POH-KR-030-LSA-1

PILOT'S OPERATING HANDBOOK

KR-030 TOPAZ
AIRPLANE

AIRPLANE REGISTER NUMBER: 24-8433

AIRPLANE SERIAL NUMBER: 30 - …… - …...

0.1 LOG of REVISIONS

Any revisions to the present Manual, except actual weighting data, should be immediately recorded in the following table and and be approved by NAA.

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.N°	Date	Discription	Revised pages
01	MAY 2017	VA FROM 88 kts to 92.8 kts	2-3
02	MAY 2017	VNE FROM 123 kts to 136 kts	2-3
03	MAY 2017	Demonstrated crosswind airspeed equals from 9.7Ktss to 14.5Ktss	4-10
04	MAY 2017	AIRSPEED INDICATOR Green VA from 88 to 92.8 kts Yellow VNE from 123 to 136 kts Red from 123 to 136 kts	2-6

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0.4 INTRODUCTION

List of ASTM Standarts used for design, manufacture and establishing the airplane airworthy and suplement files:

F 2746-09 – Standard Requirements for Light Sport Aircrafts (LSA) Flight Manual(POH).

F 2245-09 – Standard Requirements for Light Sport Aircrafts (LSA) Design and Flight Properties.

The aircraft manufacturer:

PPHU EKOLOT
Małgorzata Słowik
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38 – 420 Korczyna
POLAND

Factory:
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Before starting with operating the airplane read carefully Pilot's Operating Handbook for KR-030 TOPAZ airplane, ROTAX 912 UL Engine Operating and Maintenance Manual and AS Propeller Operating and Maintenance Manual. The Manuals will give you basic information and allow safe operation of your airplane.

If any part of the Manual is not entirely clear to you or if you need any additional information, contact the representative of the airplane manufacturer.

Remarks:

The task of this POH is to familiarize the owner/ user of the airplane with basic operational tips and safety instructions.

Engine serial number

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

The engine serial number should always be used when ordering parts to ensure correct part selection prior to shipment.

Safety rules

Although the familiarization with these instructions will not eliminate all hazards connecting with airplane operation but the understanding and application of the information herein will help you properly use of the airplane.

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

Safety information:

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

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

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

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

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

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

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

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

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

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

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

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

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

Never operate the engine and gearbox without sufficient quantities of lubricating oil. Periodically verify the level of coolant. Periodically check the level of oil, coolant and brake fluid.
Never exceed the maximum speed of the plane. Never exceed the maximum engine speed. Allow the engine to cool at idle for several minutes before turning off the engine.

Before first flight with installed GRS rescue system, thoroughly familiarize with GRS Galaxy Rescue System Operational Manual.

0.5 LIST OF DEFINITIONS AND ABBREVIATIONS

The following words or expressions have been used or may be helpful in particular Sections of this manual.

WARNING:
Means, that non-observation of the corresponding procedure leads to an immediate or important degradation of the flight safety.

CAUTION:
Means, that non-observation of the corresponding procedure leads to a more or less long-term degradation of the flight safety.

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

BASIC SPEEDS AND THEIR DENOTATIONS:

IAS – **"INDICATED AIRSPEED"** means the speed of an air vessel indicated by its airspeed indicator co-operating with a Pitot tube, which is calibrated for the compressibility of an adiabatic airflow in the conditions of the standard atmosphere at sea level, without corrected errors of the airspeed measuring system. All IAS values in this manual presume the airspeed measuring system error to be zero.

CAS – **"CALIBRATED AIRSPEED"** means the speed of an air vessel after aerodynamic and instrument correction. The calibrated airspeed is equal to the true airspeed in the conditions of the standard atmosphere at sea level.

TAS – **"TRUE AIRSPEED"** means the airspeed of an air vessel, relative to the undisturbed airflow. It is CAS corrected by the change of air density depending on altitude and temperature.

V_{NE} – Maximum never exceed airspeed. This is a limit speed, which cannot be exceeded in any conditions.

V_{NO} – Maximum structural cruising speed. This is a limit speed which cannot be exceeded except in non-turbulent conditions, and then, only with care.

V_A – Maneuvering speed. Above this speed, rapid or full displacement of the control surfaces may in certain circumstances result in exceeding the maximum permissible loads of the structure.

V_{FE} – Maximum airspeed with wing flaps extended. This is the maximum permitted airspeed of the airplane with wing flaps extended.

V_{S1} – Stalling speed, or minimum airspeed of steady flight, at which the airplane is steer able in any other configuration than the landing configuration.

V_{S0} – Stalling speed, or minimum airspeed of steady flight, at which time the airplane is controllable in the landing configuration.

V_X – Airspeed for the maximum rate of climb. This is the airspeed, at which the maximum increase of altitude in the shortest time may be achieved.

V_Y – Airspeed for the maximum angle of climb. This is the airspeed at which the maximum increase of altitude over the shortest distance may be achieved.

METEOROLOGICAL DENOTATIONS

ISA – International Standard Atmosphere.

OAT – Outside Air Temperature. This is the temperature of the static air, read from the thermometer, or received from the ground meteorological service, with instrument error and air compressibility effect corrected.

Pressure altitude – This is the altitude read from the altimeter, preset to the standard pressure at the average sea level (1013 hPa).

DENOTATION OF POWER AND RATING

Take-off power – Maximum power.

Maximum continuous power – Maximum power permitted for the whole flight.

Engine failure – any engine malfunction, engine stop included.

TERMINOLOGY USED FOR WEIGHTS AND DEFINITION OF THE CENTER OF GRAVITY OF THE AIRPLANE.

Maximum takeoff weight – it is the maximum airplane weight at the moment of beginning the takeoff.

Maximum landing weight – it is the maximum airplane weight in the moment of touch down.

Empty airplane weight – It is the weight of the equipped airplane, with unusable fuel and full amount of operational agents (oil, cooling agent).

Center of Gravity (CG) – imaginary point on the airplane. The airplane suspended at this point is in equilibrium.

Limits of the CG – range of CG positions, which must not be exceeded when loading the airplane to a given total weight.

MAC – the Mean Aerodynamic Chord.

Consumable fuel – This is the amount of fuel, which may be consumed, without symptoms of a rough engine running.

Unusable fuel – The amount of fuel, not less than that which gives the first symptoms of rough engine running, under the least favorable conditions for fuel feeding the fuel tank, which may occur during normal operation of the airplane.

OPERATIONAL DENOTATIONS

Take-off run – the distance from the location where the airplane begins to move, to the location where the airplane lifts-off from the takeoff surface.

Take-off distance – the distance from the location where the airplane begins to move, to the location where the airplane reaches the altitude of 50 ft. This distance is to be measured parallel to the takeoff surface.

Landing distance – the distance from the location where the airplane has the altitude of 50 ft, to the location where the airplane stops. This distance is to be measured parallel to the takeoff surface.

Landing run – the distance from the location where the airplane touches down on the landing surface, to the location where the airplane stops.

Demonstrated crosswind capabilities – value of crosswind velocity for which it has been demonstrated that for take-off and landing no extensive pilot force, skill or concentration is required.

SECTION 1

GENERAL

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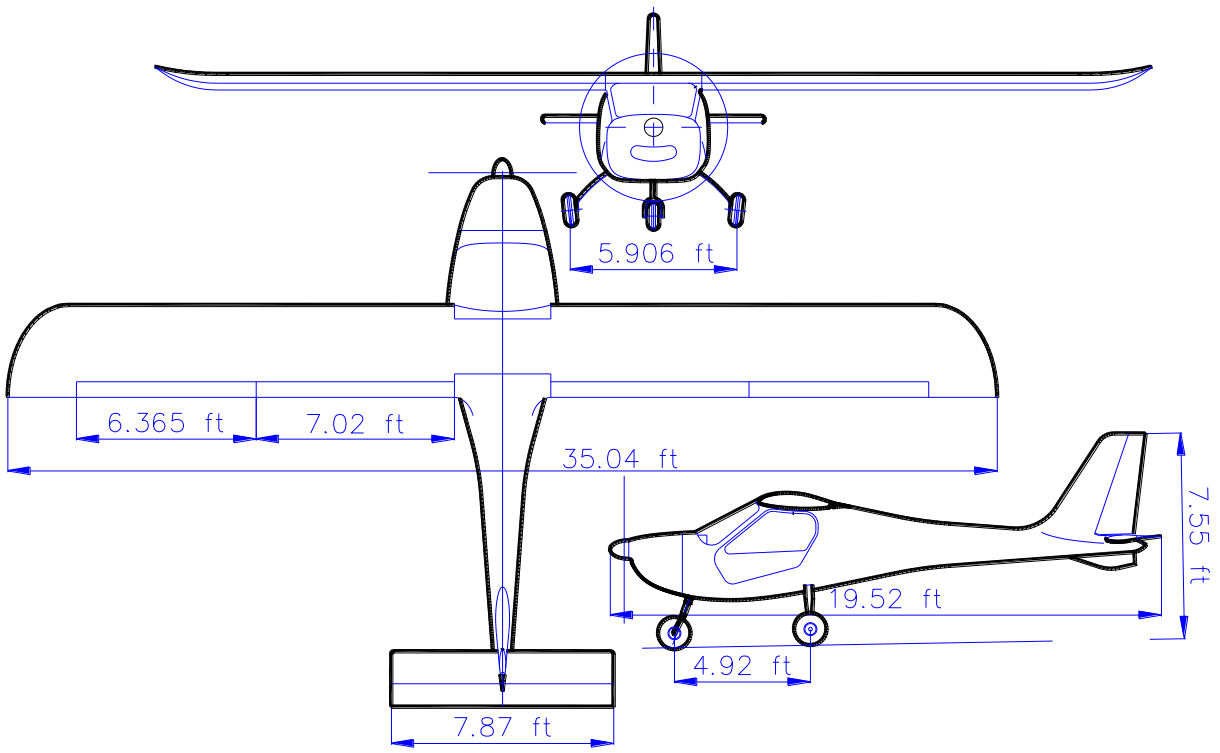
SECTION 1

1. GENERAL

1.1 AIRPLANE

KR-030 TOPAZ is a two-seat, aerodynamically controlled, high-wing monoplane. The airplane complies ASTM F 2245 – 09 requirements.

1.2 THREE-VIEW DRAWING & BASIC TECHNICAL DATA



BASIC TECHNICAL DATA

Wing span	35.04	ft	10.68	m
Overall length	19.52	ft	5.95	m
Overal heigh	7.55	ft	2.30	m
Wing surface	113.02	sq. ft	10.50	m^2
Aileron area	2 x 4.30	sq. ft	2x0.40	m^2
Flap area	2 x 4.74	sq. ft	2x0.44	m^2
Elevator unit area	15.50	sq. ft	1.44	m^2
Vertical tail unit area	11.84	sq. ft	1.10	m^2
Gross weight	1235	lb	560.0	kg
Max. airspeed at H = 0 m	110.0	kts		
Climbing airspeed at V_X = 60 kts			4.0	m/s
Climbing airspeed at V_Y = 75 kts			4.7	m/s
Stall airspeed – flaps retracted	44	kts		
Stall airspeed – flaps extended	36.6	kts		

Engine speed [RPM]	Airspeed [kts] (IAS)	Flying range for H = 2625 ft [800 m]
4000	78.4	578 NM [1070 km]
4500	89.0	502 NM [930 km]
5000	99.6	459 NM [850 km]
5200	105.4	432 NM [800 km]
5500	108.5	362 NM [670 km]

CONTROL SURFACE DEFLECTION WITH DEFLECTION TOLERANCES

Surface	**Deflection**		**Tolerance**
Ailerons	Up Down	20° 15°	-1,0°
Flaps	Position „0" Position „1" Position „2"	-6 +15 +40	-0,5° -1,0° -1,0°
Elevator	Up Down	25° 20°	-1,0°
Rudder	RH LH	35° 35°	-1,5°

1.3 ENGINE

ROTAX 912 UL engine is four cylinders, horizontal opposed, four-stroke, with spark ignition, liquid-cooled engine heads and air-cooled engine cylinders, equipped in two BING carburettors, electric starter integrated reduction gear and two magnetos.

