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PUMA
ADVANCED ULTRALIGHT

FLIGHT & OPERATING MANUAL

EDITION 2007 - October

AIRCRAFT SERIAL NUMBER: **AB-59-20-0610**

NOTE:

The following flight & operating manual should be kept with the aircraft at all times.
In case of address change, new ownership, or aircraft damage, it is the responsibility of the owner/operator to advise the manufacturer. This allows us to send updates and new information.

FIRST OWNER

OWNER: Otreb Technologies Inc.

ADDRESS: 2561 Rue De La Symphonie

CITY: ST-Lazare **STATE OR PROVINCE:** QC **COUNTRY**: CANADA

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EMAIL ADDRESS: humberto@puma-aircraft.com

AIRCRAFT REGISTRATION NUMBER: C-IPUM

AIRCRAFT FRAME HOURS: 0

ENGINE HOURS: 0

SECOND OWNER

OWNER: _____

ADDRESS: _____

CITY: _____ **STATE OR PROVINCE:** __ **COUNTRY**: _____

PHONE HOME: _____**PHONE OFFICE**: _____**FAX:** _____

EMAIL ADDRESS: _____

AIRCRAFT REGISTRATION NUMBER: _____

AIRCRAFT FRAME HOURS: ___

ENGINE HOURS: ___

CONTENTS

INTRODUCTION

This manual is integral and part of the airplane documents.
To ensure a safe flight, read carefully, follow instructions and pay particular attention to aircraft limitations.
It is strictly prohibited to alter this manual in anyway.
Situation or descriptions are highlighted as follows:

AIRCRAFT DESCRIPTION

The PUMA Advanced Ultra-light Aircraft is two seat tricycle tractor hi wing monoplane. The wing is connected through a rigid structure and may have optional folding wing system. The Aircraft landing gears are tricycle configuration with castering nose gear.
The fuselage structure is epoxy resin fiberglass moulded under vacuum and cured at high temperature.
The wing structure, ailerons wings, flaps, horizontal and vertical stabilizers are fabricated on 2024 T3 and 6061 T6 aluminium.
All the others parts are in 6061 T6.

