

**ULTRALIGHT AIRPLANE**

**JK-05L JUNIOR**

**powered by Rotax 912 UL engine**

**FLIGHT & MAINTENANCE  
MANUAL**

SERIAL NUMBER

05-07-03

**THE AIRPLANE MUST BE OPERATED CONFORMING  
TO LIMITATIONS MENTIONED IN THIS MANUAL.  
THIS MANUAL MUST BE ALWAYS AVAILABLE ON THE  
BOARD OF THE AIRPLANE.**



Manufacturer: PPHU EKOLOT  
Type: JK-05L JUNIOR

Log of revisions,  
List of effective pages, Table of contents

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### Introduction

Before operating the plane, read carefully the "Flight and Maintenance Manual for JK-05" and "Operating and Maintenance Manual" for the engine installed in the plane. The Manual provides you with basic information on the safe operation of the plane and engine.

If any passages of the Manual are not entirely understood or in case of any questions concerning the aircraft, please, contact a representative of EKOLOT. In case of any problems with the engine, please contact an authorized distributor or service center for ROTAX® aircraft engines.

### Remarks

The aim of this Operator's Manual is to familiarize the owner/ user of this aircraft with basic operating instructions and safety information.

For more detailed maintenance, safety and flight information, consult the documentation provided by the aircraft manufacturer and dealer.

For further information on maintenance and spare parts service, contact the nearest ROTAX® distribution center.

### Engine serial number

On all enquiries or parts orders, always indicate the engine serial number, as the manufacturer makes modifications to the engine for product improvement. The engine serial number should always be used when ordering parts to ensure correct part selection prior to shipment.

The engine serial number is located on the top of the crankcase, magneto side.

### Safety rules

Although the mere reading of these instructions will not eliminate a hazard, the understanding and application of the information herein will promote the proper use of the plane and the engine.

Pictures in the Manual show only typical constructional solution and standard equipment so, they may not illustrate all details and accurate shape of elements of the plane.

### Safety information

**▲Warning: Never fly the aircraft at locations, airspeeds, altitudes, or other circumstances from which a successful no-power landing cannot be made, after sudden engine stoppage.**

Aircraft equipped with this engine must only fly in DAYLIGHT VFR conditions. This plane is not suitable for acrobatics (inverted flight, etc.).

It should be clearly understood that the choice, selection and use of this aircraft is at the sole discretion and responsibility of the owner/user.

Whether you are a qualified pilot or a novice, complete knowledge of the aircraft, its controls and operation is mandatory before venturing solo flight. Flying any type of aircraft involves a certain amount of risk. Be informed and prepared for any situation or hazard associated with flying. Constant practice and training is absolutely compulsory.

You should be aware that any engine may stop or stall at any time. This could lead to a crash landing and possible severe injury or death. For this reason, we recommend strict compliance with the maintenance and operation and any additional information which may be given to you by your dealer.

Respect all government or local rules pertaining to flight operation in your flying area. Fly only when and where conditions, topography, and airspeeds are safest.

The plane is **not equipped** with anti-icing system. Do not fly in weather conditions which may cause the air inlets and wings icing. The icing may cause a total loss of control over the plane which, in a row, may cause a serious accident.

Before every flight make sure that all instruments of the plane work properly. Make sure all controls can be easily reached in case of emergency.

Unless in a run up area, never run the engine with the propeller turning while on the ground. Do not operate engine if bystanders are close. In the interest of safety, the aircraft must not be left unattended while the engine is running. Do not start the engine without the propeller installed.

Keep an engine log and respect engine and aircraft maintenance schedules. Keep the engine in top operating condition at all times. Do not operate any aircraft which is not properly maintained or has engine operating irregularities which have not been corrected.

Since special tools and equipment may be required, engine servicing should only be performed by an authorized ROTAX engine dealer or a qualified trained mechanic approved by the local airworthiness authority.

To eliminate possible injury or damage, ensure any loose equipment or tools are properly secured before starting the engine.

Certain areas, altitudes and conditions present greater risk than others. The engine may require carburetor recalibration or humidity or dust/sand preventative equipment, or additional maintenance may be required. Please. Contact the producer of the plane to obtain additional information.

Never operate the engine and gearbox without sufficient quantities of lubricating oil. Periodically verify level of coolant. Periodically check the level of oil, coolant and brake fluid.

Never exceed the maximum speed of the plane. Never exceed the maximum engine speed. Allow the engine to cool at idle for several minutes before turning off the engine.

## SECTION 1

### GENERAL

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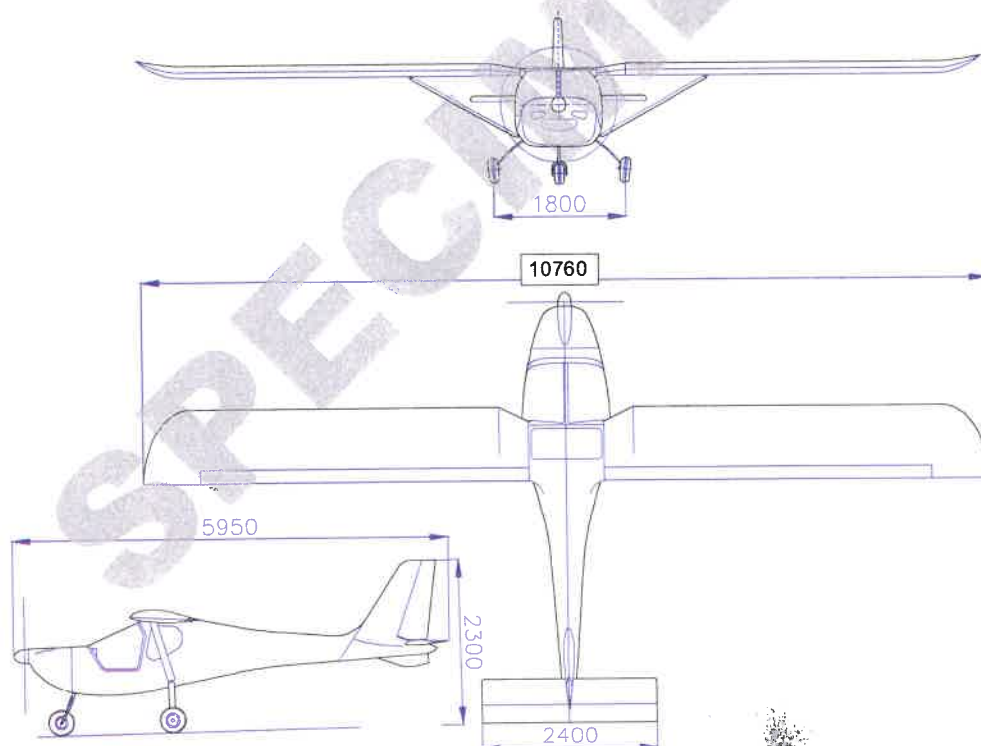
## SECTION 1

### GENERAL

#### 1.1 AIRPLANE

The JK-05 PATHMAKER is the two-seat, aerodynamically controlled ultra-light airplane in high-wing configuration, constructed on the basis of the Polish temporary airworthiness requirements for ultra-light amateur-built airplanes.

#### 1.2 THREE-VIEW & BASIC DIMENSIONAL DATA



### BASIC DIMENSIONS

Wing span	10,76 m
Length	5.95 m
Height	2.30 m
T ailplane span	2.40 m
Wheelbase	1.50 m
Wheel track	1.80 m
Wing chord	1.00 m
Wing area	10,24 m <sup>2</sup>
Flap-aileron area (both)	1.82 m <sup>2</sup>
T ailplane area	1.44 m <sup>2</sup>
Elevator area	0.60 m <sup>2</sup>
Vertical fin area	0.78 m <sup>2</sup>
Rudder area	0.32 m <sup>2</sup>
Cockpit internal width	1.19 m
Height over seats	0.95 m

### CONTROL SURFACES DEFLECTIONS & DEFLECTION TOLERANCES

Surface	Deflection		Tolerance
Ailerons	Up	14.5°	-1,0°
	Down	12.5°	
Flaps	"0"	-6°	±1°
	"1"	+15°	
	"2"	+28°	
Elevator	Up	30°	±1,5°
	Down	26°	
Rudder	Right	35°	±1,5°
	Left	35°	

### 1.3 ENGINE DATA

The JK-05 is powered by single Rotax 912 UL, four cylinders, horizontal opposed, four-stroke, with spark ignition, liquid-cooled engine heads and air-cooled engine cylinders, equipped in two BING carburetors, reduction gear with gear ratio 1:2,27 and electrical starter.

### 1.3.1 ENGINE DIMENTIONS

Piston diameter	79.50 mm
Piston stroke	61.00 mm
Engine displacement	121.1 cm <sup>3</sup>
Compression ratio	9.0:1
Propeller shaft sense of rotation – clockwise looking from cockpit	
Engine mass	55.40 kg

### 1.3.2 UTILITY PARAMETERS

Take-off power	59.6 kW with 5800 RPM	max. 5 min.
Normal power	58.0 kW with 5500 RPM	
Max. speed	5800 RPM	max. 5 min.
Idling speed	1400 RPM	

### 1.3.3 FUEL CONSUMPTION

With take-off power	24.0 l/h
With normal power	22.6 l/h
With 75% of power	16.2 l/h
Specific fuel consumption with normal power	285 g/kWh

### 1.3.4 TEMPERATURE LIMITATIONS (Refer to Rotax 912 UL Instruction Manual)

Oil temperature:		
- max.	140 °C	
- min.	50 °C	
- operational	90 - 110 °C	
Cylinder heads temperature:		
- max.	150 °C	
Engine starting temperature		
- max.	50 °C	
- min.	-25 °C	

Manufacturer: PPHU EKOLOT  
Type: JK-05L JUNIOR

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General

### 1.3.5 WORKING PRESSURES (Refer to Rotax 912 UL Instruction Manual)

Oil pressure (max.)	7 bar
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Fuel pressure	
- max.	0.4 bar
- min.	0.15 bar

### 1.4 PROPELLER DATA

The AS 1700/1950 propeller, made of carbon fibre, three blades with pitch adjustable on the ground.

