FLIGHT AND MAINTENANCE MANUAL

IUL-KR-030-iS LSA

KR-030 TOPAZ-iS AIRPLANE

FACTORY SERIAL NUMBER: **30-09-09**

AIRPLANE DESIGNATION: .....

AIRPLANE REGISTRATION NUMBER: 23-2838

THE MANUAL HAS BEEN APPROVED BY THE PRESIDENT OF THE POLISH CIVIL AVIATION AUTHORITY

APPROVAL DATE 29.06.2018, APPROVAL NO. ULC-LTT-3/4351-0122/02/18

"ULTRALIGHT" CATEGORY

THE AIRPLANE CAN BE OPERATED IN "ULTRALIGHT" CATEGORY FOR RECREATIONAL, SPORT, SHOW AND OTHER PURPOSES, EXCLUDING THE TRANSPORTATION PURPOSES.
THIS AIRCRAFT MAY BE USED FOR TEACHING AND TRAINING PURPOSES IN ULTRALIGHT PILOTS' QUALIFICATION PROGRAMS RESULTING IN ACHIEVING THE ULTRALIGHT AIRCRAFT PILOT LICENCE BY CERTIFIED PILOT TRAINING CENTRES ONLY.

THE AIRPLANE MUST BE OPERATED IN ACCORDANCE WITH LIMITATIONS, INSTRUCTIONS AND INFORMATION GIVEN IN THE PRESENT MANUAL.

THE MANUAL MUST BE AVAILABLE AT ALL TIMES IN THE AIRPLANE COCKPIT .

The present Manual was prepared on the basis of requirements stated in the Appendix 5, „Ultralight aircraft", to the Regulation of the Ministry of Infrastructure of 25th of March 2013 on the exemption from the application of some provisions of the Act – Aviation Law to some types of aircraft and defining conditions and requirements for operation of these aircraft (OJ of 10.04.2013, Item 440).

The following precaution statements were used in this manual:
"Danger", "Warning" and "Caution"

DANGER:
Describes the situation where **immediate or significant**decrease of safety of flight would occur resulting from non-observance of related procedures.

WARNING:
Describes the situation where **non-immediate/long-lasting or minor decrease** of safety of flight would occur resulting from non-observance of related procedures..

CAUTION:
Describes all special issues not directly related to safety but of significant or exceptional nature.

The present Flight and Maintenance Manual must not be changed, modified or supplemented except with the prior approval of the Polish Civil Aviation Authority.

Lost of the present Manual should be immediately reported to the Polish Civil Aviation Authority or its counterpart when abroad.

Any person finding this Manual is hereby requested to pass it to the Polish Civil Aviation Authority Head Office at the following address: ul. M. Flisa 2, 02-247 Warsaw, Poland or its counterpart when abroad.

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0.2 LOG OF REVISIONS

Any revisions to the present Manual, except actual weighting data, should be immediately recorded in the following table and approved by the Polish Aviation Authority.
New or amended text in the revised pages will be indicated by a black vertical line in the margin with the revision number. Last revision number and date must be inserted to the page imprint. After entering all changed revision pages, they should be replaced with a new one.

Rev. No.	Date	Description	Revised pages	Approval
0	2017-05-05	Edition 1	All	

IUL-KR-030-iS LSA Flight And Maintenance Manual

0.3 LIST OF EFFECTIVE PAGES

Page	Rev. No.	Date	Page	Rev. No.	Date	Page	Rev. No.	Date
0-1	0	2017-05-05	5-3	0	2017-05-05	10-5	0	2017-05-05
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0-3	0	2017-05-05	5-5	0	2017-05-05	10-10	0	2017-05-05
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0-5	0	2017-05-05	6-1	0	2017-05-05	10-12	0	2017-05-05
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0.4 INTRODUCTION

Before starting operation of the airplane, read carefully the KR-030 TOPAZ-iS Flight and Maintenance Manual, ROTAX Engine 912i Instruction Manual (ref. No.: OM-912i), ROTAX Engine 912i Maintenance Manual (Line maintenance) (ref. No.: MML-912i) and Peszke Propeller Operating and Maintenance Manual.

The Manuals will provide you with the basic information and ensure safe operation of your airplane, engine and propeller.

If any part of the Manual is not entirely clear to you or if you need any additional information, please contact:

- For the engine: The engine manufacturer representative/service centre,
- For the aircraft: The Ekolot company representative,
- For the propeller: The PESZKE S.C. representative.

Remarks:

The aim of the present Manual is to familiarize the owner/ user of the airplane with the basic operational and safety instructions.

Engine serial number:

The engine serial number should always be referred to when requesting information or ordering partsto ensure correct part selection prior to shipment as the manufacturer reserves the right to introduce modifications resulting from continuous improvement. The engine serial number should always be referred to when ordering engine spare parts to ensure correct part selection prior to shipment.

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

Safety rules

Although familiarization with these instructions will not eliminate all hazards related to the airplane operation, understanding and application of the instructions given in the Manual will help you in appropriate operation of the airplane and the engine.

Pictures placed in the Manual show typical design solution and standard equipment only. They may not illustrate all details and accurate shape of elements of the airplane of the same or similar application.

Safety information:

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

Aircraft equipped with this engine can only be operated in DAYLIGHT VFR conditions. This airplane is not suitable for aerobatics

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

Whether you are a qualified pilot or a novice, knowledge of the aircraft design, its controls and operation is mandatory before venturing a solo flight. Flying any type of aircraft involves a certain amount of risk. Be aware and prepared for any situation or hazard associated with flying. Appropriate training program and continuous skills improvementis a must for all pilots.

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

Respect all government or local rules pertaining to flight operation in your flying area. Adjust flight parameters to the weather and topography conditions.

The plane in standard configuration **is not equipped** with anti-icing systems. Do not fly in weather conditions, which may lead to icing the air inlets and wings. The icing may cause total loss of control over the airplane, which may lead to a serious or even fatal accident.

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

- Do not start the engine unless you make sure there are no obstacles or bystanders in the vicinity of the aircraft.

- Do not start the engine if there is no person in the cockpit, who is trained for operation of the given type of the aircraft.

- Do not start the engine without the propeller installed.

- In the interest of safety, the aircraft must not be left unattended while the engine is running.

- Keep the engine and the fuselage log book and observe the airplane and the engine maintenance schedules. Keep the engine in top operating condition at all times. Do not operate an 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 authorizedROTAX® engine dealer or a qualified and trained mechanic approved by the Aviation Authority.

- To avoid the risk of 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 additional humidity or dust/sand preventative equipment or additional maintenance operations. Please, contact the manufacturer of the airplane to obtain additional information. This particularly refers to first flight in new geographical areas.

- Never operate the engine and gearbox without sufficient quantities of lubricating oil.

- Check the level of coolant and oil periodically.

- Never exceed the maximum airspeed and maximum engine speed of the airplane. Allow the engine to cool down at idle for several minutes before turning it off.

SECTION 1

GENERAL

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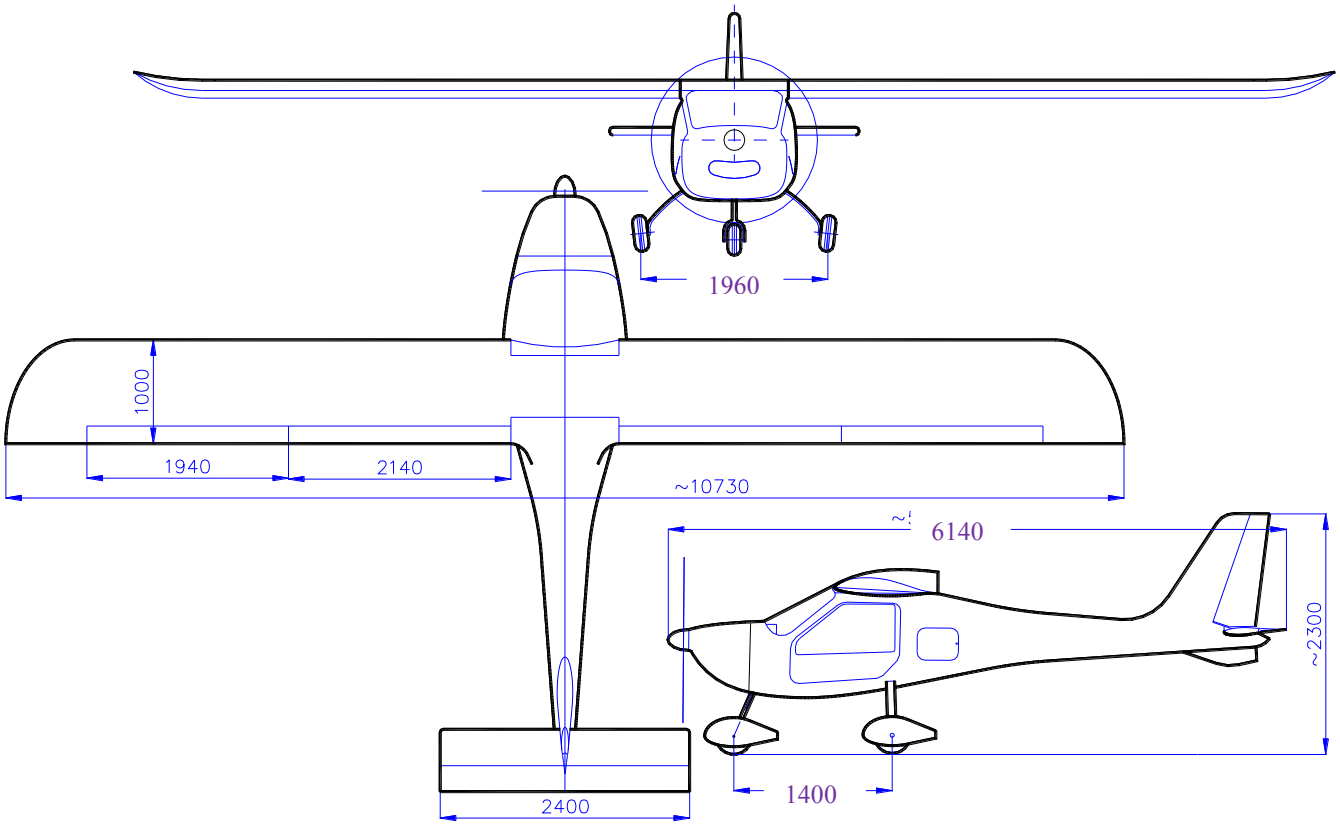
SECTION 1

GENERAL

1.1 THE AIRPLANE

KR-030 TOPAZ-iS is a two-seat, aerodynamically controlled, high-wing monoplane that has been designed in accordance with the “Polish Temporary Airworthiness Requirements for Ultralight Aircraft”, status as of December 2006.

1.2 THREE-VIEW DRAWING AND BASIC DIMENSIONS



BASIC TECHNICAL DATA

Wing span	~10.73	m	35.20	ft
Length	~6.14	m	19.52	ft
Height	~2.30	m	7.55	ft
Tail unit span	2.40	m	7.87	ft
Undercarriage base	~1.40	m	4.59	ft
Wheel base	~1.96	m	6.46	ft
Wing width	1.00	m	3.28	ft
Wing area	10.50	m^2	113.02	sq. ft
Ailerons area (both)	2x0.40	m^2	2 x 4.30	sq. ft
Flaps area (both)	2x0.44	m^2	2 x 4.74	sq. ft
Tailplane area	1.44	m^2	15.50	sq. ft
Elevator area	0.60	m^2	11.84	sq. ft
Vertical stabilizer area	0.78	m^2	8.40	sq. ft
Ruder area	0.32	m^2	3.44	sq. ft
Cockpit internal width	1.19	m	3.90	ft
Height above the seats	0.95	m	3.12	ft

CONTROL SURFACE DEFLECTION AND DEFLECTION TOLERANCES

Surface	**Deflection**		**Tolerance**
Ailerons	Up	19º	-1º
	Down	16º	-1º
Flaps	„0”	-6º	-0.5º
	„1”	+15º	-1º
	„2”	+40º	-1º
Elevator	Up	25º	-1º
	Down	20º	-1º
Rudder	Right	30º	-1º
	Left	30º	-1º

1.3 ENGINE DATA

ROTAX 912 iS2 Sport is a four cylinders, four-stroke boxer engine, with spark ignition, liquid-cooled heads and air-cooled engine cylinders. The engine is equipped with an independent, electronic Engine Management System, controlling the fuel injections and ignition systems operation. The engine is also equipped with fuel pumps, electric starter and reduction gear of overall ratio 2.43:1 with integrated damper and overload coupling.
Propeller shaft rotation – right, as seen from the cockpit.

1.3.1 1.1.1 OPERATIONAL PARAMETERS (refer to ROTAX 912i engine Operation Manual) Ref. No.: OM-912i

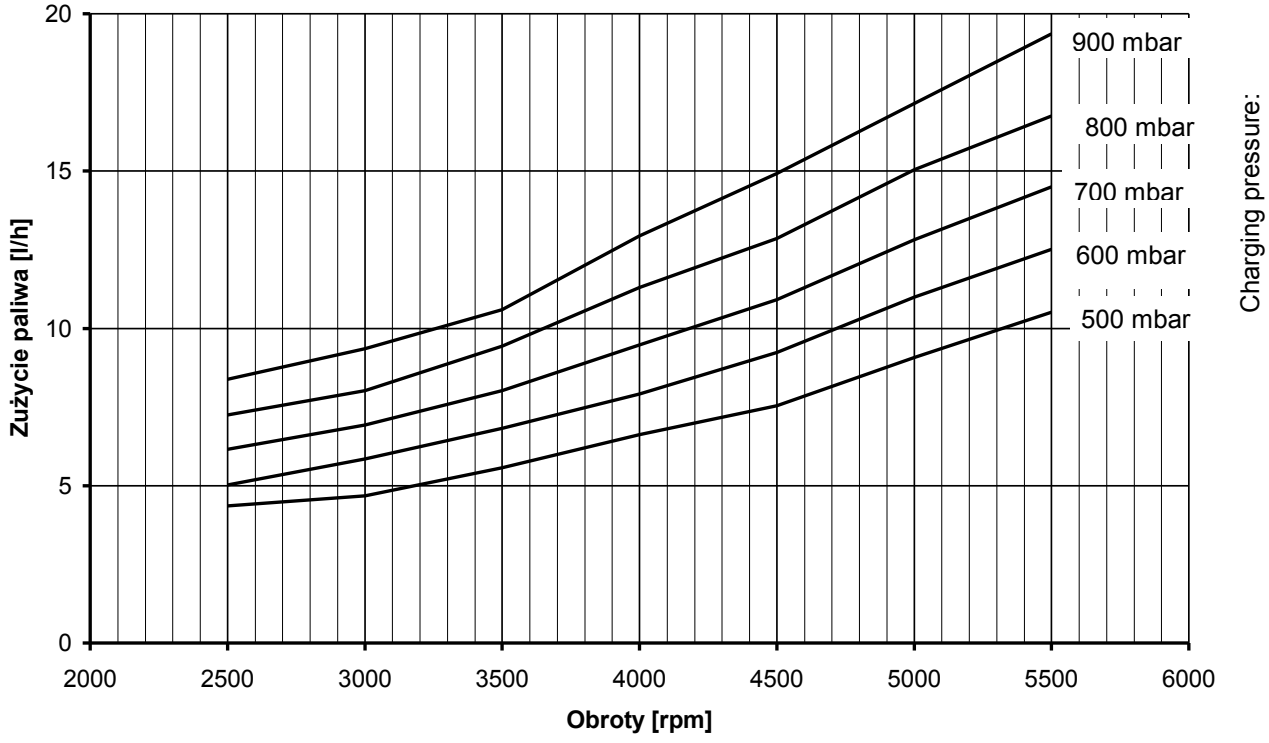
Take-off power	73.5 kW at 5800 RPM	max 5 minutes
Nominal power	69.0 kW at 5500 RPM	
Max. engine speed	5800 RPM	max. 5 minutes
Engine speed at 75% nominal power	5000 RPM	
Idle speed	1400 RPM	

1.3.2 FUEL AND ENGINE OIL CONSUMPTION (refer to the ROTAX 912i engine Operation Manual) Ref. No.: OM-912i

Fuel consumption

At take-off power (POWER mode)	7.26 U.S. gal/h [27.5 l/h]
At nominal power (POWER mode)	7.00 U.S. gal/h [26.5 l/h]

For the EKO mode – see the below graph:



Oil consumption: Max. 0.01 US gal/h [0.06 l/h]

1.3.3 OPERATIONAL TEMPERATURES (refer to the ROTAX 912i engine Operation Manual) Ref. No.: OM-912i

Oil temperature:

- maximum	266ºF [130º C]
- minimum	120ºF [50º C]
- Normal operation temperature	190º – 230ºF [90º ÷ 110º C]

Cooler temperature:

- maximum	248ºF [120º C]

Engine start temperature

- maximum during flight (inlet air temperature)	140 ºF [60º C]
- maximum during take-off (ambient temperature)	120 ºF [50º C]
- minimum during take-off (oil temperature)	-13 ºF [-20º C]

1.3.4 OPERATIONAL PRESSURES (refer to the ROTAX 912i engine Operation Manual) Ref. No.: OM-912i

Oil pressure

max.	102 psi [7 bar] (short time during cold engine start-up)
min.	12 psi [0.8 bar] (below 3500 rev/min)
normal	29-73 psi [2.0 to 5.0 bar] (above 3500 RPM)

Fuel pressure

- maximum	46.5 psi [3.2 bar]
- minimum	40.5 psi [2.8 bar]

1.4 PROPELLER DATA

Three blades Peszke B-Line 1700/1950 type carbon fibre composite propeller with pitch adjustable on ground.
Propeller diameter 1.70 m, sense of rotation clockwise.
Pitch angle setting, measured at blade cross-section in the distance 620 mm from the propeller axis:

Reducer gear ratio on the engine	Pitch angle setting
2.43:1	24.2º

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SECTION 2

LIMITATIONS AND FLIGHT CONDITIONS

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SECTION 2

LIMITATIONS AND FLIGHT CONDITIONS

2.1 CREW

Minimum crew:	One pilot
Maximum number of persons on board:	Two persons
Minimum weight on the seats:	132 lb [60 kg]
Maximum crew weight:	See, Section 6.3.

2.2 ALLOWED FLIGHT CONDITIONS

- VFR
- any manoeuvre pertaining to “normal” flight;
- stalls, except whip stalls;
- lazy eights, chandelles, turns in which angle of bank is not more than 60° for flaps in “0” position and no more than 30° for other flap settings.

2.3 PROHIBITED FLIGHT CONDITIONS

- IFR
- Known icing conditions
- Aerobatic manoeuvres
- Inverted flight
- Sideslips with angle of bank is more than 40º
- Intended spins

2.4 MAXIMUM TAKE-OFF WEIGHT

With the rescue system installed W = 1235 lb [560 kg]
For towing - as above
Max. weight of luggage in the compartment 11 lb [5 kg].

In one person flights, luggage <u>should</u> be located on the non-occupied seat, not in the luggage compartment.

2.5 ALLOWED CENTRE OF GRAVITY POSITION

10.11 – 12.01 in [257 – 305 mm] behind leading edge of rectangular part of the wing

2.6 STRUCTURAL LOAD FACTORS

Flaps set to „0”	Other flaps settings
n = +4 / -2,0	n = +2 / 0,0

2.7 ALLOWED AIRSPEEDS (IAS)

Never-exceed airspeed	**V_{NE}**	130 kt	240	km/h
Rough air allowed airspeed not higher than	**V_c**	98 kt	180	km/h
Manoeuvring airspeed	**V_A**	85 kt	158	km/h
- above this airspeed quick controls deflection must be limited to 1/3 of full range.				
Allowed airspeed with flaps extended	**V_{FE}**	67 kt	125	km/h

2.8 ALLOWED ENGINE SPEED

Take-off power 5800 RPM for max. 5 minutes
Nominal power engine speed 5500 RPM

2.9 TEMPERATURES

Oil temperature
- maximum 266ºF [130ºC]
- minimum 122ºF [50ºC]

Coolant temperature:
- maximum 248ºF [120ºC]

Engine start-up temperature
- maximum during flight (inlet air temperature) 140 ºF [60ºC]
- maximum during take-off (ambient temperature) 120ºF [50ºC]
- minimum during take-off (ambient temperature) -25ºF [-13ºC]

2.10 OTHER LIMITATIONS

PRESSURES

Oil pressure
- max. 101.5 psi [7 bar] (short time during cold engine start-up)
- min. 11.6 psi [0.8 bar] (below 3500 rev/min)
- normal 29–72.5 psi [2 to -5 bar] (above 3500 rev/min)

Fuel pressure
- max. 56.8 psi [3.2 bar]
- min. 40.5 psi [2.8 bar]

POWER CONSUMPTION

Maximum total electric power consumption from 12 volts sockets on instrument panel is 5A.

PROPELLER SPECIFICATION

Reducer gear ratio on the engine	Pitch angle setting
2.43:1	24.2º

Refer to AS Propeller Manual for permissible propeller angle setting deviation.

2.11 FUEL AND OIL

2.11.1 FUEL AND OIL

- Automobile petrol minimum RON 95:
- Mogas EN 228 Super, EN 228 Super plus
- AVGAS 100LL

Oil of quality RON 424 and viscosity SAE 10W-40:
- AeroShell Sport Plus 4

2.11.2 FUEL TANK CAPACITY

Total capacity of the fuel tanks is 23 US gallon [88 l]. Usable amount is 22 US gallon [86 l], never used amount is 0,5 US gallon [2 l].
Amount of fuel in wings is measured by the electric fuel gauge with indicator installed on the instrument panel.
Fuel reserve is the amount of fuel in the buffer tanks and is indicated by a separate indicator on the instrument panel within the range of 0 to 2 US gallon [0 to 8 litres].

2.11.3 OIL TANK CAPACITY

The tank contains 3.2 quart [3 l] of oil.

2.12 INSTRUMENTS MARKING

Airspeed markings

Airspeed range		Arc color	
30 - 65 kt	55 – 121 km/h	white	($1{,}1V_{S0}$÷V_{FE})
39 - 85 kt	73 - 157 km/h	green	($1{,}1V_{S1}$÷V_A)
85 - 130 kt	157 - 240 km/h	yellow	(V_A÷V_{NE})
Above 130 kt	Above 240 km/h	red	

Tachometer markings

Engine speed range	Arc color
0 -1400 RPM	Yellow
1400 – 5500 RPM	Green
5500 – 5800 RPM	Yellow
Above 5800 RPM	Red

Fuel pressure indicators markings

Values 2.2 psi [0.15 bar] and 5.8 psi [0.4 bar] are marked with red lines.