Sense of propeller shaft rotation – clockwise, looking from cockpit.

1.3.1 OPERATIONAL PARAMETERS (refer to ROTAX 912 UL engine Operation Manual)

Max. power	59.6 kW [80 hp] at 5800 RPM	max. 5 min.
Max. continuous power	58.0 kW [78.9 hp] at 5500 RPM	
Max. engine speed	5800 RPM	max. 5 min.
Idling speed	1400 RPM	

1.3.2 FUEL CONSUMPTION (refer to ROTAX 912 UL engine Operation Manual)

At max. power	5.95 U.S. gal/h [22.5 l/h]
At max. cont. power	5.02 U.S. gal/h [19.0 l/h]
At 75% cont. power	4.49 U.S. gal/h [17.0 l/h]

1.3.3 OPERATIONA TEMPERATURES (refer to ROTAX 912 UL engine Operation Manual)

Oil temperature:
- Max. 284°F [140° C]
- Min. 122°F [50° C]
- Normal operational temp. 194° – 230°F [90° ÷ 110° C]

Cylinder Head Temperature:
- Max. 302°F [150° C]

Temperature for starting the engine:
- Max. 122°F [50° C]
- Min. -13°F [-25° C]

1.3.4 OPERATIONAL PRESSURE (refer to ROTAX 912 UL engine Operation Manual)

Max. oil pressure 101 psi [7 bar]

Fuel pressure:
- Max. 5.8 psi [0.4 bar]
- Min. 2.17 psi [0.15 bar]

1.4 FUEL (refer to ROTAX 912 UL engine Operation Manual)

Fuel grade:

- Min. RON 95
- EN 228 Premium
- EN 228 Premium plus
- AVGAS 100LL (see Section 2.9 of Rotax 912 UL MM)

1.4.1 FUEL TANK CAPACITY

Total fuel tank capacity is 20.60 U.S. gal [78 l]. Total usable is 20 U.S. gal [76 l], unusable 0.52 U.S. gal [2 l].

1.5 PROPELLER

The **AS 16500/1950 type** propeller, made of carbon fiber, three blades with pitch adjustable on the ground.

Prop diameter: 64.96 in [1.65 m]
Sense of rotation: clockwise looking from cockpit
Pitch angle setting, measured at blade cross-section in diustance 24.40 in [620 mm] from propeller axis:

Reduction on the engine	Pitch angle setting
2.27:1	20.5º
2.43:1	24.2º

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SECTION 2

LIMITATIONS AND FLIGHT CONDITIONS

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SECTION 2

2. LIMITATIONS AND FLIGHT CONDITIONS

2.1 CREW

Minimum crew:	One pilot
Total occupants:	Two persons
Minimum one occupant weight:	132 lb [60 kg]

2.2 ALLOWED FLIGHT CONDITIONS

- VFR, day
- Any maneuver pertaining to "normal" flight
- Stalls, except whip stalls
- Lazy eights
- Chandelles
- Turns in which angle of bank is not more than 60^{o} for flaps "0" and no more than 30^{o} for other flap settings

2.3 Prohibited flight conditions

- IFR and night flight
- Flight into known icing conditions
- Aerobatic maneuvers
- Inverted flight
- Sideslips with angle of bank is more than 40^{o}
- Intended spins

2.4 MAXIMUM TAKE-OFF WEIGHT

Max. allowed take-off weight	1235 lb [560 kg]

2.5 ALLOWED CENTER OF GRAVITY POSITION

Allowed CG position	8.30 – 12.17 in [211 – 309 mm] behind leading edge of rectangular part of wing

2.6 STRUCTURAL LOAD FACTORS 136 kts

Flaps set to "0" -6°		Other flap settings
V_A = 92.8 kts n = +4, -2	V_{NE} = 136 kts n = +4, -1.5	V = 33.6 ÷ 66.4 kts n = +2, 0

2.7 ALLOWED AIRSPEEDS

Never-exceed airspeed	**V_{NE}** = 136 kts
Rough air allowed airspeed no more than	**V_C** = 97.6 kts
Manuvering airspeed - above this airspeed the controls deflection must be limited to 1/3 of full range	**V_A** = 92.8 kts
Allowed airspeed with flaps extended	**V_{s0}** = 36.6 kts **V_{FE}** = 66.4 kts

2.8 STALL AIRSPEED at W = 1235 lbs [560 kg]

Flaps retracted V_S = 44.0 kts
Flaps extended V_{S0} = 36.6 kts

2.9 STATIC CEILING

Static ceiling 14.760 ft [4.500 m]

2.10 ALLOWED ENGINE SPEEDS

Take-off power 5800 RPM during max. 5 min.
Max. continuous power 5500 RPM

2.11 TEMPERATURES

Oil temperature
- maximum 284°F [140°C]
- minimum 122°F [50°C]

Cylinder Head Temperature
- maximum 302°F [150°C]

Temperature to start the engine
- maximum 122°F [50°C]
- minimum -13°F [-25°C]

2.12 OTHER LIMITATIONS

PRESSURES

Oil pressure:

- min. 11.6 psi [0.8 bar] at 3500 RPM
- normal 29 – 72.5 psi [2 – 5 bar]
- shortly during starting cold engine 101.5 psi [7 bar]

Fuel pressure:

- minimum 2.17 psi [0.15 bar]
- maximum 5.8 psi [0.4 bar]

POWER CONSUMPTION

Maximum total electrical power consumption from 12 volts sockets on instrument panel equals 5A.

PROPELLER

Reduction on the engine	Pitch angle setting
2.27:1	20.5º
2.43:1	24.2º

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

RESCUE SYSTEM USAGE LIMITATIONS

- Minimum altitude for system activation 262 ft [80 m]

2.13 FUEL AND OIL

2.13.1 THE FOLLOWING FUELS CAN BE USED:

	Usage/Description	
	912 UL /A / F	
MOGAS		
US standard	ASTM D4814	ASTM D4814
AVGAS 100 LL (see following Warning)		
US standard	Avgas 100LL (ASTM D910)	Avgas 100LL (ASTM D910)

WARNING

AVGAS 100LL paces greater stress on valve seats due to its high lead content and forms increased deposits in combustion chamber and lead sediments in the oil system. Thus it should be only used in case of problems with vapor lock or when other types of gasoline are unavailable.

CAUTION

Risk of vapor formation if using winter fuel for summer operation.

CAUTION

Obey the latest edition of Service Information SI-912-016 for selection of the correct fuel.

2.13.2 RECOMMENDED OILS

Motorcycle oil of a registered brand with gear additives. If using aircraft engine oil; than only blended one.

Use only oil with API specification "SG" or higher.

Not use oils designed for diesel engines.

CAUTION

If the engine is mainly run on AVGAS **more frequent** oil changes will be required. See Service Information SI-912-016, latest edition.

2.13.3 OIL TANK CAPACITY

Oil tank capacity 3.2 quart [3 l]

2.14 INSTRUMENT MARKINGS

2.14.1 AIRSPEED INDICATOR

Airspeed range	Arc color	
40 – 66 kts	White	$(1.1V_{S0} \div V_{FE})$
48 – 92.8 kts	Green	$(1.1V_{S1} \div V_A)$
88 – 136 kts	Yellow	$(V_A \div V_{NE})$
Above 136 kts	Red	

2.14.2 FUEL QUANTITY INDICATION

In middle part of the instrument panel there is fuel gauge having scale divided onto five fuel quantity items described E(mpty), ¼, ½, ¾ and F(ull), and equipped in yellow light.

When yellow light is glowing it means that in fuel tank is no more than 2.1 US gal [8 l] of fuel.

Separate red light switch on when in fuel tank remained unusable fuel only.

2.14.3 TACHOMETER MARKINGS

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

2.14.4 FUEL PRESSURE INDICATOR MARKINGS

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

2.14.5 ENGINE INDICATORS MARKINGS

CYLINDER HEAD TEMPERATURE INDICATOR	
Temperature range °F [°C]	**Arc color**
122 – 185 [50 – 85]	Yellow
185 – 257 [85 – 125]	Green
257 – 275 [125 – 135]	Yellow
Above 275 [135]	Red

OIL PRESSURE INDICATOR	
Pressure range psi [bar]	**Arc color**
0 – 29 [0 – 2]	Red
29 – 72 [2 – 5]	Green
72 – 101 [5 – 7]	Yellow
Above 101 [7]	Red

OIL TEMPERATURE INDICATOR	
Temperature range °F [°C]	**Arc color**
122 – 194 [50 – 90]	Yellow
194 – 230 [90 -110]	Green
230 – 284 [110 – 140]	Yellow
Above 284 [140]	Red

2.14.6 VOLTMETER MARKINGS

Areas below 12 Volt and above 15 Volts are marked with red color.

2.15 NOTICES AND PLACARDS

In the cockpit, in full view of pilot there is a placard

No aerobatic maneuvers, including spins, approved

Next to rescue system (BRS) release handle there is notice seen for both occupants.

WARNING

PARACHUTE RESCUE SYSTEM

**USE IN CASE OF AN EMERGENCY ONLY,
SEE "PILOT' OPERATING HANDBOOK".**

On fuselage upper part, in area where the rescue system is installed there is painted red triangle edged in white with notices:

"CAUTION" and **"RESCUE SYSTEM"**

SECTION 3

EMERGENCY PROCEDURES

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SECTION 3

3. EMERGENCY PROCEDURES

3.1 ELECTRIC SYSTEM FAILURE

3.1.1 ALTERNATOR / VOLTAGE REGULATOR FAILURE

Signs:

When red light on voltmeter illuminates it may indicate battery charging multifunction.

Checking:

Switch off the master switch and check electrically supplied devices operation.

If they do not operate – it confirms alternator / regulator failure.

If they operate – there exists another failure, e.g. voltmeter malfunction.

- Switch off master switch.
- Switch off all electrically supplied units, which are not necessary to flight.
- Continue flight to place where a safe landing will be possible with the current flap setting. **CAUTION**

  The battery is capable of supplying the electrical system for about 20 min. with normal flight electric flight loads including flap and trim operation. Therefore, if necessary, only switch on electrical supplied devices for short periods.

3.1.2 Battery failure (short-circuit inside battery)

Signs:

1) **Voltage drop seen on voltmeter, battery charging light doesn't illuminate, or**
2) **Tripped alternator fuses (first two from LH)**

- Switch off master switch.
- Check operation following devices:
    - flap actuator
    - trim actuator

If they operate, continue flight. If not, land in place where landing will be possible with current flap setting.

3.1.3 OVER VOLTAGE OF ELECTRICAL SYSTEM

- Switch off master switch.
- Switch off instrument panel by turning ignition key to left position.
- Continue flight to place where safe landing will be possible with the current flap setting.

Note that in case of electric system failure (battery and alternator) continuation of normal flight is possible. In which case, the following units don't work:;

- fuel gauge,
- elevator trim,
- flap actuator,
- engine starter,
- electric fuel pump,
- navigation units,
- engine parameter indicators.