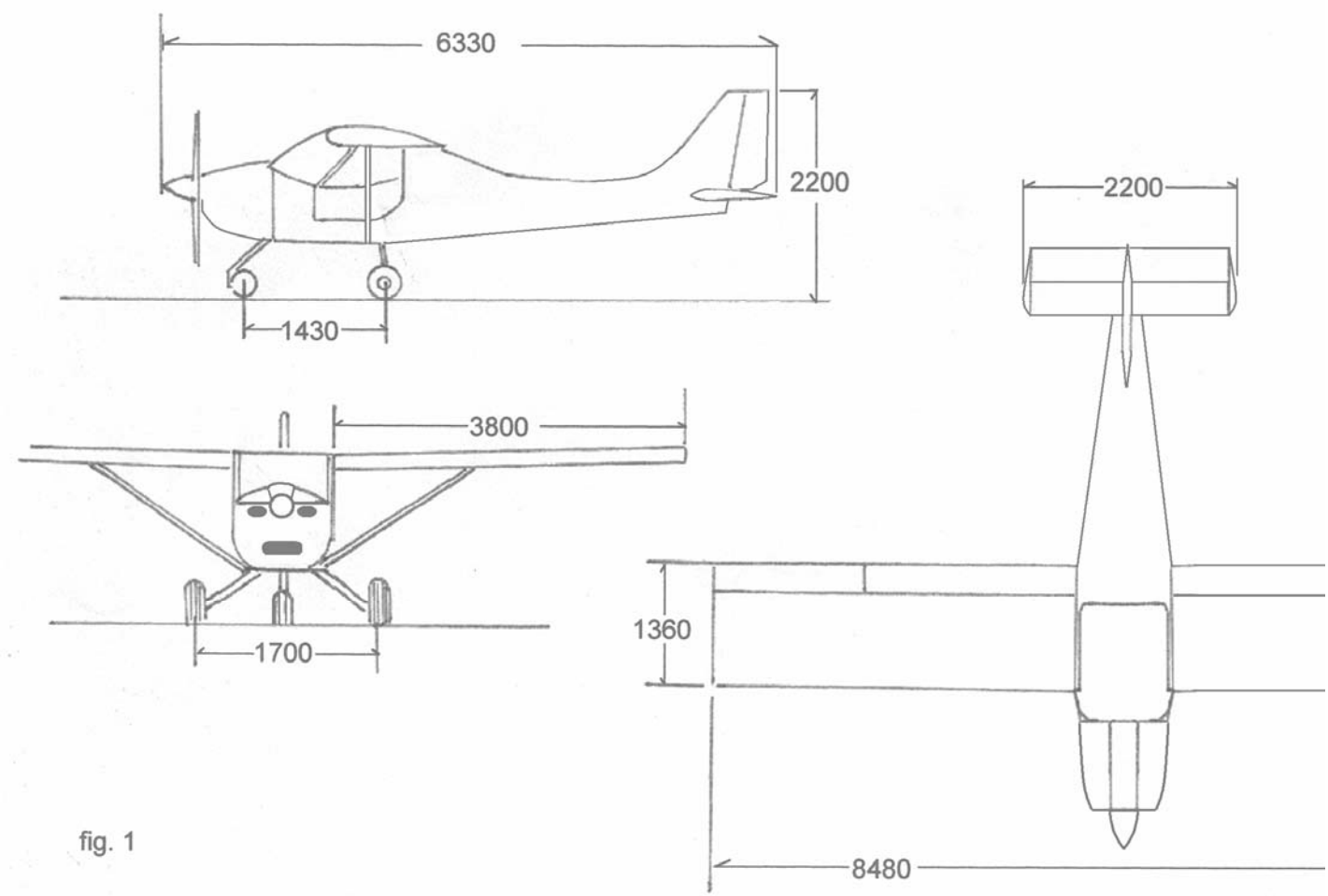


fig. 1

TECHNICAL DATA

Table #1

Wing span	**ft.**	**28**	**m**	**8,48**
Wing area	**sq Ft.**	**124**	**Mq.**	**11,5**
Wing chord	**ft.**	**4.46**	**m**	**1,36**
Aspect ratio	**-**	**6,23**	**-**	**6,23**
Wing section ratio	**-**	**1**	**-**	**1**
Glide ratio	**-**	**11:1**	**-**	**11:1**
Wing dihedral	**-**	**1,5°**	**-**	**1,5°**
Wing washout	**-**	**3°**	**-**	**3°**
Wing load max weight	**Lb/sq ft**	**9.35**	**Kg/mq**	**45.65**
Airframe length	**ft.**	**20.76**	**m**	**6,33**
Airframe width	**ft.**	**3.67**	**m**	**1,12**
Total height	**ft.**	**7.54**	**m**	**2,30**
Stabilizer length	**ft.**	**7.21**	**m**	**2,20**
Fin length	**ft.**	**4.59**	**m**	**1,40**
Stabilizer + elevator surface	**sq ft.**	**19.37**	**Mq.**	**1,80**
Elevator surface	**sq ft.**	**9.68**	**Mq.**	**0,90**
Vert Stab + ruder surface	**sq ft.**	**15.60**	**Mq.**	**1,45**
Main wheel track	**ft.**	**5.57**	**m**	**1,70**
Command deflection: Ailerons (+/- 2°)	**Up Down**	**23° 15°**	**Up Down**	**23° 15°**
Flaps		**0° - 35°**		**0° - 35°**
Elevator (+/- 1°)	**Up Down**	**25° 15°**	**Up Down**	**25° 15°**
Ruder (+/- 1°)	**Dx Sx**	**25° 25°**	**Dx Sx**	**25° 25°**
Maximum take off weight	**lb.**	**1200**	**Kg.**	**544**
Empty weight	**lb.**	**660**	**Kg.**	**300**
Number of tanks	**No.**	**2**	**No.**	**2**
Max fuel volume	**Gal.**	**8.72+ 8.72**	**Lt.**	**33+33**
Max Pilot weight + passenger weight	**lb.**	**353**	**Kg.**	**160**

Table #2

Flaps	**Flat type**	
Flaps surface (max deflection 45°)	**15.7SqFt**	**1,36 mq**
Engine type	**Rotax 912 UL**	**Rotax 912 ULS**
Engine cycle	**Four Stroke**	
HP/RPM	**80/5800**	**100/5800**
Right thrust	**2°**	
Down thrust	**- 1° 5'**	
Max propeller RPM	**2430 Rpm**	
Propeller Type	**Powerfin 68"/ GT 2 blade 65"**	
Number of blades	**2-3**	
Load factor	**+ 4 / - 2**	
Max empty weight	**661lbs**	**300 Kg.**
Pilot weight + passenger weight	**352lbs**	**160 Kg.**
Max weight before take off	**1200lbs**	**544 Kg.**
Landing gear type	**Fixed tricycle**	
Rear wheel diameter and type	**6.00-6**	
Front wheel diameter and type	**4.00-4**	
Tires pressure rear	**26PSI**	**1,8 Bar**
front	**19PSI**	**1,3 Bar**

Table #3

LIMITATIONS

Minimum Design manoeuvring speed Below this speed the airplane will not respond normally.	**VA-min Mph 45**	**VA-min Km/h 70**
Never exceed speed Do not exceed this speed for any reason.	**VNE Mph 140**	**VNE Km/h 220**
Maximum structural speed The maximum speed to be used in turbulent conditions.	**VNO Mph 95**	**VNO Km/h 150**
Design manoeuvring speed Stalling speed at the maximum legal G-force, and hence the maximum speed at which abrupt control movements will not cause the aircraft to exceed its G-force limit.	**VA Mph 80**	**VA Km/h 130**
Maximum flap extended speed Do not exceed this speed with flaps fully extended.	**VFE Mph 65**	**VFE Km/h 110**
Stalling speed with flaps **without flaps** Below this speed the airplane stall and persisting this situation may cause the airplane to spiral dive.	**VS Mph 45** **Mph 50**	**VS Km/h 70** **Km/h 80**
Max weight before take off The owner must responsible and be sure that the limits is not passed.	**lbs. 1200**	**Kg. 544**
CG Limits Pilot, passenger and fuel weight causes marginal change in the CG.		
Load Factors	**Positive + 4 g** **Negative – 2 g**	**Positive + 4 g** **Negative – 2 g**