Engine indicators marking

Engine heads temperature indicators:

Temperature range		Arc color
122 - 185˚F	50 – 85 ºC	Yellow
185 - 257˚F	85 – 125 ºC	Green
257 - 275˚F	125 – 135 ºC	Yellow
Above 275 F	Above 135 ºC	Red

Coolant temperature indicators:

Temperature range		Arc color
140 – 230˚F	60 – 110 ºC	Green
230 – 248˚F	110 – 120 ºC	Yellow
Above 248 F	Above 120 ºC	Red

Oil pressure indicator:

Pressure range		Arc color
0 - 11.6 psi	0 – 0.8 ºC	Red
11.6 - 29.0 psi	0.8 - 2 ºC	Yellow
29.0 - 72.5 psi	2 – 5 ºC	Green
72.5 - 101.5 psi	5 – 7 ºC	Yellow
Above 101.5 psi	Above 7 bar	Red

Oil temperature indicator:

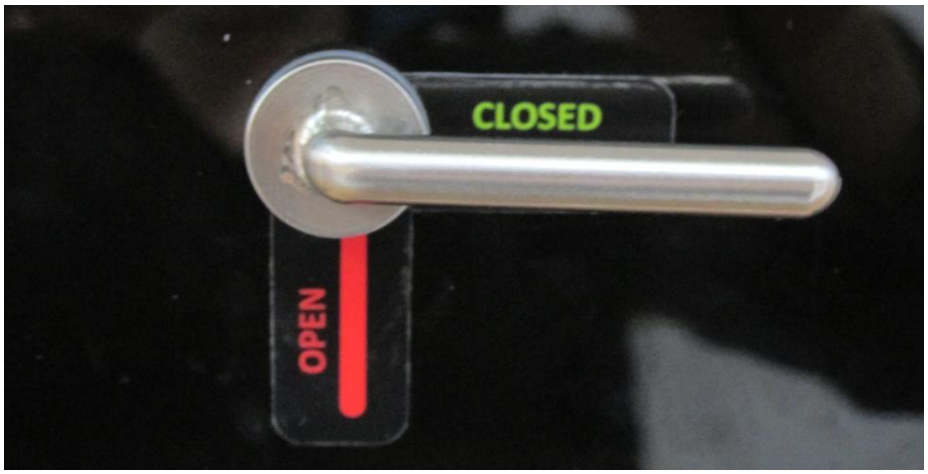
Temperature range		Arc color
122 - 194˚F	50 – 90 ºC	Yellow
194 - 230˚F	90 – 110 ºC	Green
230 - 266˚F	110 – 130 ºC	Yellow
Above 266 F	Above 130 ºC	Red

2.13 NOTICES AND PLACARDS

On the left and right side of the airplane, in the entrance area, the following inscriptions are placed:

ULTRALIGHT (height of font min. 1.6 in [40 mm])

On the left and right door, in the area of the lock at the bottom and the top of the frame the following inscriptions are placed:



In the cockpit, plates with the following text are attached:

This aircraft was granted permission to be operated in the "ULTRALIGHT" category and does not meet requirements as defined by the general airworthiness regulations, based on the Annex 8 of the International Civil Aviation Convention.

In front of the pilot:

Maximum crew weight ( ) lb*[kg]

( )* value given in the Section 6.

and:

Aerobatic figures and intentional spins are forbidden.

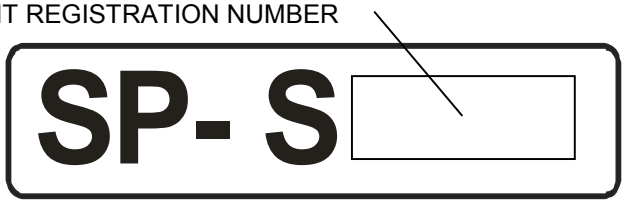
Between the luggage compartments plate:

LUGGAGE MAX. 5 KG
SOFT ITEMS ONLY

Inscriptions by the fuel fillers, on the upper surface of the wings:

Petrol min. RON 95

On the instrument panel:
Heat resistant plate on the right side.



If the rescue system is installed in the aircraft:

By the release handle, the following inscription (visible from both seats) is placed:

WARNING
PARACHUTE ROCKET RESCUE SYSTEM

PULL THE HANDLE FORWARD BY APPROXIMATELY 12 IN [30 CM]

USE IN EMERGENCY SITUATIONS ONLY,
SEE FLIGHT AND MAINTENANCE MANUAL

Outside the fuselage:

The place the rescue system is installed is designated as shown below:

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SECTION 3

EMERGENCY PROCEDURES

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CAUTION:

Section 9 **Supplements** contains variations related to configurations other than standard configuration described in the present Flight and Maintenance Manual.

Information given in the Supplements must also be taken into consideration.

SECTION 3

EMERGENCY PROCEDURES

3.1 ELECTRIC SYSTEM FAILURE

- Master Switch – switch to OFF
- Alternator – switch to OFF

CAUTION!
In case of electric system failure continuation of normal flight is possible. The following units do not work then:

- Fuel gauge
- Elevator trim
- Flap actuator
- Engine starter

In such case, the pilot has to evaluate safe flight time with disposable amount of fuel and continue flight to a place where landing with the current flaps setting is possible.

WARNING:
DO NOT SWITCH OFF THE IGNITION UNIT BECAUSE ENGINE STARTING IN FLIGHT WILL NOT BE POSSIBLE.

3.2 AIRPLANE ON FIRE

3.2.1 ENGINE FIRE

- Fuel valve – turn to OFF
- Master Switch – switch to OFF
- Ignition line A, B - switch to OFF
- “Power” throttle – push fully forward to "Max.”position
- Perform slip to side opposite to fire (to “cut out” the flame)
- Perform emergency landing.

3.2.2 OTHER AIRCRAFT COMPONENT ON FIRE

- For fire in the cockpit or if the fire is accessible from the cockpit use available means to extinguish fire.
- For the fire inaccessible from the cockpit, perform the slip to the side opposite to the fire (to “cut out” the flame).
- When the fire in the cockpit is extinguished, vent the cockpit interior
- Perform emergency landing.

3.2.3 FIRE CAUSED BY THE ELECTRIC SYSTEM

If the cause of the fire may be clearly defined as “electric”:

- Master Switch – switch to OFF
- Alternator – switch to OFF
- For fire in the cockpit or accessible from the cockpit use available means to extinguish fire.
- When the fire in the cockpit is extinguished, vent the cockpit interior
- Depending on the circumstances, continue the flight to nearest airfield or perform emergency landing.

3.3 ENGINE FAILURE

3.3.1 ENGINE FAILURE DURING THE TAKE-OFF GROUND RUN

- "Power” throttle – move to Min. GAS
- Brakes – if needed
- Ignition line A, B - switch to OFF
- Fuel valve – turn to OFF
- Master Switch – switch to OFF

3.3.2 ENGINE FAILURE AFTER LIFT-OFF (UP TO 100 M)

- Ignition line A, B – switch to OFF
- Fuel valve – turn to OFF
- Master Switch – switch to OFF
- Land straight ahead avoiding obstacles

WARNING!
NEVER TRY TO TURN !

3.3.3 ENGINE FAILURE DURING THE FLIGHT

- If possible, start engine in flight bearing in mind the below caution:

CAUTION:

If the cause of engine stall in flight is unknown or where the reason was fire, don't try to re-start the engine.

- Perform emergency landing

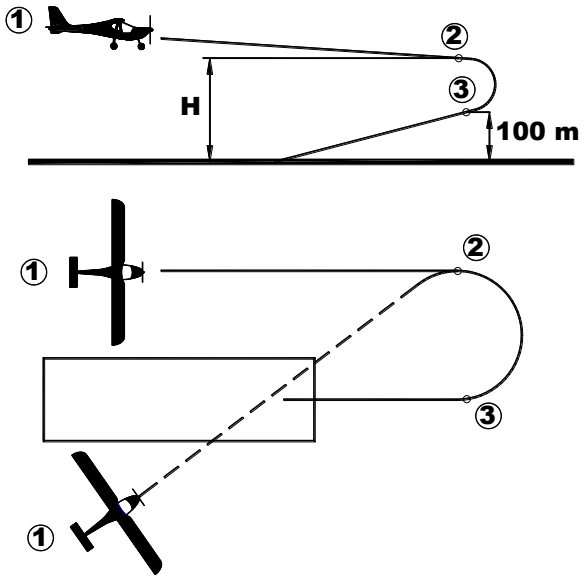
3.3.4. IN-FLIGHT ENGINE STARTING

- Fuel valve – turn to ON
- Master Switch – switch to ON
- Alternator switch – switch to ON
- Ignition switch – switch to ON
- On-board display – active
- Main Fuel Pump – switch to OFF
- Aux. Fuel Pump – switch to ON
- Ignition, Line A – switch to ON
- Ignition, Line B – switch to ON
- Set throttle lever to 0.4 in 0.7 in [1 to 2 cm] of the range (55-65% of throttle opening)
- Press and keep depressed the "Power" Button
- Watch the indication lights –they should light up and go off after 3 seconds.
- When the lights go off, keep pressing the "Power" button and press the "Starter" button. Keep both the button depressed until the engine starts up (not longer than 10 seconds). Release both buttons when the engine speed is 1500 RPM or higher (stable run of the engine).
- Check the oil pressure - the pressure should be higher than 43.5 psi [3 bar]
- Increase the engine speed above 2500 RPM and maintain for 5 sec.
- Set the required engine speed.
- Monitor engine performance until the end of the flight.

3.4 EMERGENCY LANDING

NOTES:

1. **Performing safety manoeuvres for landing with shut-off engine - with turn 360 ° - is possible at height no lower than 1000 ft [300m] above terrain.**
2. **Turns with shut-off engine should not exceed the bank angle 15°.**
3. **Close Fuel Cut-Off Valve and switch off Ignition of Line A and B.**



1. Last stage of flight

- Flaps position $\delta_{KL} = -6^0$ (position „0”)
- airspeed ca. V = 58 kt [107 km/h]
- speed of descent ca. 472 ft/min [2,4 m/s]
- gliding ratio ca. 12

2. Turn into approach for landing

- before the turn, set the Flaps $\delta_{KL} = 15^0$ (position „1”)
- choose altitude H of the beginning phase of the turn depending on the bank angle (see the note above)
- maintain the airspeed V_P = ca. 59 kt [110 km/h]

3. After the turn

- reduce the speed below 57 kt [105 km/h], and then at H_P = ca. 328 ft [100m] set the flaps to position $\delta_{KL} = +40^0$ (position „2")
- maintain the approaching speed at the level of V = 51 kt [94 km/h],
- switch the Master Switch to OFF
- at altitude H= ca. 26 ft [8m] start levelling at such rate, so the airspeed at H = ca. 3 ft [1m] above ground is 39 kt [73 km/h],
- touchdown airspeed ca. V = 34 kt [63 km/h].

Above procedure assures gentle touch down on two main wheels and landing run without the loss of direction.

3.5 ABNORMAL VIBRATION

3.5.1 ABNORMAL VIBRATION CAUSED BY ENGINE OR PROPELLER FAILURE/ DAMAGE

- Switch the Ignition 1 and 2 to OFF immediately
- Perform emergency landing.

3.5.2 ABNORMAL VIBRATION CAUSED BY THE FUSELAGE DAMAGE

- Reduce airspeed.
- If the vibration persists, perform emergency landing.

3.6 CONTROL SYSTEMS FAILURE

3.6.1 AILERON CONTROL FAILURE

The airplane can be laterally controlled by rudder deflection. Performing bank up to 15º is possible using the rudder only.

3.6.2 RUDDER CONTROL FAILURE

It is possible to keep directional flight control by means of ailerons only.

3.6.3 RUDDER CONTROL FAILURE

When you notice lack of reaction on control stick pitch deflection but descending flight angle is approximately constant, check the airplane reaction to elevator trimmer deflection and different engine speeds.
If airplane reaction on the above action is not completely safe, keep the flight as straight as possible with the airspeed around 62 kt [115 km/h] to appropriate place where landing without turns and with extended approach will be possible. Land straight ahead with engine running. Shut down the engine immediately after touch down.

3.7 EMERGENCY EVACUATION

To perform emergency evacuation from the airplane:

1. Door locks - push the lever down to OPEN position
2. Pilot's belt - release
3. Doors - push out with hands or shoulders and abandon the cockpit

3.8 RECOVERY FROM STALLS AND UNINTENDED SPINS

3.8.1 STALL RECOVERY

In case of stall:
- In straight flight – push the control stick forward and set all control surfaces to neutral position.
- In turn - push the control stick forward and gently operate the aileron against the bank direction.
- After regaining controllability, gently push back control stick and lead the airplane to horizontal flight.
- Set engine speed as for horizontal flight.

3.8.2 SPIN RECOVERY

CAUTION! THE FOLLOWING PROCEDURE WAS WRITTEN ON THE BASIS OF EXPERIENCE GATHERED WITH SIMILAR MODELS OF AIRPLANES AND SERVES AS GENERAL RECOMMENDATION ONLY.

In case of unintended spin the following procedure should be performed:

1. "Power" throttle: MIN. „POWER MIN."
2. Flaps: RETRACT (position „0")
3. Ailerons SET TO NEUTRAL POSITION
4. Rudder: APPLY FULLY AGAINST THE SPIN DIRECTION
   Elevator: PUSH FORWARD OUT OF NEUTRAL
5. Rudder: AFTER RECOVERY FROM SPIN, SET TO NEUTRAL POSITION

Gently turn to horizontal flight

WARNING!

INTENDED SPINS ARE PROHIBITED

IN OTHER EMERGENCY SITUATIONS, STANDARD PROCEDURES SHOULD APPLY

3.9 USING RESCUE SYSTEM (if installed)

Notice: In order to launch the rescue system at low altitude, Point 2 should be performed first.

If launching the rescue system is unavoidable, the following steps need to be taken:

1. Ignition line A, B - switch to OFF.
2. Pull the release handle by at least 4 in [10 cm].
3. Fuel valve – turn to OFF.
4. Master Switch – switch to OFF.
5. Tighten the seatbelt.
6. Pull the legs backward as far as possible.
7. Cover you (head) face with hands right before contact with terrain.

CAUTION!
On launching the rescue system, G-load up to 5G may occur. Improperly fastened seat belts may not secure you against clashes with the cockpit structures,
leading to serious injuries.

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SECTION 4

NORMAL PROCEDURES

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SECTION 4

NORMAL PROCEDURES

4.1 GENERAL

The airplane structure and power plant must be systematically and conscientiously inspected for damages and wear symptoms. Particularly, during the ground manoeuvres small damages may occur which, if not detected, may cause decrease of the airplane operational safety. If the detected damages raise 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. In cold weather, all accumulations (even small!) of the snow, ice or frost must be removed from the wings, empennage and control surfaces. They may cause a serious decrease of aerodynamic characteristics and unwanted weight increase.

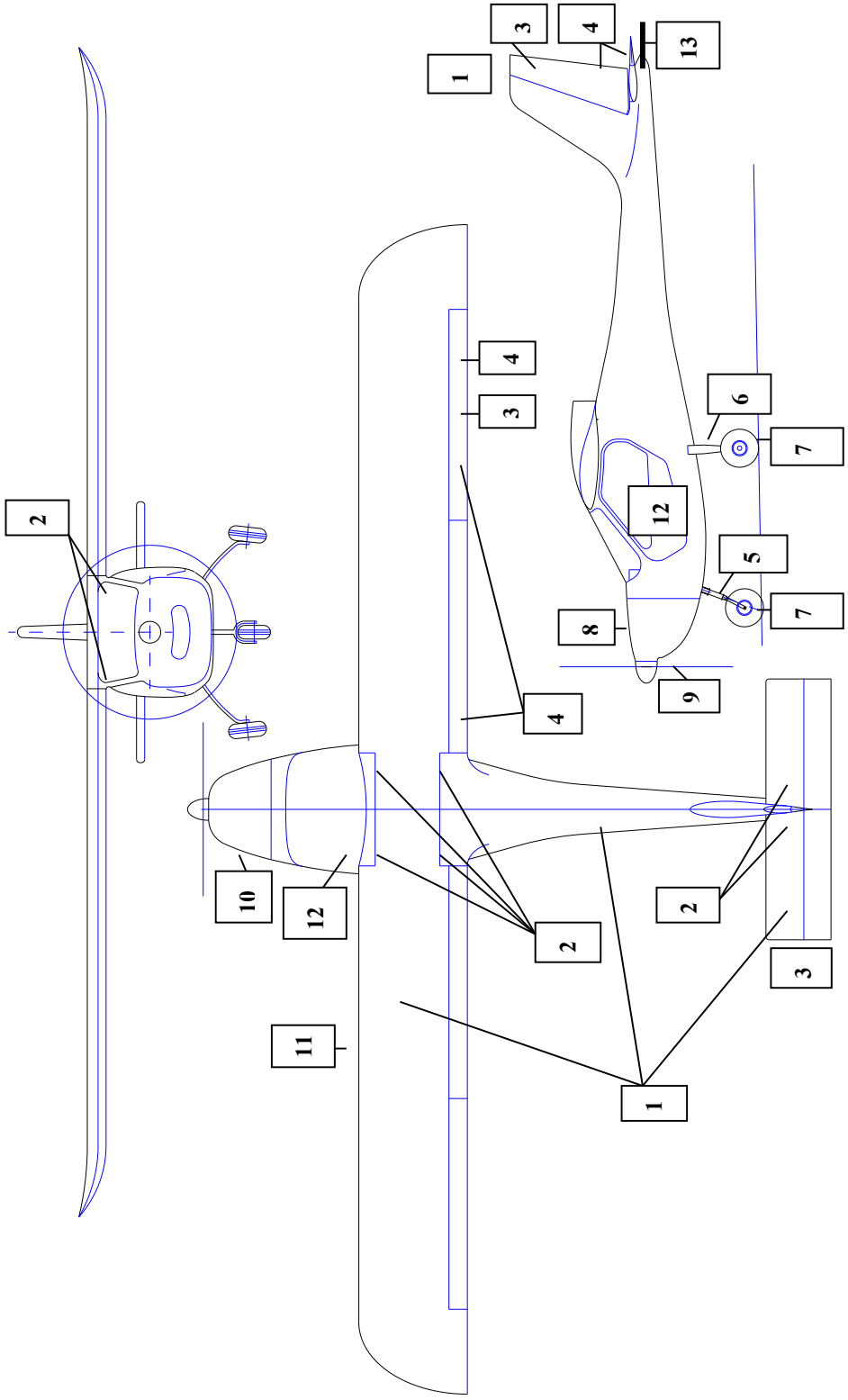
4.2 INSPECTION BEFORE FLIGHT IN A GIVEN DAY

1. Perform inspection as described in the Section 4.3, “Preflight Inspection”.

2. Perform the engine check:
   WARNING
   Set the Main Switch, Line „A” and Line „B” to „OFF”

- Check the coolant level in the expansion tank. Refill if necessary. Maximum level of coolant must align with the bottom neck of the expansion tank.
- Check the coolant level in the overflow bottle. Refill if necessary. Coolant level must be between the min. and max. line.
- Manually turn the propeller according to the engine running direction to check for suspicious sounds and extensive resistance. Check is engine compression is correct.
- Check if the throttle lever moves freely in entire range.
- Check the exhaust system for damages, leakage and general condition.
- Perform visual inspection of sensors and cables for heat and mechanical damage.

4.3 PREFLIGHT INSPECTION



CAUTION

BEFORE THE ENGINE CHECK, MAKE SURE THE IGNITION SYSTEM IS SWITCHED OFF (NO KEY IN THE IGNITION SWITCH, IGNITION SWITCH, LINE 1 AND 2 IN OFF POSITION, MASTER SWITCH IN OFF POSITION AND THE KEY REMOVED), PARKING BRAKE ACTIVATED OR CHOCKS UNDER WHEELS. IF IT IS NOT NECESSARY, DO NOT APPROACH THE PROPELLER.

1. Check all the external surfaces for deformation, damages or foreign objects. Check vents in wings and control surfaces for obstruction.
2. Check all the accessible bolt fastenings (screwed) and their security devices on wings, braces and stabilizer to fuselage, control system push-rods and control system levers.
3. Remove the controls locks (if installed), check if all the control surfaces (including wing flaps) deflect freely.
4. Check if all the control surfaces and flaps can be displaced correctly and symmetrically.
5. Check nose gear.
6. Check main gear – inspect the main gear legs for cracks and delamination.
7. Perform visual inspection of tires.
8. Perform the engine inspection.

WARNING

Set the Master Switch,
Line „A" and Line „B" to„OFF"
Perform the inspection when the engine is cold

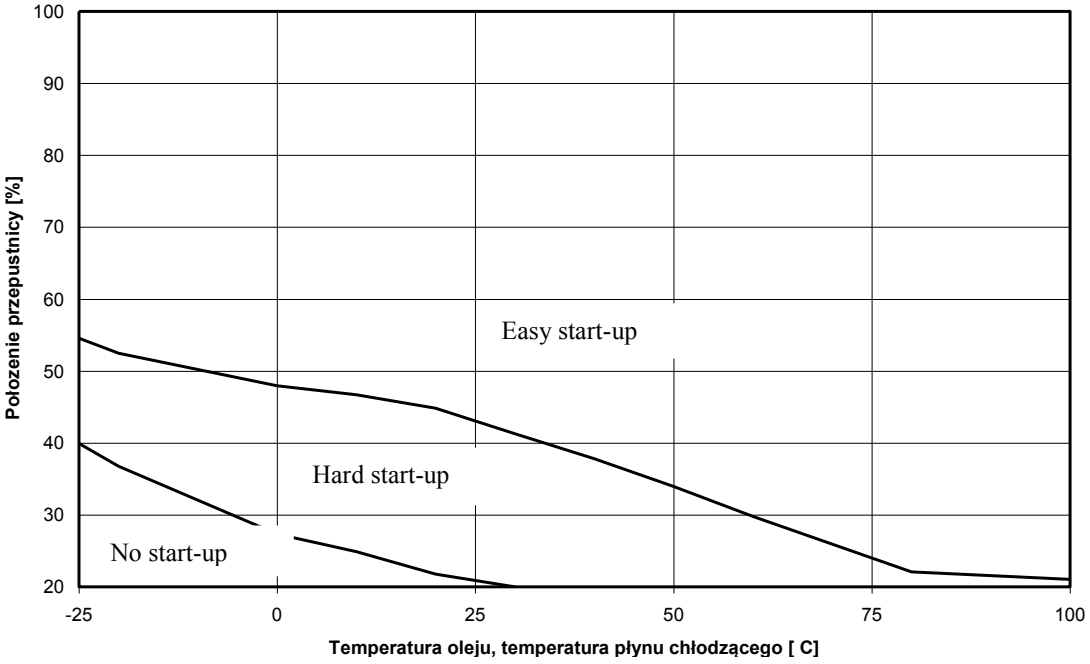
- Check the engine for oil, coolant and fuel leaks.
- Remove the oil tank cap and turn the propeller manually according to the engine run direction to pump the oil from the engine to the oil sump.
- The process can be considered finished when the air is returning to the oil sump with the characteristic bubbling sound in the open oil tank.
- Check the oil level and refill if necessary. Oil level should be in the upper half (between the line 50% and the line Max.). Before long flights, fill up to the Max. level.
- Screw the oil tank cap into place.