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

CAUTION

Do not switch off ignition unit because after that engine starting in flight will be impossible.

3.2 AIRPLANE FIRE

3.2.1 ENGINE FIRE

- Ignition OFF
- Fuel valve OFF
- Throttle FULLY FORWARD
- Electric master switch OFF
- Perform slip to side opposite to fire (for cutting the flame)
- Perform emergency landing with engine shut-off or use parachute rescue system if it is possible or when it is good reason.

3.2.2 OTHER AIRCRAFT COMPONENT IN FIRE

- For fire source in the cockpit or accessible from the cockpit USE THE FIRE EXTINGUISHER.
- For the fire source inaccessible from the cockpit, perform the slip to the side opposite to the fire (for "cutting" the flame).
- When the fire in the cockpit is extinguished, vent the cockpit interior.
- Perform emergency landing with engine shut-off or use parachute rescue system if it is possible or when it is good reason.

3.2.3 ELECTRICAL SYSTEM FIRE

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

- Main electric system switch (Master switch) - OFF
- For fire source in the cockpit or accessible from the cockpit USE THE FIRE EXTINGUISHER
- When the fire in the cockpit is extinguished, went the cockpit interior
- According to situation, continue the flight to nearest airfield or perform the emergency landing with engine shut-off or use parachute rescue system if it is possible or when it is good reason.

3.3 ENGINE FAILURE

3.3.1 ENGINE FAILURE DURING THE TAKE-OFF GROUND RUN

- Throttle IDLE
- Brakes AS DESIRED
- Ignition OFF (ignition switch – OFF position)
- Fuel cut-off valve CLOSE
- Main electrical switch (Master switch) OFF

3.3.2 ENGINE FAILURE AFTER LIFT-OFF [up to 330 ft (100 m)]

- Ignition OFF (ignition switch – OFF position)
- Fuel cut-off valve CLOSE
- Main electrical switch (Master switch) OFF
- Avoid collision with obstacles LAND STRAIGHT AHEAD

WARNING

NEVER TRY TO TURN BACK TO RUNWAY

- Avoiding collision with possible obstacles, stop the airplane with brakes, if desired.
- In cause of engine fire escape airplane emergency (refer to paragraph 3.9.

3.3.3 ENGINE FAILURE IN FLIGHT

CAUTION

If reason of self-acting engine shut-off in flight is unknown or when the reason was fire, don't try to start the engine.

- Perform landing with engine shut-down.
- If it possible, with regarding above NOTE, start the engine in flight.
- If the in-flight engine starting is not possible, perform the emergency landing, as terrain conditions makes it possible, or use the active parachute rescue system.

3.3.4 FUEL SUPPLY STOPPING

- Fuel pressure indicator — CHECK INDICATION
- Fuel cut-off valve — OPEN
- Fuel gage — CHECK FUEL AMOUNT
- Fuel pump — ON

3.3.5 OIL PRESSURE OUT OF RANGE

- Close fuel cut-off valve and switch off ignition system.
- Perform landing with engine shout-off.

3.4 IN-FLIGHT ENGINE STARTING

CAUTION

Starting of hot engine – without choke.
Starting of cold engine – with choke.

- Establish airspeed — 60 – 62 kts.
- Set throttle lever — IDLE
- Ignition switch — ON
- Fuel cut-off valve — Open
- Electric fuel pump — ON – check fuel pressure
- Press pushbutton "START" – after engine starting — Check oil pressure
- Set required engine speed
- Monitor engine parameters during in flight.

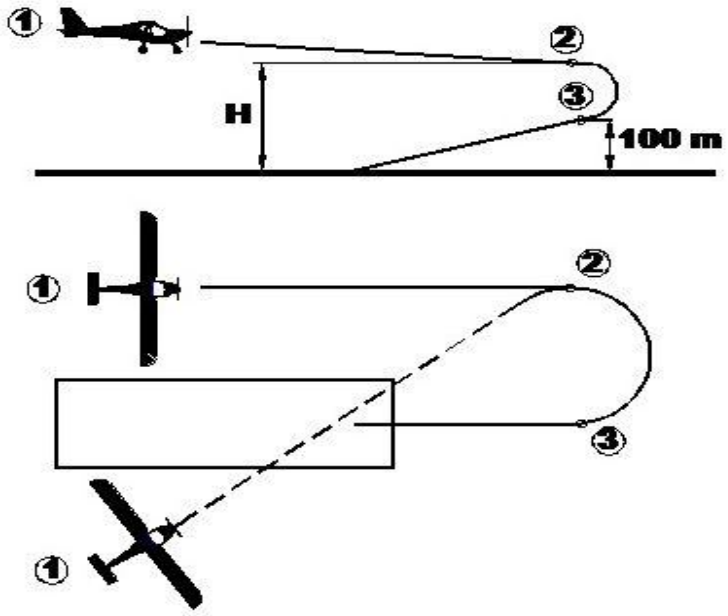
3.5 EMERGENCY DESCENDING

- Engine at IDLE.
- Decrease airspeed to 69 kts.
- Set flaps to position "1" (+15^{o}).
- Continue descending flight to desired altitude.

In case when flap position "1" setting is impossible to attain, set following airspeed:

- With flap position "0" 82 – 94 kts.
- With flap position "2" 69 kts.

3.6 LANDING WITH ENGINE SHUT-OFF



CAUTION

1) **Performing safety maneuvers for landing with shut-off engine –with turn 360° – is possible at decision height no less than 1.000 ft [300 m] above terrain.**
2) **Performing turns with shut-off engine do not exceed the bank angle 15°.**
3) **Close fuel cut-off valve and switch off ignition system.**

3.6.1 LAST STAGE OF FLIGHT

- Flap position "0" [-6°]
- Airspeed 65 kts.
- Descent 530 ft/min [2.7 m/s]
- Gliding ratio approx. 12

3.6.2 TURN INTO APPROACH FOR LANDING

- Before turn starting set flaps into position "1" (15°);
- Choose altitude of beginning phase of turn depending on bank angle (see NOTE above);
- Keep airspeed 67 kts.

3.6.3 APPROACH FOR LANDING

- Reduce airspeed below 64 kts;
- At altitude 300 ft [100 m] set flaps into position "2" [+40°];
- Set approach airspeed at 57 kts;
- Switch off master switch;
- At altitude approx. 25 ft [8 m] start with leveling out calculating that airspeed at 3 ft will be 44 kts;
- Touchdown airspeed approx. 38 kts.

Above procedure assure gently touch down on two main wheels and landing run without loss of direction.

3.7 CONTROL SYSTEMS FAILURE

If the failure of any control system element makes the safety flight impossible using other control systems use active parachute rescue system.

3.7.1 AILERON CONTROL FAILURE

The airplane lateral control is possible with rudder deflection. Performing angle of bank up to 15° is possible by means of rudder only.

3.7.2 DIRECTIONAL CONTROL FAILURE

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

3.7.3 ELEVATOR CONTROL FAILURE

When you observe lack of reaction on control stick pitch deflection but descending flight angle is approximately constant, check the airplane reaction against elevator trimmer deflection and different engine speeds.

If airplane reaction on above action is not completely safe, keep as straight a flight as possible with an airspeed of 62 kts to appropriate place where landing without turns and with extended approach will be available. Land straight ahead with powered engine. Just after touchdown, shut off the engine.

3.8 BASIC FLIGHT INSTRUMENTS FAILURE

- Set engine speed at 4500 RPM.
- Establish horizontal flight as for normal flight.
- Continue flight controlling horizontal airplane position to appropriate place where performing of landing with extended approach will be available.
- During turn do not exceed 15^{o} bank.

3.9 EMERGENCY LANDING

- Choose appropriate place for emergency landing.
  Depending on situation:
- Perform landing as landing with shut-off engine or
- If it is possible according to Section 4.12.

3.10 ABNORMAL VIBRATION

3.10.1 ABNORMAL VIBRATION CAUSED BY ENGINE OR PROPELLER FAILURE / DEMAGE

- Immediately SHUT-OFF the engine.
- Perform emergency landing with shut off engine.

3.10.2 ABNORMAL VIBRATION

- Reduce airspace.
- If vibration still exists, perform emergency landing.

3.11 AIRPLANE IN-FLIGHT EVACUATION

To perform emergency evacuation from the airplane:

1. Door locks: UNLOCK, MOVE THE LEVER DOWN
2. Pilot's belt: RELEASE
3. Doors: PUSH OUT WITH HANDS OR SHOULDERS AND ABANDON THE AIRPLANE

3.12 STALL AND SPIN RECOVERY

3.12.1 STALL RECOVERY

In case of stall:

- In straight flight – Push the control stick forward and set all control surfaces in neutral position;
- In turn - Push the control stick forward and gently act by means of aileron against bank direction;
- After retaining controllability, gently push back control stick and lead the airplane to horizontal flight
- Set engine speed as for horizontal flight.

3.12.2 SPIN RECOVERY

CAUTION

Following procedure is taken from experience with the same type of airplanes and is general recommended only.

In case of unintended spin following procedure should be done:

1. Throttle IDLE
2. Flaps RETRACT (POSITION "0")
3. Ailerons NEUTRAL
4. Rudder FULLY APPLY AGAINST SPIN DIRECTION
5. Elevator PUSH FORWARD OUT OF NEUTRAL
6. Rudder AFTER SPIN RECOVER SET IN NEUTRAL POSITION

Gently go to horizontal flight.

WARNING

INTENDED SPINS ARE PROHIBITED.

3.13 RESCUE SYSTEM USE

If rescue system use is necessary should be perform following procedure:

1.	Engine ignition system and Master switch	OFF
2.	Fuel cut-off valve	Close
3.	Release handle	Pull out min. 1 ft [0.3 m]
4.	Safety belts	Fasten
5.	Legs	Give under yourself as it possible
6.	Before touch down	Protect your head (face) with hands

NOTE: In case when rescue system was used at low altitude, start from point 3 and points 1 and 2 perform in the end.

CAUTION

During opening parachute rescue system the airplane is loaded with approximately 5 g. improper fastened safety belts may cause serious body injury.

FOR OTHER EMERGENCY SITUATIONS USE TYPICAL STANDARD PROCEDURES.

SECTION 4

NORMAL PROCEDURES

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SECTION 4

4. NORMAL PROCEDURES

4.1 GENERAL

The airplane structure and power plant must be systematically and conscientiously inspected for the damages and wear symptoms. Particularly, during the ground maneuvers small damages may occur which, if not detected, may caused decrease of the airplane operational safety. If the kind of detected damage causes any doubt, contact the professional workshop or technician before starting the repair, including even minor repair. It is particularly important for the composite structures and parts. During the walk around, check the airplane visually for the general condition. In cold weather, all accumulations (even small!) of the snow, ice or frost must be removed from the wings, empennages and control surfaces. It causes serious decreasing aerodynamic characteristics and unwanted weight increase. Check if control surfaces are free of snow, ice, frost or dirt accumulation or other foreign bodies.