Prop diameter: 1.7 m  
Sense of rotation: clockwise looking from cockpit  
Recommended pitch set angle: 22°

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## SECTION 2

### AIRPLANE OPERATION CONDITIONS AND LIMITATIONS

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## SECTION 2

### AIRPLANE OPERATION CONDITIONS AND LIMITATIONS

#### 2.1 AIRPLANE CREW

Minimum crew: One pilot  
Total occupants: Two persons

#### 2.2 ALLOWED FLIGHT CONDITIONS

- VFR, day

#### 2.3 PROHIBITED FLIGHT CONDITIONS

- IFR and night
- Known icing conditions
- Aerobatics figures
- Inverted flights
- Intended spins

#### 2.4 ALLOWED MAXIMUM TAKE-OFF WEIGHT

472 kg

#### 2.5 ALLOWED CENTER OF GRAVITY POSITION

24 - 30 % SCA

#### 2.6 STRUCTURAL LOAD FACTORS

$n = + 4 / - 2$  with flaps extended:  $n = + 2 / 0$

#### 2.7 ALLOWED AIRSPEEDS

Never-exceed airspeed

$V_{NE}$  180 km/h

Rough air allowed airspeed

$V_{RA}$  160 km/h

Manoeuvring airspeed

$V_A$  149 km/h

- above this airspeed the controls deflection must be limited to 1/3 of full range

Allowed airspeed with flaps extended (flaps indicator position)	V <sub>FE</sub>		
"0"	- 6°	220	km/h
"1"	+15°	120	km/h
"2"	+28°	112	km/h

## 2.8 ALLOWED ENGINE RPM

Max. engine speed	n <sub>max</sub> = 5800 RPM	max. 5 min.
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## 2.9 TEMPERATURES

Oil temperature:			
- max.	140 °C		
- min.	50 °C		
Cylinder heads temperature:			
- max.	150 °C		
Engine starting temperature			
- max.	50 °C		
- min.	-25 °C		

## 2.10 OTHER LIMITATIONS

This plane can be used merely in „ADVANCED ULTRA-LIGHT” category . It means that this plane can be used for pleasure and sport reasons only.

## 2.11 FUELS AND OILS

### 2.11.1 RECOMMENDED FUEL

A car petrol with min. octane number 90

### 2.11.2 RECOMMENDED OIL

Oils with API specification only and marked “SF” or “SG”.

## 2.12 INSTRUMENTS MARKINGS

Air speed indicator:

COLOUR	RANGE OF INDICATION [km/h]
Green	65 – 155
Yellow	155 – 220
Red	Above 220

## 2.13 INSCRIPTIONS AND PLACARDS

On the left and right side of plane there are following inscriptions:

### SPECIAL

In the cockpit, ahead of pilots, there are placards with inscriptions:

**This aircraft is approved to flying in „ADVANCED ULTRA-LIGHT” category only. It does not comply requirements which behavior towards airworthiness according to Annex 8 to ICAO Convention.**

Ahead of pilot:

**Acrobatics and intended spin forbidden**

Near fuel filler there is inscription:

**Min. petrol octane number – 90  
Tank capacity – 60 l.**

## SECTION 3

### EMERGENCY PROCEDURES

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## SECTION 3

### EMERGENCY PROCEDURES

#### 3.1 GENERATOR FAILURE

In case of electric system failure continuation of flight is possible. During the case, following units don't work:

- fuel gauge;
- engine hourmeter;
- flap actuator;
- trimmer actuator;
- starter;
- transceiver.

According to above pilot must evaluate what is safety flight time with disposable amount of fuel and continue flight to place where landing is possible allowing flap position.

**OFF Master switch**

#### NOTE

**DON'T OFF ignition. After that, engine starting will be impossible.**

The safety flight time since the generator failure – 30 minutes.

#### 3.2 AIRPLANE ON FIRE

##### 3.2.1 ENGINE ON FIRE

- Ignition - OFF , ignition switch - OFF
- Cut-off fuel valve - CLOSE
- Throttle lever - MOVE FULL FORWARD
- Main electric system switch (Master switch) - OFF
- Perform the glide to the side opposite to the fire (for "cutting" the flame).
- Perform the emergency landing (or use the active parachute rescue system, as the situation make it possible or reasonable).

### 3.2.2 OTHER AIRCRAFT COMPONENT IN FIRE

- For fire source in the cockpit or accessible from the cockpit USE THE FIRE EXTINGUISHER
- For the fire source inaccessible from the cockpit, perform the glide to the side opposite to the fire (for "cutting" the flame)
- When the fire in the cockpit is extinguished, went the cockpit interior
- Perform the emergency landing (or use the active parachute rescue system, as the situation make it possible or reasonable).

### 3.2.3 ELECTRICAL FIRE

If the cause of the fire may be clearly defined as "electrical":

- Main electric system switch (Master switch)- OFF
- For fire source in the cockpit or accessible from the cockpit USE THE FIRE EXTINGUISHER
- When the fire in the cockpit is extinguished, went the cockpit interior
- According to situation, continue the flight to nearest airfield or perform the emergency landing (or use the active parachute rescue system, as the situation make it possible or reasonable).

## 3.3 ENGINE FAILURE

### 3.3.1 ENGINE FAILURE DURING THE TAKE-OFF GROUND RUN

- Power lever at IDLE
- Brakes – AS REQUIRE
- Ignition - OFF (ignition switch – OFF position)
- Fuel cut-off valve – CLOSED
- Main electrical switch (Master switch)– OFF .

### 3.3.2 ENGINE FAILURE AFTER LIFT-OFF

- Ignition - OFF , (ignition switch– OFF position)
- Fuel cut-off valve – CLOSED
- Main electrical switch (Master switch)– OFF
- Avoiding collision with obstacles, straight ahead - LAND

## **WARNING!**

**DO NOT TRY TO PERFORM THE TURN!**

### 3.3.3 ENGINE FAILURE IN FLIGHT

- When the engine is out, try to perform the in-flight engine starting – see Section 4.3 .

**NOTE:**  
**ENGINE HOT STARTING – WITHOUT SUCTION!**  
**ENGINE COLD STARTING – WITH SUCTION.**

- If the in flight engine starting is not possible, perform the emergency landing, as terrain conditions makes it possible, or use the active parachute rescue system, as the situation make it possible or reasonable.

### 3.4 EMERGENCY LANDING

- Ignition - OFF , (ignition switch – OFF position)
- Cut-off fuel valve - CLOSE
- Main electric system switch - OFF
- Perform the NORMAL or SHORT landing, as terrain conditions makes it possible – see Section 4.14

### 3.5 ABNORMAL VIBRATION

#### 3.5.1 ABNORMAL VIBRATION, CAUSED BY THE ENGINE OR PROPELLER DAMAGE/FAILURE

- Immediately SHUT-OFF the engine.
- Perform the emergency landing (or use the active parachute rescue system, as the situation make it possible or reasonable).

#### 3.5.2 ABNORMAL VIBRATION, CAUSED BY THE AIRFRAME DAMAGE

- Reduce airspeed.
- If the vibration no decreases, perform the emergency landing (or use the active parachute rescue system, as the situation make it possible or reasonable).

### 3.6 CONTROL SYSTEMS FAILURES

- If the failure of any control system element makes the safety flight impossible using other control systems, evacuate the airplane or use the active parachute rescue system, as the situation make it possible or reasonable.

### 3.7 AIRPLANE IN-FLIGHT EVACUATION

- Ignition - OFF , (ignition switch - OFF position)
- Cut-off fuel valve - CLOSE
- Main electric system switch (Master switch) - OFF
- Release safety belts
- Open the canopy
- Abandon the airplane, avoiding the collision with the airframe components.

### 3.8 SPIN RECOVERY

#### NOTE

Following procedure is taken from experience with the same type planes and is general recommendation only .

In case of unintended spin, immediately slope airplane nose down vigorously pushing control stick forward. Keep ailerons and rudder in neutral stopping airplane rotation and next slowly pull the stick going to horizontal flight.