9. Check the propeller for general condition, notches, cracks, scratches and loose bolts.
10. Check the engine cowling for general condition (fastening, latches).
11. Check the covers of pressure gauges (if installed), check all inlets and holes of the pneumatic system (must be clean and unobstructed).
12. Cockpit
    - Check the “Power” throttle lever for correct operation

    Set the throttle lever to MIN engine speed position (back position).
    - Check the instrument panel,
    - Check the position of the electric switches and Ignition Line A and B switches – they all must be in OFF position. They all must be in „OFF” position.
    - Check the cockpit interior for foreign objects.
    - Check the condition of safety belt (locks, wear).
    - Check fuel level; refill if necessary.
    - Check if all necessary documentation is on board.

4.4 ENGINE STAR-UP, HEATING AND TEST RUN-UP

- Apply the parking brake.
- Fasten and adjust the pilots seat belt, fasten the passenger seat belt and secure its loose tips.
- Close and lock the doors.
- Check of the propeller area is FREE of obstacles.
- Set the throttle lever as per the below chart.



- "Fuel" valve – turn to ON
- Master Switch – switch to ON
- Alternator switch – switch to ON
- Unlock the rescue system lever
- Activate the instrument panel – set the ignition switch to ON
- Main Fuel Pump – switch to ON
- Check the fuel pressure. Should be between 40.6 - 46.4 psi [2.8 - 3.2 bar].

Caution: For the engine start-up only one pump should be switched on. Switching on both pomps may hamper the engine start-up.

- Ignition switches, line A and B – switch to ON.
- Press and keep depressed the "Power" Button.
  Carefully watch the indication lights for Line A and B: Both lights should illuminate for about 3 seconds and go out. Other behaviour of those lights indicates irregularities.
- Push the Starter button and keep depressed until the engine starts and reach the speed 1500 RPM. (starting should last max. 10 second - wait 2 minutes before the next attempt).

- Carefully watch the indication lights. Other behaviour of those lights indicates irregularities. Carry out the LINE and ignition. On completion of the LINE check and ignition check the lights must go out. Continuous illumination of any of the lights indicates a fault. The fault must be rectified before the flight.
- Oil pressure should increase to ca. 43 psi [3 bar] within 10 sec.
- When the engine reach the stable value of 43 psi [3 bar] or higher increase the engine speed to 2500 RPM and maintain for about 5 sec. (Generator A will switch to Generator B).
- Run the engine at speed 2000 RPM for about 2 min. and then increase the speed to 2500 RPM until the oil temperature is 122˚F [50ºC]. Watch carefully the indication lights.
- Check if the engine speed 5350 RPM on ground is achievable and if engine runs smoothly.
- Check the fuel pressure at the max. engine speed and the idle speed. The pressure should be between 40.6 - 46.4 psi [2.8 - 3.2 bar].
- Check the idle speed. The speed should be ca. 1400 RPM.
- Set engine speed to 4000 RPM. Check both ignition LINES circuits by switching-off one of them. Maximum speed drop with one LINE deactivated should not exceed 180 RPM.
- Set the LINE A switch to OFF. Watch the engine speed indicator.
- Set the LINE A switch to ON.
- Set the LINE B switch to OFF. Watch the engine speed indicator.
- Set the LINE B switch to ON.
- Reduce the engine speed to idle.

NOTICE: When the LINE „A” is in OFF position, the following indicators do not work:

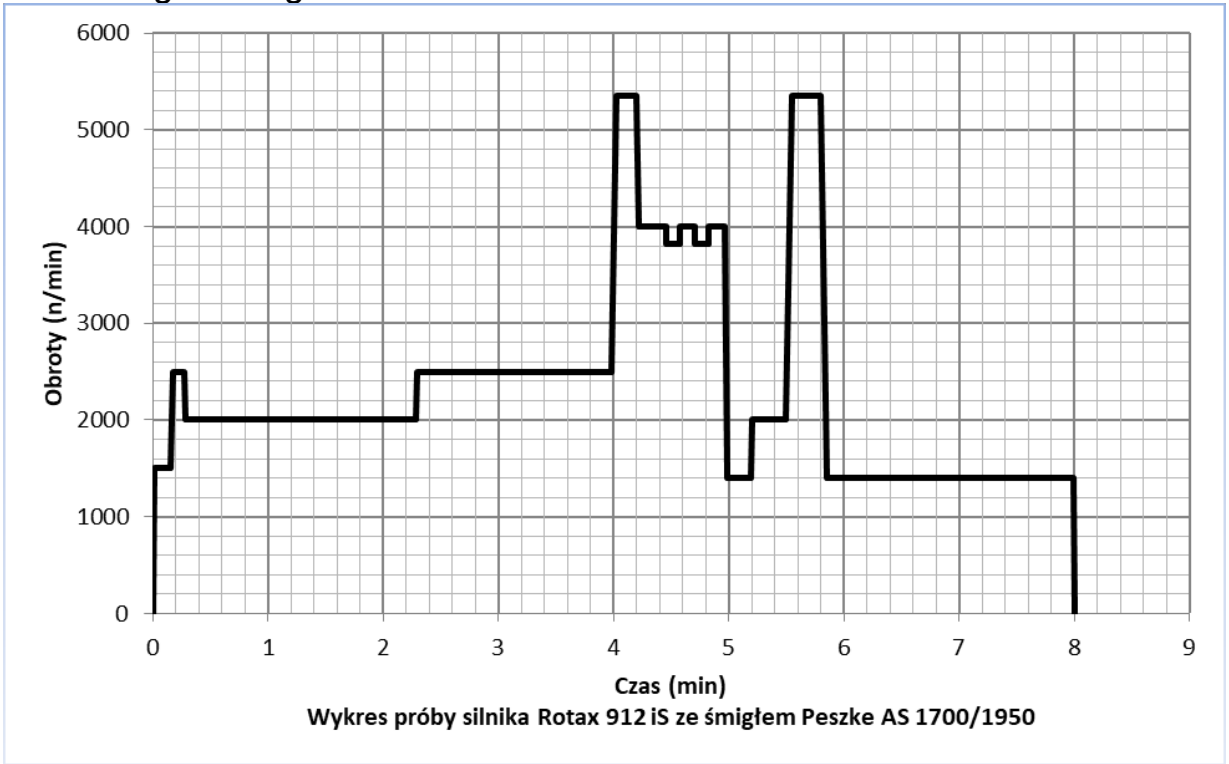
- coolant temperature
- exhaust gas temperature
- ambient temperature
- throttle position

When the LINE „B” is in OFF position, the following indicators do not work:

- oil temperature
- oil pressure

- Set both fuel pomps to ON. Set the engine speed to 2000 RPM. Check the fuel pressure.
- Turn OFF the Aux Fuel Pump for 5 seconds.
- Check the fuel level and turn ON the Aux Fuel Pump.
- Turn OFF the Main Fuel Pump for 5 seconds.
- Check the fuel pressure and turn ON the Main Fuel Pump.

- Check the fuel pressure. Should be between 40.6 - 46.4 psi [2.8 - 3.2 bar]. If the fuel pressure does not fall within the scope, it must be considered an irregularity and rectified before the flight.
- Check the engine power - set the throttle to take-off engine speed 5350 RPM (power throttle - back position).
- Cooling the engine at 1400 RPM.



ROTAX 912 iS equipped with the Preszke AS propeller
Engine test diagram

4.5 TAXING

The airplane starts moving on the grass at the engine speed ca. 2500 RPM When the airplane is moving, check the brakes efficiency. During taxiing, control stick should be in neutral position. Tax at the speed 8 kt [15 km/h], engine speed 2400 RPM.

4.6 PRIOR TO TAKE-OFF

- Brake the wheels.
- Check the control surfaces for free deflection.
- CHECK if the Master Switch is in ON position.
- CHECK if the Fuel Valve is in ON position.
- Alternator Switch – switch to ON.
- CHECK operation of the Ignition LINE A and B at the engine speed 4000 RPM.
- CHECK if the Ignition Switches A and B are in ON position.
- CHECK if the Main Fuel Pump is in ON position.
- CHECK if the Aux Fuel Pump is in ON position.
- CHECK if the fuel pressure is between 40.6 - 46.4 psi [2.8 - 3.2 bar].
- CHECK if oil temperature is between 194-230˚F [90÷110ºC].
- Check if the oil pressure is between 29-72.5 psi [2.0 ÷ 5.0 bar].
- CHECK if exhaust gas temperature is 1742˚F [950ºC].
- CHECK if the coolant temperature is 248˚F [120ºC].
- CHECK if the Trimmer „Trim” is in neutral position.
- CHECK if the Rudder Trimmer „Yaw Trim” is in neutral position.
- Rescue system lever unlocked.

4.7 TAKE-OFF

- Check the runway allowance.
- Extend flaps to „1” (+15º).
- Brake the wheels.
- Set the throttle lever maximum front position (Max. Power).
- Release the wheel brakes.
- Take-off run with the stick slightly pulled.
- At airspeed approx. 32 kt [60 km/h] (IAS) smoothly pull the stick and lift-off.
- Climb rate up to 49 ft [15 m] should be ca. 480 ft/min [2.5 m/s].
- Final take-off airspeed to the 49 ft [15 m] altitude – 51 kt [95 km/h] (IAS).

4.8 TAKE-OFF RUN IN CROSSWIND

During take-off run, compensate loss of direction by means of rudder deflections and smooth movements of rudder. Aileron should be deflected to the wind direction. When airspeed increases, aileron should be retracted to original position to prevent banking.

4.9 CLIMBING

Carefully watch the instruments indications

4.9.1 CLIMBING AFTER TAKE-OFF UP TO 50 m

- Airspeed: 53 kt [99 km/h] (IAS)
- Extend flaps to „1” (+15º)
- Set the throttle lever maximum front position (Max. Power)

4.9.2 CLIMBING TO CRUISING ALTITUDE

- Airspeed: 66 kt [123 km/h]
- Extend flaps to „0” (-6º)
- Set the throttle lever maximum front position (Max. Power)

4.9.3 BEST RATE OF CLIMB AIRSPEED

In normal flight configuration (flaps in “0” position) the best climb rate is achieved at the airspeed 67 kt [124 km/h].

4.10 LEVEL FLIGHT

Carefully watch the instruments indications.

- Extend flaps to „0” (-6º)
- Set engine RPM (using the throttle lever) accordingly to the desired cruise airspeed (refer to Section 5).

4.11 STALL

CAUTION!
PERFORMING STALL IN THIS AIRPLANE IS PERMISSIBLE ONLY TO SHOW FLYING PROPERTIES DURING FAMILIARISATION TRAINING FLIGHTS.

- Set appropriate flight conditions (flaps position, engine speed)
- Decrease the airplane speed by pulling stick backward with the rate of 1 kt [2 km/h] per second until nose dropping cannot be controlled.
- During straight flight – the stall characteristics are the same for all flap settings and centre of gravity position. The airplane stalls unwillingly. When flying with the control stick pulled, the airplane have light longitudinal oscillations, which can be corrected with the increase of descent.
- When the airspeed is close to stall the airplane still demonstrates proper reaction against aileron and control surface deflections. Recovery from stall comes immediately after pulling the control stick forward. The airplane recovers its controllability without delay. Loss of altitude during stall equals approximately 82 ft [25 m]. The airplane doesn't tend to spin.
- In a turn, stall characteristics are smooth. The airplane carry-out flight with control stick pulled, having light longitudinal and lateral oscillations which can be corrected with the increase of descent. Other conditions as for the straight flight.
- Recovery from stall – refer to the Section 3.10.1.

4.12 DESCENDING

- Flaps set to „0" (-6º).
- Throttle lever as needed for intended airspeed

4.13 GLIDING

Gliding with the idling engine:
- With flaps set to „0" (-6º) and recommended airspeed 56 kt [104 km/h] (IAS). Rate of descend for this airspeed equals ca. 373 ft/min [1.9 m/s].
- With flaps set to „1" (-15º) and recommended airspeed 53 kt [99 km/h] (IAS). Speed of descent ca. 393 ft/min [2.0 m/s].
- with flaps set to „2" (+40º) and recommended airspeed 49 kt [90 km/h] (IAS). Speed of descent ca.

4.14 LANDING APPROACH AND LANDING

CAUTION!
BEFORE STARTING THE LANDING MANOEUVRES SWITCH ON THE AUXILIARY FUEL PUMP

Circling flight conditions:
- Height H = 656 ft [200m].
- Set the flaps to „0" (-6^0).
- Throttle lever as needed for intended airspeed.
- Airspeed V(IAS) = 80 kt [148 km/h].

From 3-rd to 4-th turn:
– Reduce airspeed to approx. V ≤ 66 kt [123 km/h].
– Set the flaps to „1", (+15º).
– Switch ON the Aux Fuel Pump.
– Switch ON the Landing Lamp.
– Using the throttle lever reduce the engine speed to n = 3000 RPM.

After 4-th turn:
– Airspeed V_P = 63 kt [116 km/h], reduce to 59 kt [109 km/h] (w_Z = ca. - 393 ft/min [- 2,0 m/s] (in rainy weather approach speed should be higher by 2,7 kt [5 km/h]).
– Throttle lever - reduce the engine speed to n_{bj} = 2000 RPM,
– Set the flaps to „2", (+40º).
– Balance the airplane and gradually decrease the speed, so that:
  - at altitude approx. 20 ft [6 m] the airspeed is 49 kt [90 km/h],
  - at altitude approx. 2 ft [0.5 m] (just above the ground) the airspeed is 39 kt [73 km/h],
  - establish airplane position for touchdown on main wheels,
– Touchdown airspeed ca. 34 kt [63 km/h].
– During the first stage of landing run keep 2-point position and hold ahead direction (gentle rudder moves – don't use brakes).
– During the second stage of landing run, gently use brakes to reduce velocity.

4.15 LANDING IN CROSSWIND

CAUTION!
During approach to landing with crosswind pay special attention to hold proper flight direction

CAUTION!
Demonstrated crosswind airspeed equals 5 m/s.
10 kt [5 m/s]

1. Approach and landing with cross wind stronger than 984 ft/min [5 m/s] should be done with flaps set to “1” position (+15°):
   - At the altitude approx. 20 ft [6 m] above the ground , the airspeed is ~ 48 kt [88 km/h],
   - at altitude approx. 2 ft [0.5 m] (just above the ground) the airspeed should be reduced toca. 39 kt [73 km/h].
2. During approach hold direction of flight by means of aileron and rudder.
3. Before touchdown level flight path for touchdown on central line (without bank).
4. During the first phase of the landing run rudder deflection should be done smoothly and at small range; control stick deflection against the wind help to hold direction.
5. During the second phase of the landing run loss of direction should be compensated with rudder deflections and gentle movement of rudder. Aileron, if necessary, should be deflected against the wind. Retract the flaps. When the airspeed is reduced the aileron deflection can be gradually increased.

CAUTION: In the cross wind conditions decrease the taxing speed (in relation to normal taxing) and simultaneously push the control stick forward and deflect control stick against the wind.

4.16 BALKED LANDING

- Throttle lever – FULL ENGINE SPEED - MAX. position.
- Flap deflection – no change (the same as for the landing approach).
- Go to climbing.
- Airspeed: flaps set to „2” - recommended speed 46 kt [85 km/h] (IAS),
  for the flaps position „1” - airspeed 49 kt [90 km/h] (IAS),
  for the flaps position „0” - airspeed 54 kt [100 km/h] (IAS)
- On target altitude pass to level flight, set desired flap position and adjust RPM to achieve the desired airspeed.

4.17 AFTER LANDING

- Throttle lever – as required
- Flaps to „0” (-6°) position.
- Brakes - as required.
- If landing with crosswind, control the yaw with the rudder and ailerons.

4.18 ENGINE SHUT-OFF

Before shut-down the engine should be cooled for few minutes at idling speed.
Next perform the following:

- Throttle lever - rear position.
- Ignition switches, LINE A and B – switch to OFF.
- The Main Fuel Pump - set to OFF.
- Set the Ignition Switch to OFF and remove the key.
- Master Switch – switch to OFF
- Fuel Valve – turn to OFF.
- Unfasten the seatbelt.
- Lock the rescue system lever.
- Electric Switches - set to OFF.

4.19 AIRPLANE PARKING

- Place the airplane nose to the wind.
- Put chocks under the wheels.
- Close and lock the doors.
- In sunny day put the cover on the glass part of the cockpit.
- In long-term storage, tie-down the aircraft, put the control surfaces locks and cover the Pitot system inlets.

SECTION 5

PERFORMANCE

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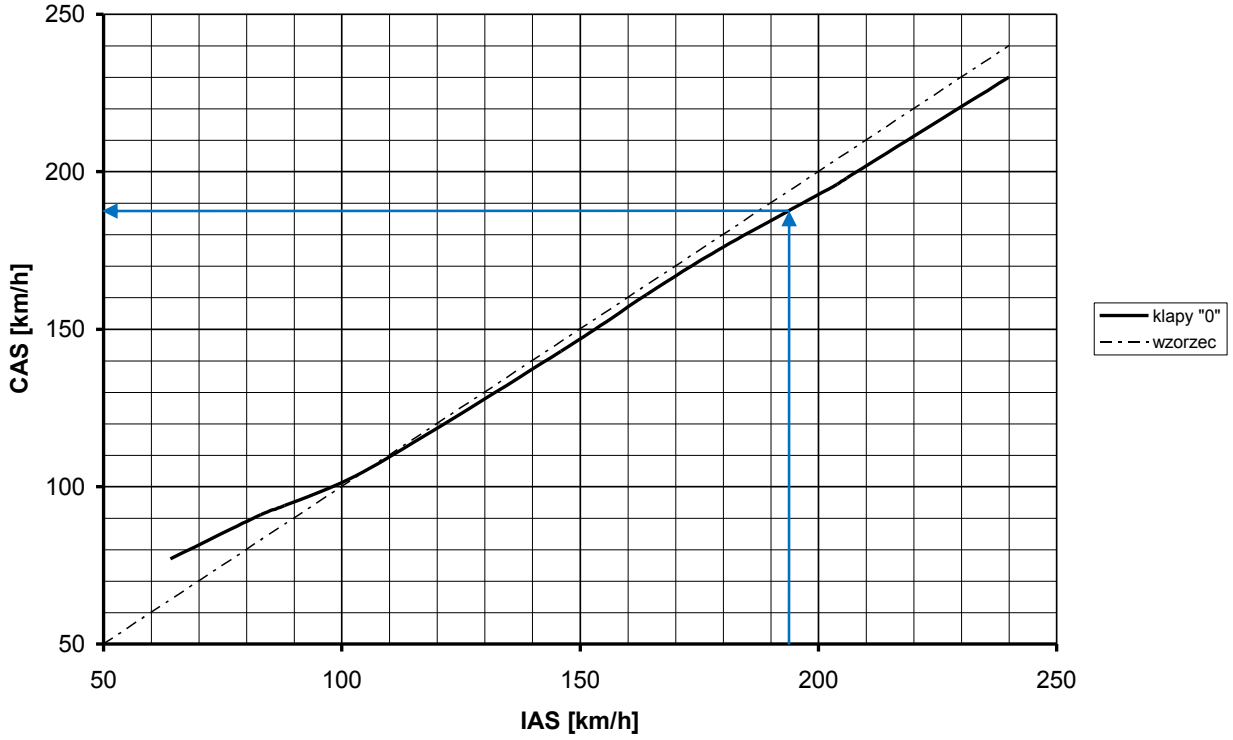
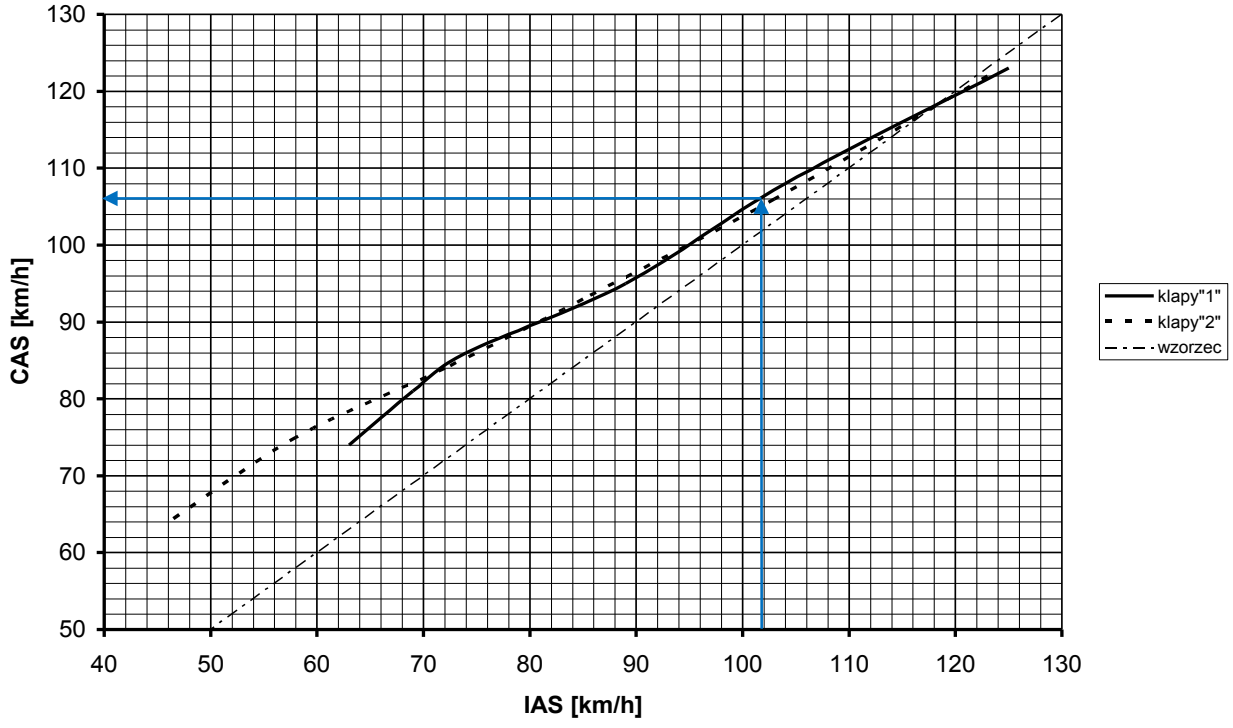
PERFORMANCE

