 km/h (75 kt)

Engine	*115 HP*
Solo flight	9 m/s 1770 ft/min
600 kg	6,35 m/s 1250 ft/min

5.7. Cruising Speeds

ROTAX 914 UL

Air speed		*RPM*	*Fuel consumption*
km/h	*kt*		*l/h*
120	65	3500	7,5
140	76	3700	8
160	86	4100	10,1
180	97	4500	13,2
200	108	4800	14,7
220	119	5200	17,5
242	131	5500	20

5.8. Flight Range

When maximum fuel amount of 100 L

ROTAX 914 UL

Speed		*Flight range*		*Flight endurance*	*Fuel reserve (10 L)*
km/h	*kt*	*km*	*n.m.*	*h*	*h*
140	76	1575	850	11:15	1:15
160	86	1425	769	8:54	1:00
180	97	1227	662	6:48	0:45
200	108	1224	661	6:06	0:40
220	119	1131	610	5:06	0:34
239	129	1080	583	4:30	0:30

Information on engine RPM, consumption, flight endurance and flight range has informative character only. Listed values depend on propeller type and pitch, flight altitude, air temperature, air pressure and loading of the aircraft. The flight range is considered as theoretic when windless conditions. When planning the flight track, do consider all above factors and safe amount of fuel!

Chapter 6

6. Aircraft Assembly/Disassembly

6.1. Introduction
6.2. Tailplanes Assembly/Disassembly
6.3. Wings Assembly/Disassembly

6.1. Introduction

This chapter contains description of assembly and disassembly of individual parts of the aircraft. At least two persons are needed for assembly/disassembly. All parts necessary for assembly are being delivered with the aircraft.

Before assembly, clean, grease and then secure all pins. Pay attention to correct adjustment of ailerons and flaps, which is carried out by shortening and prolonging of connecting pushrods.

With each next assembly, it is necessary to replace locking nuts and split pins with new pieces.

After the aircraft is assembled, make deflections adjustment according to levelling record and carry out engine check with a focus on both fuel tanks function. Check the correct values on fuel indicators.

6.2. Tailplanes Assembly / Disassembly

At least two people are needed for assembly/disassembly. Pay attention to avoid a fall of small parts into the inner space of the tail during manipulation!!

Horizontal (HT) tail assembly

- **Vertical tail rudder disassembly**

To reach better access to attachment points of the HT, it is recommended to remove the VT rudder. Unscrew two M5 screws fixing the VT rudder in the lower carrier. Then, deflect the rudder fully to the left or right. Pull the bottom part of the rudder out of the lower carrier and then, lift the rudder upwards to remove it out of the upper hinge.

- **Horizontal tail mounting to the fuselage**

Remove the cover of the mounting hole situated under the HT on the left side of the fuselage. Connect the right half of the HT with the elevator first. Insert its crossbeam into the hole in the fuselage and insert the elevator into the pin in the steering lever at the same time. Connect the left half of the HT same way. At the same time, it is necessary to get the trim servo wire through the hole into the fuselage.

Install two M8 screws, which connect both halves of the HT, into appropriate holes and screw them into the bulkhead inside the tail. The screws must be fitted with a locking washer to avoid their self-loosening and must be properly tightened.

Install M4 screws in the holes situated in the front root area of each half of the HT stabilizer. These fix both HT halves via connecting tube. Secure the screws by the Loctite glue.

Install two washers and nuts on M6 screws, each mounted on each steering lever. These secure the elevators on the steering levers.

Install the cover of the mounting hole situated under the HT stabilizer on the left side of the fuselage. Finally, cover the gap between the fuselage and HT stabilizer by any suitable white plastic tape (eg. 3M) which avoids water intrusion into the fuselage.

• Vertical tail rudder installation
Adjust the foot-operated steering to the left or right deflection. In that position, insert the VT rudder (its upper pin) into its upper hinge on the tail and push its lower carrier inside the tail at the same time. Adjust the steering back to neutral position and install two M5 screws securing the VT rudder in the lower carrier.