**FOR OTHERS EMERGENCY SITUATIONS, USE TYPICAL, STANDARD PROCEDURES**

## SECTION 4

### NORMAL PROCEDURES

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## SECTION 4

### NORMAL PROCEDURES

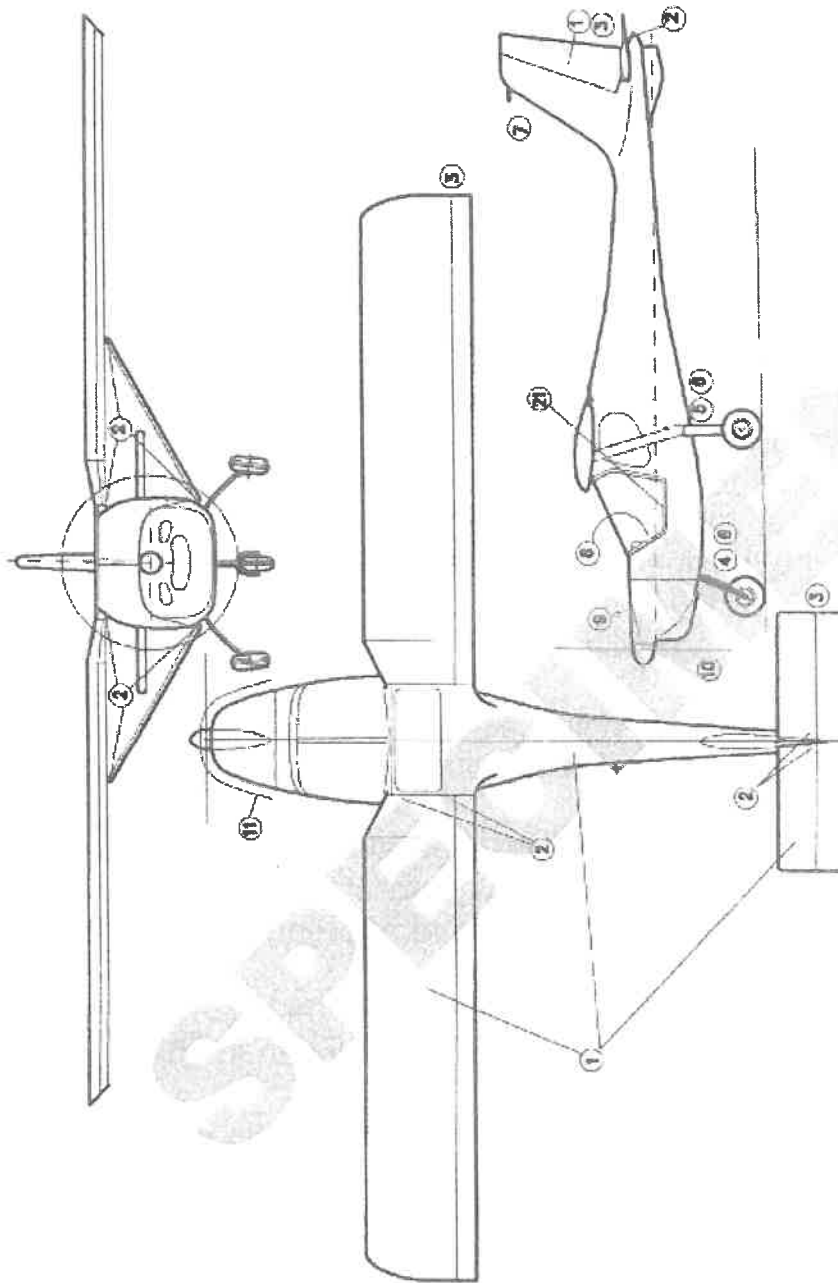
#### 4.1 GENERAL

Because the ultra-light aircraft structure is more "fragile" than the "normal" aircraft structure, and it is submitted to the similar loads and operation conditions, the ultra-light aircraft structure and power plant must be systematically and conscientiously inspected for the damages and wear symptoms. Particularly, during the ground maneuvers the small damages may occur which, if not detected, may cause the decreasing of the airplane operational safety. If the kind of the detected damage causes any doubt, contact the professional workshop or technician before starting the repair, including even minor. It is particularly important for the composite structures and parts. During the walk-around check the airplane visually for the general status. At cold weather, all the accretions (even small!) of the snow, ice or frost must be removed from the wings, empennages and control surfaces. It causes the serious aerodynamical characteristics decreasing and the unwanted weight increasing. Check that inside of the control surfaces is free of the snow, ice, frost or dirt accretions or the other foreign corps.

#### 4.2 PREFLIGHT INSPECTION

**CAUTION:**

**BEFORE CHECKING THE POWERPLANT, BE SURE THAT THE IGNITION SYSTEM IS OFF (IGNITION SWITCH – OFF POSITION), DURING THE POWERPLANT CHECK DO NOT STAY IN THE PROPELLER RANGE AS DOES NOT NECESSARY**



- 1) Check all the external surfaces for deformation and/or damages
- 2) Check all the accessible bolt fastenings and securities (wings, braces and tailplane to fuselage, control system push-pull rods, gears)
- 3) Remove the controls locks (if installed), check all the control surfaces (including wing flaps) for free deflection
- 4) Check the forward wheel and its position
- 5) Check the main gear – the main gear leg must be springy, the main gear and wheel axles must be free from deformations
- 6) Check the tires pressure (visually – lack of inflation) and wheels safety/protection
- 7) Remove all the covers of the Pitot system (if installed), check the Pitot system holes/inlets (must be clean and not obstructed)
- 8) Check the fuel level, refill if necessary
- 9) Check the oil level, refill if necessary
- 10) Check the propeller for general status (notches, cracks, scratches)
- 11) Check the engine cowlings for general status (fastening, latches)
- 12) Check the Airplane Log Book and others required documents presence on the board
- 13) Check the control surfaces free and proper deflection and flaps deflection (symmetry), set flaps to “1” position
- 14) Check the engine control levers proper function (throttle and suction)
- 15) Check the instrument panel status, set the throttle lever in the “LOW RPM” position and suction lever in the “OFF” position (pressed home).
- 16) Check the electrical system switches positions and ignition switch position – all must be in the “OFF” position.
- 17) Check the cabin interior for the foreign body presence.
- 18) Check the safety belts status (latches proper function, wear).
- 19) Fasten and adjust safety belts, fasten safety belts of unoccupied seat and secure its free endings.
- 20) Close and lock the doors.

### 4.3 ENGINE STARTING, HEATING AND TEST

- Set engine control lever in vertical position and return back to stop.
- During cold engine starting, pull back suction lever and lock rotating clockwise. During hot engine starting, press suction lever.
- Set the fuel valve to "ON" position.
- Set Master switch to "ON" position.
- Put the key to ignition switch and turn one step to the RIGHT .
- Switch on the additional electric fuel pump and wait until the sound of working pump is not audible any more (carburetors are filled).
- Check the fuel pressure on the gauge.
- Switch both ignition switches to "ON" position.
- Shout "CLEAR" and check if the area around the plane is clear.
- Start the engine by pushing the starter button (max. 10 sec. Wait for minimum 2 minutes before next starting).
- As the engine is running, slowly set the throttle to obtain stable engine work – about 2500 RPM. Oil pressure should rise to approximately 2 bars during 10 sec.
- Set suction lever to OFF position.
- Warm up the engine and slowly increase RPM until oil temperature obtain 50°C.
- Check, that max. engine speed on the ground is approximately 5300 RPM and that the engine work is stable.
- Check the engine on IDLING – should be about 1400 RPM;
- Check both ignition system circuits by means of switching-off one of them and then the other. Set engine speed to 4000 RPM. Maximum RPM drop on each magneto should not exceed 300 RPM.  
Maximum difference between both ignition system circuits should not exceed 120 RPM.

### 4.4 TAXING

The airplane starts moving on the grass with 2200 RPM. After that, check wheel brakes efficiency. During taxiing control stick should be in neutral position and taxiing speed should equals speed of walking man.

### 4.5 PREPARATION TAKE-OFF

- Brake the wheels.
- Check the control surfaces free movements.

- Check the engine operation (using the instruments and "by ear").
- Suction pressed home.
- Check if the both ignition circuits are switch to ON position.
- Check if the fuel valve is open.
- Arm the Ballistic Rescue System (remove the safety pin).

#### 4.6 TAKE-OFF

- Check the runway allowance.
- Flaps position "1" (=15°)
- Throttle lever – FULL RPM
- Ground run with the stick in the neutral position
- Lift-off airspeed: 75 km/h

#### 4.7 CLIMBING

##### 4.7.1 CLIMBING AFTER TAKE-OFF UP TO 50 m

- Airspeed: 95 km/h
- Flaps position: "1" (=15°)
- Throttle lever: FULLY OPEN

##### 4.7.2 CLIMBING TO FLIGHT ALTITUDE

- Airspeed: 120 km/h
- Flaps position: "0" (= -6°)
- Throttle lever: 5400 RPM
- Switch off the additional electric fuel pump at safe altitude.

4.7.3 THE BEST RATE OF CLIMB AT CRUISE COFIGURATION IS OBTAINING AT AIRSPEED 105 km/h.

#### 4.8 LEVEL FLIGHT

- Flaps position: "0" (= -6°)
- Engine RPM set accordingly to the desired cruise airspeed (economical - 4500 RPM)
- The greatest range is achieved with cruise airspeed and wing flaps folded.

## 4.9 STALL

### NOTE

Performing of stall on the airplane is permissible only for showing flying qualities during demonstration flight.

- Determine flight conditions (flap position, engine speed);
- Decrease the airplane speed by pulling the stick in rate 2 km/h until nose dropping can be controlled.
- After nose dropping, the airplane keeps stalling speed and continue gliding flight with throttled back engine.  
With full engine power in cruise configuration and full take-off mass, the airplane does not drop nose and continue flight with rate of climb about 2.5 m/s to speed 80 km/h.. Below that speed, the airplane drops nose automatically .

## 4.10 DESCENT

- Flaps position: "0" (-6°)
- Engine speed: 2600 RPM

## 4.11 GLIDE

Gliding flight with the engine shut-off is recommended with the wing flaps deflected to "0" position and with the airspeed 110 km/h. The chute rate for this airspeed equals about 3.0 m/s.

With flaps position "1" (+15°) recommended airspeed equals 100 km/h. The chute rate equals about 2.6 m/s.

## 4.12 LANDING APPROACH

Switch on the additional fuel pump.

During approach with crosswind is recommended to reach the moderate bank to the wind. The glide angle may be corrected by means of the lateral glide, keeping the proper approach airspeed. In the proximity of the runway surface, recovery the level flight and reduce the airspeed for touchdown with the stick fully pull-out. Allowed approach airspeed range – see table in the Section 2, p. 2.6.

#### 4.13 BALKED LANDING

*Afbrudt*

- Throttle lever: HIGH RPM;
- Flap position: "1" (15°);
- Perform climbing
- Airspeed – 105 km/h
- On target altitude pass to level flight and adjust RPM to desirable airspeed.

#### 4.14 LANDING

##### 4.14.1 NORMAL LANDING

- Reduce the airspeed to 95 km/h
- Wing flaps position: "1" (15°)
- Approach airspeed: 90 km/h (in the rain increase to 95 km/h)
- In the proximity of the runway surface recovery the level flight and perform the touchdown with minimal airspeed and with the throttle lever in "IDLE" position
- Wheel brakes – USE IF NEEDED

##### 4.14.2 SHORT LANDING

- Reduce the airspeed to 95 km/h
- Wing flaps position: "2" (28°)
- Reduce the airspeed to 80 km/h
- Approach airspeed: 80-85 km/h (in the rain increase to 90 km/h).
- In the proximity of the runway surface (but not too early!) recovery the level flight and perform the touchdown with minimal airspeed and with the throttle lever in "IDLE" position.
- Wheel brakes – USE DECIDEDLY

#### 4.15 AFTER LANDING

- Throttle lever: INCREASE RPM UNTILL THE RUDDER IS BE EFFECTIVE
- Wing flaps position: "0" (-6°)
- Wheel brakes - USE IF NEEDED
- During landing with side wind control yawing by means rudder and brakes.

#### 4.16 ENGINE SHUT-DOWN

Before engine shut-down the engine should be cooled for few minutes with IDLING. Next perform following:

- Switch-off ignition - selector in "OFF" position.
- Master switch: SWITCH-OFF .

#### 4.17 AIRPLANE PARKING

- Place the airplane into the wind.
- Put chocks under the wheels.
- Check electric system switches position and ignition switch position – must be OFF .
- Take out the key from ignition switch.
- Secure active parachute rescue system (insert cotter pin together with red flag).
- Close and secure the doors.
- In sunny day put the cover on glass part of cockpit;
- During long term storage, tie-down and put control surfaces locks and cover Pitot system.