5.1 AIRSPEED INDICATOR SYSTEM CALIBRATION





5.2 AIRSPEED (IAS) AND AND THE RANGE IN LEVEL FLIGHT

– for the take-off weight 1041,6 lb [472,5 kg] at altitude 1968 ft [600 m] MAW

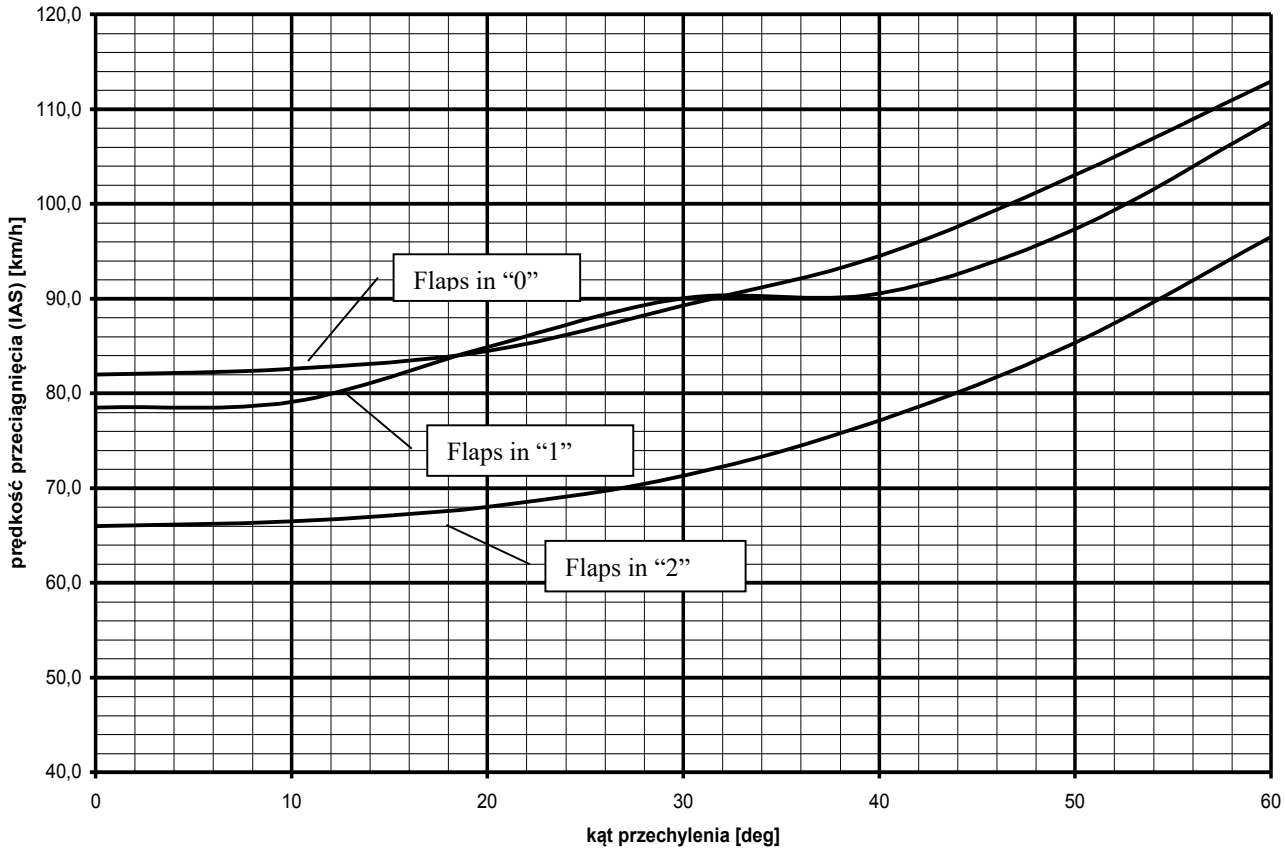
Engine speed [RPM]	Airspeed		Flying range	
	kt	[km/h]	NM	[km]
4000	80	148	529	980
4500	91	168	461	855
5000	102	188	421	780
5200	108	199	396	735
5500	112	207	332	616

5.3 CLIMBING W = 1041,6 lb [472,5 kg] at the sea level n = 5500 RPM

Flaps position	Airspeed for best rate of climb				Airspeed for best angle of climb			
	ft/min	kt	[m/s]	V [km/h]	ft/min	kt	[m/s]	V [km/h]
„0” (-6º)	1082	65	5.5	120	984	49	5.0	90
„1” (+15º)	1279	54	6.5	100	1042	43	5.3	80
„2” (+40º)	885	49	4.5	90	885	37	4.5	69

5.4 STALL SPEED W = 1041,6 lb [472,5 kg] engine at idle speed

flaps	V(CAS)		V(IAS)	
	kt	[km/h]	kt	[km/h]
„0” (-6º)	42	77	35	64
„1” (+15º)	40	74	34	63
„2” (+40º)	35	64	25	46



Stall speed in turn

5.5 TAKE-OFF DISTANCE to the 50 ft [15 m] obstacle, W=1041,6 lb [472,5 kg]

Flap position"1" (+15º), lift-off airspeed 45 kt [82 km/h] (CAS) = 38 kt [70 km/h] (IAS)
Acceleration during climbing up to 48 kt [89 km/h] (CAS) = 43 kt [80 km/h] (IAS) for H = 49 ft [15 m]

Runway	Take-off run		Take-off to the 15m obstacle	
	ft	[m]	ft	[m]
grass	262	80	525	160

5.6 LANDING DISTANCE

Landing distance on the grass runway from the 49 ft [15 m] obstacle equals approximately 656 ft [200 m] – flaps position "2" (+40º) and the approach airspeed 50 kt [92 km/h] (IAS).

5.7 FLIGHT WITH THE ENGINE SHUT-OFF

In the table below airspeeds for the best aspect ratio and flying range with shut-off engine for the loss of 3280 ft [1000m] altitude are given.

	V_{OPT}				w_Z		**RANGE** from the 328 ft [1000 m] altitude	
	CAS		IAS					
	kt	[km/h]	kt	[km/h]	ft/min	[m/s]	NM	[km/h]
„0” (-6º)	49	90	43	80	315	-1.6	7.50	13.9
„1” (15º)	59	109	57	105	512	-2.6	6.26	11.6
„2” (40º)	48	89	42	77	492	-2.5	5.99	11.1

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SECTION 6

WEIGHT & BALANCE

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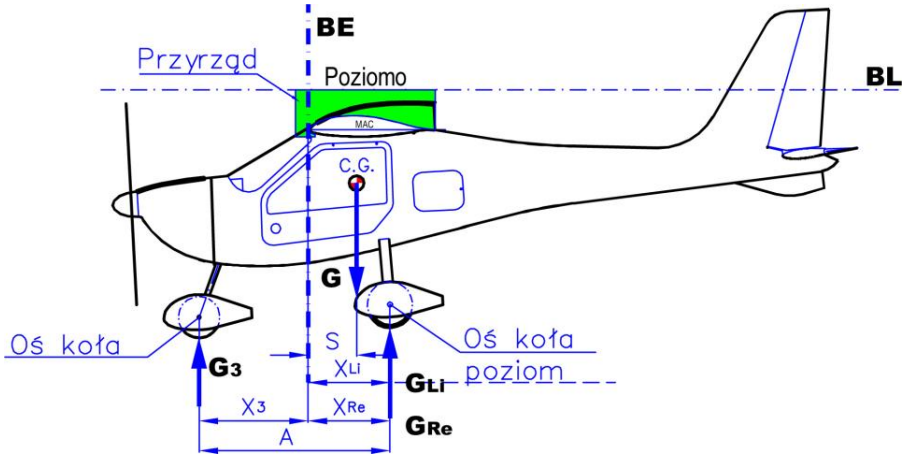
SECTION 6
WEIGHT & BALANCE

6.1 WEIGHTING THE EMPTY AIRPLANE

Put the airplane on three scales of measuring range 0 ÷440 lb. Wing and the upper edge of the fixture should be in horizontal position.



Measure the distance A , X_{Li} and X_{Re}.

BL (horizontal datum plane)	The upper edge of the fixture (horizontally)			
BE (vertical datum plane)	The nose of profile close to the wing root.			
		Distance to the datum plane BE		
	A= [in]	Weight [lbs]	Distance [in]	Moment [lbsin]
Main wheel, left	$M_{Li} = G_{Li} * x_{Li}$	G_{Li}=	x_{Li}=	M_{Li}=
Main wheel, right	$M_{Re} = G_{Re} * x_{Re}$	G_{Re}=	x_{Re}=	M_{Re}=
Nose wheel	$M_3 = G_3 * x_3$	G_3 =	x_3 =	M_3 =
		, where $x_3 = (x_{Li} + x_{Re})/2 - A$		
Total weight of empty airplane	$G = G_{Li} + G_{Re} + G_3$	G =		
Total moment	$M = M_{Li} + M_{Re} + M_3$			M =
Empty airplane centre of gravity location	S = M / G		S =	

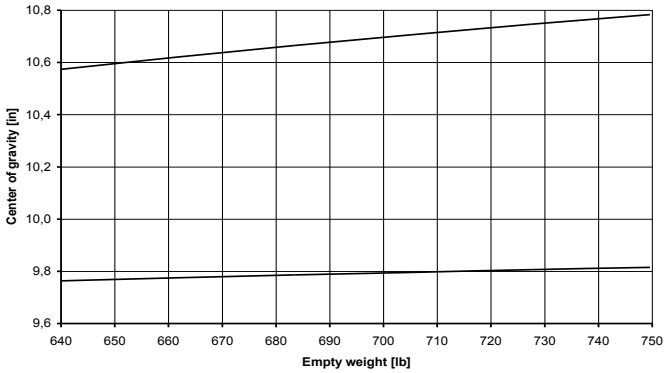
where:
G_3 - the value read on the scale under the nose wheel x_3 - distance from the nose wheel axis to the wing edge of attack
G_3 - the value read on the scale under the left main wheel x_3 - distance from the left main wheel axis to the wing edge of attack
G_3 - the value read on the scale under the right main wheel x_3 - distance from the right main wheel axis to the wing edge of attack

Empty airplane weight G = lbs

Centre of gravity position S = in

For the empty airplane S should be within the following range:

for 640 lb between 9.76 in and 10.59 in
for 750 lb between 9.81 in and 10.78 in
(interpolate according to the diagram on the left for the intermediate weighs)
Weighing report form is given in the Annex 3.



Equipment as per records in the Airplane Log Book on the date of weighting.

6.2 EMPTY AIRPLANE WEIGHT AND THE CENTRE OF GRAVITY POSITION

Weight of the complete, empty airplane serial number: 30 - . . - . .
with operating fluids: - oil engine 3.2 US quart [3 l]
- coolant 2.6 US quart [2,5 l]
- never used fuel 2.1 US quart [2 l]

With equipment recorded in the airplane Log Book

Item	Date	Airplane empty weight G [lbs]	Empty aircraft Centre of Gravity location S [in]	Maximum crew weight Max. crew weight [lbs]	Signature
1		346.25kgs			

6.3 AIRPLANE LOADING

a. Minimum total weight on both pilot seats: 132 lb [60 kg]
b. The maximum weight on the shelf rack 11 lb [5 kg]
d. The maximum weight of the crew shall be calculated according to the formula:

$$W_{z\,max} = 1235 \text{ lb } [560 \text{ kg}] - G - 9$$

Designations as in the Section 6.4

6.4 CENTRE OF GRAVITY DETERMINATION

Current location of the airplane CoG for specific loading may be calculated using the following formula:

$$X = \frac{G \cdot S + 10{,}6 \cdot W_Z + 18{,}1 \cdot W_{Pal} + 41{,}3 \cdot W_{Bag}}{G + W_Z + W_{Pal} + W_{Bag}}$$

where: G – airplane empty weight (see: the Table above)
S – empty aircraft Centre of Gravity location (see: the Table above)
W_Z – weight on pilots seats
W_{Pal} – fuel weight
W_{Bag} – luggage weight
$W_{z\,max}$ - max. weight of the crew

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SECTION 7

AIRPLANE AND SYSTEMS DESCRIPTION

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SECTION 7

AIRPLANE AND SYSTEMS DESCRIPTION

7.1 AIRFRAME

FUSELAGE – Monocoque structure made of composite based on vinyl ester resin and glass and carbon fiber. The fuselage is made as a one piece with the fin. Windscreen and door windows are made of Plexiglas. The aircraft is equipped with a tow fitting TOST E22, installed at the rear area of the fuselage , under the elevator unit. Tow fitting release lever is located under the instrument panel, left hand side.
INTERIOR – The cockpit windscreen is stationary. Doors on both sides of cockpit are opened outward. Doors are equipped with handles and locks. Two seats inside are installed side-by-side and equipped with seat belts. The luggage shelf is situated in the rear part of the cockpit.
WING – one-piece cantilever wing. Monocoque structure made of vinyl ester resin composite reinforced with carbon and glass fibre. The wing is equipped with ailerons and slotted flaps.
EMPENNAGE – conventional design. Monocoque structure made of composite based on vinyl ester resin and glass and carbon fibre.
UNDERCARRIAGE – fixed, tricycle undercarriage with nose wheel. Elastic main wheels suspensions. Hydraulic disc brakes mounted on the main wheels, operated by a lever on the control stick. Nose wheel is mounted on a fork damped with rubber rings. The form movements are controllable (15^{o} each direction). Tires - 350x100. Pressure in wheels - 17 -22 psi [1.2-1.5 bar].

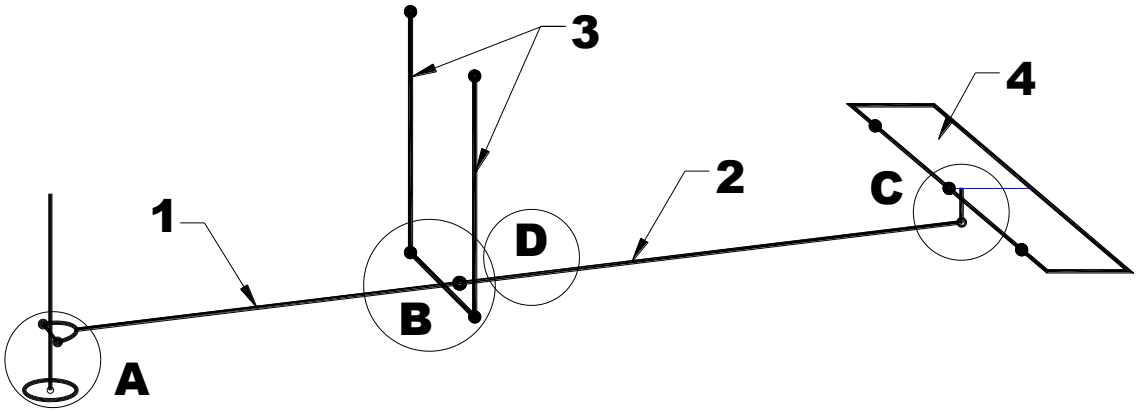
7.2 FLIGHT CONTROLS

KR-030 TOPAZ is equipped with two coupled sets of pedal controls and one control stick, installed in the middle of the cockpit.

ELEVATOR - control stick movements are transferred to elevator through a system of rigid push-pull rods.

AILERONS – control stick movements are transferred to ailerons through a system of rigid push-pull rods.

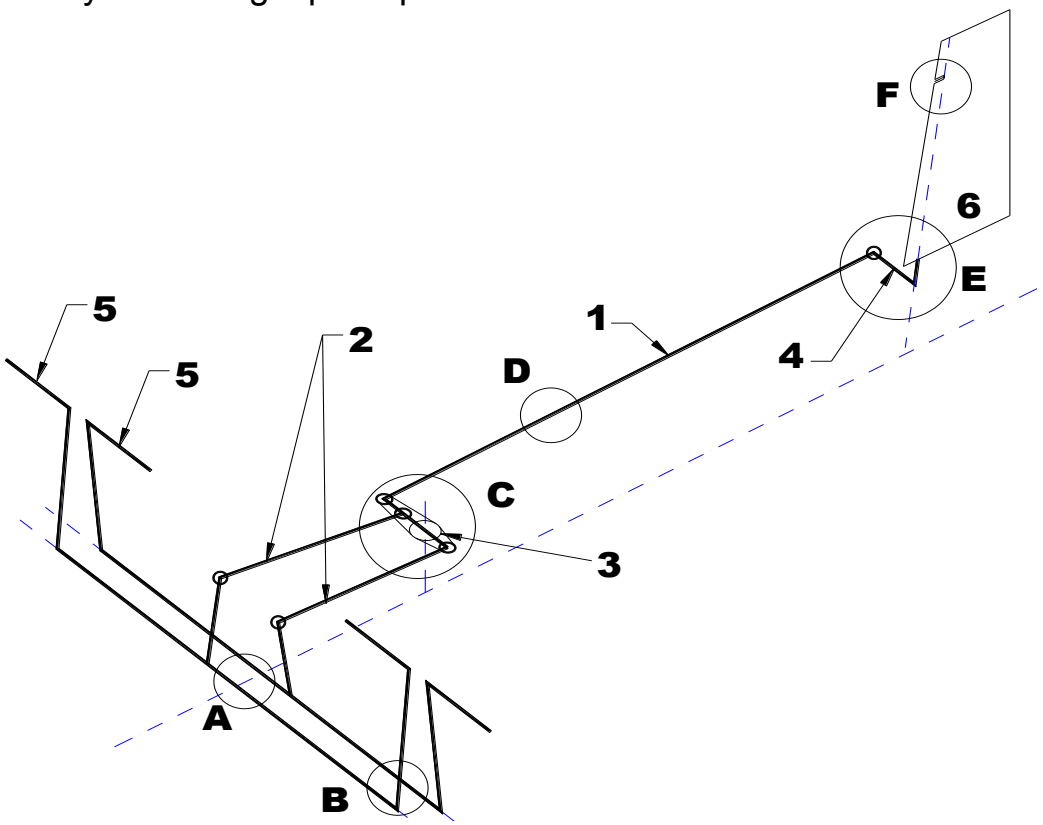
FLAPS – electro-mechanically displaced, control buttons are situated on the control stick. Drive is transferred by a system of twisting tubes.



Elevator and ailerons control system diagram

1. Controls, stick and torsion pipe
2. Main rod
3. Vertical rod driving the ailerons in the wing
4. Elevator

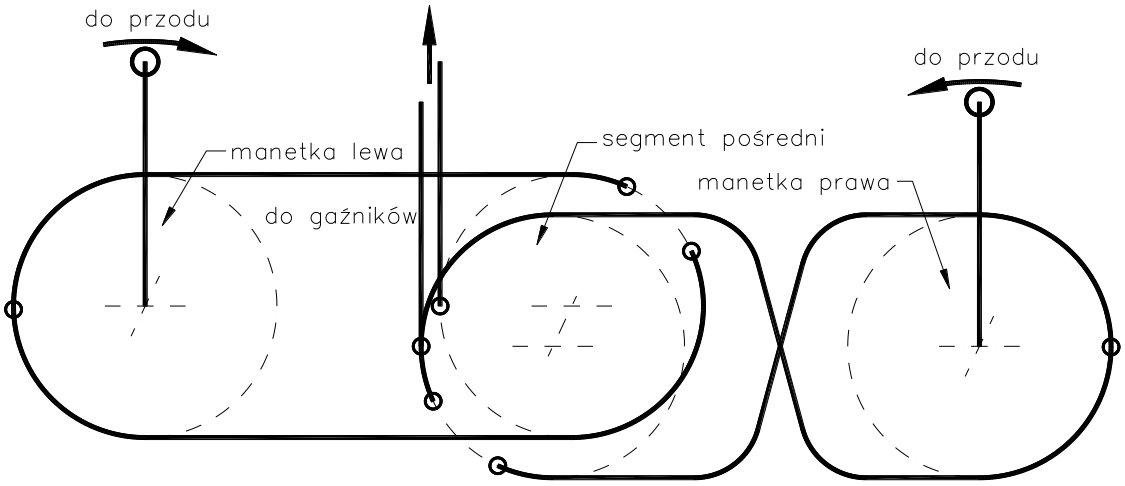
RUDDER – pedals movements are transferred to the rudder througha system of rigid push-pull rods.



Rudder control system diagram

1. Main rod
2. Front rod
3. Intermediate lever
4. Control drive arm
5. Pedals
6. Rudder

ENGINE – two coupled throttle levers on the left and right side of the cockpit. Throttle movement is transferred by means of cables in housings to the transfer block and the engine throttle.



Engine control kinematic diagram

PROPELLER - automatic with constant rotational speed. Propeller rotational speed lever is located on the left side of the cockpit, below the engine throttle lever. Position of the propeller rotational speed lever is transferred to the rotational speed regulator through the push-pull rod (wire in the Bowden cable housing).

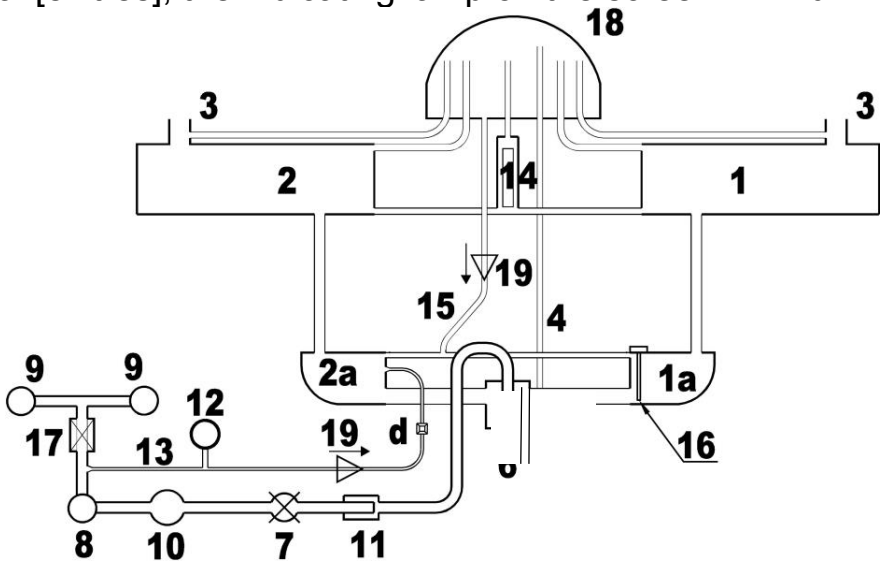
7.3 POWERPLANT

Engine and propeller: see description in Section 1.3 and 1.4.

7.4 FUEL SYSTEM

Two connected fuel tanks of total capacity 21.13 US gal [80 litres], made of vinyl ester resin composite reinforced with fibre glass. The tanks are mounted into the wings. Two buffer tanks 1,05 US gal [4 litres] each in the bottom part of the fuselage, behind the cockpit.