PERFORMANCE

Table #4

Best endurance speed (Vbe)	**Mph 90**	**Km/h 140**
Design cruising speed at s.l.m. (sea level)	**Mph 100**	**Km/h 160**
Best power off glide speed (Vbg)	**Mph 60**	**Km/h 100**
Speed for best rate of climb (Vy)	**Mph 75**	**Km/h 120**
Speed for best angle of climb (Vx) with 10° flaps	**Mph 60**	**Km/h 100**
Vertical speed	**f/min 1000**	**m/s 5**
Take off distance (cond. ISA + 15°)	**feet 328**	**mt 100**
Landing distance (cond. ISA + 15°)	**feet 394**	**mt120**
Take off distance with obstacle 15 meter height	**feet 722**	**mt 220**
Landing distance with obstacle 15 meter height	**feet 590**	**mt 180**
Glide ratio at 100 km/h	**11:1**	
Service ceiling	**feet 12000**	**mt 3800**
Fuel reserve s.l.m. max weight and cruising speed	**min15**	

NOTE: Flight characteristics based on standard conditions
It is strictly prohibited perform aerobatic manoeuvres and intentional spins

Table #5

Field color	Speed field (MPH)	Speed field (Km/h)	Meaning
White arc	45 – 65	70 – 110	Flaps fields fully extended
Green arc	45 – 95	70 – 150	Manoeuvring field at any time
Yellow arc	95 – 125	150 – 200	Field speed with calm air
Red arc	140	220	Speed never exceed

BACKGROUND

NOTE: THIS AIRCRAFT IS AN ADVANCED ULTRA-LIGHT AEROPLANE AND IS OPERATING *WITHOUT* A CERTIFICATE OF AIRWORTHINESS

In addition to private recreational use an Advanced Ultra-light Aeroplane may be used for hire and reward for the purpose of pilot flight training in accordance with section 406 of Part IV of the *Canadian Aviation Regulations*.

An advanced ultra-light aeroplane MAY NOT be used for any other commercial aviation operation or aerial work.

ADVANCE ULTRALIGHT REGULATIONS (CANADA)

Definition

An “advanced ultra-light aeroplane” means an aeroplane that has a type design that is in compliance with the standards specified in the manual entitled *Design Standards for Advanced Ultra-light Aeroplanes* (DS-10141)(subsection 101.01, subpart 1 of Part I of the *Canadian Aviation Regulations*.)

GENERAL INFORMATION

The PUMA is a two seats aircraft with dual controls.
The instrument panel is divided in three sections and a center console.

The sections are organized as follow:

- Right section flying instruments
- Center section engine instrument
- Left section intercom, transponder, GPS and accessories.
- Center console from the top to the bottom; throttle, flaps switch, magnetos, differential brake lever, phone and microphone jacks (beside the sits)

Throttle, brakes, flaps are reachable for both pilots.

All the flying controls are dual and they actuate respectively elevator, ailerons, and rudder using AN stainless steel cables.

Load factors on the aircraft are +4g -2g and they refer at the max weight of 544kg (1200Lbs)

Engine power plant is four stroke four cylinder horizontally opposed Rotax 912UL or Rotax 912 ULS and drives a gear box connected to a propeller tractor configuration.

The fuselage is made of composite, sandwich construction with bulkheads.
Two doors in fiberglass frame, and polycarbonate (Lexan or Macrolon) windows, windshield is clear polycarbonate, and the top window is tinted polycarbonate.

Fuselage has the followings parts:

Inside

- Fixed double rudder pedals, with AN cables that connect to the rudder.
- Dual controls that actuate elevator and ailerons. The connection between them is done thru a group of certified AN cables and turnbuckle and linked thru MS pulleys.
- Differential brake lever;
- Choke located under the instrument panel on the right side of the center console
- One throttle
- Electric trim
- Two adjustable seats with three points harness safety belts.
- Instrument panel in carbon/fiberglass
- Basic instrumentation for VFR flight
- Aileron lateral cables.
- Rudder cables.
- Elevator pushrod
- Flap servo command, with micro-switch to control the travel,
- Fuel line
- Steel cage to which wings are attached.

External

- The front nose wheel assembly is made of medium carbon steel for the fork, the leg is in AL 7510, and the wheel is castering type, the tire size is (4.00-4).
- Rear landing gear made of fiberglass and wheels (15 x 6 x 6 or 13 x 4 x6) with hydraulic disc brake system.
- Engines mount in steel chrome-moly.
- Riveted wing with aluminum ribs, two ailerons and two flaps.
- Front engine cowling complete enclosed.
- Wood or carbon composite propeller 2 or 3 blades ground adjustable or fixed.
- Fixed horizontal stabilizer and elevator in aluminum with integrated electric trim.
- Aluminum rudder.