## SECTION 5

### PERFORMANCE

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## SECTION 5

### PERFORMANCE

#### 5.1 AIRSPEED IN LEVEL FLIGHT (IAS) – for in-flight weight 472 kg, at the height 500 m above the terrain surface

Engine speed [RPM]	Velocity [km/h]
4000	110
4500	135
5000	158
5400	180

#### 5.2 CLIMB RATE – for in-flight weight 472 kg, at sea level

Flaps: +15°	airspeed: 100 km/h	climb rate: 4.0 m/s
Flaps: -6°	airspeed: 100 km/h	climb rate: 5.0 m/s
	110 km/h	climb rate: 4.5 m/s

#### 5.3 STALL SPEED (IAS) – km/h, for in-flight weight 560 kg, minimal RPM

Flaps: -6°	airspeed: 72 km/h
15°	64 km/h
28°	55 km/h

#### 5.4 TAKE-OFF DISTANCE from grass area over 15 m obstacle – 220 m. Take-off run – about 150 m.

#### 5.5 LANDING DISTANCE from 15 m obstacle – 200 m.

## SECTION 6

### WEIGHT AND BALANCE

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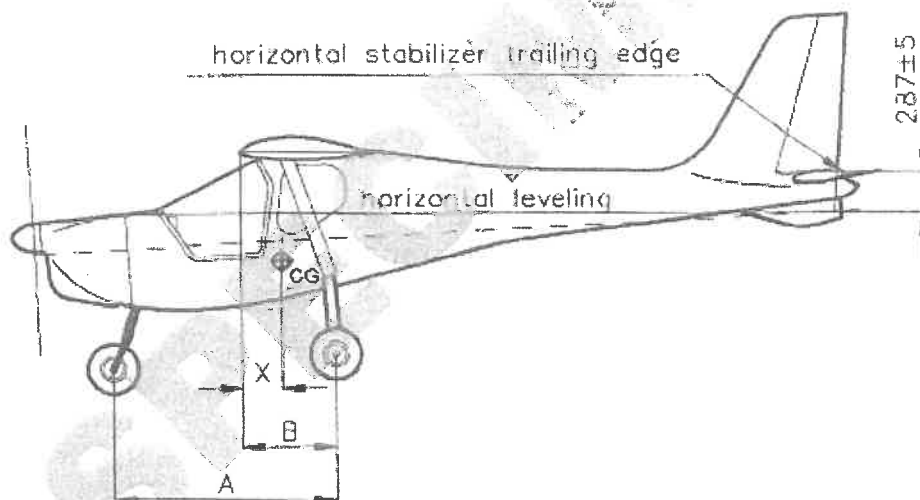
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## SECTION 6

### 6.1 AIRPLANE WEIGHTING AND CENTER OF GRAVITY CALCULATION

- Weigh the airplane in a closed hangar to avoid errors due to draughts;
- Drain fuel tanks;
- Ensure that airplane is exempt of all items other than those of normal airplane kit;
- Carry out airplane leveling. It means that the wings should be in horizontal position and should be kept dimension  $287 \pm 5$  as on the figure;
- Position the airplane on scales;



- Measure distance A and B;
- Calculate center of gravity (C.G.) using formula:

$$X = C.G. = B - \frac{W_N \cdot A}{W_N + W_{ML} + W_{MR}}$$

X [C.G.] must be within 233,4 – 304,3 mm

Airplane center of gravity location in relation to mean aerodynamic cord:

$$CG [\%MAC] = \frac{X[mm] - 24}{9,76}$$

## 6.2 WEIGHT AND BALANCE

The airplane S/N 05-07-03 empty equipped manufacturer weight :

Item	Date	Airplane empty weight [kg]	Center of gravity [21,5%-28,7% MAC]

- a. Maximal Take-Off Weight      472 kg
- b. Minimal weight on the pilot's seat      60 kg
- c. Maximal weight on the baggage shelf      5 kg

## SECTION 7

### AIRPLANE AND SYSTEMS DESCRIPTION

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## SECTION 7

### AIRPLANE AND SYSTEMS DESCRIPTION

#### 7.1 AIRFRAME

**FUSELAGE** – the monocoque structure of glass and carbon-epoxy vinyl ester composites, integral with vertical fin and partially glazed with plexi panes.

**ACCOMODATION** - the two-piece canopy equipped with latches and handles is opened backwards and upwards. Two adjustable pilot seats situated side-by-side, equipped with safety belts. Baggage space – cockpit rear shelf.

**WING** – two-segments, braced. Monocoque structure of glass and carbon-epoxy vinyl ester composites with three-circuit torque box. The wings are equipped with the flaps and ailerons.

**EMPENNAGES** – classic configuration. Monocoque structure of glass and carbon-epoxy vinyl ester composites.

**LANDING GEAR** – fixed, tricycle type with nosewheel. The main gear legs are the spring-type, main wheels equipped with the mechanical brakes, controlled by the lever on the stick; main wheel dimension 350x100, tyre pressure 1.2-1.5 bar. Nose gear leg with rubber-blocks type damper, controlled nosewheel on the fork (1<sup>6</sup> each side); nosewheel dimensions 350x100, tyre pressure 1.0-1.2 bar.

#### 7.2 AIRPLANE CONTROL SYSTEMS

The JK-05 PATHMAKER airplane is equipped with dual main control system.

**AILERONS** – the control sticks movements are transmitted to the ailerons by the rigid system with the push-pull rods and levers.

**FLAPS** – electrically deflected, buttons on the stick grips, power unit movements are transmitted to flaps by the rigid system with the push-pull rods and levers.

**ELEVATOR** - the control sticks movements are transmitted to the elevator by the rigid system with the push-pull rods and levers.

**RUDDER** – the control pedals movements are transmitted to the rudder by the rigid system with the push-pull rods and levers.

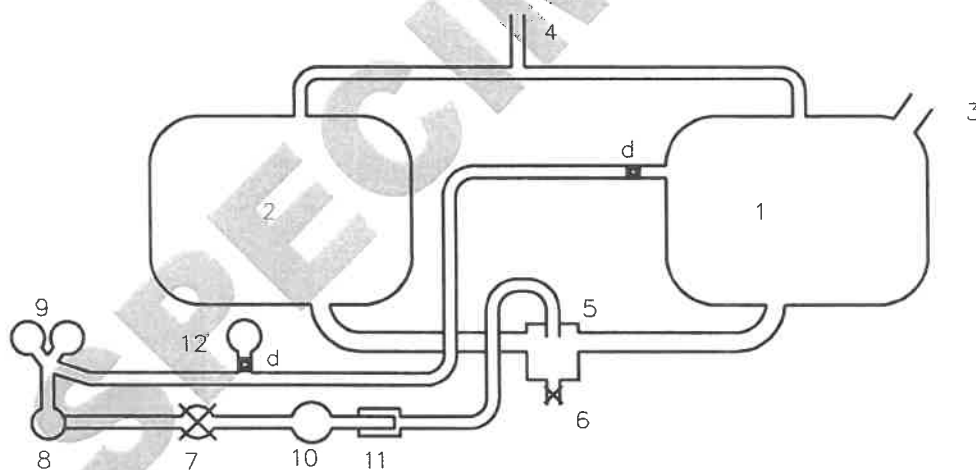
WHEEL BRAKES – hydraulic, controlled by the lever on the control stick.

### 7.3 POWER PLANT

Refer to Section 1.3 and 1.4.

### 7.4 FUEL SYSTEM

Two connected together fuel tanks of 60 litres total capacity from glass-epoxy composite is located in the fuselage behind the crew seats. Drain tank (clarifier) of 40 cm<sup>3</sup> capacity located under the fuselage. The fuel cut-off valve located on central panel before instrument panel. On the right side under instrument panel there is hand fuel pump (gum bullet) for additional fuel supplying to engine fuel pump. The central fuel filling inlet with locked cap is located on the left side of the fuselage, behind the wing. The fuel quantity is indicated by means of the electrical fuel quantity indicator placed in the instrument panel.

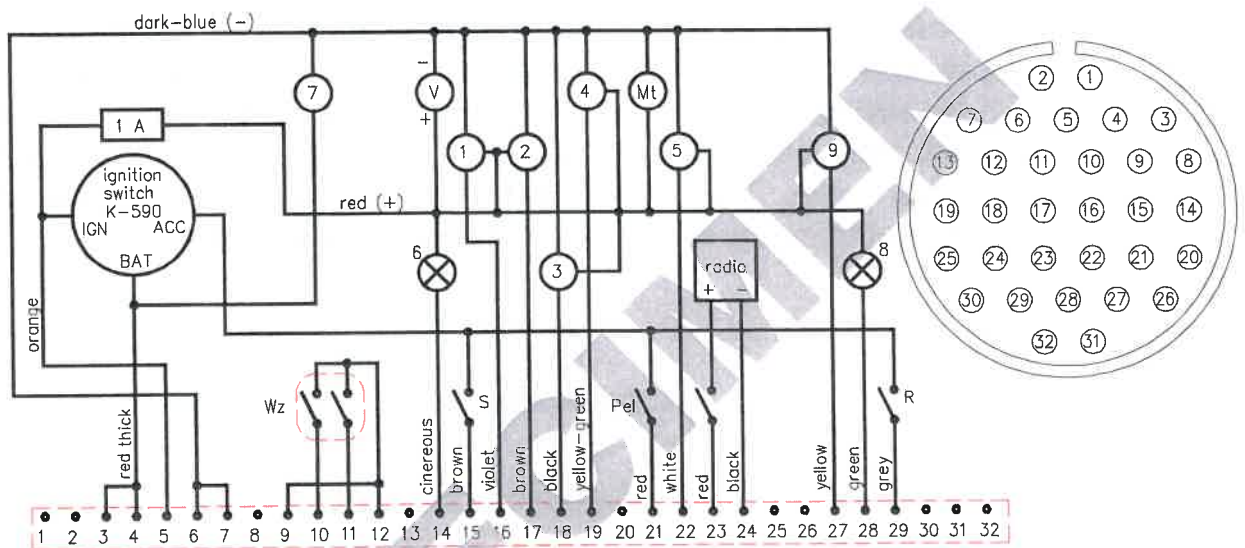


Fuel system diagram

- |                |                     |                              |
|----------------|---------------------|------------------------------|
| 1 - left tank  | 6 – clarifier tap   | 11 – fuel filter             |
| 2 – right tank | 7 – cut-off valve   | 12 – fuel pressure indicator |
| 3 – fuel inlet | 8 – fuel pump       | d - choke                    |
| 4 – breather   | 9 – carburetors     |                              |
| 5 – clarifier  | 10 – auxiliary pump |                              |

### 7.5 ELECTRICAL SYSTEM

12V DC, double-wire. The main electrical energy sources is the alternator 13.5-14.2V 240 W (AC, single-phase, current induction, with the rectifier-regulator). The auxiliary (reserve) electrical energy source is the battery 12V/17Ah (plumbous/acid, no requiring the maintenance). The electrical system provide the power for starter during engine starting and for instruments. The system does not equipped with the ground receptacle socket.