HT disassembly

Disassembly of the HT is being performed in reverse order. Pull the VT rudder out of the tail first, then unscrew the front M4 screws from the upper side of the HT. Finally, unscrew both M8 screws connecting both HT halves with the fuselage. Pull both HT halves out of the fuselage.

6.3. Wings Assembly/Disassembly

At least two people are needed for wings assembly/disassembly. One for assembly and one (or better two) assistant(s) to hold and support the wing to avoid its fall and damage.

Do not press the wing surface to avoid cracks in the gel-coat especially in the areas of material connections, dividing lines, edges and not-stiffened areas.

The assistant holds the wing by the wingtip and you hold it by the root (the third person can support it also by the trailing edge near to its root). Lift the wing up and lay it down on any smooth soft pad (e.g. mattress) to prevent it from damage.

Wings assembly
(same for both left and right wing)

• Flap pushrod preparation - connection to the wing
Place the wing by its leading edge on the soft pad. Hold the wing together with your assistant (who holds the wing by its wingtip). Connect the pushrod to the flap steering lever situated inside the wing. The assistant deflects the flap to enable better accessibility to the flap steering lever.

Pay attention to install correct pushrod (LEFT („L“) or RIGHT („R“)) to appropriate wing. Pay attention to correct pushrod position (its non-adjustable end leads into the wing, the adjustable end leads into the fuselage (see the sticker with letters L/R on the upper side of the pushrod). Secure the connection by the pin of Ø5mm with the spacer + split pin (all such parts delivered together with pushrods).

• Aileron pushrod preparation - connection to the wing
Screw the aileron pushrod to the adjustable end protruding from the wing. Pay attention to install the correct pushrod (LEFT or RIGHT) to appropriate aileron. Exact adjustment will be done later.

• Wing attachment to the fuselage
Prepare two of main wing pins. Grease them by appropriate quantinty of vaseline. Pay attention to their correct position – UPPER pin is WITHOUT thread, LOWER pin is WITH thread.

The assistant holds the wing by the wingtip and you hold it by the root (the third person can hold the wing by its trailing edge near to its root).

Attach the wing close to the fuselage, so that both pushrods (aileron and flap) enter the fuselage through the corresponding holes. But, leave some sufficient space between the wing and fuselage to have enough

access to interconnect the rest of the equipment between the wing root and fuselage. All persons must still hold and support the wing to avoid its fall. Support the wing at the area of its root rib with a help of the assistant (or you can support it by your knees) to be able to interconnect the rest of the equipment. Then connect the equipment:

- static and dynamic pressure hoses of Pitot tube (on the left wing only)
  Note: Pay attention not to interchange the hoses of Pitot tube during assembly.
- quick couplings of fuel hoses
- cable connector of the fuel gauge
- cable connector of the strobes/position lights *(if equipped with)*

Push the wing towards the fuselage to attach it completely without any gap in between. Insert main wing pins into the holes with fittings. Insert the upper pin (without thread) first and then insert the lower pin (with thread). This operation requires careful use of the hammer and any auxiliary metallic rod (Ø 18mm) to beat the pins into the holes. During this operation, the assistant (holding the wing by the wingtip) pays attention to keep the correct dihedral angle. If needed, he can slightly lift the wing to match the holes with the fittings and so to get appropriate position needed for smooth passing of the pins through the fittings. Both pins must be inserted to their fully beaten position. Then the assistant can leave the wing then.

From the upper side, secure the pins by the bolt and tighten it by the torque 25 Nm. Install the M10 self-locking nut on its lower end to secure the wing connection properly. Finally, cover the holes with composite covers (delivered with the plane). Upper one with the hole heading backwards, lower one is half ball-shaped. Or when any next re-assembly, you can use any removable white plastic sticker (to avoid water intrusion).

• Flaps pushrods connection inside the cockpit

Remove the seats to have better access to the flap steering lever situated in the central tunnel. Connect the pushrod with the lever and secure it by the pin Ø 5mm and spacer + split pin (all parts delivered with the pushrod). Eventually, it is possible to insert the pin Ø 5mm via from the bottom side (better accessibility to insert the spacer and split pin). Install seats back.