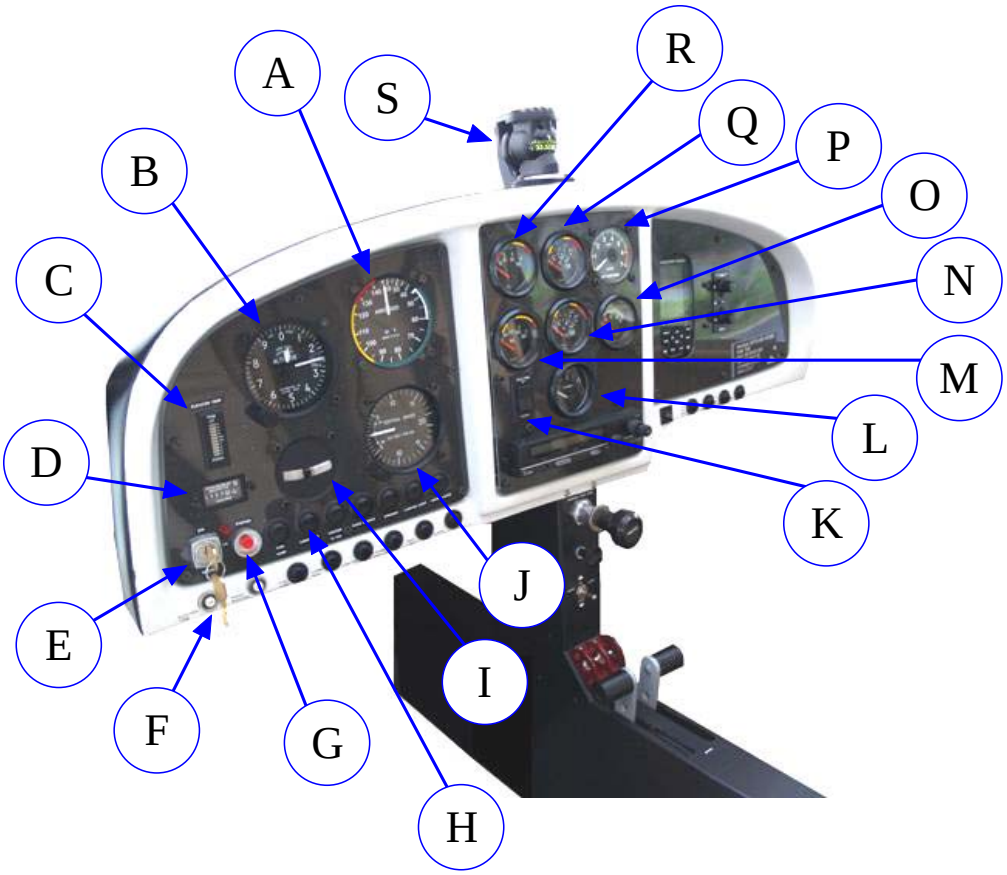
All above mentioned constitute the empty weight. The maximum weight before take off is calculated adding this weight plus the load, and must not exceed 544 kg (1200lb).
The useful load is generated by:

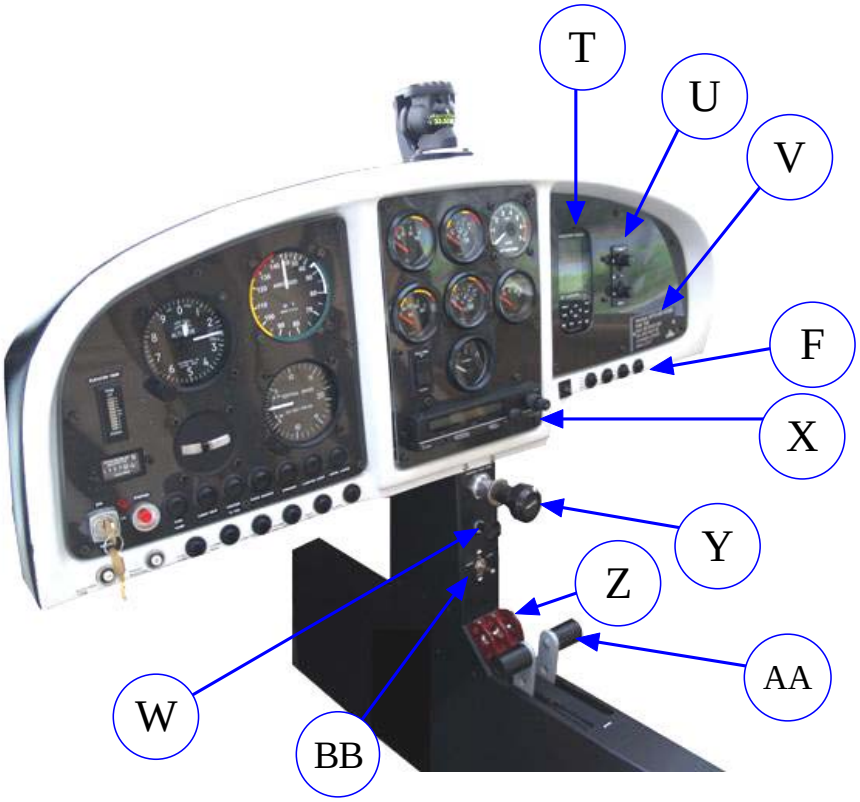
- Pilots weight
- Liquid weight and engine

NOTE: **It is the pilot responsibility to verify that the airplane does not exceed the above mentioned weight.**

INSTRUMENT PANEL

A. Air speed indicator
B. Altimeter
C. Electric trim indicator
D. Hour meter
E. Master
F. Switch breaker
G. Start button
H. Switch area
I. Slip Indicator
J. VSI
K. Electric trim switch
L. Fuel gage
M. Oil temperature
N. CHT back
O. Voltmeter
P. RPM
Q. CHT front
R. Oil Pressure
S. Compass
T. GPS
U. Intercom
V. Placard
Y. Throttle
Z. Magneto switch
AA. Differential brakes
BB. Flap switch
W. Ventilation





PROPULSION GROUP

ENGINE

The PUMA aircraft has two standard engine configuration.