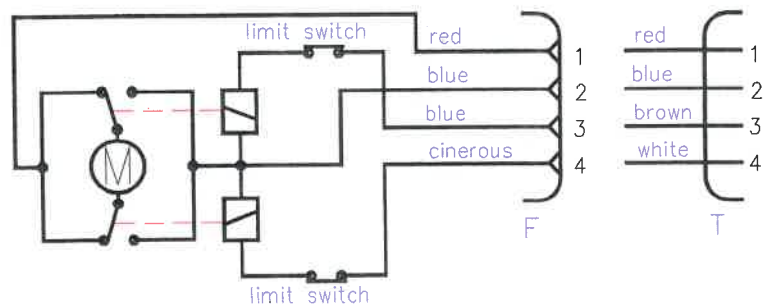


#### Instruments wiring diagram

- |                               |                                 |                       |
|-------------------------------|---------------------------------|-----------------------|
| 1- Oil temp. indicator        | 6- Battery charging signal lamp | Switches:             |
| 2- Oil pressure indicator     | 7- 12 V socket                  | R- Landing lamp       |
| 3- Right head temp. indicator | 8- Fuel reserve indicator       | Pel- Elec. fuel pump  |
| 4- Left head temp. indicator  | 9- Fuel gauge                   | S- Anticollision lamp |
| 5- Engine speed indicator     | V- Voltmeter                    | Wz- Ignition cut-off  |

#### Wiring diagram of flaps and trimmer actuators

- F – flaps actuator (socket)  
 T – trimmer actuator (plug)