• Ailerons pushrods connection inside the cockpit

Screw the connecting pushrods of the ailerons to the control stick to be in fully tightened position. Then loosen it again by a number of turns indicated on the pushrod. This assures correct neutral position of ailerons. Secure the connection with the pin Ø 5mm and spacer + split pin (all parts delivered with the pushrod).

Wings disassembly

First of all, drain off the fuel from both fuel tanks.

Inside the cockpit, disconnect ailerons pushrods from the control stick and flaps pushrods (in the central tunnel).

Release and remove the locking nut of the wing pins bolt. Screw the bolt out by approx. 2cm.

If needed, the assistant (holding the wing by the wing tip) can slightly lift the wing to allow the pins to be pulled out more smoothly.

Beat out the lower pin by the hammer by light tapping on the head of the bolt. Unscrew the bolt and remove the lower pin. Push out the upper pin with a help of any metal rod of Ø 18mm and the hammer.

The assistant still holds the wing by the wingtip and you hold it by the root (the third person can hold the wing by the trailing edge near its root) to avoid its fall and damage.

After the pins are removed, partially pull the wing out of the fuselage to have the space between the wing and fuselage and to have enough access to disconnect the equipment. Support the wing at the area of its root rib with a help of the assistant (or you can support it by your knees) to be able to disconnect the rest of the equipment. Then disconnect:

- static and dynamic pressure hoses of the Pitot tube (only on the left wing)
  Note: Pay attention not to interchange the hoses of the Pitot tube during their next re-assembly.
- quick couplings of fuel hoses
- cable connector of the fuel gauge
- cable connector of the strobes/position lights (if equipped with)

Store the wings on any safe and dry place with stable temperature. Wings need to be properly secured and prevented from structural and surface damage.

Chapter 7

7. Aircraft and Systems Description

7.1. Wing
7.2. Fuselage
7.3. Tailplanes
7.4. Landing Gear
7.5. Steering
7.6. Propulsion unit
7.7. Fuel System
7.8. Instruments
7.9. Controlling Elements
7.10. Canopy
7.11. Cockpit Equipment

7.1. Wing

The cantilever tapered backswept wings with combined structure, slotted lift flaps and composite coating have SM 701 airfoil along the whole span and winglets on wingtips. The main spar is made of laminated hard beech wood saturated with synthetic resin and is situated in 30% of the wing depth. Ailerons are hinged on the rear spar. Flaps are hinged on composite hinges with turning point under the outline profile. Root ribs are made of carbon sandwich, other ribs are made of plastic foam. The wing coating is made of carbon sandwich. Ailerons and flaps have all-composite structure. The centrewing is welded of CrMo steel tubes of high quality. Inside of each wing, the fiberglass composite fuel tank of 50L capacity is inbuilt. Fuel tank is situated in the area of leading edge of the wing.

7.2. Fuselage

The fuselage is a carbon composite shell braced with carbon sandwich bulkheads, NOMEX honeycomb and hardened foam. The fuselage cross-section is elliptic with aerodynamic wing base and spacious cockpit covered by perspex canopy. The luggage compartment with two small side-windows behind the seats is a part of the cockpit. The engine compartment in the front part of the fuselage is separated from the cockpit by the firewall to which the engine bed and the steerable nose wheel are mounted.

7.3. Tailplanes

The tailplanes have carbon composite structure designed in classical cross tail arrangement. The horizontal tail has trapezoidal shape and consists of fix stabilizer and elevator. The vertical tail has trapezoidal shape. The tail fin is an integral part of the fuselage. The VT rudder has carbon composite structure. The elevator trim is electrical.

7.4. Landing Gear

The landing gear is a fixed tricycle undercarriage with a steerable nose wheel. The main gear is designed as a pair of composite leaf springs with the wheels size of 350x120 mm. Main wheels are fitted with hydraulic disc brakes and aerodynamic wheel spats. Integral nose leg with aerodynamic fairing consists of composite construction and the metal tube with shock absorbing rubber springs. Nose wheel size is 300x100 mm.

7.5. Steering

All controls have dual steering. Ailerons and elevator are controlled by pushrods and levers. The rudder is controlled by steel wire ropes. Flaps are driven electrically. All controls attachments are designed as to not to disturb outline profile of the airframe. Important check points in the wings are fitted with inspection holes covered by perspex covers. The pitch angle can be trimmed. The cockpit can be optionally equipped with co-pilot control stick.