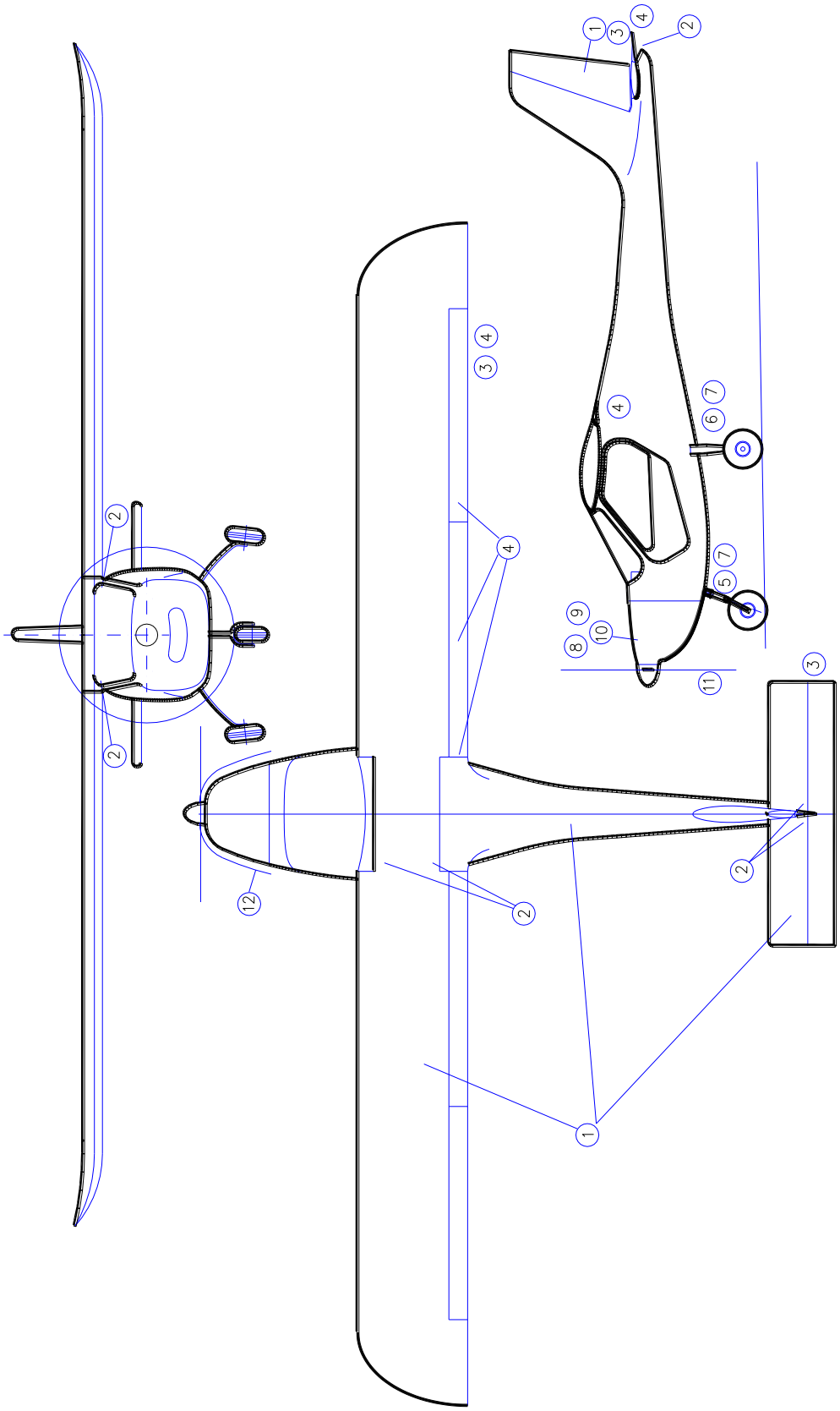
4.2 PREFLIGHT INSPECTION

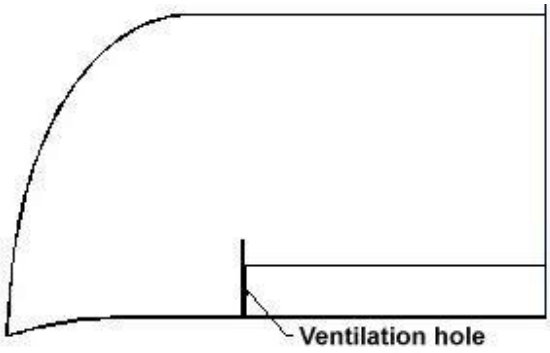
CAUTION

Before checking the power plant, be sure that the ignition system is off (ignition switch – off position), during the power plant check do not stay in the propeller range as does not necessary

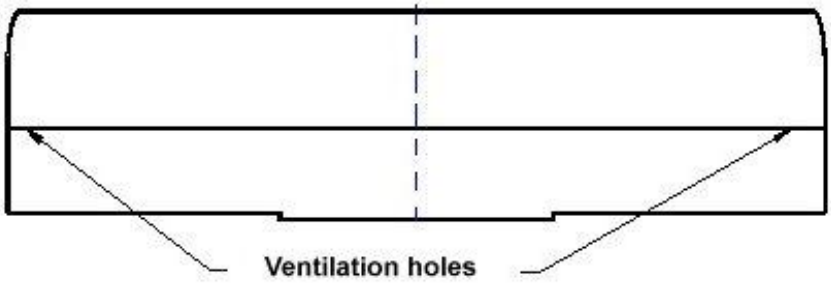
1. Check all the external surfaces for deformation and/or damages. Check vents in wings and control surfaces for obstruction.
2. Check all the accessible bolt fastenings and securities (wings, braces and stabilator to fuselage, control system push-rods and control system levers).

3. Remove the controls locks (if installed), check all the control surfaces (including wing flaps) for free deflection.
4. Check control surfaces and flap deflection (symmetry) for free movement, set flaps to "0" position.
5. Check nose forward wheel and its position. With rudder in neutral position, the wheel should be directed straight ahead.
6. Check main gear – inspect the main gear leg for cracks and ply separations and tires for general condition.
7. Check the tires pressure (26 to 29 psi) [1.8 to 2.0 bar]. Maximum pressure deference between wheels – 1.5 psi [0.1 bar].
8. Perform engine preflight inspection according to para 10.3.3 of ROTAX 912 UL Engine Operation Manual.
9. Check the oil level; refill if necessary.
10. Check the coolant level; refill if necessary.
11. Check the propeller for general condition (notches, cracks, scratches – refer to Type AS Propeller Operation and Maintenance Manual).
12. Check the engine cowlings for general condition (fastening, latches).
13. Check the engine control levers for proper function (throttle and choke), set throttle lever at MIN and choke fully push forward.
14. Check the instrument panel for general condition.
15. Check the electrical system switches positions and ignition switch position – all must be in the "OFF" position.
16. Check the cabin interior for the foreign body presence.
17. Check the safety belts status (latches proper function, wear).
18. Remove all the covers of the Pitot system (if installed), check the Pitot system holes and inlets (must be clean and not obstructed).
19. Check fuel level; refill if necessary.
20. Check that all required airplane files there are on board.
21. Check attachment of rescue system (GRS) and parachute straps to fuselage structure.

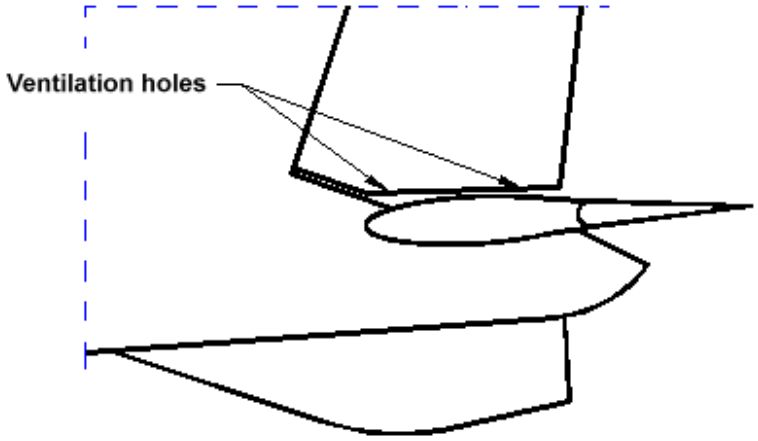




Wing ventilation holes scheme



Elevator unit ventilation holes scheme



Rudder ventilation holes scheme

4.3 BEFORE STARTING THE ENGINE

1) Check control surfaces for free move and proper deflection, set flaps to "0" position.
2) Check nose wheel and its position.
3) Check visually tires inflation.

4) Check fuel level; refill, if necessary.
5) Check oil and coolant level; refill, if necessary.
6) Check engine cowling general condition (attachments, fasteners).
7) Check whether all required files there are on board.
8) Check proper operation of engine control levers (throttle, choke); set throttle lever at MIN and choke lever press fully forward.
9) Check instrument panel general condition.
10) Check electrical system switches setting and ignition switch position – all switches should be in OFF position.
11) Check cockpit interior for foreign body.
12) Check safety belts general condition (proper operation of locks, wear).
13) Fasten and set safety belt, lock safety belt not occupied seat and secure its free ends.
14) Close and lock door.
15) Unlock active rescue parachute system by means of removing cotter pin with red flag.

4.4 ENGINE STARTING, WARM-UP AND RUN-UP TEST

1) During cold starting apply wheel chocks.
2) Pull choke lever fully backward.
3) When the engine is cold pull back choke lever and lock rotating clockwise. During hot engine starting press choke lever forward.
4) Set Master switch to ON position.
5) Put the key to ignition switch and turn one step to the RIGHT for switching on instrument panel supply.
6) Switch ignition on (both switches to ON position).
7) Set fuel valve to ON position.
8) Switch electric fuel pump. Verify fuel pressure.
9) Check whether area around the airplane is clear.
10) Start the engine by pushing the electric starter button (max. 10 sec. wait for minimum 2 minutes before next starting).
11) As the engine is running, slowly set throttle to attain smooth engine running – approx. 2500 RPM. Oil pressure should rise to 29 psi [2 bar] during 10 sec.
12) Set choke lever to OFF position.
13) Switch off electric fuel pump.
14) Warm up the engine until oil temperature attained at 122^{o}F [50^{o}C].

15) Check that max. engine speed on the ground is 5300 RPM and that the engine running is smooth.
16) Check fuel pressure at max. RPM as well as at IDLING.
17) Check engine running at 1400 RPM (IDLING).
18) Set engine speed at 4000 RPM. Check both ignition system circuits by means of switching-off one of them and then the other. Maximum RPM drop on each magneto should not exceed 300 RPM. Maximum difference between both ignition system circuits should not exceed 115 RPM.

4.5 TAXING

The airplane starts moving on the grass with 2500 RPM. After that, check wheel brakes efficiency. During taxiing control stick should be in neutral position and taxi with velocity 8 Kts at 2400 RPM.

4.6 PRIOR TO TAKE-OFF

- Brake the wheels.
- Check the control surfaces free deflections.
- Check the engine running (using the instruments and "by ear").
- Choke pressed fully backward - **VERIFY**.
- Main fuel valve at ON position - **VERIFY**.
- Both ignition switches at ON position - **VERIFY**.
- Set elevator trimmer at neutral position - **VERIFY**.

4.7 TAKE-OFF

- Check the runway allowance.
- Flaps position "1" (+15^{o}).
- Electric fuel pump – ON.
- Apply the wheel brakes.
- Throttle lever – FULL RPM – set MAX.
- Release wheel brakes.
- Ground run with the stick gently backward for unloading nose wheel.
  1. At airspeed approx. 41 Kts (IAS) smoothly pull the stick and lift-off.
- Rate of climb up to 50 ft [15 m] 8.2f/s (2.5 m/s).
- Final take-off airspeed on 50 ft [15 m] – 59 Kts (IAS).

4.8 TAKE-OFF RUN WITH CROSSWIND

During take-off run, compensate loss of direction by means of rudder deflections and smooth movements of rudder. Aileron should be deflected. If necessary, against the wind. When airspeed increases, aileron should be retracted to position, which doesn't force the airplane to bank.