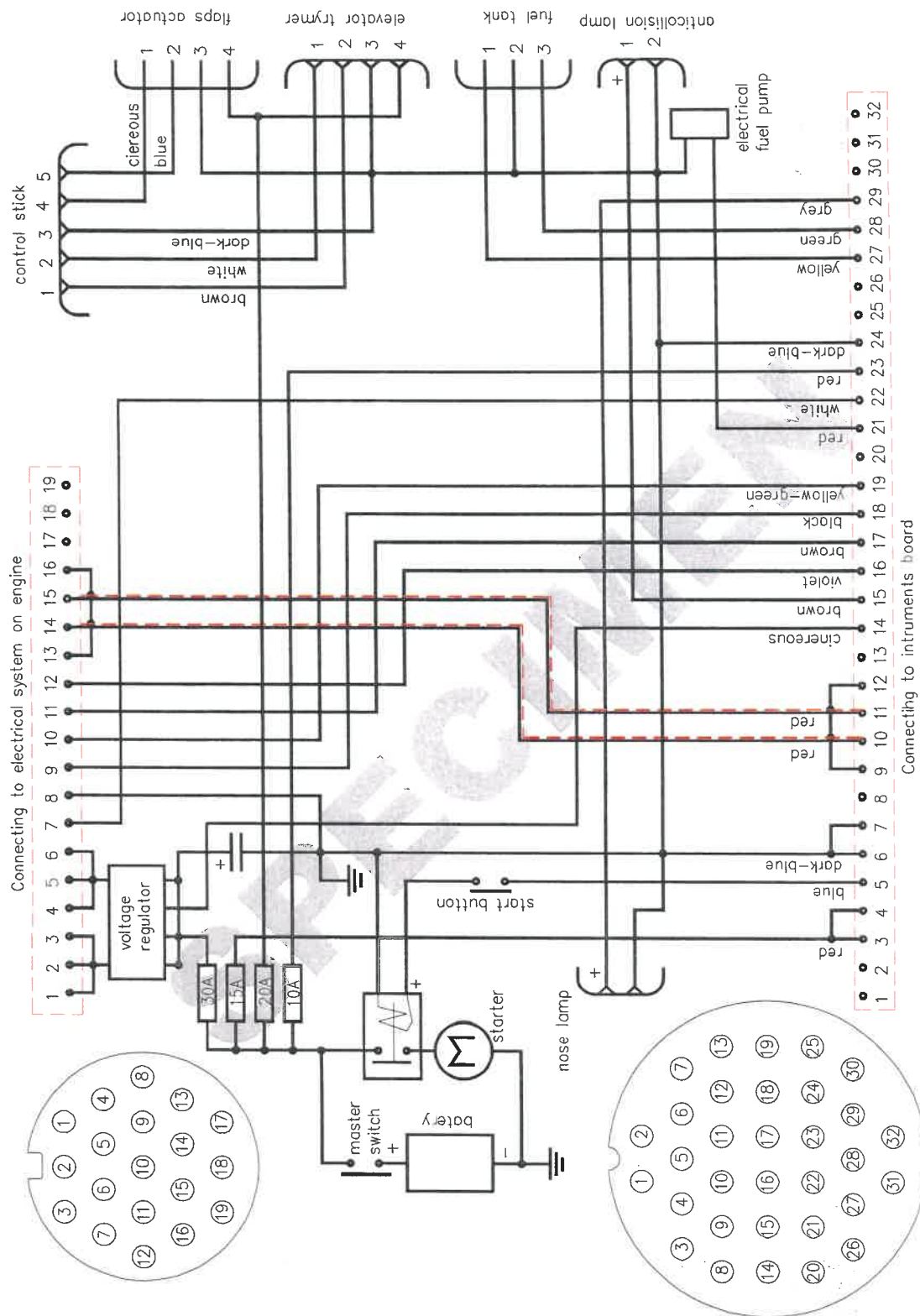


Diagram of wiring in fuselage

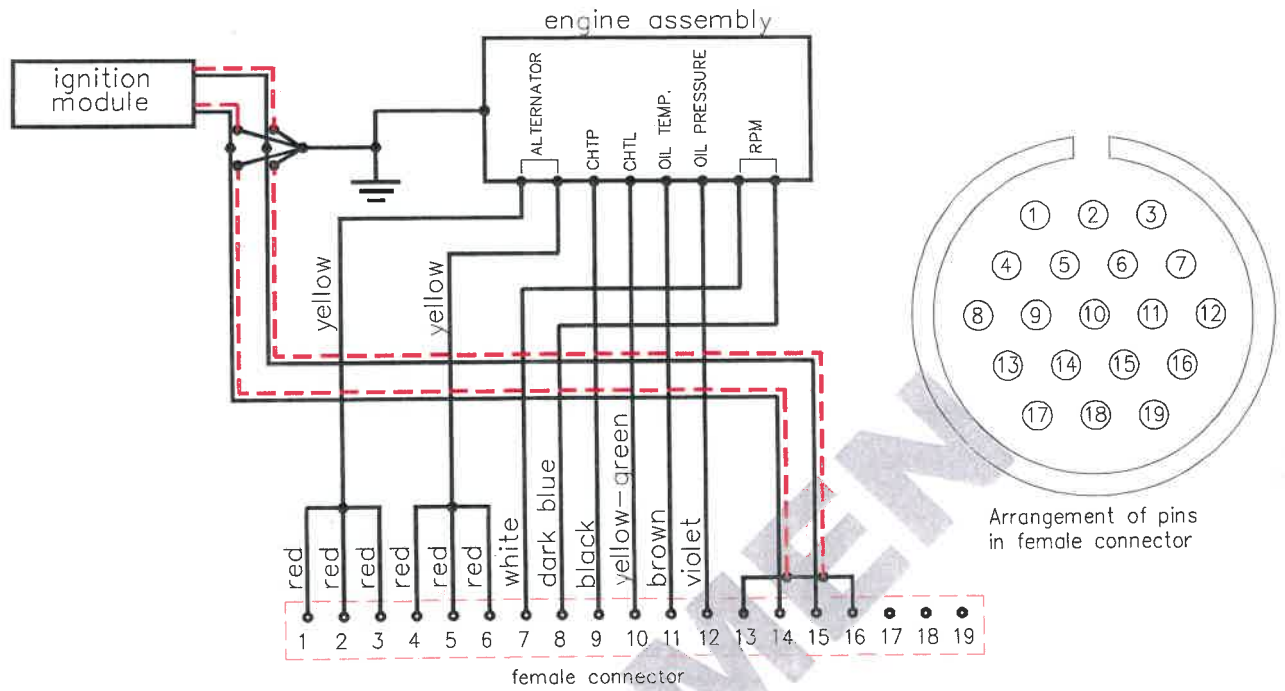


Diagram of wiring in the engine

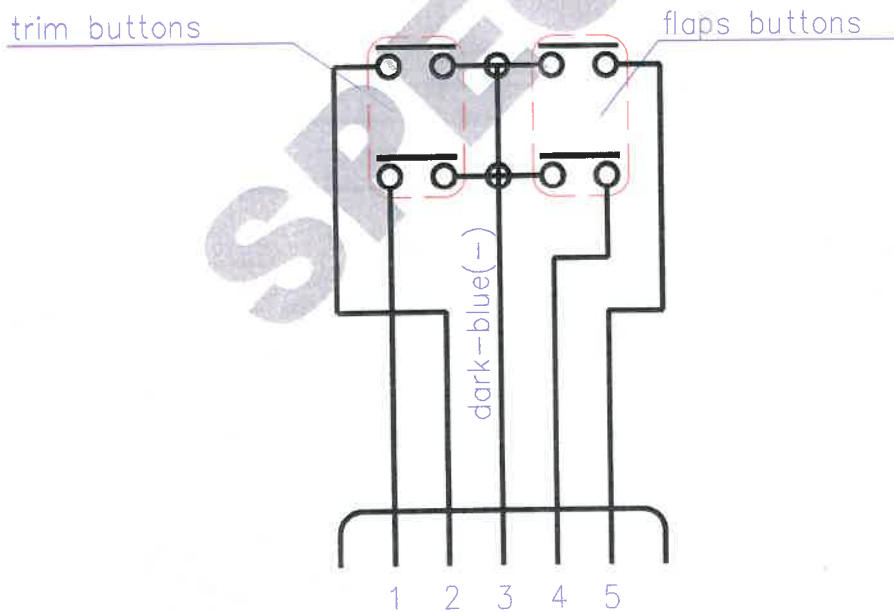
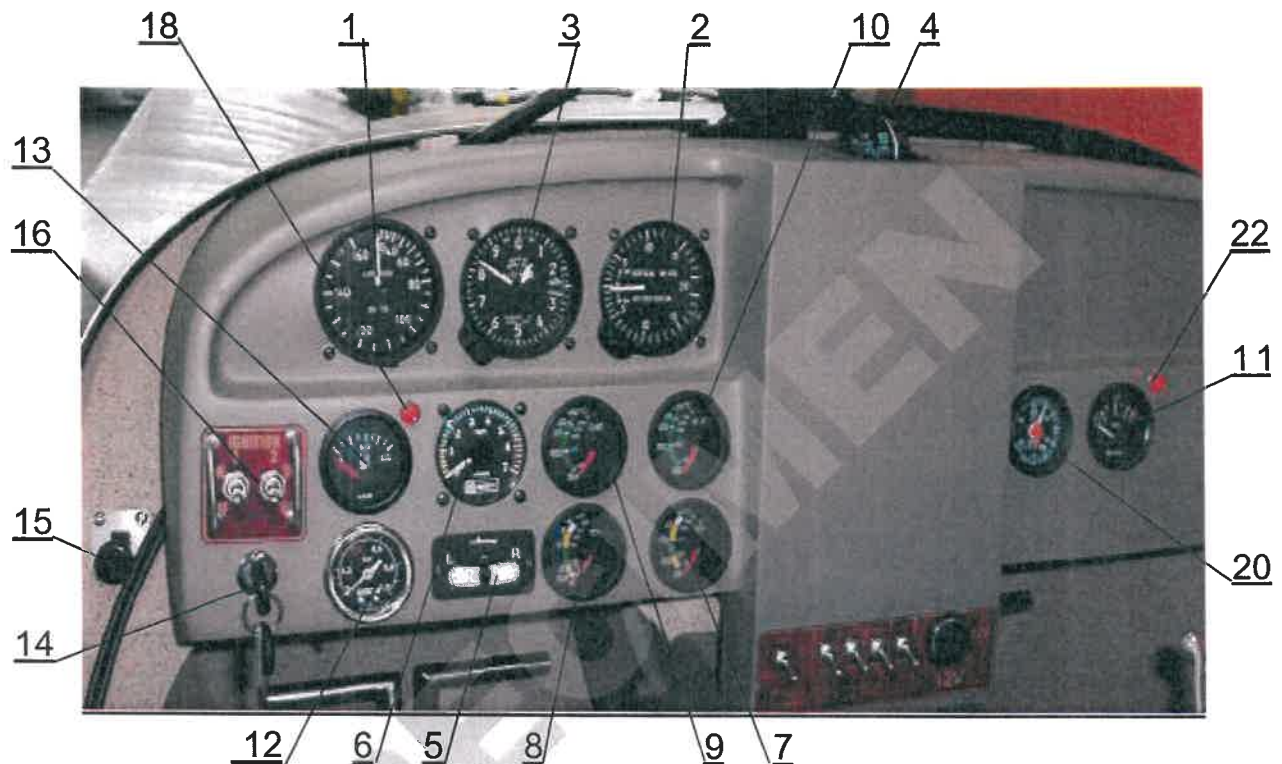


Diagram of wiring in the control stick

## 7.6 COCKPIT

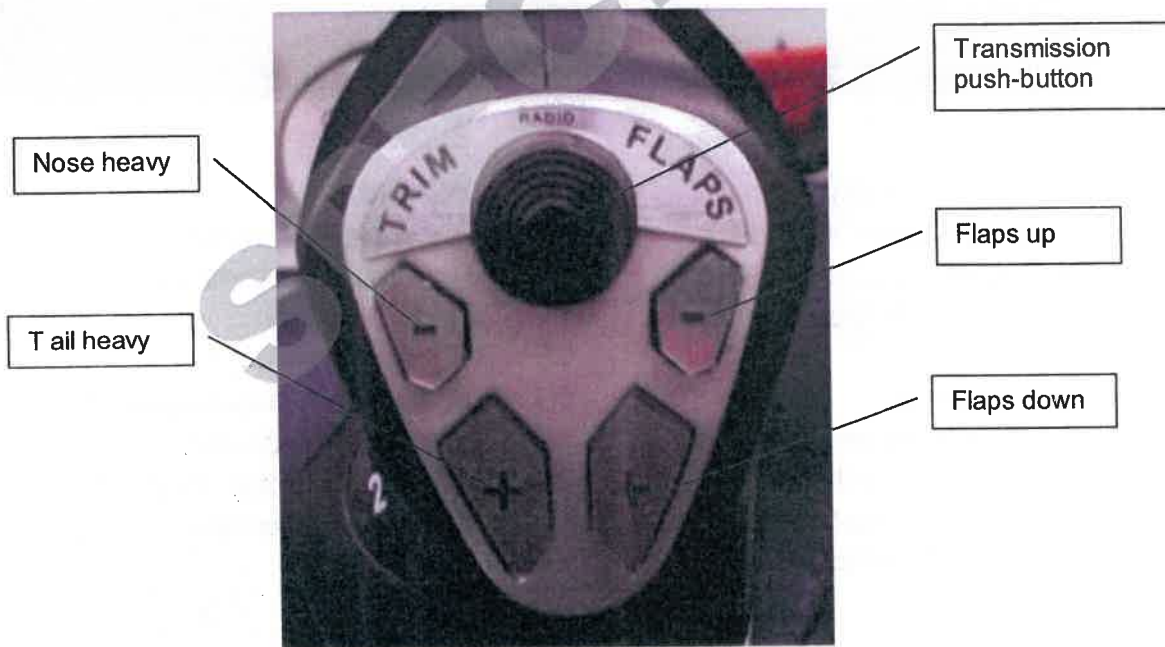
The cockpit interior is ventilated by the adjustable blow outlet of fresh and hot air placed above the instrument panel. The fresh air is taken by means of inlet under engine cowling, hot air from behind coolant cooler.



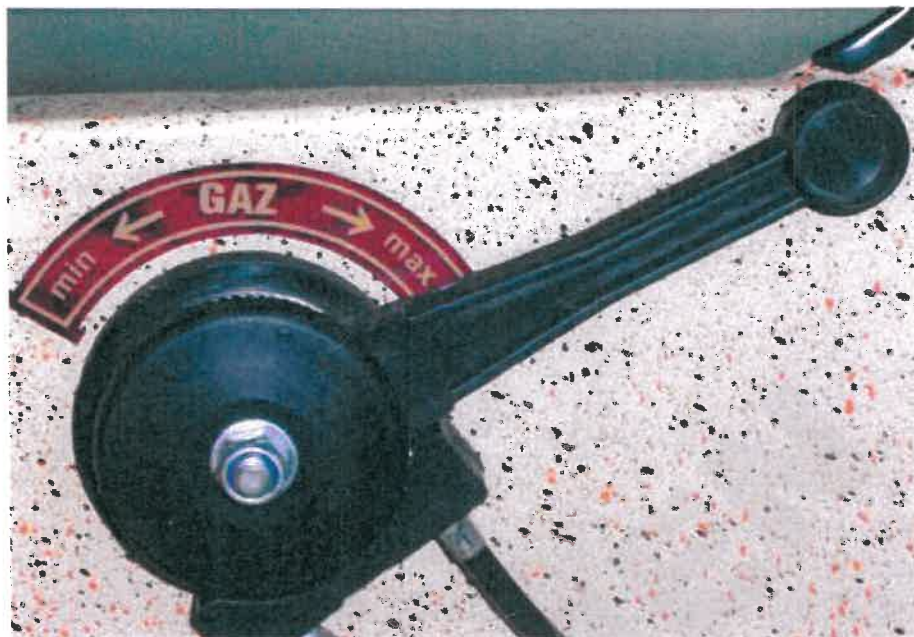
- |    |                           |    |                                  |
|----|---------------------------|----|----------------------------------|
| 1  | Airspeed indicator        | 11 | Voltmeter                        |
| 2  | Vertical speed indicator  | 12 | Fuel pressure indicator          |
| 3  | Altimeter                 | 13 | Fuel contents indicator          |
| 4  | Magnetic compass          | 14 | Ignition switch                  |
| 5  | Libelle                   | 15 | Suction tie                      |
| 6  | Tachometer                | 16 | Ignition switch-breakers         |
| 7  | Oil temperature indicator | 17 | Engine time counter              |
| 8  | Oil pressure indicator    | 18 | Reserve fuel checking lamp       |
| 9  | Left CHT indicator        | 19 | Charging generator checking lamp |
| 10 | Right CHT indicator       |    |                                  |