7.6. Propulsion unit

The propulsion unit consists of ROTAX 914 UL engine and three blade FITI ECO COMPETITION in-flight adjustable propeller.

7.7. Fuel System

The fuel system consists of two fuel tanks inbuilt in wings. Its total fuel capacity is 100 liters (2 x max. 50L). The piping connection is equipped with a sediment bowl with the drain plug. The fuel supply is assured by two independent circuits with two fuel pumps (main and auxiliary). Unconsumed fuel returns back to the fuel tank. The fuel pressure is measured by the pressure gauge. When the fuel amount indicator light turns on, the fuel reserve in appropriate fuel tank is 5 liters.

7.8. Instruments

The instrumental equipment consists of basic flight and engine instruments and navigation system. Static and dynamic pressure is taken from the Pitot tube installed on the underside of the left wing. Instrumental layout on the dashboard is displayed on the picture in the Art. 7.11.

If the aircraft is equipped with SSR transponder, this must be switched-on during the flight. The installation of SSR transponder must be provided by appropriate authorized person.

Basic transponder squawks:
- 2000 - controlled flight
- 7000 - uncontrolled flight
- 7500 - unlawful interference
- 7600 - communication failure / radio contact loss
- 7700 - emergency

When setting up the new squawk, the transponder must be in “STAND-BY” mode. When handling the device, follow operating instructions of its manufacturer and instructions of air traffic controller!

7.9. Controlling Elements

Foot-operated control
By pushing the left pedal when sufficient speed is reached, the aircraft turns to the left when moving either on the ground or in flight, and vice versa. Pedals can be fix or optionally adjustable in three positions.

Hand-operated control
By pulling the control stick towards the pilot, the nose lifts up (pitch angle increases) and the aircraft is climbing. By pushing the control stick forward, the aircraft is descending. By moving the control stick to the left, the aircraft banks to the left, and vice versa.

Electrical flaps
The electrical flaps are controlled by electronic flaps controller. By moving the control lever of the actuator backwards, the flaps move from 0 position to the positions I, II or III, and vice versa. Each flap position is indicated by indicator light. In case the limit of airspeed appropriate to certain flaps position is exceeded, the controller does not allow further opening of flaps to the next position. For detailed instructions to use, see the User Manual to the e-flaps controller issued by its manufacturer and delivered with the aircraft.

Engine throttle
By pushing the throttle lever forward, the engine power increases and vice versa.

Choke
By pushing the choke lever forward, the choke opens and vice versa.

7.10. **Canopy**

The cockpit is covered by hinged perspex canopy with two small sliding windows. The canopy opens up- and backwards. Electrical blocking system installed on the canopy locks disables to start up the engine in case the canopy is not properly closed. Mechanical blocking system (i.e. the lever to OPEN/CLOSE the canopy) prevents the canopy from its self-opening during the flight. Small demisting fan installed on the top of the dashboard avoids canopy fogging.

7.11. **Cockpit Equipment**

The aircraft shall be equipped with at least minimum equipment, which is:
1. Speed indicator with colour markings of speed limits

2. Altimeter
3. Skid ball
4. Compass
5. EMS device (engine monitoring system) example with colour indicators suitable for Rotax 914 ULS

example

Dashboard with instruments

(picture and description according to individual configuration)

Chapter 8

8. Weight and Balance

8.1. Introduction
8.2. Empty Weight
8.3. Maximum Take-off Weight
8.4. Range of the Centre of Gravity
8.5. Weight Envelope
8.6. Centre of Gravity Determination
8.7. Useful Load, Weight Sheet
8.8. Maximum Useful Load of the Luggage Compartment
8.9. Levelling and Hinge Moments

8.1. Introduction

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

8.2. 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

8.3. Maximum Take-off Weight

The maximum take-off weight defined by the regulations and manufacturer is

600 kg

Never exceed maximum take-off weight!