Table # 7

Manufacturer:	**ROTAX-BOMBARDIER**
Engine Type	**Rotax 912 UL/ULS**
Category:	**4 stroke, 4 cylinders boxer Mixed Liquid air cooled.**
Max power to take off:	**80 HP at 5800 Rpm / 100 HP at 5800 Rpm**
Max continuous power:	**75 Hp at 5500 Rpm / 95 Hp at 5500 Rpm**

Limitations

Table # 8

Max RPM	**5800 Rpm (5' max)**	
Continuous max RPM	**5500 Rpm**	
Min and Max Temperature CHT	**140° F – 300° F**	
Min and Max OIL Temperature	**122° F – 284° F**	
Min and Max OIL Pressure	**22 PSI (2800 Rpm) – 72 PSI**	
Type of gasoline	**Premium Unleaded RON 98/100**	
Oil Grade	**SAE 10W/40**	
Propeller in use GT 2 blade	**diameter m 1660**	**Pitch 1450**

Cooling system engine and engine oil

This engine has two radiators one to cool down engine heads and the second is the oil cooler.
In the winter season, when the ground temperature is less than 41° F (5° C), may be required a cover to reduce the flow of air thru the radiators.

NOTE: Please refer to the ROTAX manual user guide

OPERATING USE

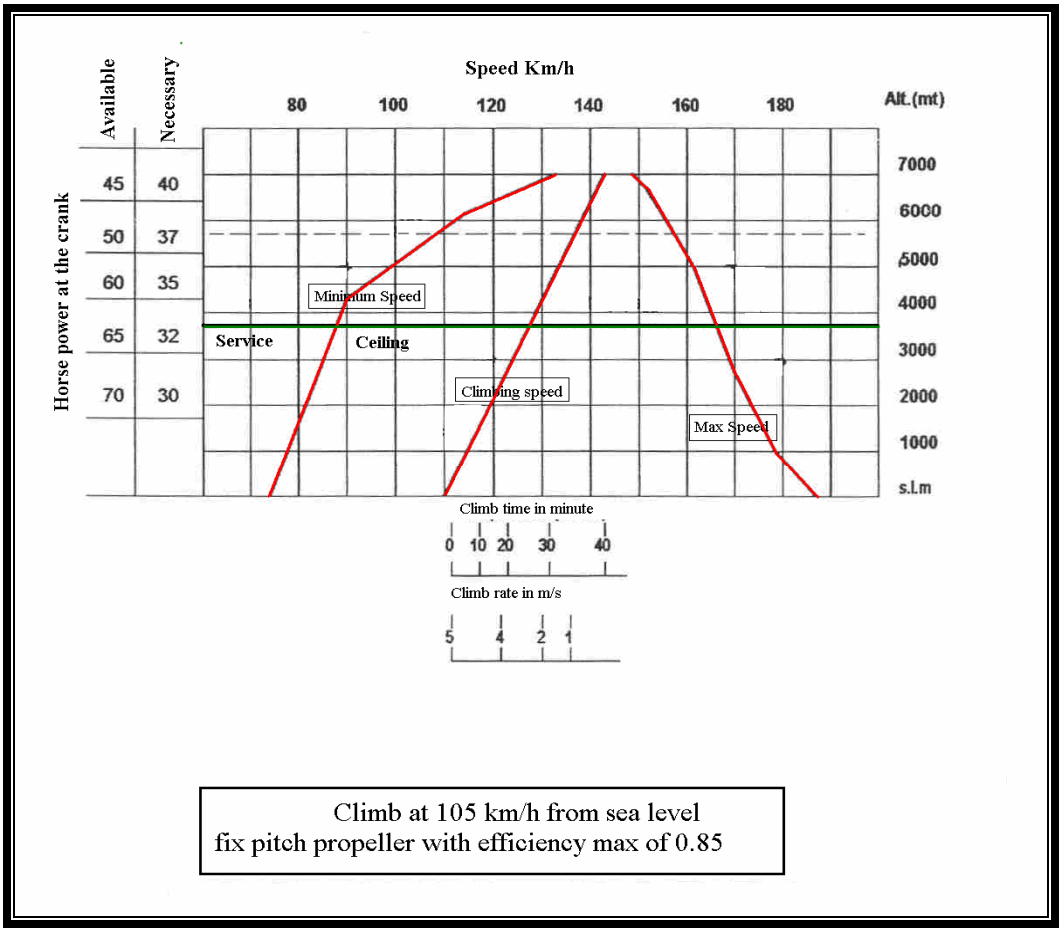
Operating limits

This section explain the operating limits of the aircraft, some of the important data is printed on the placard (see page 15 letter G).
For safe use of this airplane the pilot must follow the instruction given in this manual and observe all the instrument and placard limitations.
This aircraft is engineered to operate in temperature range of -40°C (-40°F) to +50°C (+122°F)
Remember temperature decreases with increased altitude approximately 0.7 °C every 100 m (6.5°C every 1000 m).
Direct sunlight on white paint may increase the temperature up to 57°C on the surface and higher below the surface with the consequence of reduction of the structure capacity.
The use of colors other than white may reduce the structure integrity.
We recommend painting the airplane with lustrous white, white does not absorb ultraviolet rays which are very dangerous for the life of the structure.