Sedimentation tank with a valve is situated under the fuselage. Fuel cut-off valve is located on the central panel, in front of the instrument panel. The system is equipped with the electric fuel pumps, activated with switches located on the instrument panel. Two fuel inlets with a lockable plug are located on both sides of the wing. Quantity of fuel in wings is measured by the electric fuel gauge with indicator installed on the instrument panel. Fuel reserve from buffer tanks is indicated by an electric fuel gauge equipped with a separate indicator on the screen of range 0 to 2.11 US gal [0-8 litres]. If the fuel reserve drops below 2,11 US gal [8 litres], the indicating lamp on the screen will illuminate.



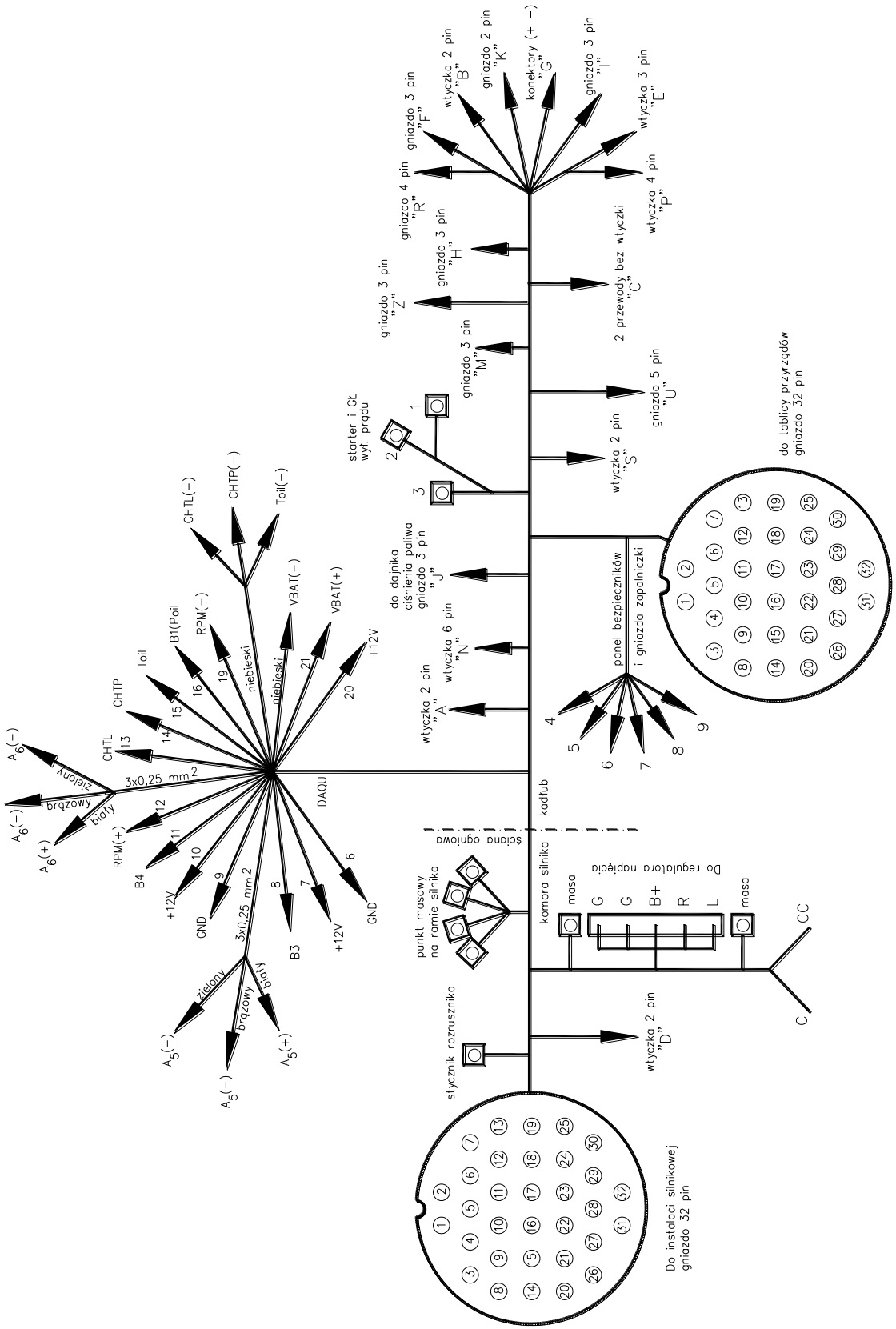
Fuel system diagram

1,2 - Fuel tanks	7 – Cut-off valve	14 – Wing fuel quantity gauge
1a i 2a – Buffer tanks	8 – Fuel pump	15 – Ventilation pipes of the buffer tanks
	9 – Carburettors	16 – Fuel reserve sensor in the buffer tanks
3 – Fuel inlet	10 – Aux. electric fuel pump	
4 – Ventilation	11 – Fuel filter	17- Fuel flow-meter – optional
5 – Sedimentation tank	12 – Fuel pressure sensor	18 – Integral ventilation box
6 – Drain valve	13 – Fuel overflow	d – Choke

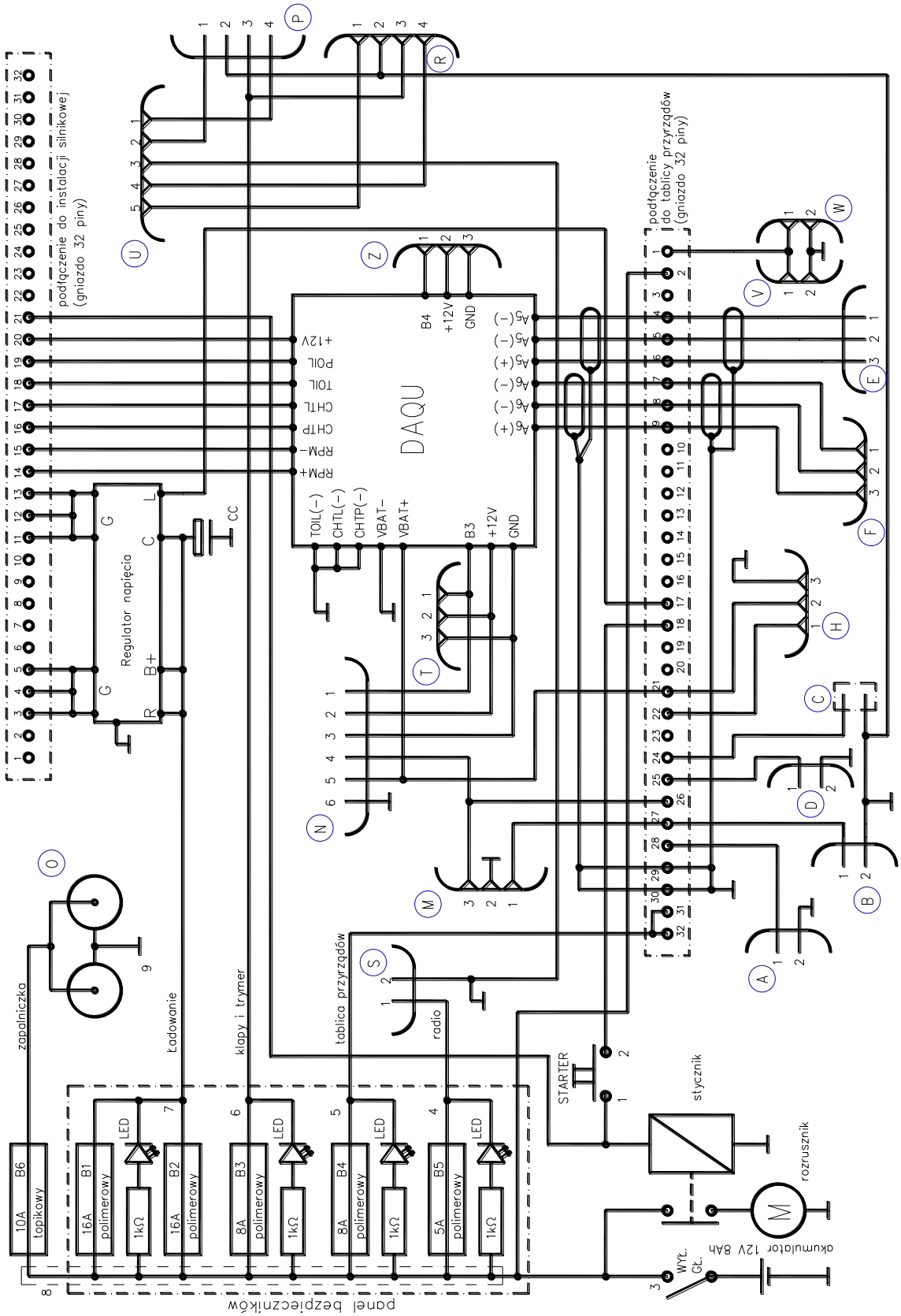
7.5 ELECTRIC SYSTEM

Two conductor electrical system of 12V DC. The main source of power is an alternator 13,5 - 14,2 V of generated power A=240 W and generated power B=420W. Auxiliary (back-up) source of power is a 12V/17Ah battery.
Electrical system provides power supply for all instruments and during engine starting to starter. The system is not equipped with the ground service plug-in socket.
The airplane has a modular wiring system. The main module is an universal wire harness in the airplane fuselage, equipped in various modules and connections for various standard and optional components.

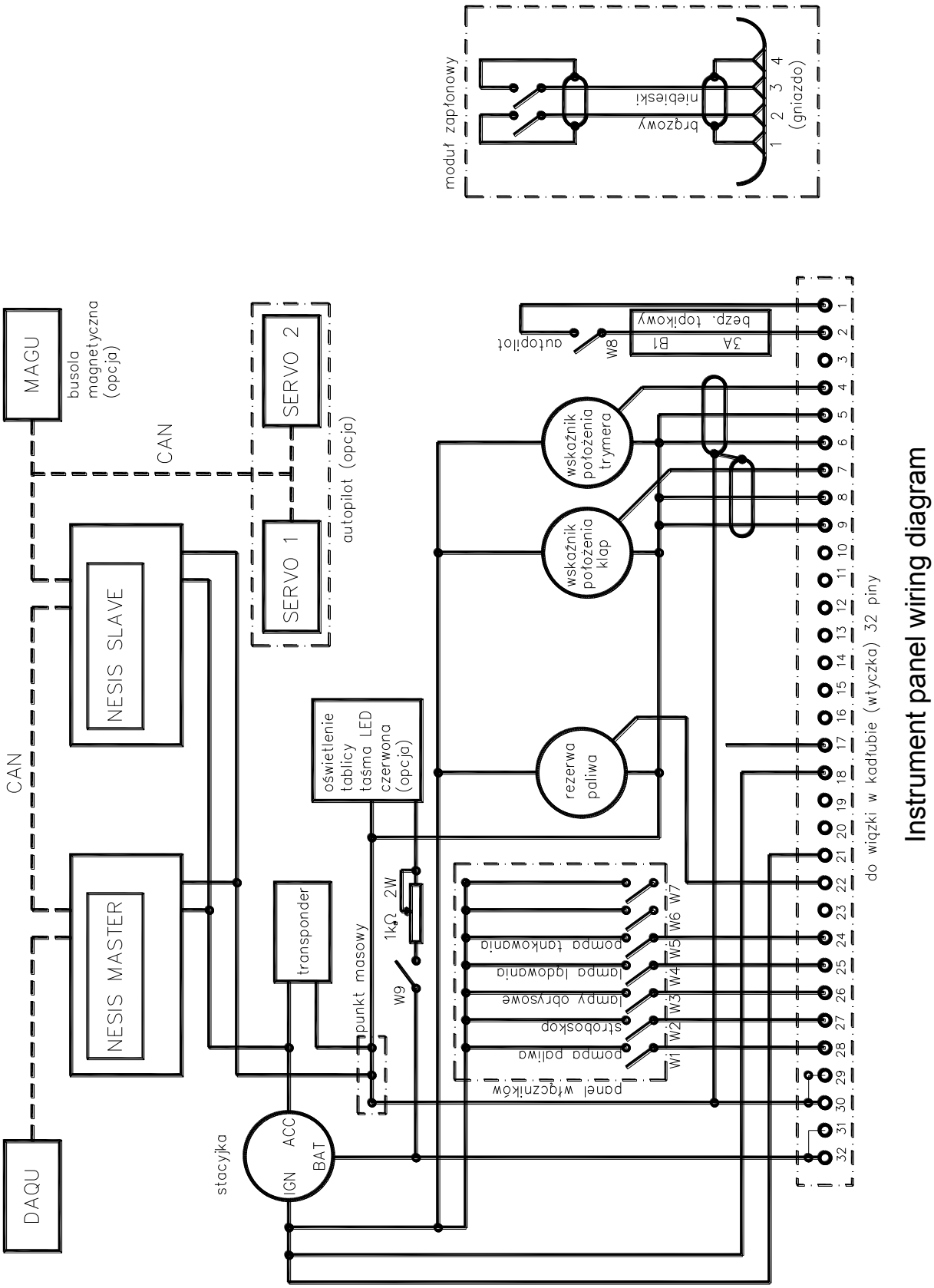
Modules connections designations on the main module circuit diagram:
A – Fuel pump
B – Standard strobo light
C – Fuel filling pump (optional)
D – Front light
E – Trimmer position indicator
F – Flaps position indicator
H – Bottom tanks fuel gauge
J – Fuel pressure sensor
K – Outside temperature sensor
L – Engine compartment temp. sensor
M – Strobo lights converter
N – Upper wiring in the fuselage and wings
O – Lighter socket
P – Trimmer actuator
R – Flaps actuator
S – Radio power supply
U – Control stick wiring
1,2 – Starter button terminals
3 – Main switch terminals
4 – 8 – Fuse panel connections
9 – Lighter socket ground point



The main module of the fuselage wiring system (diagram of terminals and connections, not to scale).
Letter and number designations are in line with designations on the general wiring diagram.

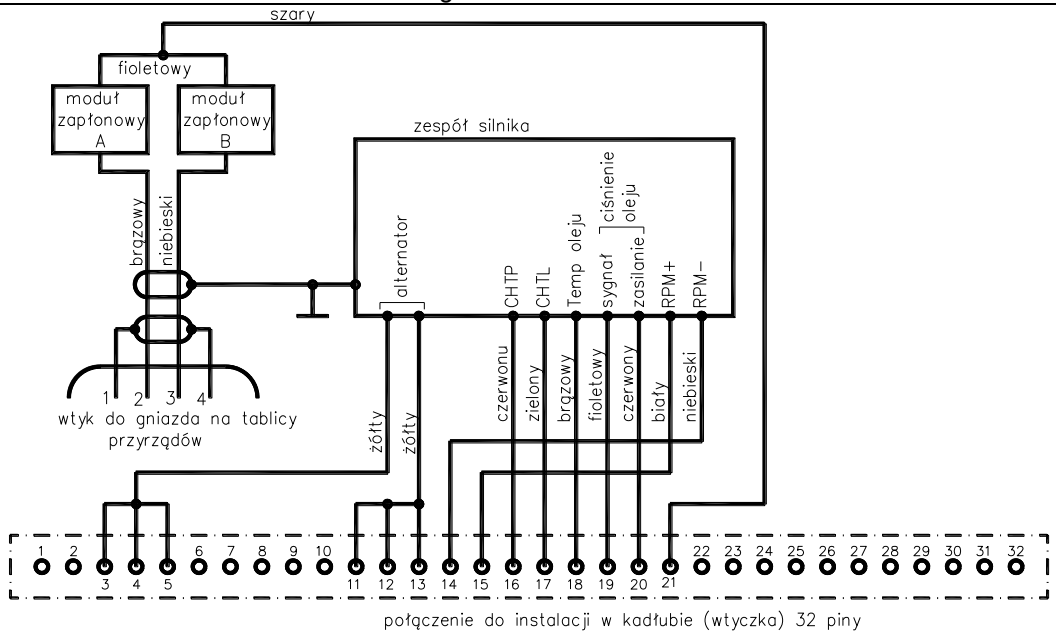


General wiring diagram of the main module in the fuselage

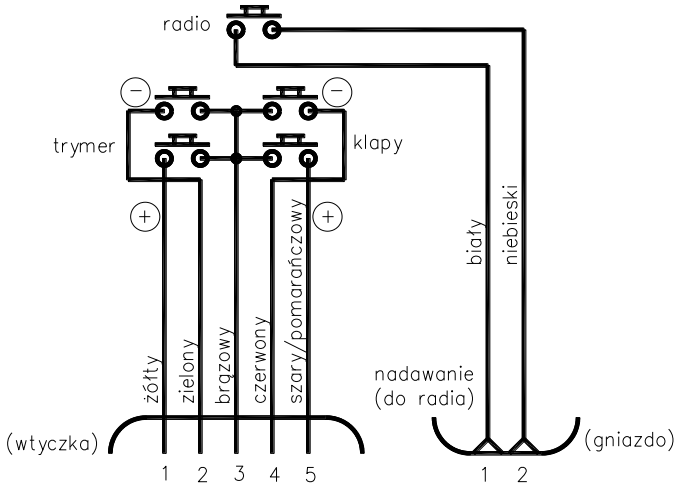


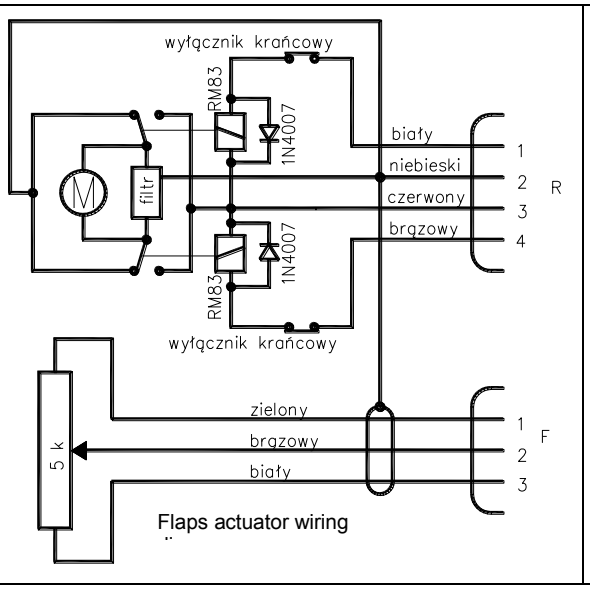
Instrument panel wiring diagram

Engine wiring diagram

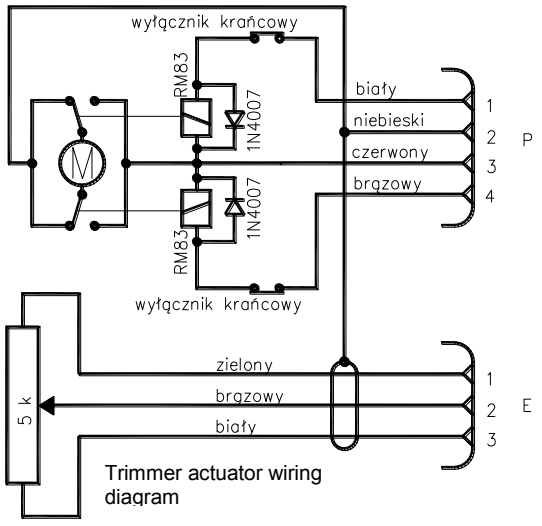


Control stick wiring diagram

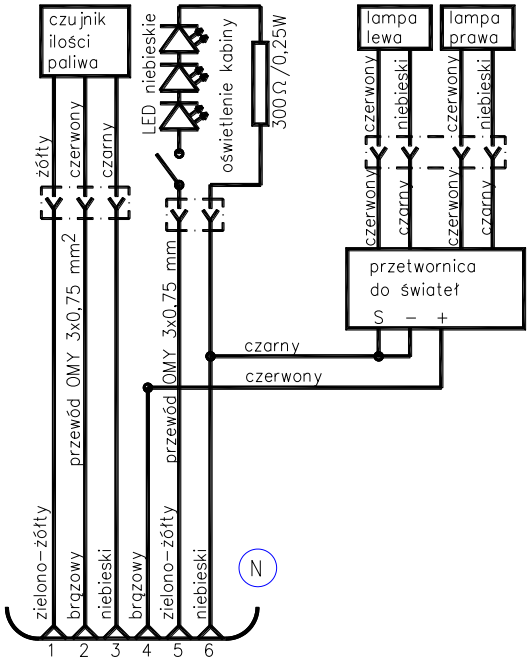




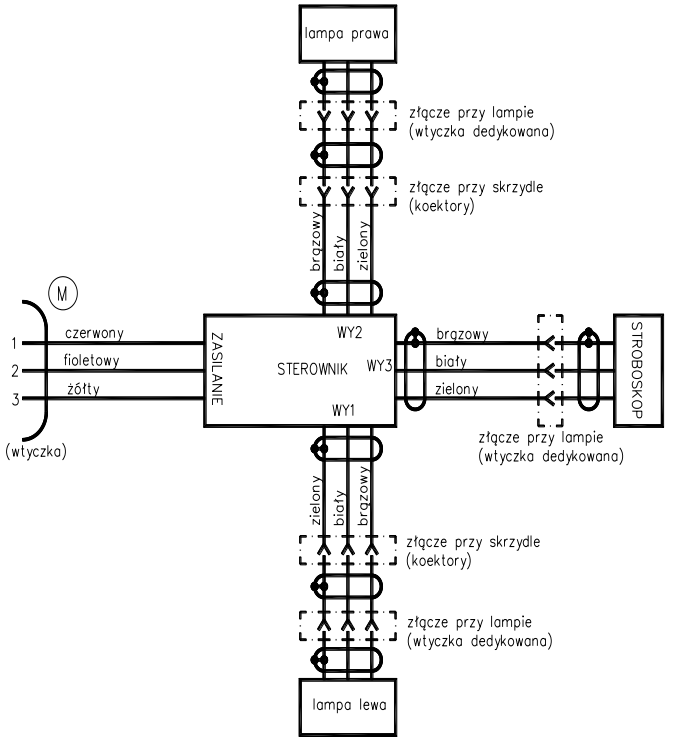
Flaps actuator wiring



Trimmer actuator wiring diagram



Upper fuselage wiring diagram



Uwaga: przewód 3x1 mm^2 w ekranie. Ekran połączony z masą przy sterowniku oraz w skrzydle.