4.9 CLIMBING

4.9.1 CLIMBING AFTER TAKE-OFF UP TO 164 ft [50 m]

- Airspeed: 59 Kts (IAS)
- Flaps position: "1" (+15^{o})
- Throttle lever: FULLY OPEN

4.9.2 CLIMBING TO CRUISING ALTITUDE

- Airspeed: 115 km/h
- Flaps position: "0" (-6^{o})
- Throttle lever: 5000 RPM
- Switch off electric fuel pump at safe altitude.

4.9.3 BEST RATE OF CLIMB AIRSPEED

Best climb angle airspeed V_x = 59.4 Kts w = 780 ft/min [4.0 m/s]
Best rate of climb airspeed V_y = 75.0 Kts w = 925 ft/min [4.7 m/s]

4.10 LEVEL FLIGHT

- Flaps position: "0" (-6^{o})
- Set engine RPM accordingly to the desired cruise airspeed (refer to SECTION 5).

4.11 STALL

CAUTION

Performing of stall on the airplane is permissible only for showing flying properties during demonstration flights.

- Determine flight conditions (flap position, engine speed).
- Decrease the airplane speed by pulling stick backward with rate 1 Kts/s until nose dropping can be controlled.
- During straight flight – the stall characteristics are the same for all flap settings and center of gravity position. The airplane stalls unwillingly performing flight with control stick pulling-out having light longitudinal oscillations, which can be corrected with the increase of descent.
- When airspeed is close to stall the airplane still has proper reaction against aileron and control surface deflections. Recovery from stall will come 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 pulling-out having light longitudinal and lateral oscillations which can be corrected with the increase of descent. The rest of conditions are for straight flight.
- Recovery from stall – refer to SECTION 3.10.1.

4.12 DESCENDING

- Flaps position: "0" (-6^{o})
- Engine speed as needed for intended airspeed.

4.13 GLIDING

Gliding flight with the throttling engine:

-with flaps setting to "0" (-6^{o}) position and recommended airspeed 63 Kts (IAS);

- rate of descend for this airspeed equals 400 ft/min [2.0 m/s];
- with flaps setting to "1" (+15^{o}), position, recommended airspeed equals 59 Kts (IAS). Rate of descent equals 430 ft/min [2.2 m/s].
- with flaps setting to "2" (+40^{o}), position, recommended airspeed equals 55 Kts (IAS). Rate of descent equals 510 ft/min [2.6 m/s].

4.14 APPROACH AND LANDING

CAUTION

Before beginning landing maneuvers switch on electric fuel pump.

Circling flight conditions:

- Altitude 656 ft [200m]
- Flap position "0" (-6°)
- Engine speed 4000 RPM
- Airspeed (IAS) 90 Kts.

From 3-rd to 4-th turn:

- Reduce airspeed to approx. 74 Kts.
- Flap position "1" (+15°)
- Reduce engine speed to 3000 RPM

After 4-th turn:

- Airspeed 70 Kts reduce to 66 Kts (descending 400 ft/min [2.0 m/s]) (at rain weather approach speed higher approx. 3 Kts)
- Reduce engine speed to 2000 RPM
- Set flaps to "2" (+40°)
- Trim the aircraft and smoothly reduce airspeed so that:
  - at altitude approx. 20 ft [6 m] airspeed was 54 Kts.
  - close to ground (1.6 ft [0.5 m])] airspeed was 44 Kts.
  - Establish airplane position for touchdown on main wheels.
- touchdown airspeed 38 Kts,
- during first phase of landing run keep 2-point position and hold ahead direction (gent rudder move – don't use brakes),
- second phase of landing run, to reduce velocity gently use brakes.

4.15 LANDING WITH CROSSWIND

CAUTION

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

NOTE

Demonstrated crosswind airspeed equals 14.5Ktss (7.4 m/s).

2. Switch on electric fuel pump.
3. Approach and landing with cross wind stronger than 9.7Ktss(5 m/s) should be done with flaps setting to "1" position (+15°);

- at altitude approx. 20 ft [6 m] airspeed was approx. 54 Kts.
- close to ground (approx. 1.6 ft [0.5 m])] reduce airspeed to touchdown speed - 44 Kts.

4. During approach hold direction of flight by means of aileron and rudder.
5. Before touchdown level flight path for touchdown on central line (without bank).
6. During first phase of landing run rudder deflection should be done smoothly and at small range; control stick deflection against the wind help to hold direction.
7. During second phase of 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 flaps. When velocity decreases change aileron deflection, as desired.

CAUTION

During crosswind reduce taxing velocity (in relation to normal taxing) simultaneously push control stick forward and deflect control stick against the wind.

4.16 BALKED LANDING

- Throttle lever: FULL RPM – MAX. position.
- Flap deflection: the same as for approach to landing.
- Go to climbing
- Airspeed: for flap position "2" 52 Kts (IAS)
  for flap position "1" 55 Kts (IAS)
  for flap position "0" 60 Kts (IAS)
- On target altitude pass to level flight, set desired flap position and adjust RPM for desired airspeed.

4.17 AFTER LANDING

- Throttle lever: INCREASE RPM UNTILL THE RUDDER WILL BE EFFECTIVE
- Wing flaps position: "0" (-6^{o})
- Wheel brakes USE, IF NEEDED
- During landing with crosswind control yawing by means rudder and ailerons.

4.18 ENGINE SHUT-DOWN

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

- Switch-off ignition unit - selectors in "OFF" position.
- Master switch OFF.
- Electric fuel pump OFF.

4.19 AIRPLANE PARKING

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

SECTION 5

PERFORMANCE DATA

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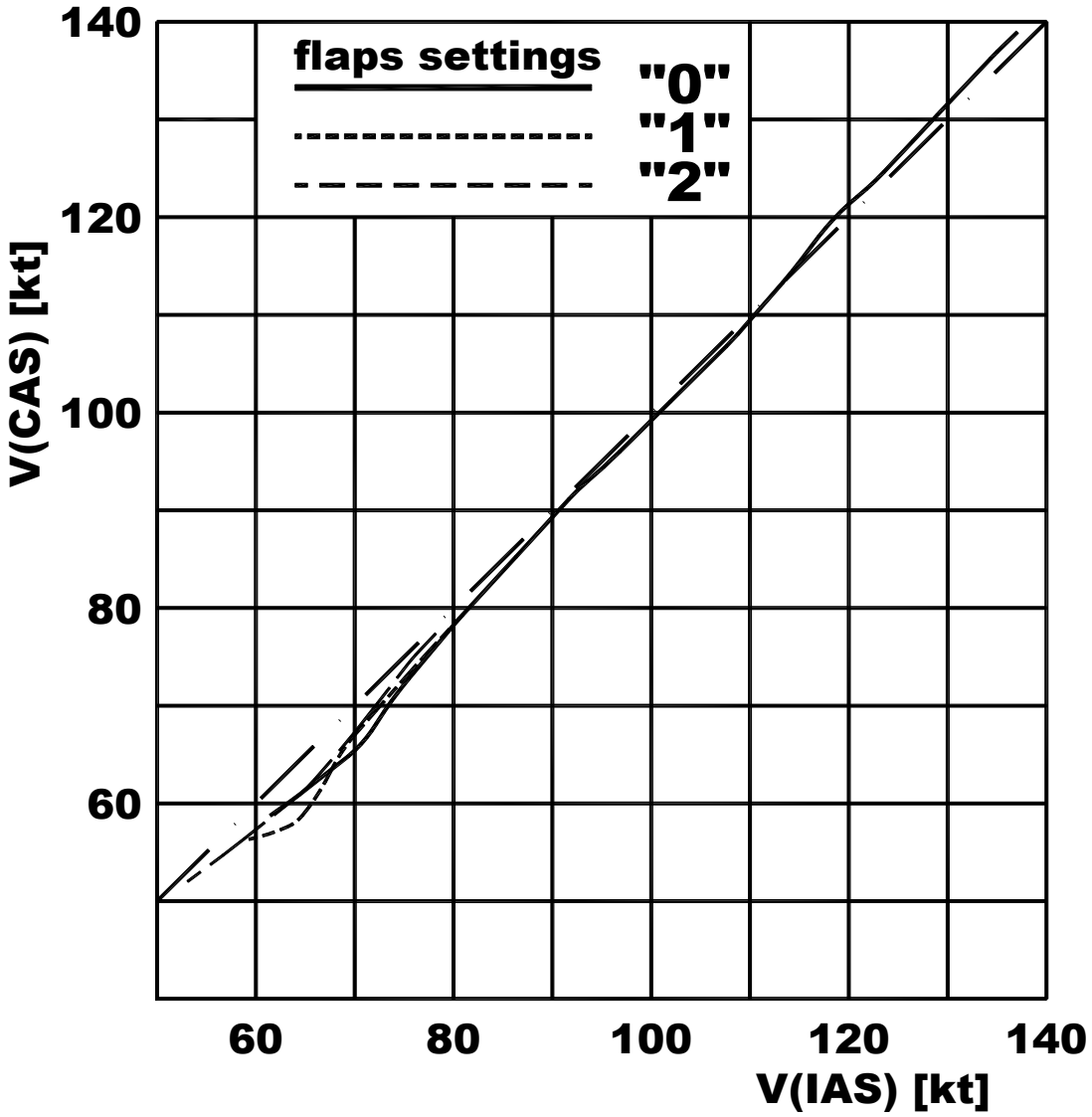
SECTION 5

5. PERFORMANCE DATA

5.1 AIRSPEED INDICATOR SYSTEM CALIBRATION



5.2 AIRSPEED (IAS) AND FLYING RANGE AT LEVEL FLIGHT

- for take-off weight 1235 lbs [560 kg] and altitude 1970 ft [600 m] MAW

Engine speed [RPM]	Airspeed [kt]	Flying range [NM]	Flying range [km]
4000	77	427	790
4500	88	372	689
5000	98	340	630
5200	103	320	593
5500	108	270	500

5.3 CLIMB

- for total weight 1235 lbs [560 kg], at sea level and engine speed 5200 RPM

Flap position	Best airspeed of climb		Best angle of climb	
	w [m/s]	V [kt]	w [m/s]	V [kt]
„0" (-6º)	4.7	72	4.0	61
„1" (+15º)	3.9	54	3.2	48
„2" (+40º)	3.1	46	2.6	44

5.4 FLIGHT WITH SHUT-OFF ENGINE

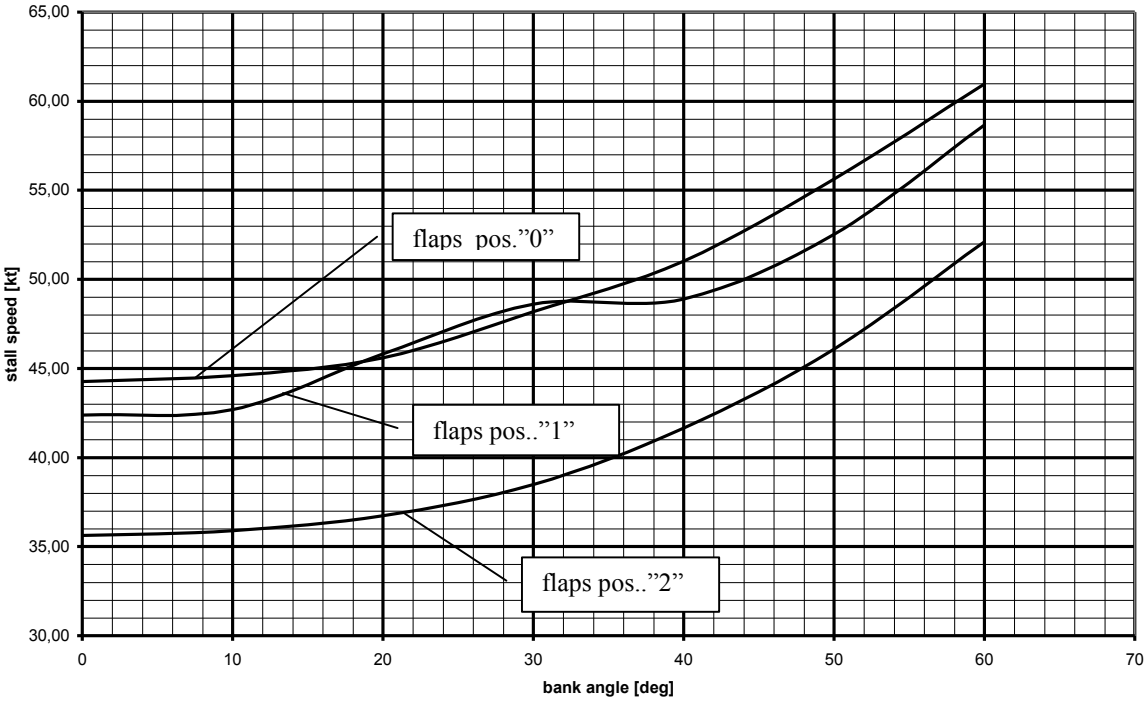
In table below there are optimal airspeeds during descending and flying range with shut-off engine for loss of 3280 ft [1000 m] altitude.