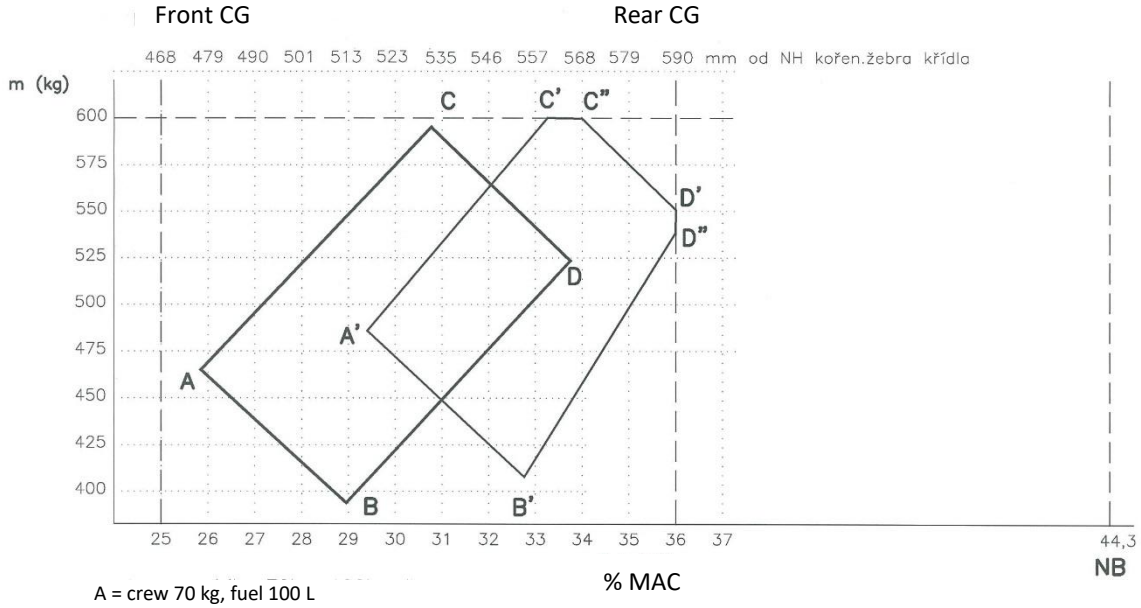
8.4. Range of the Centre of Gravity (CG)

CG of the empty aircraft .....% MAC

Permitted range of the CG in flight 25 – 36 % MAC

Operation over this range is prohibited!