Aircraft graphic curves performance in standard configuration.

Aircraft graphic curves taken in consideration in this paragraph are:

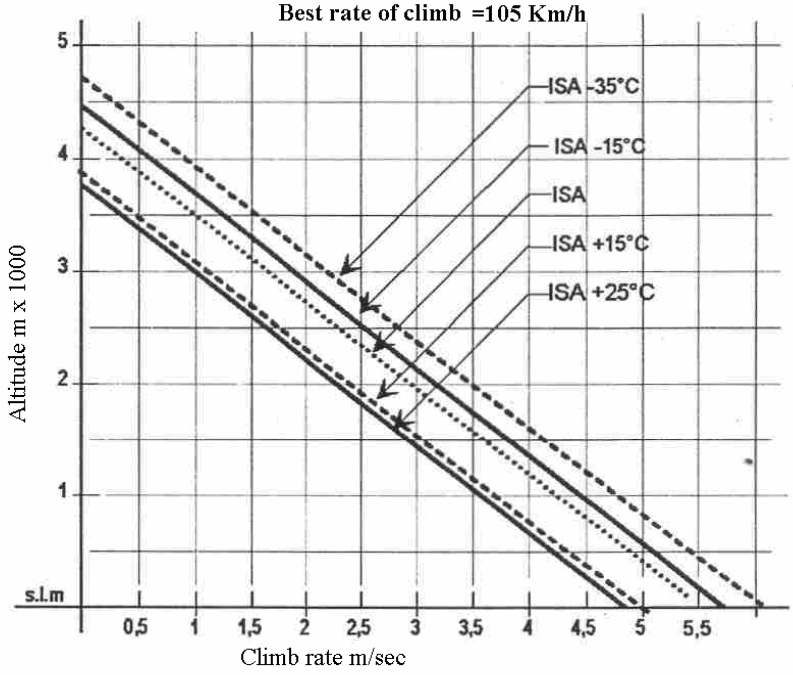
1) Climbing ratio, climb time, minimum horizontal speed, max horizontal speed according to the altitude
2) Climb ratio according to altitude and temperature
3) Take off distance based on the altitude
4) Landing distance based on the altitude.