Flaps	V_{OPT} [kt]		w_Z [m/s]	**RANGE** [NM]	**RANGE** [km]
	CAS	IAS			
„0" (-6º)	67	72	-2.12	7.15	13.26
„1" (15º)	62	67	-2.21	6.97	12.9
„2" (40º)	50	50	-2.34	5.45	10.1

5.5 STALL SPEED

- for total weight 1235 lbs [560 kg] and engine idle

Flaps	V [kt] (IAS)	V [km/h] (IAS)	V [kt] (CAS)	V [km/h] (CAS)
„0" (-6º)	23.8	44	23.8	44
„1" (+15º)	22.9	42.4	22.7	42.1
„2" (+40º)	19.8	36.6	19.2	35.6



Stall airspeed vs. bank angle

5.6 TAKE-OFF DISTANCE to 50-foot [15 m] obstacle, total weight 1235 lbs [560 kg]

Flap position "1" (+15°), lift-off airspeed 38 kt (IAS)
Acceleration during climbing up to 51kt (IAS) for H = 50 ft [15 m]

Runway	Take-off run [ft]	Take-off run [m]	Take-off to 50 ft obstacle [ft]	Take-off to 50 ft obstacle [m]
Grass	380	115	740	226
Concrete	295	90	725	221

5.7 LANDING DISTANCE

Landing distance for grass runway from 50-foot [15 m] obstacle equals approximately 660 ft [200 m] – flap position "2" (+40^{o}) and approach airspeed 55 kt (IAS).

SECTION 6

WEIGHT AND BALANCE

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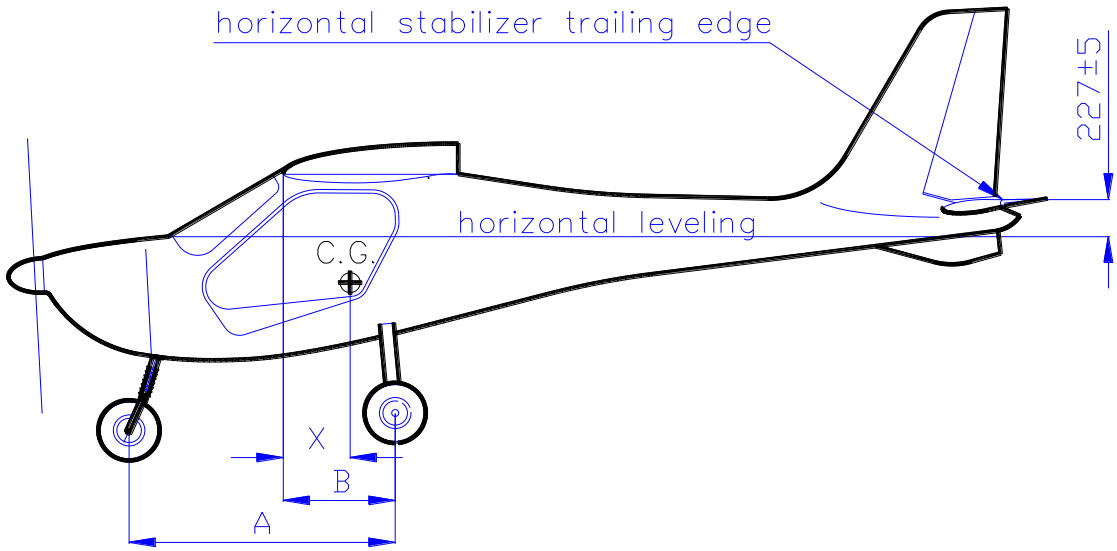
SECTION 6

6. WEIGHT AND BALANCE

6.1 AIRPLANE WEIGHING PROCEDURE

The airplane should be placed on three scales 0 to 500 lbs [0 – 200 kG] range each. Wings must be in horizontal position and the dimension 10.79 ± 0.2 in [287±5 mm] must be observed (see figure below).



Measure distance A and B.

Record weight on each scales.

Calculate empty weight with formula:

$$W_{SP} = W_N + W_{ML} + W_{MR}$$

6.2 CENTER OF GRAVITY (CG)

Calculate center of gravity (X) for the airplane empty weight with the formula below:

$$X = B - \frac{W_N \bullet A}{W_N + W_{ML} + W_{MR}}$$

where: W_N - nose wheel scale reading
W_{ML} – RL main wheel scale reading
W_{MR} – RP main wheel scale reading

6.3 EMPTY AIRPLANE WEIGHT AND CENTER OF GRAVITY LOCATION

Equipped empty weight of airplane serial number: 30 - …… - …..
With - engine oil 3.17 U.S. quart [3 l]
- coolant 2.64 U.S. quart [2.5]
- unusable fuel 2.11 U.S. quart [2 l]
and equipment recorded I The airplane Log Book.

N°	Date	Airplane empty weight lbs [kg]	Empty weight CG location X_{SP} (in) [mm]	Max. crew weight Wz_{max} (lbs) [kg]	Signature
		305.5kgs			

6.4 AIRPLANE LOADING

Minimum total weight on both pilot seats 132 lbs [60 kg]

6.5 CENTER OF GRAVITY DETERMINATION

When the airplane complies with limitations from Section 2 and 6, empty weight CG always will be located between permissible limits (para 2.5).

Current location of the airplane CG for specific loading may be calculated with the following formula:

$$X = \frac{W_{SP} \cdot X_{SP} + X_Z \cdot W_Z + X_{Pal} \cdot W_{Pal} + X_{Bag} \cdot W_{Bag}}{W_{SP} + W_Z + W_{Pal} + W_{Bag}}$$

where: W_{SP} – airplane empty weight (*)
X_{SP} – empty airplane CG location
W_Z – weight on pilot seats
X_Z – crew arm (190 [mm] = 7.48 [in])
W_{Pal} – fuel weight
X_{Pal} – fuel arm (460 [mm] = 18.11 [in])
W_{Bag} – luggage weight
X_{Bag} – luggage arm (704 [mm] = 27.72 [in])

(*) – refer to table from para 6.3

or using chart listed below

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Loading Schedule Chart							
Your Aircraft			**Sample Aircraft**			**Your Aircraft**	
No	**Item**	**Arm* [in]**	**Arm [in]**	**Weight [lb]**	**Moment [lb·in]**	**Weight [lbs]**	**Moment [lb·in]**
1	**Empty Airplane**		9.39	674	6330.46		
2	**Crew**	7.48		308.64	2308.63		
3	**Fuel**	18.11		22.11	400.41		
4	**Baggage – top compartment****	27.72		17.64	488.98		
5	**Baggage – bottom compartment*****	27.72		66.14	1833.40		
6	Take off weight = Sum of weights 1-5 **(MTOW 1235 [lb])** Total moment = Sum of moments 1-5			**W= 1088.53**	**M= 11361.88**	**W=**	**M=**
7	**Computed CG = W / M Must to be between 8.30 – 12.17 [in]**			**10.44**			

*) – for your empty airplane arm see "Sheet of the plane weighing" delivered with your plane

**) – max load 11 [lb] for each top compartment (left or right)

***) – max load 33 [lb] for each bottom compartment (left or right)

SECTION 7

AIRPLANE AND SYSTEMS DESCRIPTION

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SECTION 7

7. AIRPLANE AND SYSTEMS DESCRIPTION

7.1 AIRFRAME

FUSELAGE – Shell-like structure made of composite based on vinyl ester resin and glass and carbon fiber. The fuselage is made as a one piece with fin. Windscreen and door windows are made of Plexiglas.

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 situated side-by-side and equipped with seat belts. The luggage shelf is situated in rear part of the cockpit.

WING – one-piece cantilever wing. Shell-like structure made of vinyl ester resin composite reinforced with carbon and glass fiber.
The wing is equipped with ailerons and slotted flaps.

EMPENNAGE – classical design. Shell-like structure made of composite based on vinyl ester resin and glass and carbon fiber.

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 actuated with rubber rings. It is mounted on controllable fork (15^{o} of turn each direction). Wheels dimensions 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, placed in the middle of cockpit.

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

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

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

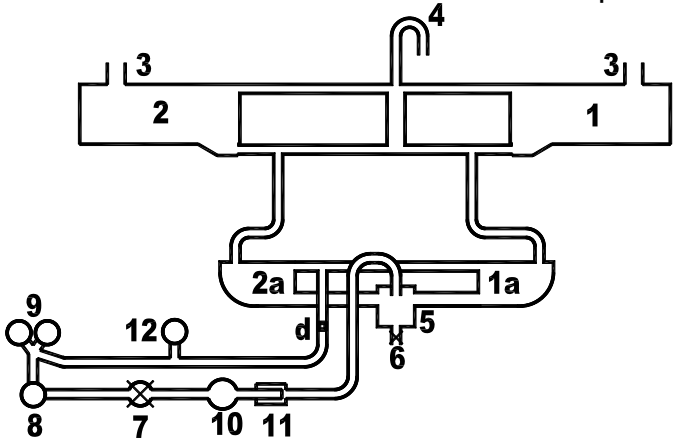
RUDDER – pedals movements are transferred to rudder through a system of rigid push-pull rods.

7.3 POWER PLANT

Refer to description in Suction 1.3 and 1.4.

7.4 FUEL SYSTEM

Two connected tanks of total capacity 18.5 U.S. gallon [70 litres], made of vinyl ester resin composite reinforced with fibre glass are placed in the wing and two buffer tanks 1.06 U.S. gallon [4 litters] each there are in bottom part of fuselage, behind the cockpit. Sedimentation tank of 0.02 U.S. quart [40 cm^3] capacity with a valve situated under the fuselage. Fuel cut-off valve is located on the dashboard, before instrument panel. The system is equipped with mechanical fuel pump already mounted on the engine that is driven by propeller shaft and additional electric fuel pump, which is operated by switch located on the instrument panel. The electric pump is to be used for initial filling of the mechanical pump and as auxiliary pump for take-off and landing and also considered to be a stand-by pump. Fuel inlets with a lockable plug are located on the upper side of the wing. Fuel quantity is indicated by means of electric gauge with indicator located on the instrument panel.