8.5. Weight Envelope

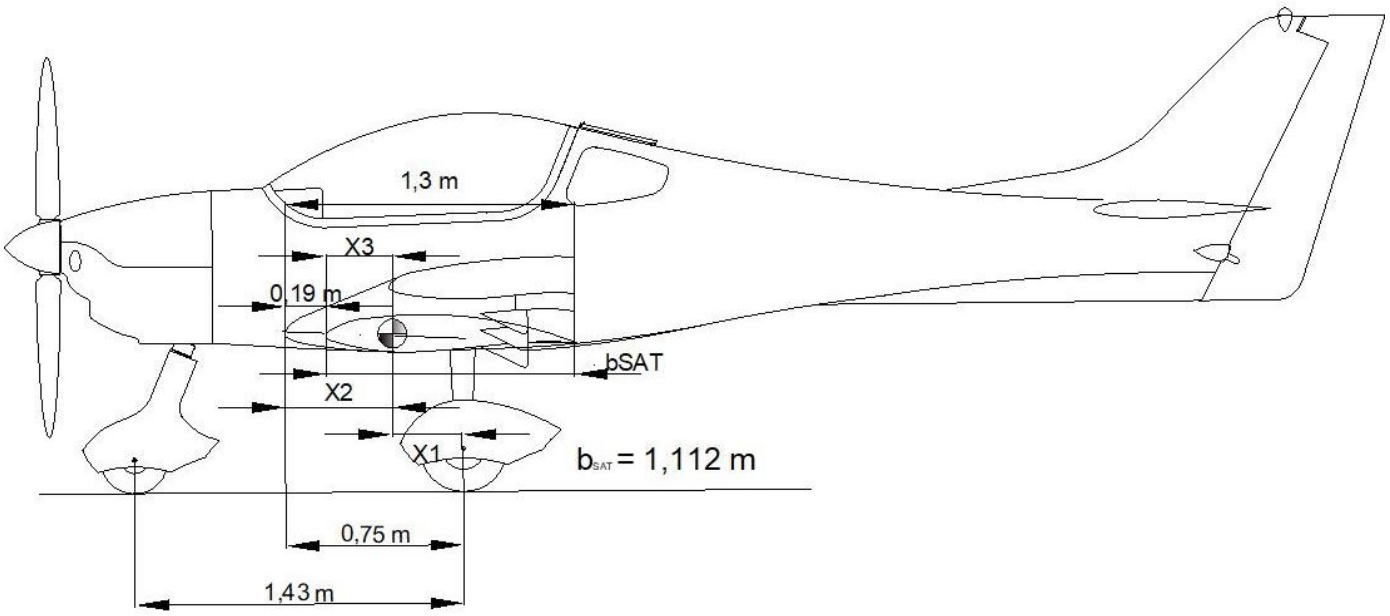


A = crew 70 kg, fuel 100 L
B = crew 70 kg, fuel 0 L
C = crew 200 kg, fuel 100 L
D = crew 70 kg, fuel 0 L
A' = crew 70 kg, fuel 100 L, luggage 20 kg
B' = crew 70 kg, fuel 0 L, luggage 20 kg
C' = crew 185 kg, fuel 100 L, luggage 20 kg
C'' = crew 200 kg, fuel 80 L, luggage 20 kg
D' = crew 200 kg, fuel 15 L, luggage 20 kg
D'' = crew 200 kg, fuel 0 L, luggage 17 kg

8.6. Centre of gravity determination

The aircraft has to be balanced in "flight position" including crew and fuel.

Weight on main wheels	G_1	(kg)
Weight on nose wheel	G_2	(kg)
Total weight $G_1 + G_2$	$G = G_1 + G_2$	(kg)
Distance from main wheel axis to nose wheel axis	$x_{MW-FW} = 1,43$	(m)
Distance from main wheel axis to wing leading edge in the root area	$x_{MW-LE} = 0,75$	(m)
Distance of the CG from main wheel axis	$x_1 = G_2 * x_{MW-FW} / G$	(m)
Length of MAC	$b_{MAC} = 1,112$	(m)
Length of wing chord in the root area	$b = 1,300$	(m)
Back-swept MAC displacement	$s_y = 0,19$	(m)
Distance from CG to leading edge	$x_2 = x_{MW-LE} – X_1$	(m)
Distance from CG to leading edge of MAC	$x_3 = X_2 – s_y$	(m)
Distance from leading edge in % b MAC	$x_{CG-MAC\%} = X_3 * 100 / 1,112$	(%)



8.7. Useful load, weight sheet

Useful load is the weight difference between the maximum take-off weight and the empty weight determined by weighing.

When the empty weight is ..... kg, the useful load is ..... kg.

Weight and centre of gravity sheet, fuel tanks 2 x 50 L, take-off weight 600 kg:

Fuel amount	**100 L**	**75 L**	**50 L**	**25 L**	**10 L**
Max. weight of crew					
CG position in % bMAC					
Min. weight of crew	**70 kg**	**70 kg**	**70 kg**	**70 kg**	**70 kg**
CG position in % bMAC					
Max. weight of luggage	**20 kg**	**20 kg**	**20 kg**	**20 kg**	**20 kg**
Max. weight of crew					
CG position in % bMAC					

If above listed limits are kept, the centre of gravity is situated in permitted position range.

8.8. Maximum Useful Load of the Luggage Compartment

Maximum useful load of the luggage compartment is 20 kg. This load is limited by the weight of the crew according to following weight sheet. For calculation of the max. useful load, an extreme option for max. rear CG is considered at each given weight of the crew.

Never exceed this load! An overloading of the rear CG may be caused in an extreme situation!

When transporting any objects in the luggage compartment, always pay attention to their proper storage and fixation under the fixing net to disable their free movement within the cockpit.