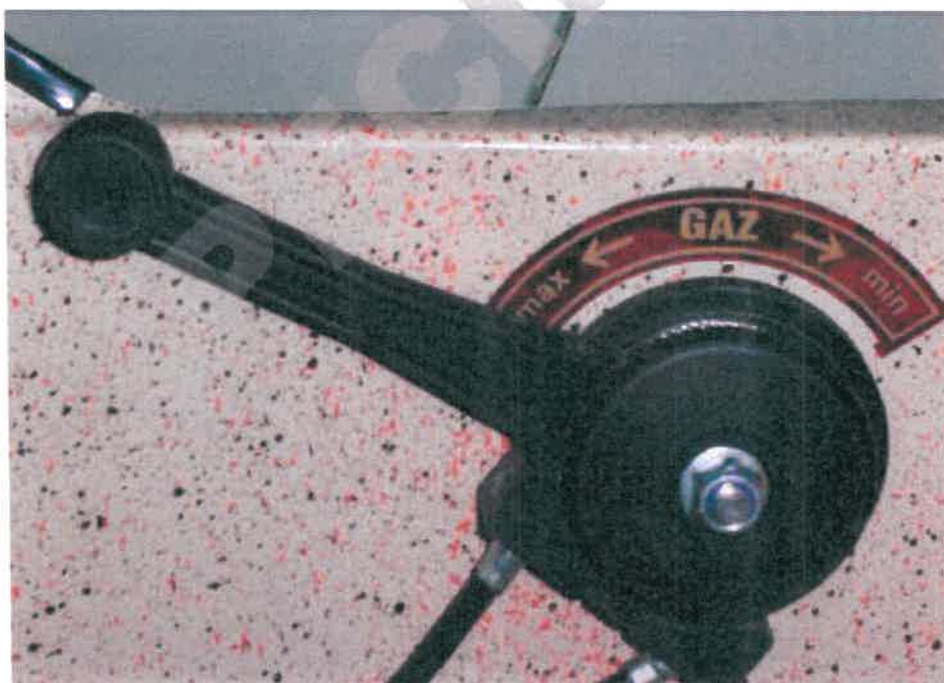
Switches and sockets



Control stick head



Left side throttle lever



Right side throttle lever

## SECTION 8

### HANDLING, MAINTENANCE AND PERIODIC INSPECTIONS

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## SECTION 8

### HANDLING, MAINTENANCE AND PERIODIC INSPECTIONS

#### 8.1 HANDLING

##### 8.1.1 GROUND HANDLING

- a) Fuel system filling: fill the fuel tanks by the filling inlets from the clean can or distributor hose using the funnel with the chamois insertion.
- b) Oil system filling: fill the oil tank from original can or other clean dish using the funnel with metallic strainer.
- c) Towing and handling:  
The airplane may be towed forward on ground with aid of tow-rope catching the sleeve on nose gear above gum dumper. Towing speed – 5 km/h.  
The airplane handling may be done:  
- forward, by means of hand pushing solid fuselage elements, or  
- rearward, by means of hand pushing solid fuselage elements or front inboard part of wing.  
During handling rearward, nose wheel should be lift under the ground.
- d) Mooring:  
The airplane may be moored to ground attachment points through holes  $\varnothing 8$  mm in bolts attaching strut to wing using special elements and by means of the clamp put on nose gear above gum dumper.
- e) Jacking:  
Airplane jacking may be done in section where main landing gear enter the fuselage exactly behind nose gear steel sleeve and on profile soft pad before tail fin.

### 8.1.2 CLEANING

- a) External painted surfaces may be clean with soft cloth (flannel, chamois) using water with cleaning agent (without abrasive elements).
- b) Glasses – the same procedure as for painted surfaces. After cleaning dry by means of soft cloth.
- c) Keep airplane interior clean using vacuum cleaner or soft cloth dipped in water with cleaning agent as describe above. Clean carpets and seat upholstery out of airplane.
- d) Keep the engine clean removing dust and dirt with soft cloth evenly dipped with paraffin oil. Dry after cleaning.
- e) Propeller - the same procedure as for glasses. Special agent for removing killed insects may be used.
- f) Pitot system – keep free from obstruction removing killed insects, dust and dirt with the same procedure as for propeller.

## 8.2 MAINTENANCE

### 8.2.1 BEFORE FIRST FLIGHT IN THE DAY - EXTERNAL

**CAUTION:**  
**BEFORE CHECKING THE POWERPLANT, BE SURE THAT THE IGNITION SYSTEM IS OFF (IGNITION SWITCH PUSH OFF, LIGHT BURNED OUT), DURING THE POWERPLANT CHECKING DO NOT STAY IN THE PROPELLER RANGE AS DOES NOT NECESSARY**

- a) Check all the external surfaces for deformation and/or damages
- b) Check all the bolt fastenings and securities (wings, braces and tailplane to fuselage, control system push-pull rods, gears)

- c) Remove the controls locks, check all the control surfaces (including wing flaps) for free deflection and proper fastening/suspension
- d) Remove all the covers/caps of the Pitot system, check the Pitot system holes/inlets (must be clean and not be obstructed)
- e) Check the forward wheel and its position
- f) Check the main gear – the main gear leg must be springy, the main gear and wheel axles must be free from deformations
- g) Check the tyres for pressure (1.2 to 1.5 bar) and wheels safety/protection
- h) Check the windshield and visors panels for cracks and scratches
- i) Check the propeller for general status (notches, cracks, scratches)
- j) Check the engine cowling latches/fastening
- k) Remove the engine cowlings, check the exhaust system, carburettor, ignition plugs and all accessories for proper fastening and general status
- l) Check the oil level, refill if necessary
- m) Check the oil system lines for leaks and general status (bending, fractures, abrasion wear)
- n) Check the fuel quantity, refill if necessary
- o) Check the fuel tank and the fuel lines for leaks and general status (bending, fractures, abrasion wear)
- p) Rotating the propeller manually, check the engine for abnormal acoustic effects or rotation irregularities, and for proper, regular compression
- q) Check the engine mount and engine rubber suspensions for cracks; grease rubber parts with vaseline for avoid its premature aging
- r) Check the Bowden-cable engine controls and electrical system wires for proper status and fastening (wearing, bending, fractures, abrasion are not allowed)
- s) Remove the float cover(s) from the carburettor(s) and check for the water and/or dirt presence
- t) Check the wheel brakes function.

### 8.2.2 AFTER LAST FLIGHT IN THE DAY

- a) Master switch – OFF .
- b) Perform the pre-flight inspection (see p. 8.2.1).
- c) Clean the airplane (externally and internally).
- d) Lock the doors.

- e) Put the control locks, power plant and windscreen/glazes covers, wheel tyres covers and Pitot system covers/caps.

#### 8.2.3 LUBRICATION Periodically should be lubricated:

- Control stick articulation (at seat in base).
- Articulation connecting control stick torque pipe and elevator rod.

Force in small amount of grease to plastic seat gap articulation of bearing. Coat with thin film of grease or vaseline non-covered steel ball surfaces.

Remaining articulations don't need lubrication. Those may be periodically lubricated for preservation.

#### 8.2.4 MINOR REPAIRS AND MODIFICATIONS

Repair damaged and scratched lacquer by means of painting with brush.

If glass cracked, drill  $\approx \varnothing 2$  hole in the end of crack.

#### 8.2.5 AIRPLANE PREPARATION FOR PROLONGED OUT-OF-SERVICE

- Disassemble the airplane. Set wings and empennage on special stand, best in vertical position, ailerons and controls UP .
- Clean attachment fittings and bolts with extracting naphtha and coat film of vaseline or thick grease.
- Coat with protective cover .
- Jack the airplane if stored in hangar .
- Drain fuel from the tanks by drain point under the fuselage. Close drain point with screw and secure. Set fuel cut-off valve to OPEN position.
- Disconnect and remove battery from airplane.
- Make engine preservation according to the engine manual.
- Lubricate wing attachment fittings, struts and empennage, control system articulations and bolts with vaseline and wrap with grease dipped clothes.
- Clean wing attachment bolts and struts and coat thin film of vaseline and put them together with washers and nuts to bag and next to luggage compartment.
- Close and secure the doors.

- Cover all airplane by means of protective cover.
- Clean and coat thin film of vaseline to bolt seat in struts and wrap them with grease dipped clothes.

### 8.2.6 AIRPLANE RESTORE TO OPERATION AFTER PROLONGED OUT-OF-SERVICE

- Remove preservation, wash and clean all airplane elements.
- Perform steps 1 to 6.
- Install and connect the battery.
- Restore all fuselage systems to normal condition.
- Remove engine preservation according to the engine manual.
- Perform steps 7 to 9.
- Assembly the airplane.
- Perform steps 10 to 12.

### 8.3 PERIODIC INSPECTION LIST

Item	Inspection/Checking
1	Inspection of the airframe structure, with particular checking of the elements high-loaded during take-off and landing.
2	Surface status inspection of the attachments and bolts, and assemblage plays of main components checking.
3	Safety protection elements status inspection for airframe, power plant and control systems main assemblies.
4	Control systems, friction forces checking, grommet wearing checking.
5	Landing gear status inspection and checking.
6	Instrument's status inspection and checking.
7	Fuel system and oil system status inspection and checking.
8	Electrical system status inspection, electrical system components fastening checking.
9	Metallic elements external surface status inspection for components exposed to protection coating damages.
10	Wheel brake inspection and checking.
11	Control surfaces deflection checking.
12	Propeller inspection and checking.

#### 8.4 PERIODIC INSPECTION SCHEDULE

This schedule indicate the inspections/checkings for performing after the operating periods or events mentioned below:

After	Perform the inspection/checking item:
First 2 flight hours	1, 2, 3, 4, 5, 6, 7, 8, 12
First 5 flight hours	1, 2, 3, 4, 5, 6, 7, 8, 12
100 flight hours or flight season	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Hard landing	1, 2, 3, 5, 6

The airplane proper and safety operation is guaranteed by regular servicing, maintenance and inspection of the airframe and the power plant. Those works must be performed in the periods defined by the Airplane, Engine and Propeller Maintenance Manuals.

#### 8.5 AIRPLANE ASSEMBLY AND DISASSEMBLY

For assembly the airplane, the co-operation of minimum two persons is needed, proceeding as below:

- a) Complete all the airplane components and parts and verify for the possible damages.
- b) Before assembly, check visually the interior of the fuselage and wings for general status, clean if necessary.
- c) Open the canopy, attach L/H wing to the fuselage; the flaperon control bolt must be insert to the hole in the flaperon rib.
- d) Join the two main bolts  $\varnothing$  15 mm into the main wing-fuselage attachments (Fig.1).
- e) Attach the wing brace using the 2 bolts (Fig.2).
- f) Secure all the bolts with safety pins.
- g) Attach the R/H wing using same manner (repeating the steps c, d, e, f).
- h) Insert the bolt, located at the forward part of the horizontal stabilizer, to the hole on the fuselage and tight two screws, mounting the stabilizer to the fuselage.
- i) Using the bolt, attach the elevator control lever to the push-pull rod, tight the nut and secure with the safety pin.
- j) Check the function of all control systems, including flaps control system.

The disassembly of the airplane is performed in the opposite order.