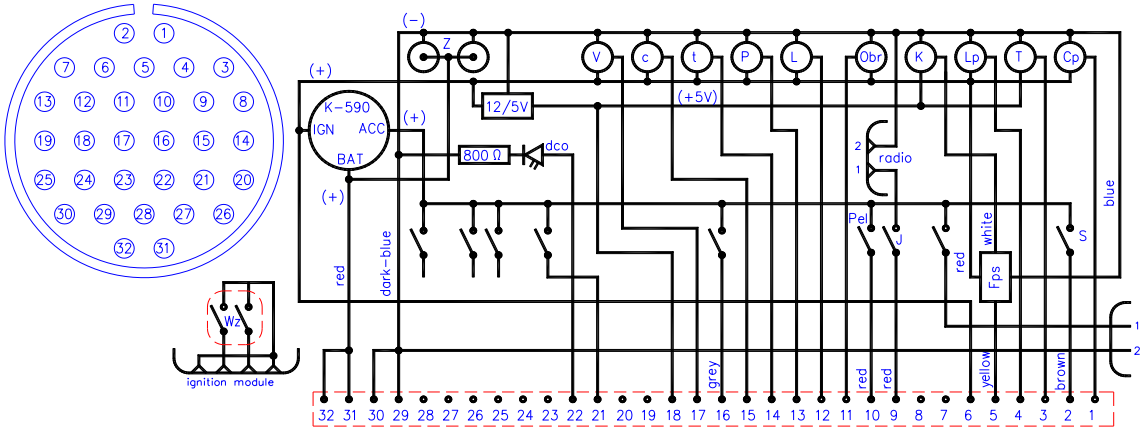


Fuel system diagram

1	LH tank	5	Sedimentation tank	10	Electric fuel pump
2	RH tank	6	Drain valve	11	Fuel filter
1a, 2a	Tank buffers	7	Cut-off valve	12	Fuel pressure sensor
3	Fuel inlets	8	Fuel pump		
4	Vent	9	Carburetors	d	Choke

7.5 ELECTRICAL SYSTEM

Two conductor electrical system of 12V DC. The main source of power is an alternator 13,5 - 14,2 V, 240 W (AC, monophase, constant excitation with interference reducer). Auxiliary (back-up) source of power is a battery 12V/17Ah (lead-acid, maintenance free).
Electrical system provides power for all instruments and during engine starting to starter. The system is not equipped with a ground service plug receptacle.



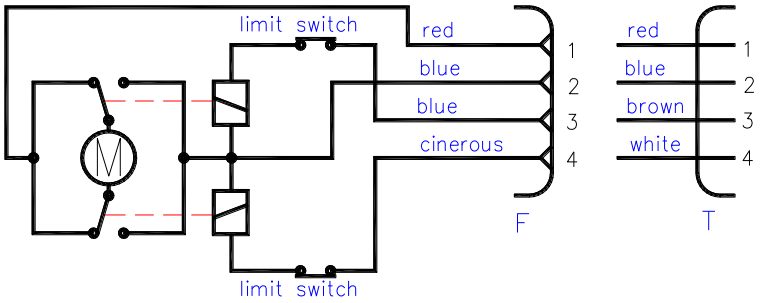
Instrument panel electrical wiring diagram

t-	Oil temp. indicator	K-	Flap position indicator	Switches:	
c-	Oil pressure indicator	T-	Trimmer pos. indicator	Pel-	Elec. fuel pump
P-	RH head temp. indicator	Lp-	Fuel gauge	S-	Anti-collision lamp
L-	LH head temp. indicator	Cp-	Fuel pressure indicator	Wz-	Ignition cut-off
Obr-	Engine speed indicator	V-	Voltmeter	Z-	Lighter socket

Wiring diagram of flaps and trimmer actuators

F – flaps actuator (socket)

T – trimmer actuator (plug)



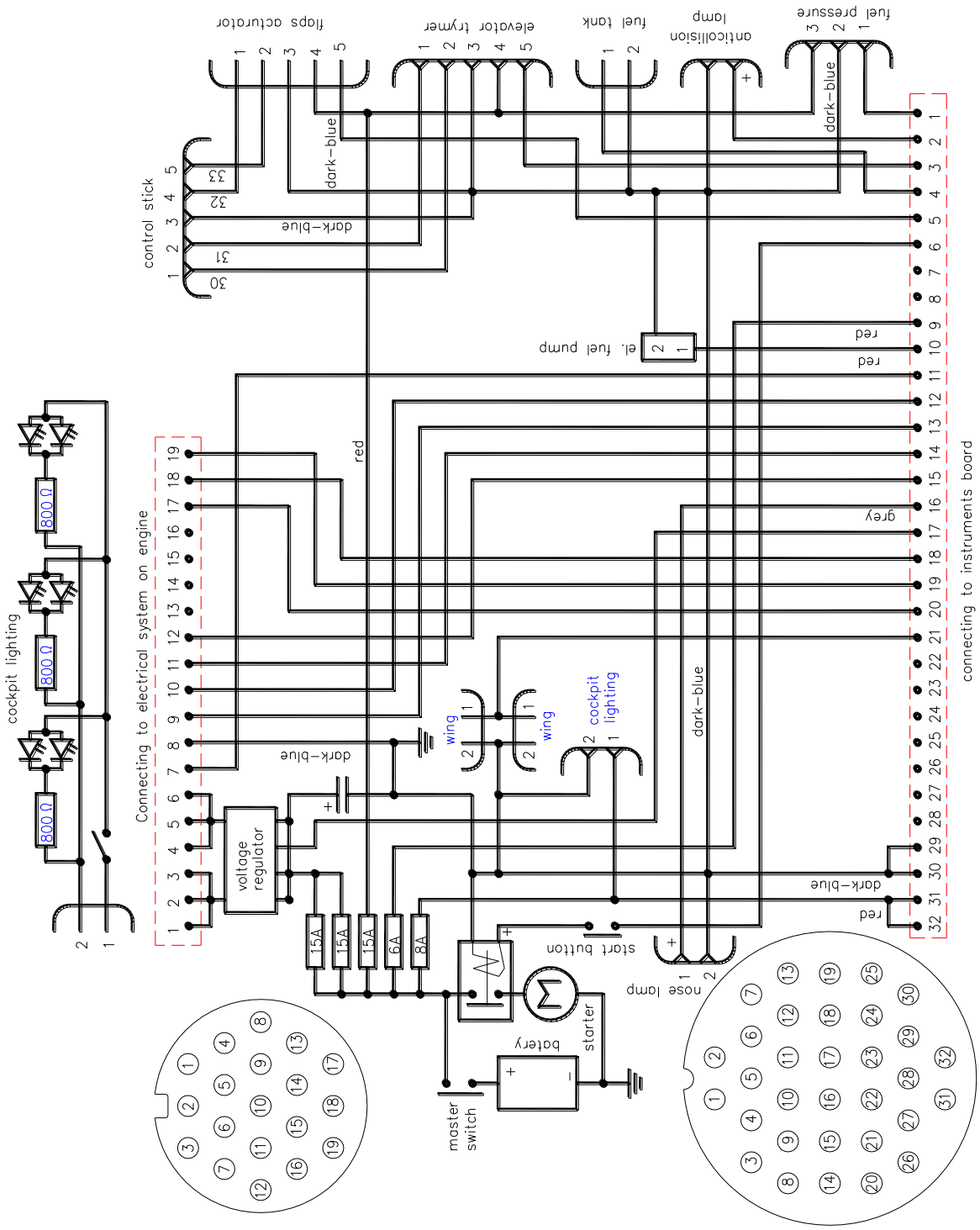
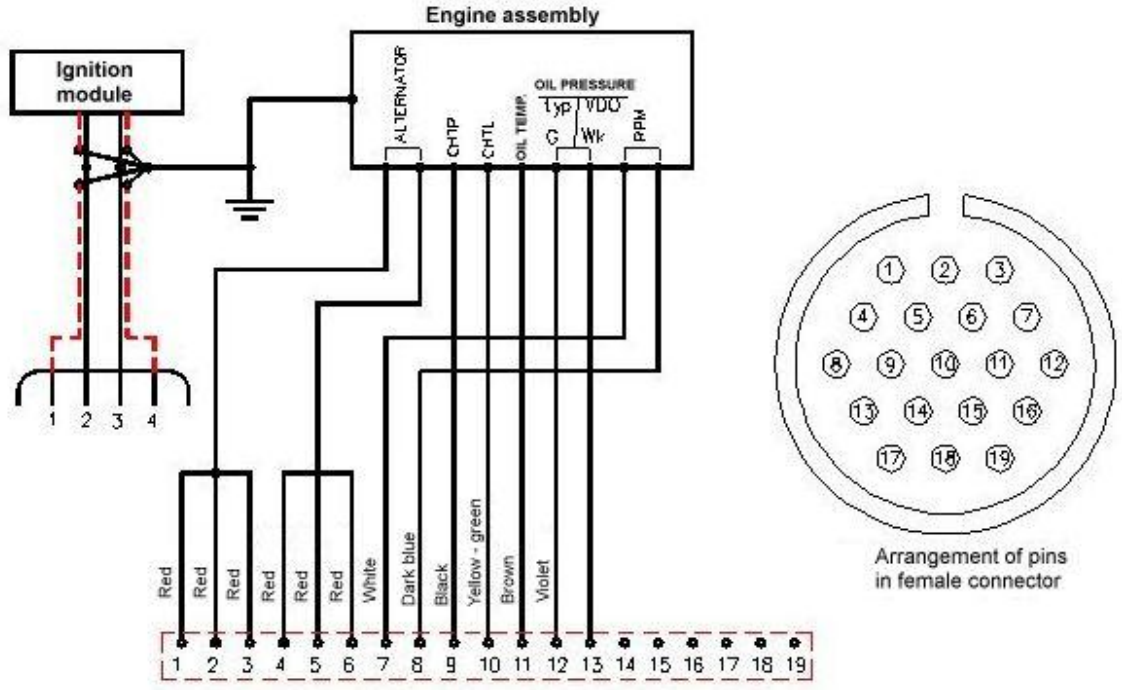
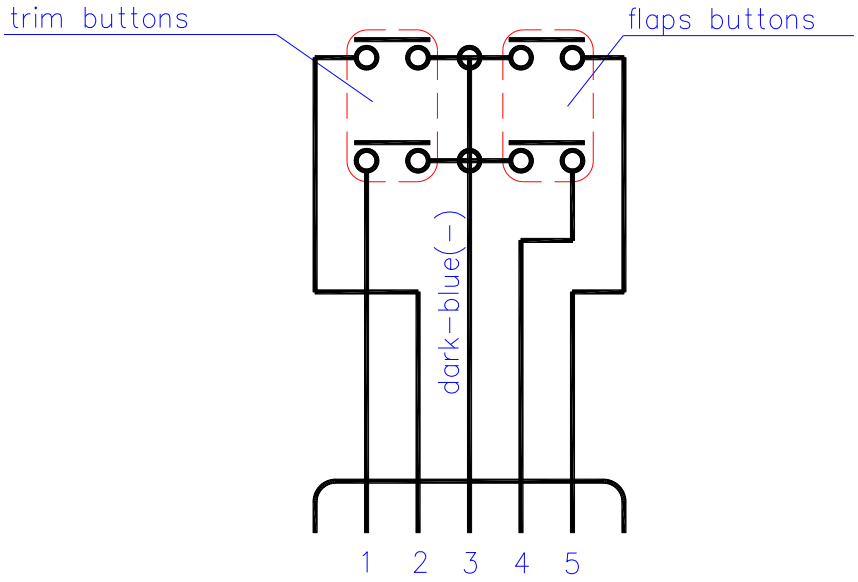