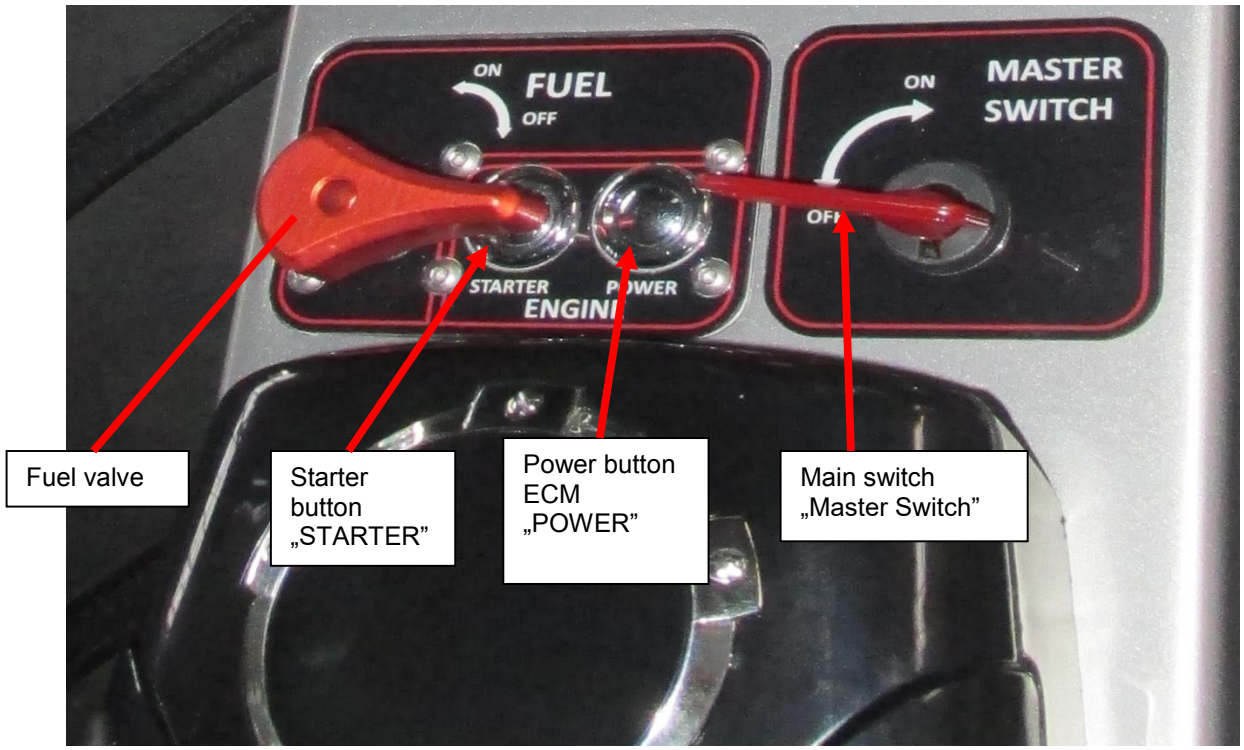
Wiring diagram of the contour lights in the wing

7.6 COCKPIT

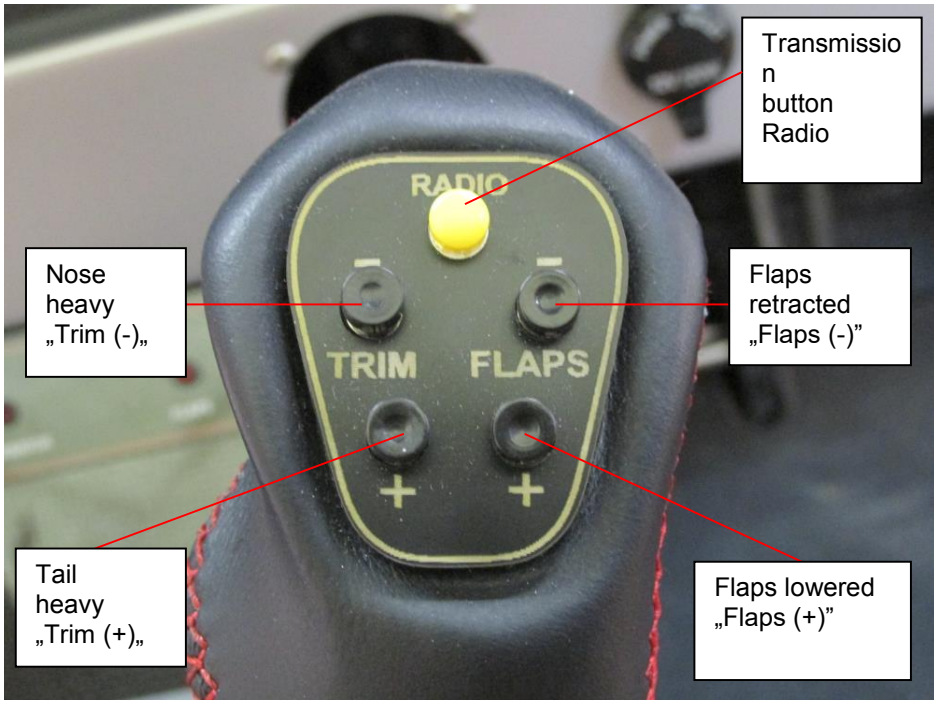
Cockpit interior is ventilated by adjustable warm air inlet located under instrument panel. Cold air enters through inlets located in the side windows, whereas the warm air is drawn from a heater fixed to exhaust silencer.

Instrument panel arrangement

1	Main fuel pump	18	Tank lighting
2	Ignition, Line A	19	Autopilot
3	Ignition, Line A indicating lamp	20	Nesis III SL display
4	Ignition, Line B indicating lamp	21	Radio
5	Ignition, Line B	22	Transponder
6	Nesis III MA	23	Yaw trim
7	Nesis III SL	24	Alternator
8	Bank indicator	25	Alternator fuse
9	Compass	26	Battery
10	Dashboard lightning	27	Radio fuse
11	Windscreen fan	28	Trimmer fuse
12	Pocket	29	Flaps fuse
13	Auxiliary fuel pump	30	Battery Backup power supply
14	Landing Light	31	Cabin Heating
15	Ignition switch	32	Airspeed indicator
16	Strobe light	33	Power 12V
17	„Marker Lights”		



Panel on the central channel



Control stick head

The “Power” throttle lever on the left side of the cockpit

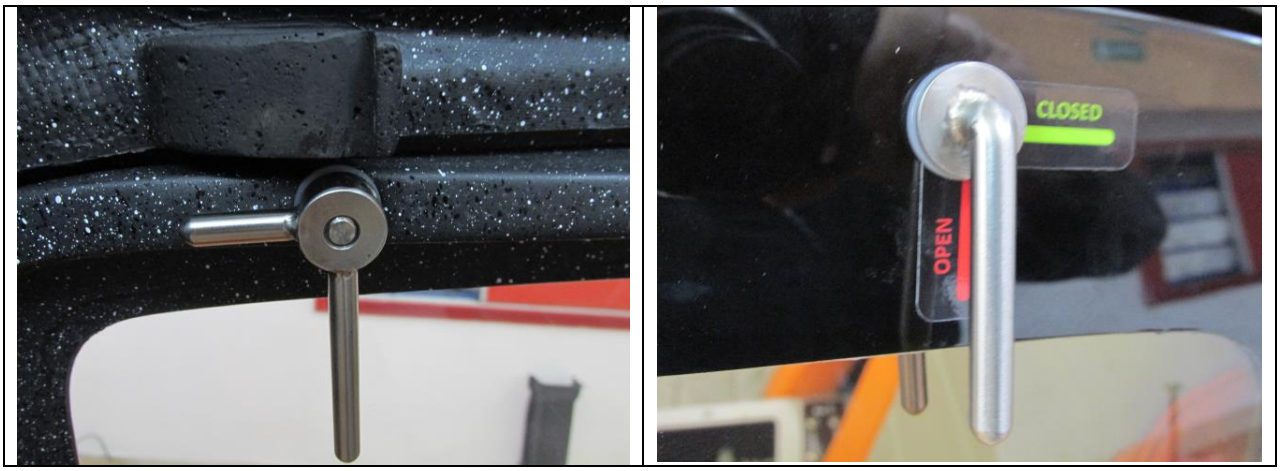
The “Power” throttle lever on the right side of the cockpit

DOOR LOCKS

Bottom lever on the left door - “Closed” position

Bottom lever on the left door - “Open” position

Upper lever on the left door - “Closed” position



Upper lever on the left door - “Open" position

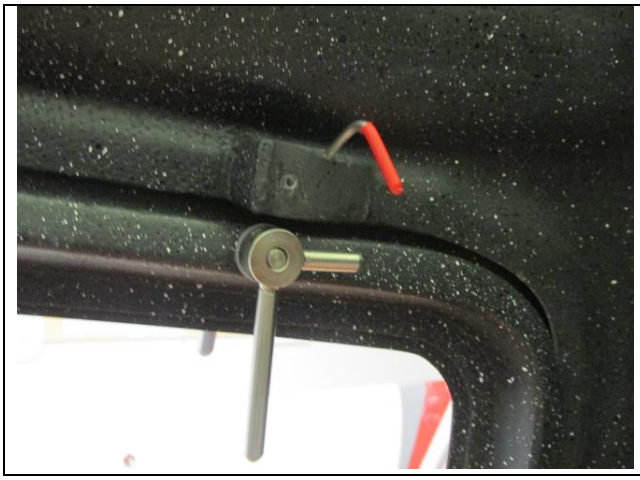
Locks on RH side are symmetricall to LH side

Left door locking

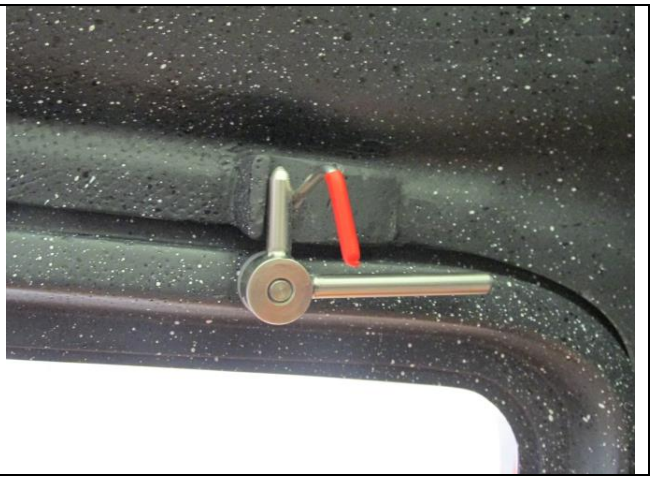
„Open”

„Closed”

Right door locking



„Open”



„Closed”

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SECTION 8

HANDLING, SERVICE AND MAINTENANCE

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SECTION 8

HANDLING, SERVICE AND MAINTENANCE

8.1 EFFECTIVE DOCUMENTS

- **Operators Manual For Rotax Engine Type 912i (Ref. No.: OM-912i)**
- **Maintenance Manual (line maintenance) For Rotax Engine Type 912i (Ref. No.: OM-912i)**
- **Peszke S.C. Propeller Operation and Maintenance Manual, AS Type.**
- **Galaxy GRS Rescue System Assembly and Operation Manual**
- **Nesis III Operation Manual**

8.2 INSCRIPTIONS ON THE AIRPLANE

Apart from the inscriptions and plates described in the Section 2 and shown in the Section 7, the following inscriptions and plates and mounted on the airplane:

On both sides of the cockpit,
On the outer surface of the fuselage,
letter 1,6 in [40 mm] high

ULTRALEKKI

8.3 OPTIONAL AIRFIELD EQUIPMENT

- canopy protective cover

8.4 HANDLING

8.4.1 HANDLING ON THE GROUND

a) Refuelling: refill the fuel tank pouring fuel straight from a clean can or fuel pump. Use chamois leather filter to strain impurities.

b) Filling up the oil system: top the system up with oil poured straight from original bottle or other clean container, using metal sieve.

c) Filling up of the cooling system: top up to the extension chamber to the 2/3 of its capacity. Coolant level in the overflow tank should be between the min. and max. mark.

d) Towing and shunting:
The plane can be shunted:
- forward, by manual pushing of the fuselage,
- backward, by manual pushing of fuselage or wing root area.

During backward shunting the front wheel must be lifted to avoid its contact with the ground.

e) Anchoring:
The plane can be anchored to the ground through: anchors, eye bolts screwed into seats located on the bottom of wings and eye located on the front wheel shock absorber.

f) Supporting:
The plane may be supported in the main wheels legs area (bottom edge of legs' splines), in the steel tube of the front wheel area and under the tail plane using a special, soft support.

8.4.2 WASHING AND CLEANING

a) Exterior, painted surfaces may by washed using soft piece of cloth and water mixed with mild detergent (washing up liquid, for example).

b) Windows and windscreen – similar to painted surfaces
After washing, dry them with a piece of soft cloth.

c) Cockpit interior may be cleaned with vacuum cleaner or a piece of soft cloth and water with detergent. Carpets and upholstery are to be cleaned outside the plane.

Dust and dirt on the engine must be cleaned with a piece of soft cloth moistened in kerosene. Dry it afterwards with a piece of cloth.

d) Propeller can be cleaned as windows. Dead insects removal fluid can be used.

e) External surface of the Pitot pipe is to be cleaned with a piece of soft cloth moistened in dead insects removal fluid.

8.5 MAINTENANCE

8.5.1 INSPECTION BEFORE FLIGHT IN A GIVEN DAY– EXTERIOR

CAUTION:
BEFORE THE ENGINE CHECK, MAKE SURE THE IGNITION SYSTEM IS SWITCHED OFF (NO KEY IN THE IGNITION SWITCH, IGNITION SWITCH, LINE 1 AND 2 IN OFF POSITION, MASTER SWITCH IN OFF POSITION AND THE KEY REMOVED), PARKING BRAKE ACTIVATED OR CHOCKS UNDER WHEELS. IF IT IS NOT NECESSARY, DO NOT APPROACH THE PROPELLER.

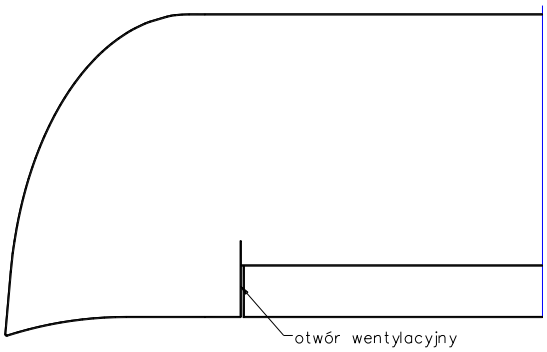
1. Perform inspection as described in the Section 4.3, “Preflight Inspection”.

2. Perform the engine check:

WARNING
Set the Main Switch, Line „A” and Line „B” to „OFF”

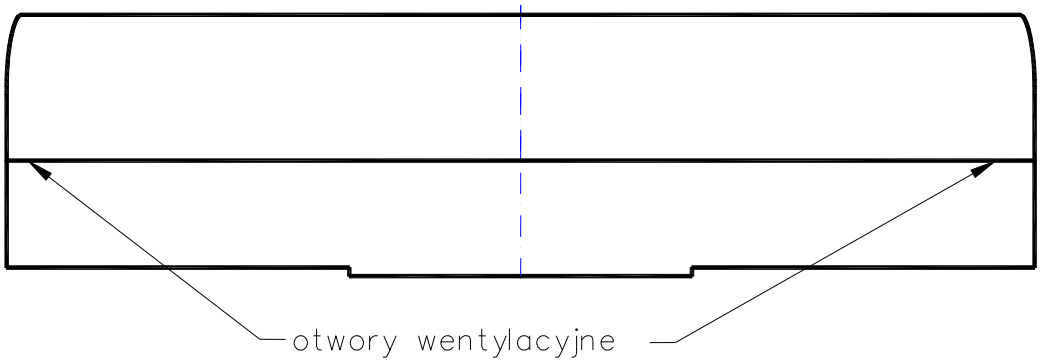
- Check the coolant level in the expansion tank. Refill if necessary. Maximum level of coolant must align with the bottom neck of the expansion tank.
- Check the coolant level in the overflow bottle. Refill if necessary. Coolant level must be between the min. and max. line.
- Manually turn the propeller according to the engine running direction to check for suspicious sounds and extensive resistance. Check if the engine compression is correct.
- Check if the throttle lever moves freely in entire range.
- Check the exhaust system for damages, leakage and general condition.

– Perform visual inspection of sensors and cables for thermal and mechanical damage.

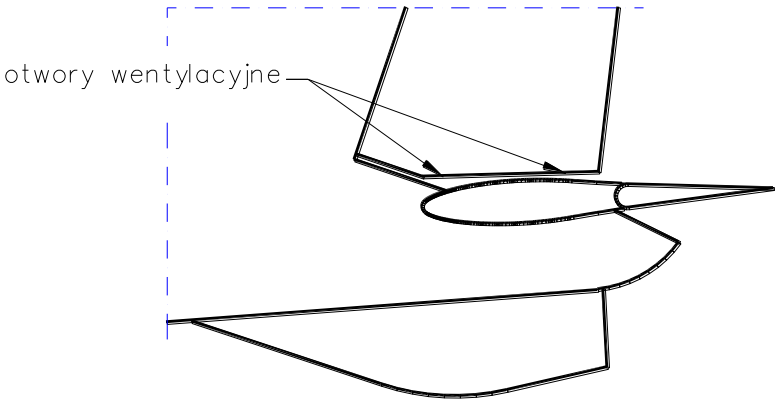


Ventilation holes of the wing

Venti



lation holes of the tailplane



Ventilation holes of the rudder

8.5.2 AFTER THE LAST FLIGHT IN THE GIVEN DAY

a) Set the Main Switch to OFF.
b) Perform the inspection as described in the Section 8.5.1
c) Clean the airplane (interior and exterior surfaces).
d) Close and lock the doors.
e) Lock the control surfaces and put covers on the engine, canopy, wheels and Pitot systems components.

8.5.3 LUBRICATION

Components that require periodical lubrication:
- control stick articulation joint (in the seat),
- connection of the rudder crosshead pipe and elevator push-pull rod.

Using a syringe, push a small amount of bearing grease into the plastic seat of the joint. Exposed area of the steel ball must be covered with thin layer of lubricant or Vaseline.
Other articulation joints do not require any lubrication. Yet, they may be covered with grease periodically to protect them against corrosion.

8.5.4 SMALL REPAIRS

CAUTION: In case of any damages to the propeller, refer to the type KW-20W propellers, manufactured by B-LINE or WOODCOMP PROPELLERS s.r.o. (whichever is installed on the airplane)

CAUTION: All damages to the composite structures should be immediately reported to the aircraft manufacturer.

a) Small scratches of paint can be repaired with a paintbrush. So called “cobweb cracks” gives indication of an internal composite structure damage.
b) Windows cracks can be stopped by drilling at end of cracks using 0.08 in [2 mm] bit.
c) Before repainting a control surface (ailerons, flaps, ruder, elevator), the painted components should be weighted in original condition (factory painted), then the factory coating should be removed and the part repainted to such extend not to exceed the original weight.

It is obligatory to check CoG of the ailerons after painting.
Technique to be used for verification of CoG:
Hang the aileron on two hinges (no 1 and 3 along the edge) in the upside down position. Aileron suspended this way must swing freely.
If the aileron will stop in the nose down position or will stop in horizontal position, it can be assumed properly balanced.

d) When removing the old coating, special attention should be paid not to damage the composite structure (see: Point “a”)

8.5.5 PREPARATIONS FOR A LONG TERM STORAGE

- Disconnect and remove the battery.
- Protect the engine according to the manufacturer instructions.
- Drain the fuel from the tanks by opening the drain valve under the fuselage. Fuel cut-off valve set to ON position.
- Disassemble the airplane (refer to Section 8.9). Wings and horizontal controls should be set in special stands, ideally in vertical position - ailerons and control pointing upwards.
- All wings and controls joints, bolts, pins and articulation joints are to be cleaned with naphtha, covered with Vaseline and wrapped with grease impregnated cloth.
- Cover with protective covers.
- Suspend the fuselage in such way as to separate wheels from the ground.
- Wing bolts, elements of controls etc are to be covered with a thin layer of Vaseline and put into a bag together with washers and nuts. Put the bag into the luggage compartment.
- Decrease pressure in tires to 7.24 psi [0.5 bar].
- Properly cover the back section of the fuselage (tailplane mounting area).
- Wing mounting bolts should be cleaned, covered with thin layer of Vaseline and put into a bag together with washers and nuts. Put the bag into the luggage compartment.
- Bolts seats in the wings and the fuselage should be cleaned with naphtha, covered with Vaseline and wrapped with a grease impregnated cloth.
- Close and lock the doors.
- Cover the entire airplane with the protective cover.

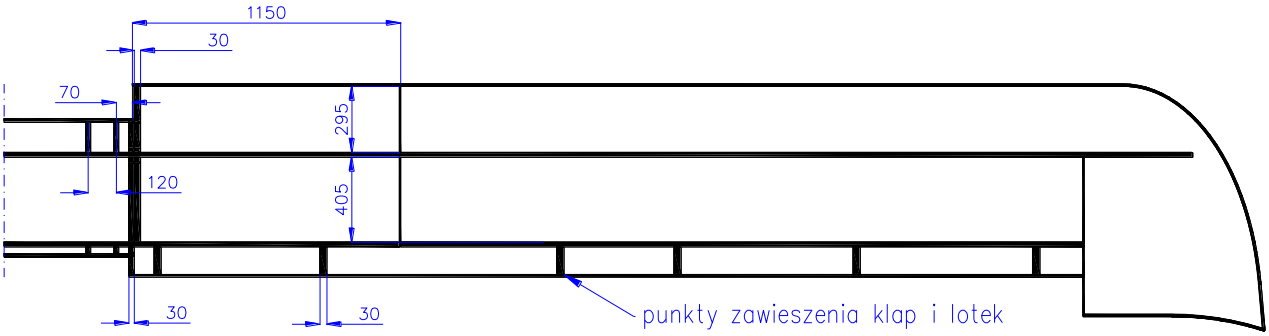
8.5.6 RECONDITION OF THE AIRPLANE AFTER A LONG TERM STORAGE

- Remove the protective coating from all parts, clean them and dry.
- Pump the tires to the pressure level 26-29 psi [1.8 -2.0 bar].
- Perform activities 1, 2, 3, 4, 5, 6 as per Section 8.6
- Install and connect the battery (connect „+" lead to „+" terminal and „-" lead to the „-" terminal of the battery).
- Remove protective coatings from the power plant according to power plant manufacturer instructions.
- Perform activities 9, 5, 6 as per Section 8.6
- Assembly the airplane (see Section 8.9)
- Perform activities 10, 11, 12 as per Section 8.6

8.6 ROUTINE MAINTENANCE LIST

Item	Inspection/check
1	Inspection of airframe structure, paying special attention to all elements that are highly loaded during take-off and landing. Check condition of the glued joints between the skin and internal structures of the wing by percussion, according to the provided plan.
2	Inspection of all metal joints pins and bolts. Check for clearances in allvital joints of the airframe.
3	Inspection of all safety elements in particular elements of airframe, power plant and control system.
4	Checking of friction in the control system. Checking of the fair-leads for excessive wear. Flaps and ailerons check: external surfaces, hinges, drive components.
5	Inspection and check of the undercarriage.
6	Inspection and check of the instruments and tightness of pneumatic systems.
7	Inspection and check of the fuel and oil systems(check band clips on pipes). Cracked pipes must be replaced. Replace all pipes with cracks or scratches.
8	Inspection of wiring system and tightness of cables connections.
9	Inspection of external metal surfaces and protective coatings that are prone to damage.
10	Inspection and check of the brake system.
11	Inspection of control surfaces displacement.
12	Inspection and check of the propeller according to the Propeller Manual

13	Lubrication according to the Section 8.5.1
14	Inspection and check of the engine according to the Engine Manual
15	Inspection and check of the rescue system according to the Rescue System Manual



KR-030 wing glue joints arrangement

8.7 PERIODICAL INSPECTIONS SCHEDULE

The following schedule contains inspections that must be performed after specified periods of time or after incidents mentioned (items numbered as per the list given in the Section 8.6):

Period of time	**Perform inspection/check per point:**
after the first 2 hours of flight	1, 2, 3, 4, 5, 6, 7, 8, 12,14,15
after the first 5 hours of flight	1, 2, 3, 4, 5, 6, 7, 8, 12,14,15
after 100 hours of flight or once a year	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12,13,14,15
after a hard landing	1, 2, 3, 5, 6

Safe and correct operation of the plane is guaranteed by the systematic maintenance and inspections of the airframe and power plant. The activities must be performed after periods specified in Flight and Maintenance Manual of the airplane, power plant and propeller manuals.