Weight of the crew (kg)	**70**	**80**	**100**	**120**	**140**	**160**	**180**	**200**	**220**
Max. load in the luggage compartment (kg)	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**15**

8.9. Levelling and Hinge Moments

The aircraft is delivered leveled by the manufacturer and deflection angles of controls are already adjusted. Next levelling and inspection of hinge moments of controls are being performed after repairs or painting works made on the aircraft. Measured values of hinge moments may not exceed permitted limits and deflection angles shall be adjusted according to prescribed values. Then the Levelling Record shall be issued. The values of hinge moment are measured on trailing edge of controls in flight position with basic zero deflection of controls and with steering disconnected. The hinge moment is weighed on electronic scales with the tolerance of 1 gram.

1. The angle of attack of wings and tailplanes is given by the shape of the fuselage transition to the wings and to the tailplanes. If fuselge transitions fit together with root ribs of the wings and horizontal tail, the angle of attack is 2,5°.

2. Deflection angles of controls are measured on trailing edges of the controls, towards their zero position.

Elevator:
Upward deflection..... 80 mm +- 2 mm (measured towards end bow)
Downward deflection..... 60 mm +- 2 mm
Max. hinge moment..... 0,3 Nm (130 g) (measured on the trailing edge in the distance of 250 mm from the turning point)

Ailerons:
Upward deflection..... 80 mm +-3 mm (measured towards end bow)
Downward deflection..... 60 mm +-3 mm
Max. hinge moment..... 0,6 Nm (250 g) (measured on the trailing edge in the distance of 250 mm from the turning point)

Vertical tail rudder:
L/R deflection..... 120 mm +-5 mm (measured at the bottom of the trailing edge)
Max. hinge moment..... 2,0 Nm (600 g) (measured on the trailing edge in the distance of 250 mm from the turning axis)

Chapter 9

9. Care and Maintenance

9.1. Maintenance Schedule
9.2. Aircraft Repairs
9.3. Engine Major Overhaul
9.4. Anchorage of the Aircraft
9.5. Cleaning and Care
9.6. Aircraft Storage

9.1. Maintenance Schedule

Inspection, Mandatory Work	Inspection Period (hours)				
	10	25	50	100	200
Engine					
Follow maintenance instructions and schedule according to the Rotax Maintenance Manual.					
Engine Compartment					
Engine Bed Surface condition, integrity of construction with a special focus on welds, mounting points, silentblocks and bushings.				x	
Bolted Connections Surface condition of bolted connections and bearings, securing and tightening. Tighten if necessary, secure. Always replace locking nuts, split pins and binding wires with new ones after removal.			x		
Engine silentblocks (shock absorbers) Elasticity of engine bearings, pre-stress, integrity of rubber blocks, degree of permanent deformation. Replace silentblocks if necessary, tighten, secure.				x	
Oil, Coolant and Fuel Hoses Surface integrity, leakage, clamps tightness, condition of connections, prevention from contact with oscillating parts and exhaust system. Re-tighten or replace if necessary. Filters replacement according to the Rotax Maintenance Manual.		x			
Operating Liquids Check level, refill. Change liquids according to the Manual of the engine manufacturer	x				
Coolers Mechanical integrity, leakage, purity				x	
Controls Actuating forces, end stops adjustment, plays, hinges, self-locking. Adjust, secure.			x		
Exhaust piping Mounting, integrity, tightness, surface condition, corrosion degree, springs condition and pre-stress. Grease ball connections by a special lubricant.				x	
Carburetors Mounting, surface condition, controls synchronization, condition of elastic rubber connection flange – integrity, tightness. Replace the rubber flange in case of material degradation or cracks on the surface. Condition and mounting of the air filter.		x			
Fuel System Leakage, fuel flow and supply, pumps, gauge, valve, drain plug, fuel tanks air-ventilation and its clearness. Replace fuel filters. (for maintenance instructions see the Rotax Maintenance Manual)		x			