Diagram of electrical wiring inside fuselage



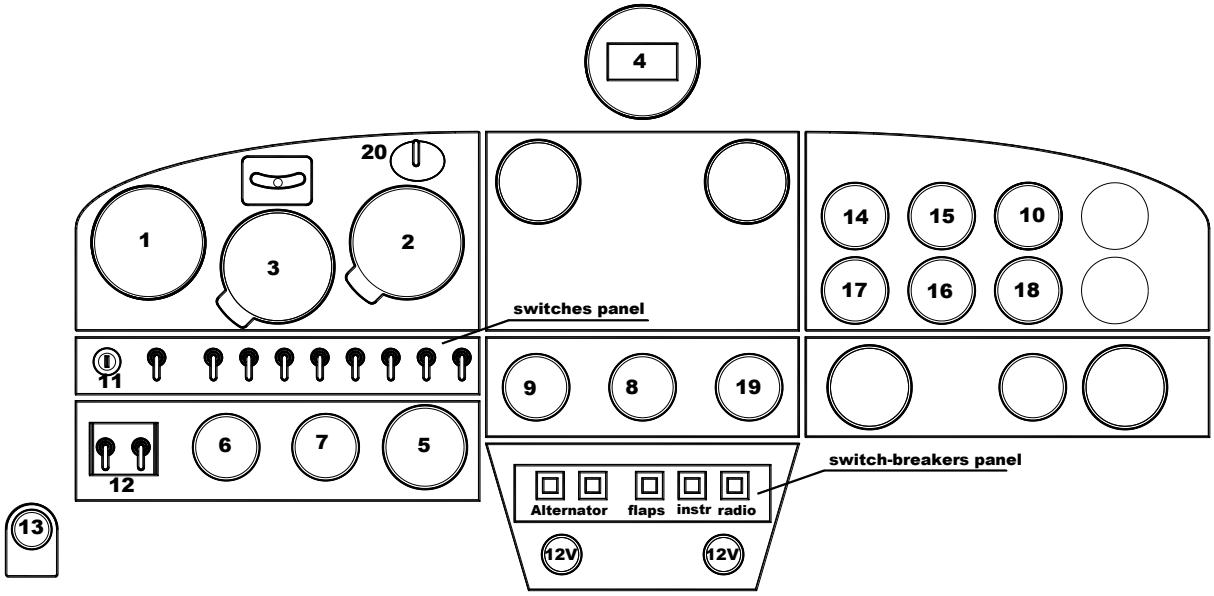
Engine wiring diagram



Control stick wiring diagram

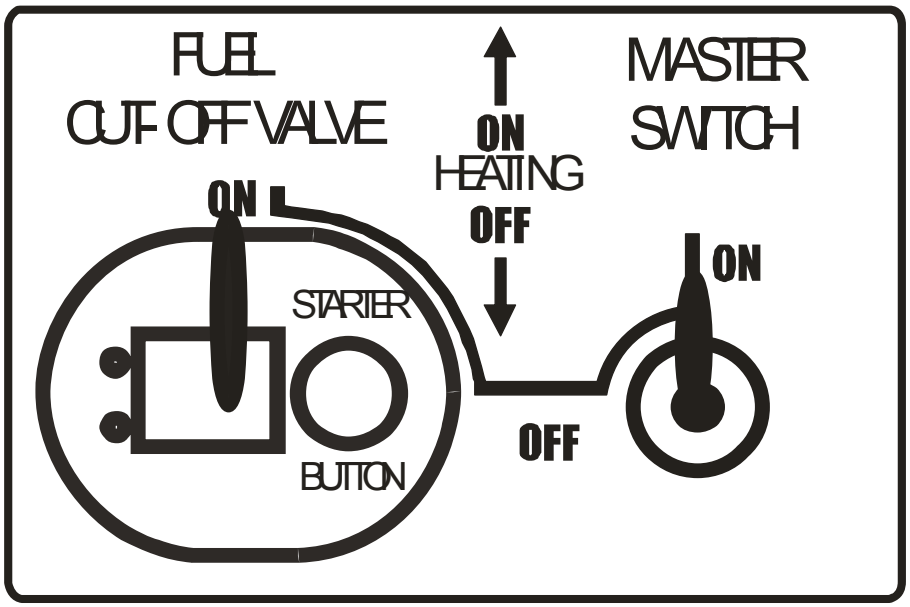
7.6 COCKPIT

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



Instrument arrangement on the instrument panel

1	Air Speer indicator BK-300	11	Ignition switch
2	Rate-of-climb indicator BG-10	12	Ignition key
3	Altimeter BG-3E	13	Choke
4	Compass	14	LH head temperate indicator
5	Tachometer	15	RH head temperate indicator
6	Flap position indicator	16	Oil temperature indicator
7	Elevator trimmer position indicator	17	Oil pressure indicator
8	Fuel gauge	18	Flight time counter VDO
9	Fuel pressure indicator	19	„Zero of fuel" indicator
10	Voltmeter	20	Carburetors heating control



Panel on central tunnel

Control stick head

Throttle lever on RH side

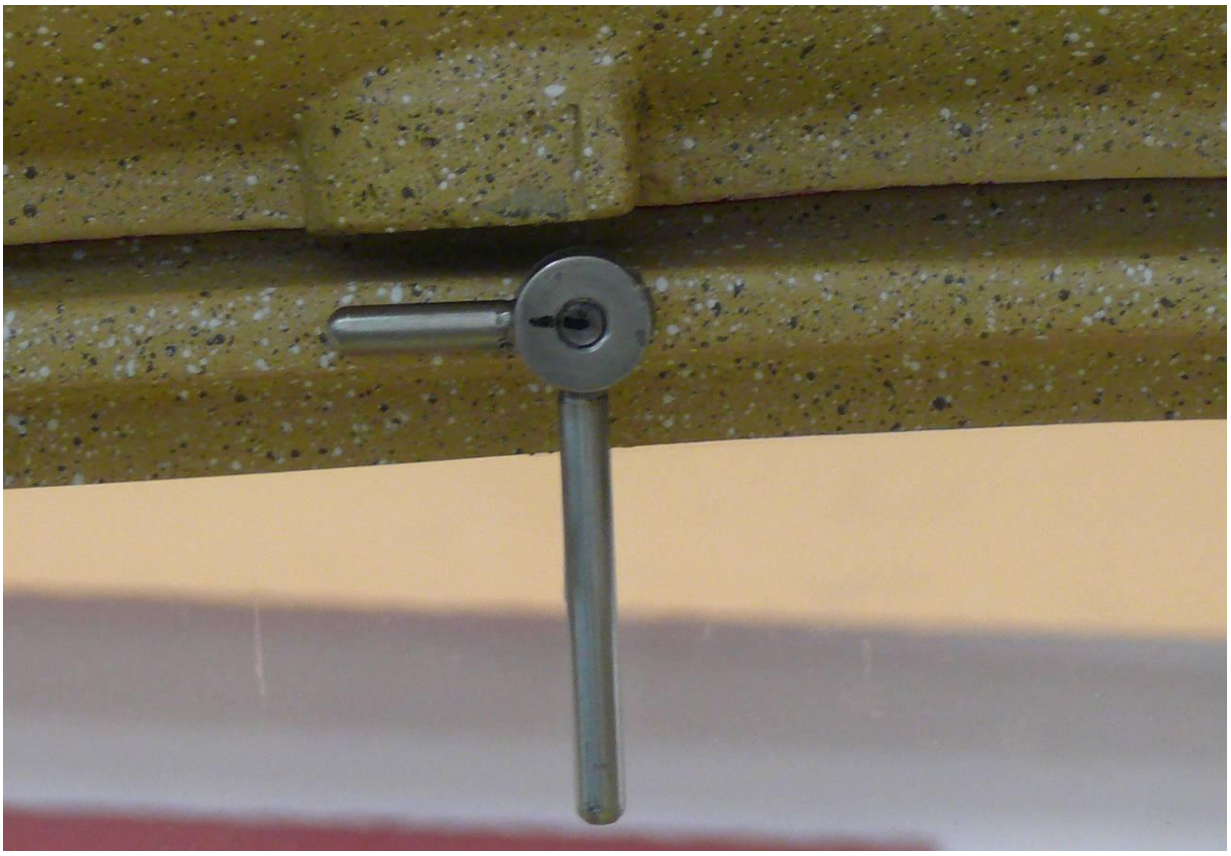
Throttle lever on LH side

COCKPIT DOOR LOCK

Bottom door lock on LH side
Closed position

Bottom door lock on LH side
Open position

Upper door lock on LH side
Closed position



Upper door lock on LH side
Open position

Locks on RH side are symmetrically to LH side

SECTION 8

HANDLING, SERVICING AND PERIODIC INSPECTIONS

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SECTION 8

8. HANDLING, SERVICING AND PERIODIC INSPECTIONS

8.1 LIST OF EFFECTIVE MANUALS

- **Rotax 912 Engine Operation Manual**
- **Rotax 912 Engine Maintenance Manual (line maintenance)**
- **AS Propeller Operation and Servicing Manual**
- **GRS Galaxy Rescue System Operational Manual**

8.2 HANDLING

8.2.1 HANDLING ON THE GROUND

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

b) Filling up of the oil system: top the system up with oil poured straight from original bottle or clear can, using insert with metal filter net.

c) Filling up of the coolant: Pour in the coolant into expand chamber up to 2/3 of capacity. Fluid level should be between min. and max. marks of overflow tank.

d) Towing and moving:

The airplane can be towed ahead. Towing rope must be attached to the front wheel sleeve, above the rubber shock absorber. Towing speed – 2.7 kt [5 km/h].

The airplane can be moved:

- forward, by hand pushing of fuselage,
- backward, by hand pushing of fuselage or wing root area.

During backward moving the front wheel must be lifted avoiding its contact with the ground.

e) Ground anchorage:

The airplane should be moored using eye bolts screwed located on the bottom of wings and by means of clamp mounted on the nose shock absorber leg.

f) Supporting:

The airplane may be supported in place where main wheels legs enter to fuselage (bottom edge of leg), directly after steel tube of the nose shock absorber leg and on profile soft pad under ventral fin.

8.2.2 WASHING AND CLEANING

a) Exterior, painted surfaces may be washed using soft piece of cloth (flannel, chamois leather) and water mixed with mild detergent (without abrasive additives).

b) Windows and windscreen- as 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 airplane.

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

e) Propeller can be cleaned as windows. Dead insect removal fluid can be used .

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

8.3 MAINTENANCE

8.3.1 BEFORE FIRST FLIGHT IN THE DAY - EXTERNAL

Refer to SUBSECTION 4.2.

8.3.2 AFTER LAST FLIGHT IN THE DAY

a) Turn off master switch (verify).
b) Carry out checks according to para 8.5.1.
c) Wash and clean the airplane (outside and inside)
d) Close and lock the doors.
e) Put locks on control surfaces and install engine cowling, covers of windows, wheels and Pitot system.

8.3.3 LUBRICATION

Elements that need periodical lubrication:

- control stick articulation joint (in the seat at base)
- connection of the rudder crosshead pipe and elevator push-pull rod.

With the help of syringe push a small amount of lubricant into the plastic seat of the joint. Exposed area of the steel ball must be covered with thin layer of lubricant or Vaseline.

The rest of the articulation joints do not need lubrication. They may be covered with lubricant periodically to protect them against corrosion.