View 8-1 Wing attachment fittings to fuselage



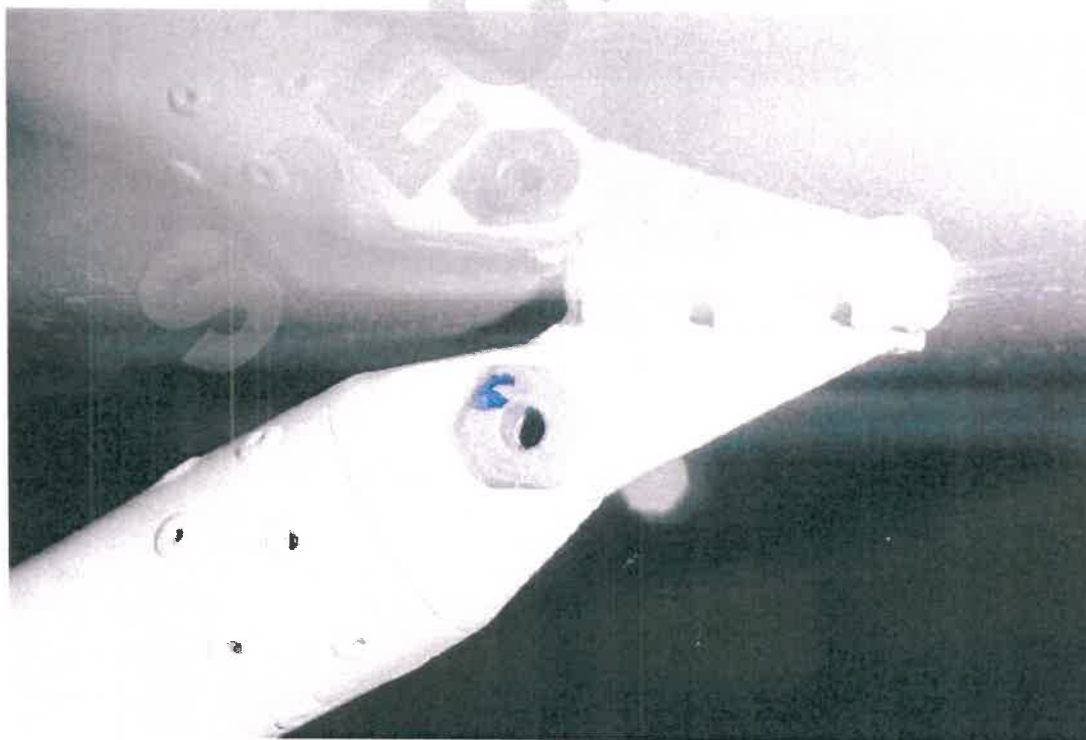
View 8-2 Flap-aileron actuator lever



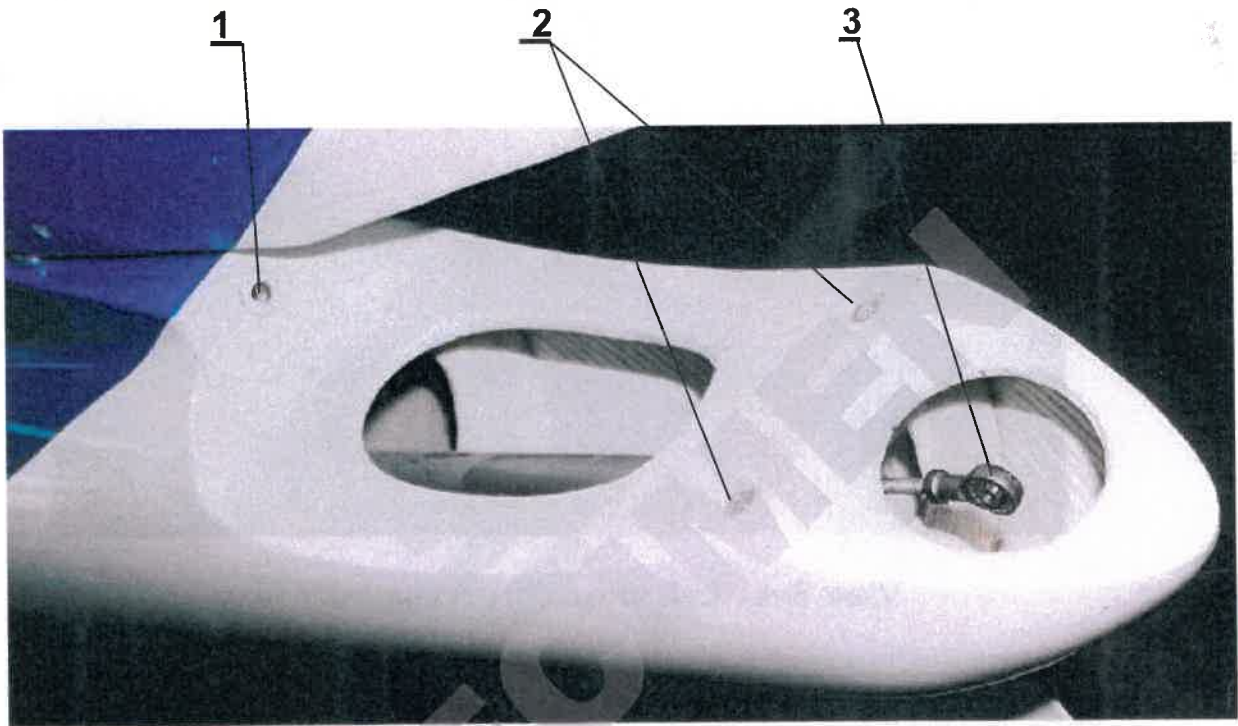
View 8-3 Assembled left wing main fittings. Bottom view.



View 8-4 Left down strut fitting front view



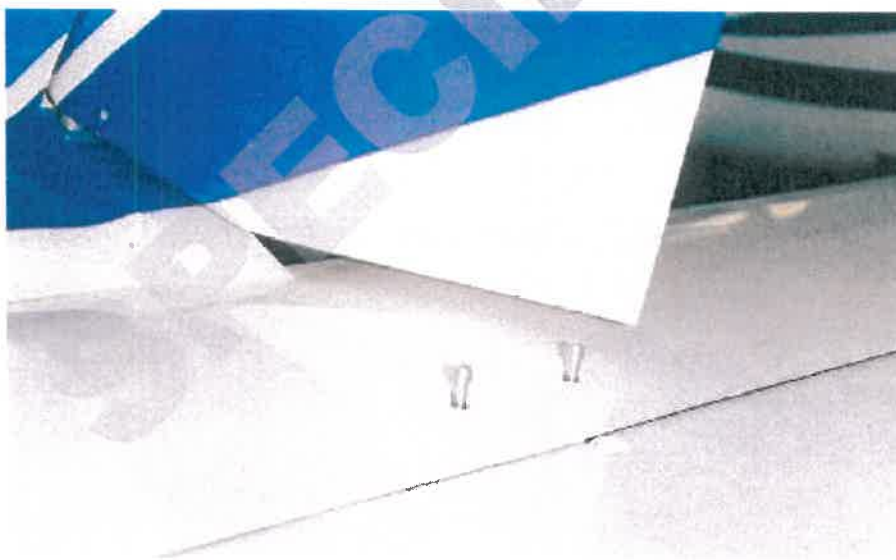
View 8-5 Left up strut fitting front view



View 8-6 Rear part of fuselage (without elevator unit)  
1 – horizontal stabilizer front attaching seat  
2 - horizontal stabilizer rear attaching seats  
3 – elevator rod end



View 8-7 Entering the horizontal stabilizer dowel to fuselage seat



View 8-8 Screws attaching horizontal stabilizer to fuselage



View 8-9 Assembling of elevator rod end on elevator lever

## SECTION 9

### SUPPLEMENTS

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## Supplement N° 1

### JK-03 AIRPLANE BY ROTAX 912 ULENGINE PILOT'S CHECKLIST

#### TAKE-OFF

1	CANOPY	CLOSED AND LOCKED
2	CONTROL SYSTEMS	MOVEMENTS CHECKED, PROPER
3	MAIN ELECTRICAL SWITCH	ON
4	FLAPS	DEFLECTED AT 15° ("1")
5	IGNITION SWITCH	ON
6	SUCTION LEVER	OFF
7	CUT - OFF VALVE	OPEN
8	ELECTRIC FUEL PUMP	SWITCH ON
9	ENGINE MAX. RPM	CHECKED, PROPER
10	ENGINE INSTRUMENTS	PROPER INDICATIONS
11	RUNWAY	FREE
12	TAKE-OFF PERMISSION	DONE

#### LANDING

1	LANDING PERMISSION	DONE
2	APPROACH AIRSPEED	100 KM/H, STEADY
3	FLAPS – AS REQUIRE	a) +15° ("1") – maintain the airspeed 85-95 km/h on the direct approach (as require) b) +28° ("2") – reduce the airspeed to 85 km/h before flaps extending c) maintain the airspeed 80-85 km/h on the direct approach
NOTE: IN THE RAIN INCREASE THE APPROACH AIRSPEED FOR 5 KM/H		
4	LANDING	LEVEL THE FLIGHT TRAJECTORY AND TOUCH-DOWN WITH MINIMAL AIRSPEED, WITH POWER LEVER AT IDLE

## Supplement N° 2

### JK-05 AIRPLANE POWERED BY ROTAX 912 UL ENGINE BASIC OPERATING DATA

#### GRAVITY CENTER

Allowed gravity center in-flight position range:  
24% to 30% MAC

#### AIRSPEED

AIRSPEED	IAS	km/h
NEVER EXCEED	V <sub>NE</sub>	220
IN ROUGH AIR	V <sub>RA</sub>	160
MANOEUVRING	V <sub>A</sub>	149
CLIMBING AFTER TAKE-OFF, FLAPS +15° ("1")		90
CLIMBING, FLAPS -6° ("0")		100 - 110

#### AIRSPEED WITH FLAPS EXTENDED FOR MTOW = 472 kg

Flaps deflection angle [°]	Flaps indicator position	Max. allowed airspeed [km/h]	Stall speed [km/h]	Min. safe airspeed [km/h]
+ 28°	"2"	112	55	66
+ 15°	"1"	120	64	77
- 6°	"0"	220	72	87

#### ALLOWED WIND COMPONENT

HEADWIND - 15 m/s

CROSSWIND - 5 m/s