8.8 LIFE CYCLE OF THE AIRPLANE COMPONENTS

Item	Subassembly	Life cycle
1	Airframe - composite structures, - metal components of the structure, - control system components,	According to technical condition
2	Engine ROTAX 912 iS	Per current technical bulletins issued by the manufacturer
3	AS propeller	According to technical condition, refer to the AS Type Propeller Manual
4	On-board instruments (pressure, electric)	According to technical condition
5	Radio and electronic equipment	Per current technical bulletins issued by the respective manufacturers
6	Fuel and oil pipes	According to technical condition but no longer than 6 years from the given part date of manufacture
7	Nose gear rubber blocks	
8	Tires, inner tubes	
9	Engine rubber shock absorbers	
10	Rescue system	Per current technical bulletins issued by the manufacturer

8.9 ASSEMBLY AND DISASSEMBLY OF THE AIRCRAFT

To perform the assembly described below, at least two persons are needed:

a) Gather all parts to be assembled, check them for any visible damages.

b) Before commencing assembly, examine the general condition of the wings and fuselage structure. If necessary, clean all bolts, pins and holes and cover them with a thin layer of Vaseline. Check fuel tank vent for any obstruction.

c) Put the wing on the fuselage in such a way that its central part slips into the gap over the cockpit. Flaps must be moved up in such a way they are above the flaps drive levers (Figure 8-1).

d) Put pins into the mounting seats (2 in front and 2 in rear). Front pins are to be inserted after removing top windscreen panel, back pins are to be inserted from the compartment area side. To facilitate access to the back bolts seats, the flap actuator should be set as for lowered flaps. The threaded bolts securing the mounting bolts should be tightened home and returned slightly to align the bolt head with the bolt head housing. Bolts are to be secured with cotter pins or wire (picture 8-2)

e) Flaps drive is to be connected by a clamping ring secured with bolts. Prior to connecting the flaps drive, set the flaps actuator as for retracted flaps. Bolts are to be screwed in using LOCTITE 262 fluid. They must be secured with cotter pins from the bottom (Figure 8-3)

f) Ailerons drive is to be connected in the cockpit by placing rods eyes on the drive lever pins in the bottom part of the wing. Tight the castellated nuts and secure with cotter pins (Figure 8-4

g) Connect the left wing fuel tank with the left buffer tank and secure the fuel pipes with clamps. Do the same with the left tanks.

h) Connect the buffer tanks vent pipe to the right vent pipe going from the wing and secure with a clamp. Connect the left vent pipe going from the wing the pipe going from the fuselage and secure with a clamp.

i) Connect all wing electric cables to respective fuselage cables.

j) Put the control stick covers on the front windshield.

k) Insert the pin located in the front part of horizontal stabilizer to the hole in the fuselage and tighten two bolts to fix the stabilizer to the fuselage (Figure 8-6 and 8-7).

l) Put the elevator rod eye on a bolt in elevator control lever. Install the nut and secure it with the cotter pin (Figure 8-8).

m) Check performance of all control systems, including flaps control system.

n) Connect pneumatic pipes to the Pitot pipe.

Disassembly of the plane is to be carried out in reverse order.

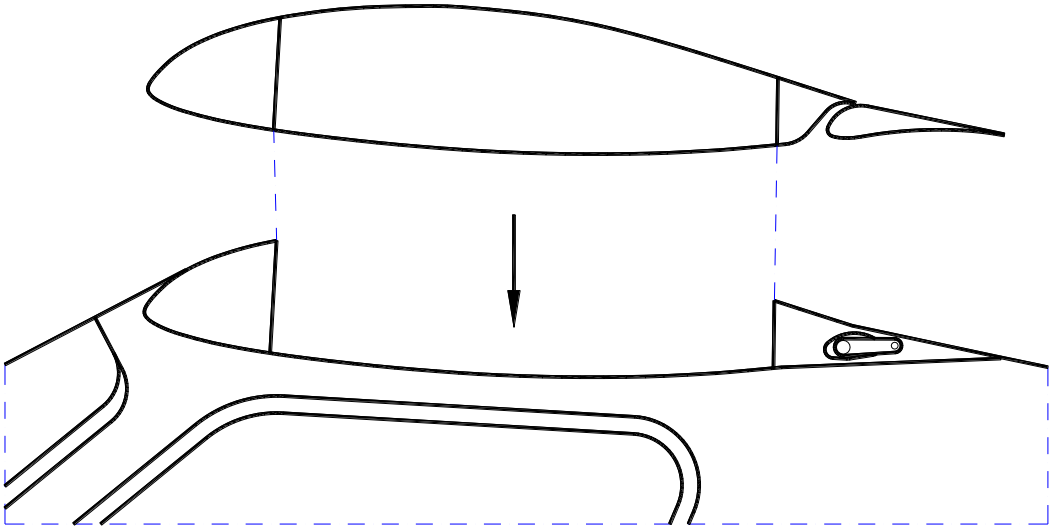


Fig. 8-1 Mounting the wing on the fuselage

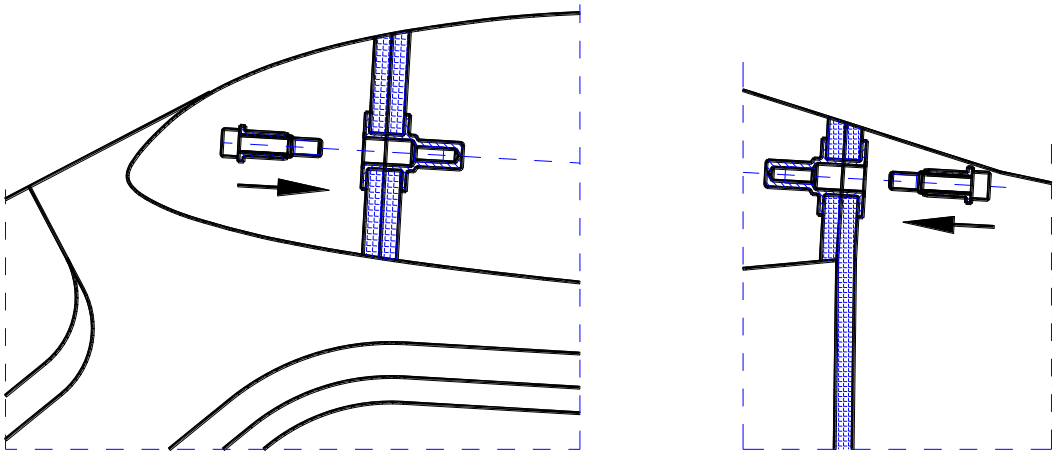


Fig. 8-2 Inserting the mounting pins to the fuselage

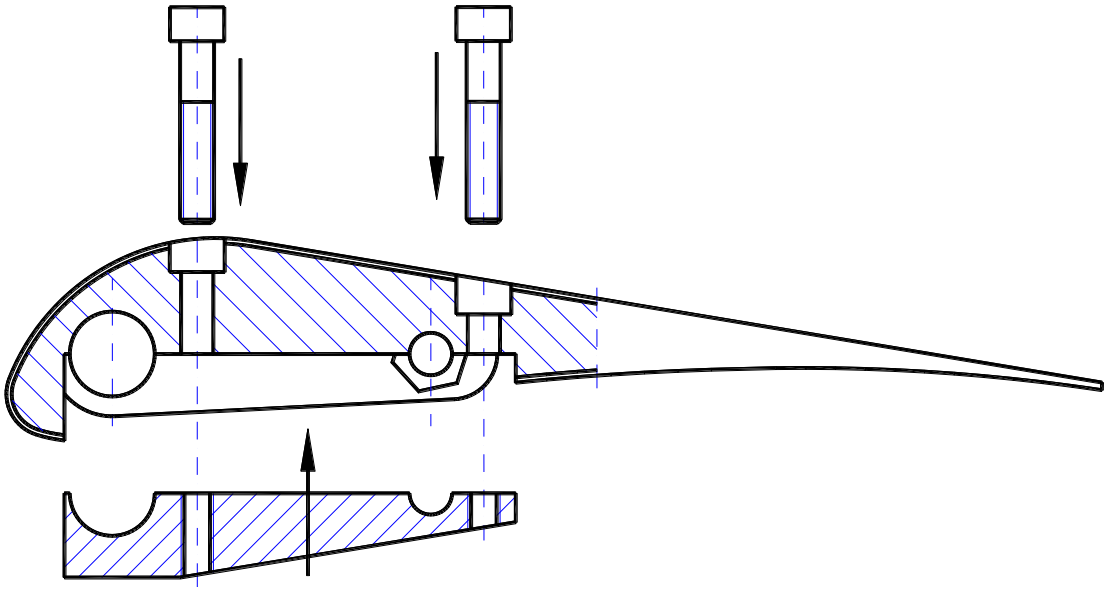


Fig. 8-3 Flaps drive connection

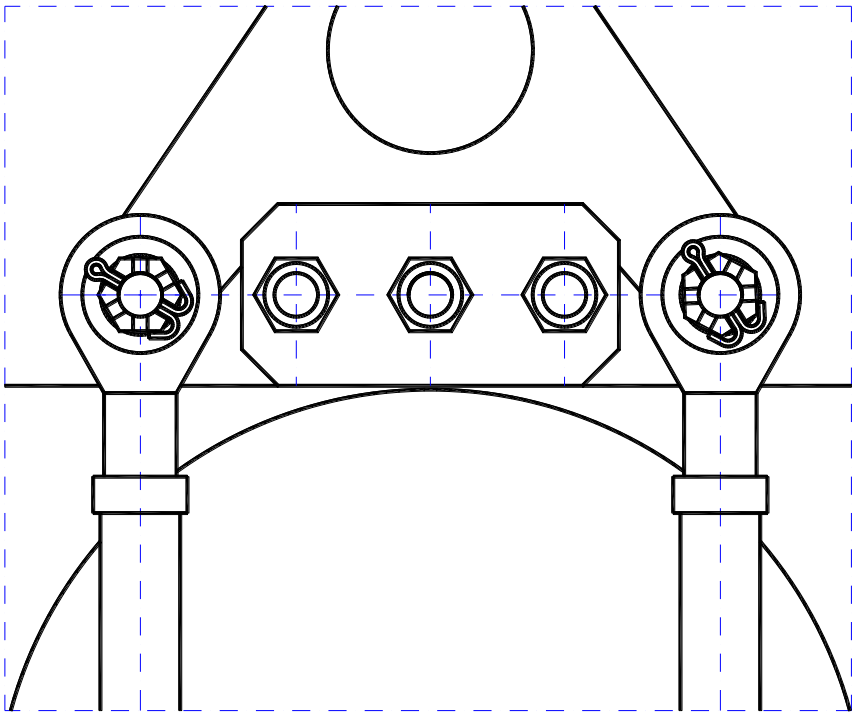


Fig. 8-4 Ailerons drive connection in the fuselage

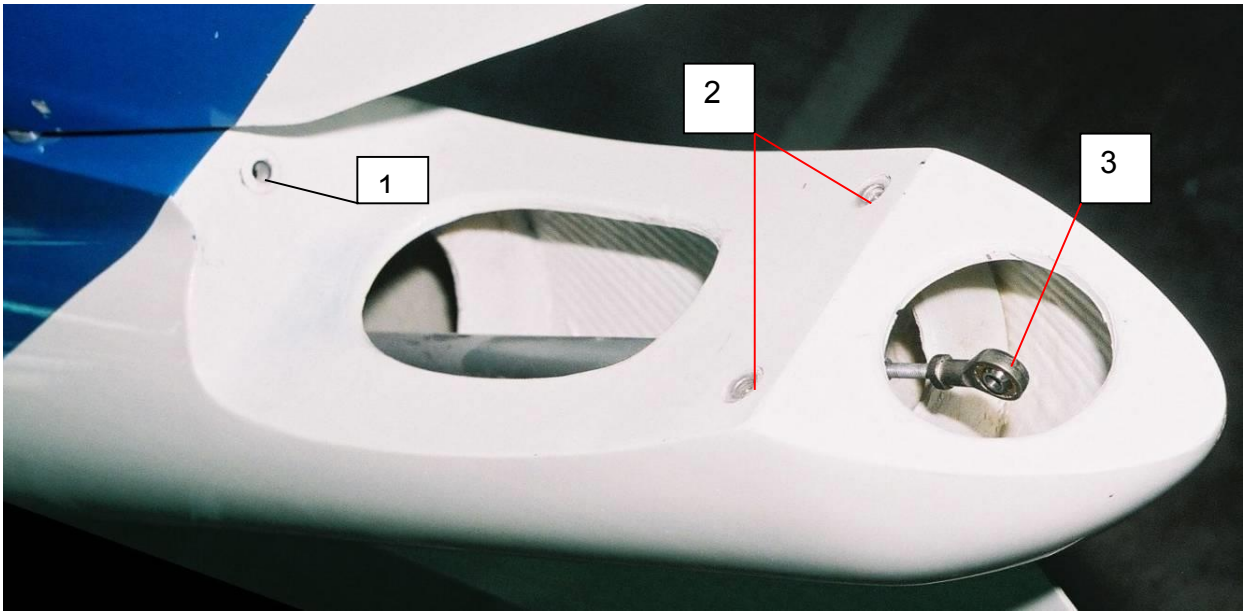


Fig. 8-5 Tail without the elevator unit

1 - front seat of elevator mounting
2 - rear seat of elevator mounting
3 - push-pull rod tip of the elevator

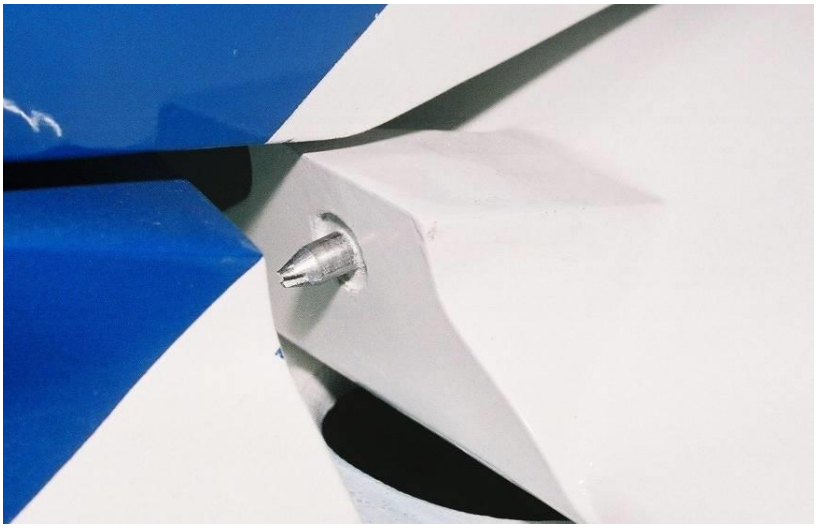


Figure 8-6
Inserting the elevator unit pin to the seat in the fuselage

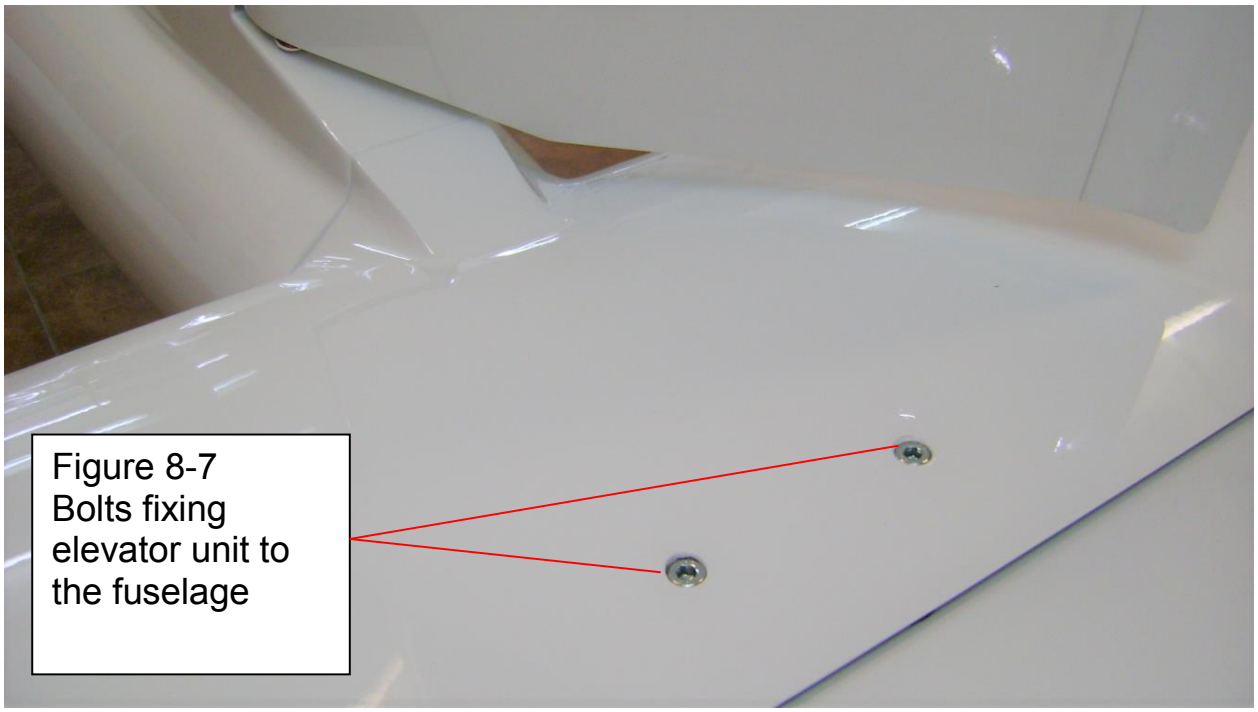


Figure 8-7
Bolts fixing elevator unit to the fuselage

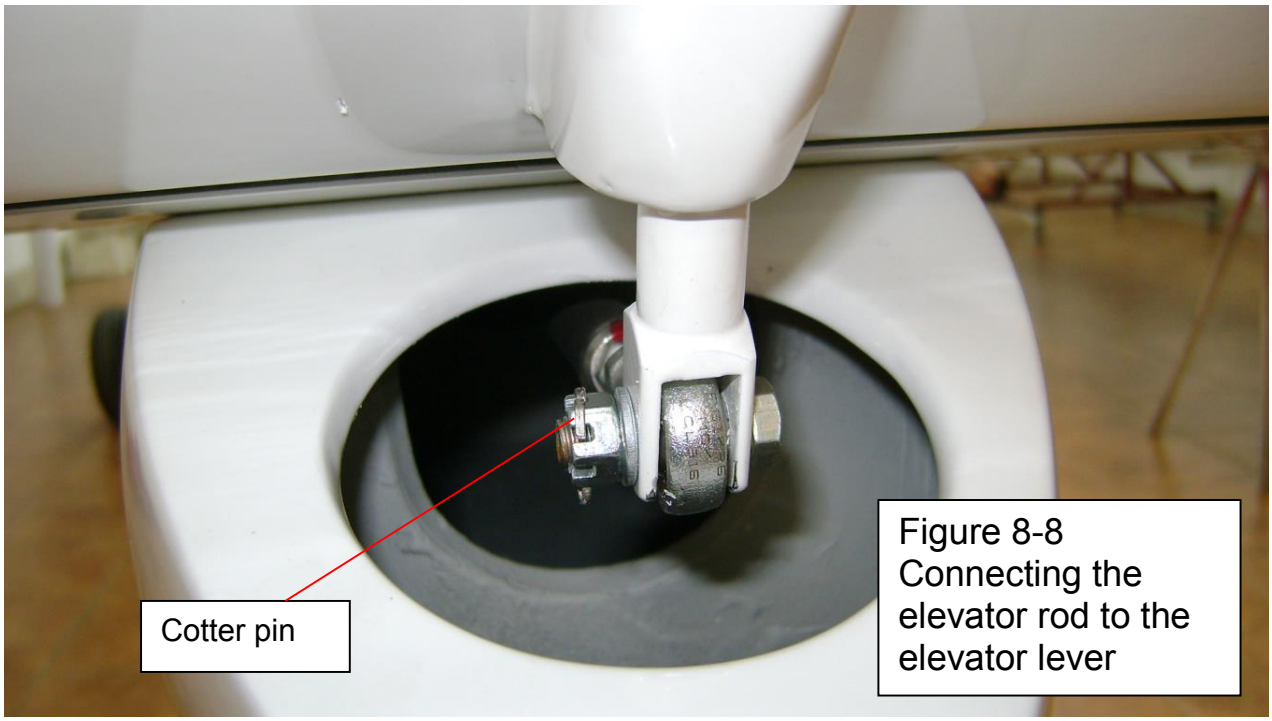


Figure 8-8
Connecting the elevator rod to the elevator lever

8.10 CONTROLS ADJUSTMENT POINTS

1. **1. Adjustment of the elevator deflectio** is performed by screwing in/screwing out the eye end elevator push rod.
   See Figure 8-5, Item 3.
   Release the locknut prior to adjustment.
   Once the adjustment is finished, the connection should be secured by the locknut using the LOCTITE 262 glue.
2. **Ailerons control system.** Ailerons can be adjusted by changing length of the push rods located before the ailerons (the adjustment is recommended to be performed by the airplane manufacturer).
3. **3. Rudder control system** Rudder can be adjusted to neutral position when the pedals are in neutral position (Fig. 8-10) . Rudder deflection can be adjusted by setting the rudder push rod stops.