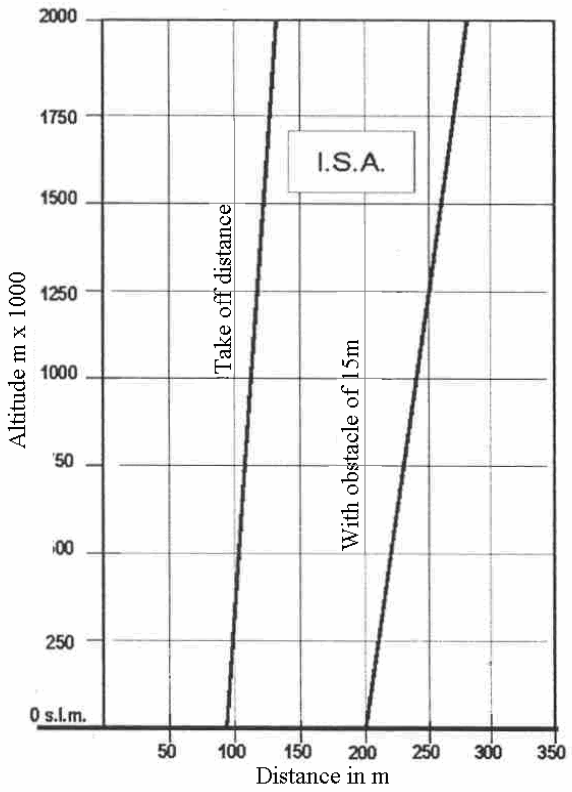


ISA=International Standard Atmosphere

Climbing rate in function of the altitude

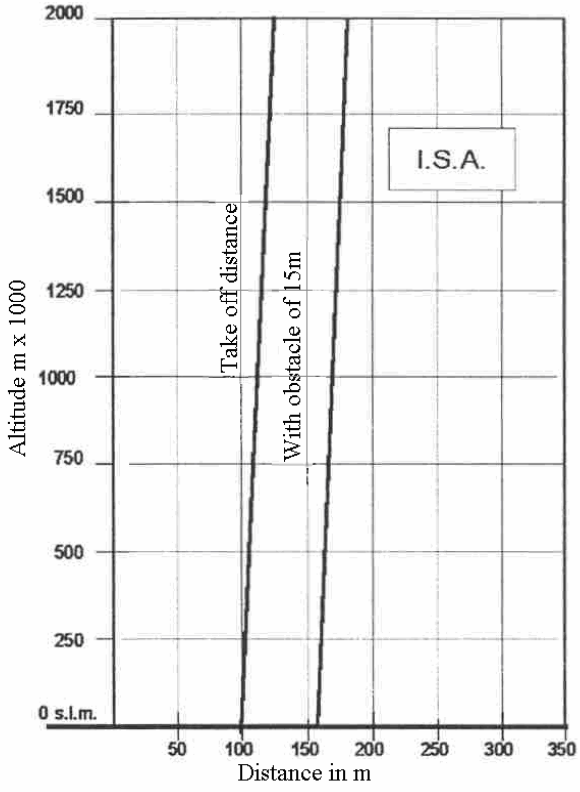
Conditions: **Max weight before take off**
Max power
Best rate of climb =105 Km/h





Take off distance

Conditions: Max weight before take off
Flaps 10 degrees



Landing distance

Conditions: Max weight before take off
Flaps 35 degrees

ENGINE OPERATING TEMPERATURE

Table #9

Instrument	Min	Green Normal	Yellow Carefully	Max Danger
Rpm		1400 - 5500	5500 - 5800	5800
CHT F°	140°	140°- 266°	266°- 300°	301°
Oil pressure PSI	22	22 - 58	58 - 73	74

NOTE:

Respect the engine parameter limits.

If for any reason you pass these limits, or you have an engine failure, please follow the chapter EMERGENCY PROCEDURE.

WEIGHT AND BALANCE

You must observe the following weight limitations:

- Max weight before take off **Kg. 544 (1200Lbs)**
- Max weight with crew of 160 kg (352Lbs). **Kg. 544 (1200Lbs)**

Center of Gravity

The aircraft is configured to fly with the minimum weight (one pilot with fuel or without) or at the max weight (two pilot plus fuel) without the necessity to move weight.
From the minimum to max weight the CG variation may increase one to two percent towards the front without affecting the aircraft manoeuvrability keeping it inside the calculated CG limit.

CG Position (see fig. 5 page. 19)

In table 10 is shown the CG position stated as a percentage of mean aerodynamic chord

Table 10

Exact CG	**25% MAC**	**Equal to 340 mm**
Limit to front	**23% MAC**	**Equal to 313 mm**
Limit to the back	**31% MAC**	**Equal to 421 mm**

Where **MAC** = Mean Aerodynamic Chord = 1360 mm.

After replacing parts, or repair not executed by the factory, the user may recalculate the CG using the following formula.
In case of problem with the original CG (± 10 mm), correct this variation **only** by moving parts already present on the aircraft like the battery **and do not hesitate to call the factory.**
Referring to page 19 you will see all the correct operation for a proper CG calculation, the formula are:
Determination of the total weight

$$W_{fw} + Wrw + W_{lw} = W_t$$

Definitions**:** W_{fw} = weight at the front wheel in Kg
W_{rw} = weight at the right wheel in Kg
W_{lw} = weight at the left wheel in Kg
W_t = total weight

Finding the moment

$$(W_{fw} \times d_1) + (W_{rw} \times d_2) + (W_{lw} \times d_2) = M_t$$

Where: d_1 and d_2 = distance in mm measure parallel to the horizontal axe starting from (D), which is 200 mm from the front wheel see fig.5