	10	25	50	100	200
Electric Installation Condition of wirings, integrity, purity, insulation, contacts and soldered joints, wiring harness attachment to the airframe and condition of bushings. Check probes and indicators interconnection. Battery attachment and its condition.					**x**
Propeller					
Follow maintenance schedule and instructions according to the Manual of the propeller manufacturer.					
Propeller Attachment Condition of bolts, check torques, securing.				**x**	
Cockpit					
Control Stick Free movement in all directions, end stops adjustment, securing, plays in pins. Replace pins and bolts if excessive plays or worn-out, grease, secure.				**x**	
VT Rudder Control Condition and integrity of pedals with a special focus on deformations and surface cracks near to welds. Full and free movement right and left (lift the nose wheel off the ground to check), end stops adjustment, rudder wires tension, plays, securing. If excessive plays on parts, adjust or replace. Replace worn-out parts, grease pedals mounting and hinge joints, secure.				**x**	
Flaps Control Correct function and free movement of flaps, flaps stability in each position, plays, wear of interlock pin. Replace worn-out parts, grease, secure.			**x**		
Canopy – Open / Close Condition and function of locking mechanism, hinges, struts, plays. Adjust plays, replace worn-out parts, grease joints and pins, secure.					**x**
Flight and Engine Instruments Condition, legibility, mounting in the dashboard, condition of air-operated and electric installations, connectors.					**x**
Electric installation Condition of wirings, integrity, purity, insulation, contacts and soldered joints, connectors.					**x**
Fuel system Leakage, fuel flow, fuel pumps function, fuel indicator, fuel tank selector valve.		**x**			
Safety Belts Condition, mounting strength, adjustment.				**x**	
Ballistic Rescue System Condition of parachute, rocket, lines, attachment to bulkhead. Maintenance according to the Manual of rescue system manufacturer.					**x**

	10	25	50	100	200
Landing Gear					
Main Gear Rigidity and strength of mounting to the fuselage, plays, integrity, surface condition, degree of permanent deformation.			x		
Wheels Mounting, brakes condition, brake pads and disc wear, brake system leakage. Attachment and purity of wheel spats.		x			
Nose Gear Overall condition, plays, surface, integrity, rubber springs condition and elasticity when loaded, control and steering pushrods condition. Grease slide bearings, replace worn-out parts.		x			
Fuselage Overall condition, integrity, purity. Antennas, lights, covers and cowlings attachment.					x
Wings Overall condition, surface quality, integrity, attachment, fittings, bolts, plays. Condition of ailerons and flaps, surface quality, hinges, plays, securing. Controls condition, free movement, end positions, plays. Pitot tube condition and its mounting to the wing.			x		
Tailplanes					
VT Rudder, Elevator Overall condition, hinges, free movement, plays, securing.					x
HT Stabilizer Overall condition, mounting, fittings, securing.				x	

9.2. Aircraft 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 tyres

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

9.3. Engine Major Overhaul

The major overhaul is 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.

9.4. Anchorage of the Aircraft

Anchorage of the aircraft is necessary in order to avoid possible damage caused by wind or wind gust when parking outside the hangar. For this purpose, the aircraft is equipped with screw mounting points for eyelets on the underside of wingtips.

9.5. Cleaning and Care

The aircraft 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.

9.6. 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, high 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.

Keep the fuel valve open for any of the fuel tanks L/R.

The tyres inflation pressure shall be periodically checked.

For engine maintenance during the storage, follow the instructions of the engine manufacturer.

Log Book

Each aircraft must be equipped with the log book where flight informations are noted just after each flight track performance. The log book arrangement may be a subject of national rules related with requirements on obligatory content.

OK-ABC						
Date	**Pilot name**	**Track**	**Flight Time /day**	**Flight Time (total)**	**Number of Take-offs**	**Fuel filled (L)**

Enclosure 2

Records of Revisions

Any revisions of the present manual, except actual weight, must be recorded into following sheet according to information received from the Manufacturer. New or amended text on the revised pages shall be indicated by black vertical line on the left margin, along the section affected. The revision number and date shall be shown on the left side at the bottom of the page.

Revision Number	Affected Section	Affected Pages	Approval Date	Approved by	Insertion Date	Signature
1.	Document issuance		27.5.2019	Petr Volejník	27.5.2019	
2.	Document revision	all	16.1.2020	Petr Volejník	16.1.2020	

Service and Maintenace 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, reparations, modifications, replacements, inspection reports, notes)	**Signature**

Service and Maintenace Book

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