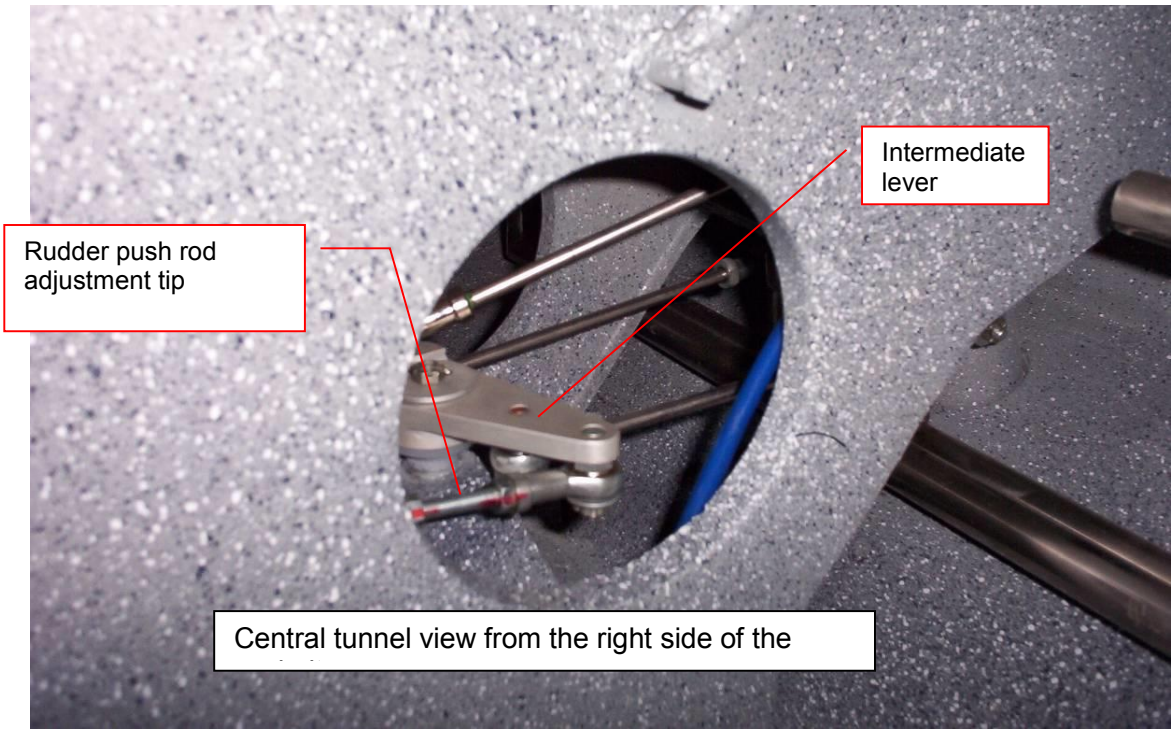


Fig. 8-10 Rudder neutral position adjustment point

Adjustment of the rudder neutral position

1. Remove the rudder push rod adjustment tip from the bolt on the intermediate lever
2. Set the pedals in neutral position and block them

3. Loosen the stops retaining bolts on the rudder push rod.
4. Set the rudder in neutral position and block.
5. Screw in or screw out the adjustment tip (Fig. 8-10) to align the articulated head hole with the bolt on the intermediate. Put the articulated head on the bolt.
6. Put the lock washer on the bolt, install the castellated nut and secure with a cotter pin. Secure the tip with the lock nut, similar to the elevator system.
7. Push the stops on the push rod to the springs (no lengthwise play allowed) and secure with the bolts on the rod.
8. Unlock the rudders and pedals.

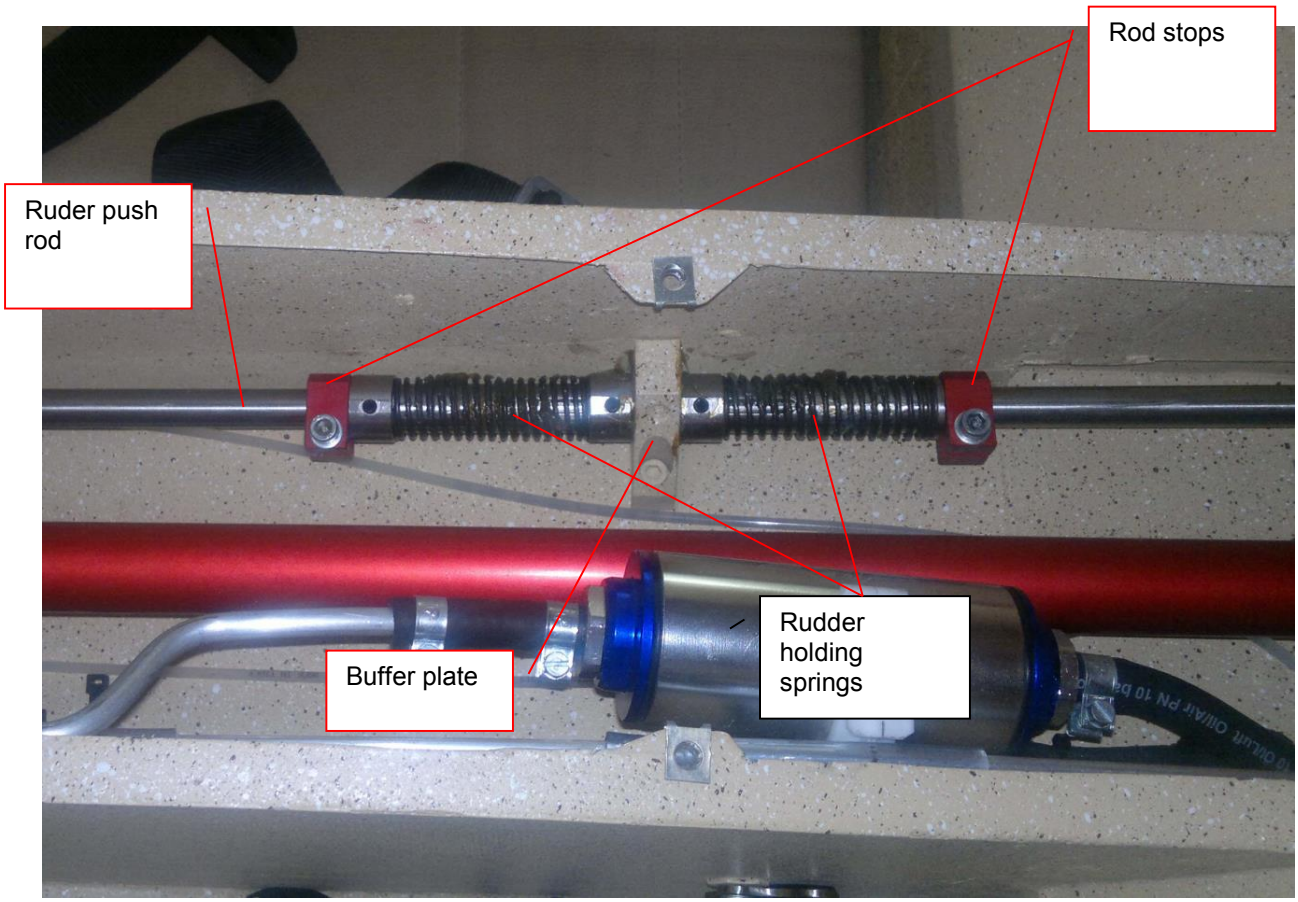


Fig. 8-11 Rudder push rod stops adjustment point (tunnel armrest removed for better visibility)

Rudder deflections in both directions is determined by the limited movement of the trimming spring and cannot be adjusted.

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SECTION 9

SUPPLEMENTS

THE LIST OF APPROVED SUPPLEMENTS

Factory serial number……..

Supplement No.	Title, date of issue, number of pages	Attached (yes/no)

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SECTION 10

ANNEXES

TABLE OF CONTENTS

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ANNEX 1 - PILOT'S CHECK LIST
KR-030 TOPAZ-iS AIRPLANE

TAKE-OFF

1	COCKPIT	CLOSED AND LOCKED
2	FLIGHT CONTROLS	MOVING FREELY AND WITHOUT EXTENSIVE RESISTANCE
3	MAIN SWITCH	ON
4	ALTERNATOR	ON
5	FLAPS	DISPLACED TO „1" (15º)
6	IGNITION SWITCHES, LINE A AND B	ON
7	MAIN FUEL PUMP	ON
8	FUEL VALVE	ON
9	AUXILIARY FUEL PUMP	ON
10	MAX. RPM	CHECKED, CORRECT
11	ENGINE INSTRUMENTS	CORRECT INDICATIONS
12	AIRSTRIP	FREE
13	PERMISSION TO START	GRANTED

LANDING

1	PERMISSION TO LAND	GRANTED
2	AUXILIARY FUEL PUMP	ON
3	SPEED AT THE CIRCLE	70 kt [130 KM/H], MAINTAIN
4	AFTER THE 3RD TURN	Flaps in „1" (+15º) position – maintain the speed and decrease to 58 kt [108 km/h] when on straight path
5	AFTER THE 4TH TURN	- Reduce the airspeed to 51 kt [95 km/h] - Flaps in „2" (+40º) position - Decrease speed from 51 kt [95km/h] to 35 kt [65 km/h] just before the touch-down
CAUTION: IN RAINFALL CONDITIONS, INCREASE THE LANDING APPROACH SPEED BY 3 kt [5 KM/H]		
6	LANDING	Level out and touch down with minimum speed and the throttle at idle

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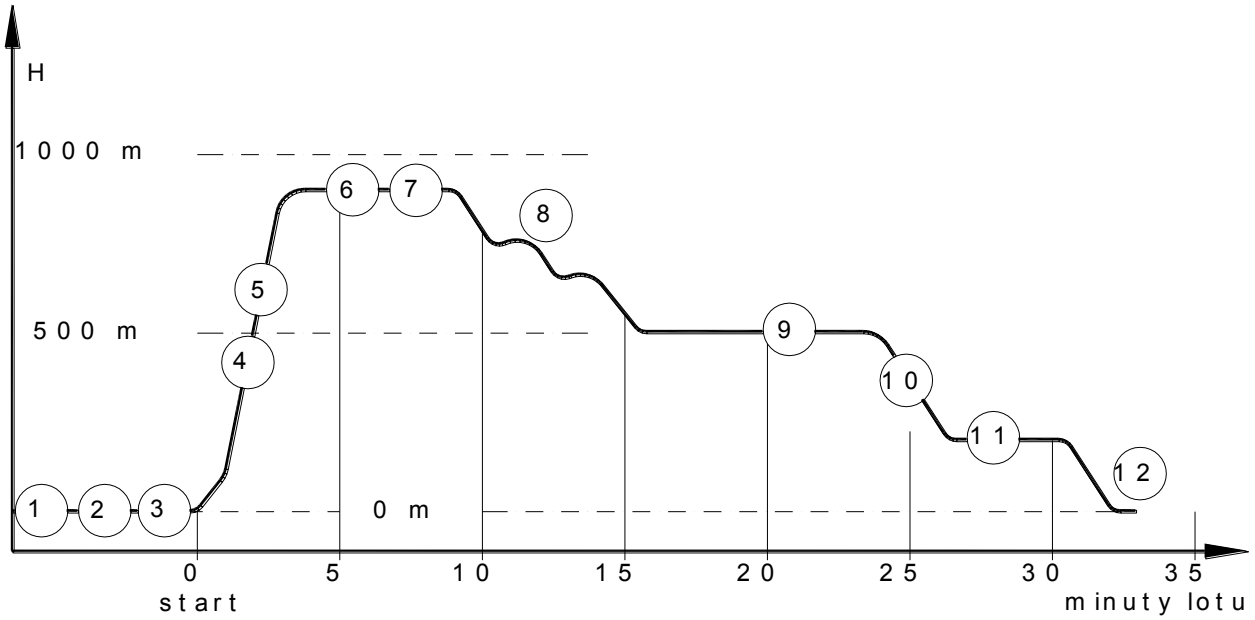
ANNEX 2 - CONTROLLED TEST FLIGHT PROGRAM

Controlled test flight program was shown on the below chart. Results achieved during the flight should be compared to the data given in the Flight and Maintenance Manual. If the flight performance is decreased by more than 20%, the root cause of the performance drop should be investigated. The test results shall be recorded in the CONTROLLED TEST FLIGHT REPORT.

Prior to the controlled test flight:
- Check the airplane documentation and all logs in the Airframe Book and the Engine Book.
- Perform the airplane inspection as described in the Section 8.5.1 (Section 8) of the present Manual. Check loading and the Centre of Gravity (Section 6).



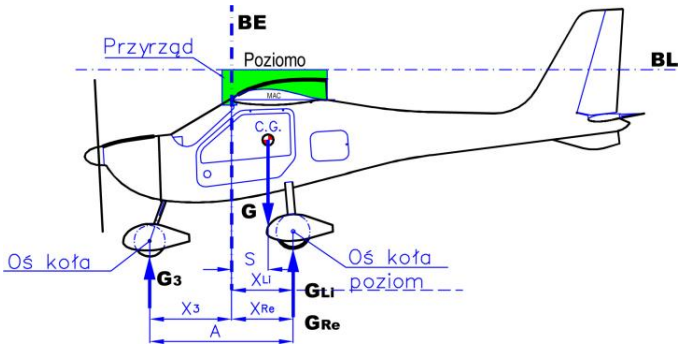
Controlled test flight program and the scope of check:

1. Starting and testing the engine and instruments – record the engine performance on ground, check performance of the brakes.
2. Taxing – verify correct operation of the brakes, shock absorbers and tires, check susceptibility to side wind. Record the engine speed at which the airplane starts rolling.
3. Perform the take-off – remember the lift-off speed (record when the take-off is finished), verify behaviour and performance of the controls system components: ailerons, rudder and elevator.

4. Continue the climbing flight with max. engine speed for 2 minutes with the constant speed V_Y from the altitude 328 ft [100m] a 2952 ft [900m]. Record the altitude and the test commencement time, as well as the altitude reached after 2 minutes. Calculate the climbing speed and compare with the Flight and Maintenance Manual data. Record the engine performance data.
5. During the climb, verify correct operation, range and efficiency of the elevator trimmer.
6. At the altitude 2624 ft [800 m] check the navigation and radio equipment for proper operation. Perform three static stalls with engine on “Idle”, both with „flat” configuration and with flaps lowered and record the results. Evaluate the airplane behaviour at low speeds.
7. Check and evaluate lateral, longitudinal and directional stability.
8. Perform two complete turns to the left and to the right with 30º and 45º bank, diving with 30º climbing and 30º diving with a turn while climbing after diving. Check and evaluate lateral, longitudinal and directional stability and forces in the control system.
9. At the altitude 500 m (std), in the horizontal flight perform the maximum speed measurement (within two minutes) for the following ranges of power: 0,55 MCP, 0,65 MCP, 0,75 MCP, Max. continuous power and Max. power.
   On completion of each test, record the engine performance data for each range of power. The above ranges of power should be in line with the values of speed (IAS) given in Section 4 i 5 . Evaluate balance and forces that appear in the control system.
10. While descending at Idle at the speed V = 62 kt [115 km/h] check the longitudinal balance of the airplane and the rate of descent, and then accelerate the airplane at Idle to the V_{NE}– record the engine performance data and the propeller (engine) speed.
11. Perform the landing approach – evaluate performance of the control system of the airplane.
12. During the landing run, evaluate performance of the landing gear, shock absorbers and brakes.
13. Fill out the Controlled Test Flight Report. Inform all interested parties about the technical condition of the airplane.

ANNEX 3 - AIRPLANE WEIGHING PROCEDURE
KR-030 TOPAZ-iS FACTORY NUMBER 30-...-...

Put the airplane on three scales of measuring range 0 ÷440 lb. Wing and the upper edge of the fixture should be in horizontal position.



Measure the distance A , X_{Li} and X_{Re}.

BL (horizontal datum plane)	The upper edge of the fixture (horizontally)			
BE (vertical datum plane)	The nose of profile close to the wing root.			
		Distance to the datum plane BE		
	A= [in]	Weight [lbs]	Distance [in]	Moment [lbs/in]
Main wheel, left	$M_{Li} = G_{Li} * x_{Li}$	G_{Li}=	x_{Li}=	M_{Li}=
Main wheel, right	$M_{Re} = G_{Re} * x_{Re}$	G_{Re}=	x_{Re}=	M_{Re}=
Nose wheel	$M_3 = G_3 * x_3$	G_3 =	x_3 =	M_3 =
		, where $x_3 = (x_{Li} + x_{Re})/2 - A$		
Total weight of empty airplane	$G = G_{Li} + G_{Re} + G_3$	G =		
Total moment	$M = M_{Li} + M_{Re} + M_3$			M =
Empty airplane centre of gravity location	S = M / G		S =	

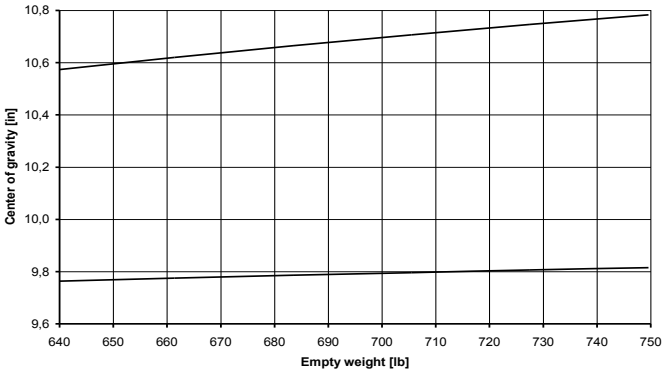
where:
G_3 - the value read on the scale under the nose wheel x_3 - distance from the nose wheel axis to the wing edge of attack
G_3 - the value read on the scale under the left main wheel x_3 - distance from the left main wheel axis to the wing edge of attack
G_3 - the value read on the scale under the right main wheel x_3 - distance from the right main wheel axis to the wing edge of attack

Empty airplane weight G = lbs

Centre of gravity position S = in

For the empty airplane S should be within the following range:

for 640 lb between 9.76 in and 10.59 in
for 750 lb between 9.81 in and 10.78 in
(interpolate according to the diagram on the left for the intermediate weighs)
Weighing report form is given in the Annex 3.



Equipment as per records in the Airplane Log Book on the date of weighting.

DATE.....SIGNATURE.....

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Flight and Maintenance Manual UL-KR-030-iS LSA

ANNEX 4 - CONTROLLED TEST FLIGHT REPORT
KR-030 TOPAZ-iS AIRPLANE

Factory number..... Registration number …….....as per the Controlled Test Flight Program

Attachment to the Flight Order no. ..... issued on.....

Teke-off weight ..... lbs CoG location X.....in

Weather conditions: p_O= ..... mm Hg (hPa), t_O= ..... ºK

Pilot…… Airport..... Date..... Flight duration……

MEASUREMENTS ON GROUND

	Engine speed [RPM]	Oil pressure [psi]	Fuel pressure [psi]	Oil temperature [ºK]	Coolant temperature [ºK]
Min.					
Max.					

IN FLIGHT MEASUREMENT

Flight stage	n [RPM]	H [ft]	Climbing [ft/min]	V [kt]	Flaps [˚]	Oil pressure [psi]	Fuel pressure [psi]	Oil temperature [ºK]	Coolant temperature [ºK]
Climbing									
Gliding									
Level flight	4300								
	4800								
	5000								
	5500								

FLIGHT PERFORMANCE EVALUATION

1. Stability and controllability: - .....
2. Minimum speed behaviour: - .....
3. Balance ability: - .....
4. Stall: - .....
5. Manoeuvres: - .....

INSTRUMENTS AND EQUIPMENT PERFORMANCE EVALUATION

1. Airframe control: - .....
2. Engine control: - .....
3. Engine instruments: - .....
4. Navigation/flight instruments - .....
5. Fuel system: - .....
6. Engine: - .....
7. Undercarriage: - .....
8. Wheels brakes: - .....
9. Radio: - .....
10. ……. - ……..
11. …….. - ……..

PILOT'S ASSESSMENT

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.....

.....
Pilot's signature

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ANNEX 5 - INSPECTION CARD

Registration numbers……
Aircraft type ……
Factory number
……
Flying time since the beginning of operation ……
Number of flights since the beginning of operation ……

Item	LIST OF ACTIVITIES				Periodic activities			Signature
					After the first 2	After the first 5	100 h or 1 year	
1	2				3	4	5	6
1	Inspect the airframe structure, paying special attention to all elements that are highly loaded during take-off and landing. Check condition of the glued joints between the skin and internal structures of the wing by percussion, according to the provided plan.				X	X	X	
2	Inspection of all metal joints pins and bolts. Check for clearances in allvital joints of the airframe.				X	X	X	
3	Inspection of all safety elements in particular elements of the airframe, power plant and control system.				X	X	X	
4	Check friction in the control system. Check the fair-leads for excessive wear. Flaps and ailerons check: external surfaces, hinges, drive components.				X	X	X	
5	Inspection and check of the undercarriage.				X	X	X	
6	Inspection and check of the instruments and tightness of pneumatic systems.				X	X	X	
7	Inspection and check of the fuel and oil systems(check band clips on pipes). Cracked pipes must be replaced. Replace all pipes with cracks or scratches.				X	X	X	
8	Inspection of wiring system and fastening of assemblies and units				X	X	X	
9	Inspection of external metal surfaces and protective coatings that are prone to damage.						X	
10	Inspection and check of the brake system.						X	
11	Inspection of control surfaces displacement.						X	
	Name	Nominal	deflection	Measured deflection				
	LH aileron	Up	19° -1°					
		Down	16° -1°					
	RH aileron	Up	19° -1°					
		Down	16° -1°					
	Elevator	Up	25° -1°					
		Down	20° -1°					
	Rudder	Left	35° -1.5°					
		Right	35° -1.5°					
	Flaps	0	- 6°-0,5°					
		1	+15°-1°					
		2	+40°-1°					

1	2	3	4	5	6
12	Inspection and check of the propeller according to the Propeller	X	X	X	

	Manual.				
13	Lubrication: - control stick articulation joint (in the joint seat), - connection of the rudder cross head pipe and elevator push-pull rod.			X	
14	Inspection and check of the tow fitting according to the Propeller Manual	X	X	X	
15	Inspection and check of the engine according to the Engine Manual	X	X	X	
16	Inspection and check of the rescue system according to the Rescue System Manual	X	X	X	
Overall inspection on completion of all checks: – Make sure all tools have been removed – Make sure measuring instruments and other foreign bodies have been removed – Make sure all hatches were installed and locked – Check if the airplane is clean		X	X	X	
Make appropriate entries in the airplane documentation.		X	X	X	

Notice:

1. Circle all performed activities in the “Periodic activities” column.

The airplane is ready for further operation when all the respective inspections are timely performed.

.

Works performed on the airframe .....

Maintenance completion date: ..... Certificate number ……

Personnel issuing the Certificate: .....