M_t = total moment

Determinate the CG

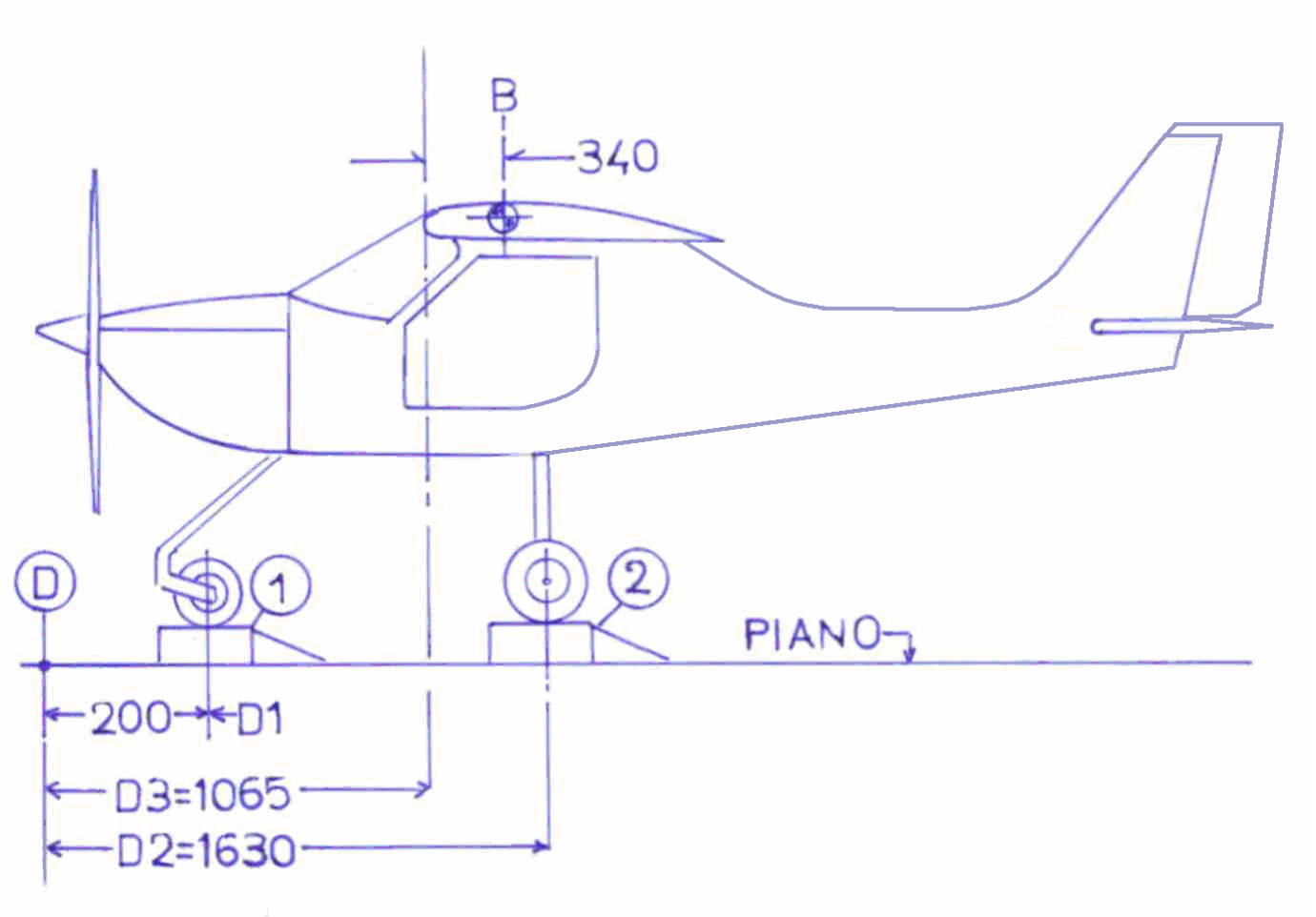
$$CG\ (\pm 10\ mm) = \frac{M_t}{W_t} - d_3$$

Where **CG** represents the measurement in mm starting at the leading edge.

This distance must correspond to that shown one (± 10 mm) in table10, and $\mathbf{d_3}$ is the distance in mm from (D) to the leading edge (see fig. 5).

CG (Center of Gravity)

Fig. 5



Point **1**, must be 20 mm lower than the point 2

1 = front scale
2 = two rear scale

Consideration about the Center of Gravity

From the table #10, we can see that the CG range is 108mm (313-421).
This means that the CG must be within these limits.

You must make sure that the CG falls exactly in the right position which is 340mm from the leading edge.

Variation in the CG may compromise the attitude of the airplane during the flight, and create a dangerous situation.

Note:

The pilot flying this airplane must not try spins, steep turn (over 60° banking angle), loops, rolls or any other aerobatic manoeuvres.

This aircraft is made for sport flying and not as instrument to prove pilot's ability.

Manoeuvring Loading factors

The manoeuvring factor limit (elasticity), positive and negative, are designed and referred to a weight max before take off of Lbs 1102 (Kg. 544), and they are reported in tab 11:

Table 11

Design manoeuvring speed (Va)	**+ 4 g**
Design cruising speed (Vc)	**+ 4 g**
Never exceed speed (Vne)	**+ 4 / - 2 g**
Maximum flap extended speed (Vfe)	**+ 2 g**

Equipment during the flight.

Limit of use are:

1. Aircraft can be flown by one person
2. Aircraft can be flown by two persons non exceeding a total weight of 160kg (Lbs 352).

FLYING CONDITIONS

This aircraft is design to fly in VFR conditions and with the limitation shown in this manual
It is prohibited to fly inside clouds or when it is not possible to have visual contact with the ground
It is prohibited to fly with wind over 40 Km/h (25 Mph), and taking off or landing with wind intensity stronger than 25 Km/h (15 Mph).

NOTE:

It is prohibited to locate any object behind the seats.

In this area all the controls and cables pass through and an object can block their movement.
Maps, Log book, documents etc.., can be located in the cabin but remember to respect the weight

AIRWORTHINESS

THIS AIRCRAFT IS AN ADVANCE ULTRA-LIGHT AEROPLANE AND IS OPERATING WITHOUT A CERTIFICATE OF AIRWORTHINESS

This must be visible on the dashboard of the aircraft where the placard is situated.

Characteristics and performance.

Fig. 7

CHARACTERISTIC		**PERFORMANCE**	
Wing surface	**sqf. 123.8**	**Speed never exceed (Vne)**	**Mph 140**
Max empty weight	**Lbs 660**	**Manoeuvring speed (Va)**	**Mph 80**
Max weight before take off	**Lbs 1200**	**Maximum flap extended speed (Vfe)**	**Mph 60**
Tank capacity	**Gallons 17.5**	**Stall speed extended flaps**	**Mph 40**
Useful fuel	**Gallons 17.5**	**Service ceiling**	**Feet 12500**

Engine installed:	**Rotax 912UL**
Max power :	**HP 80/100**
Type of gasoline :	**Unleaded as per engine manufacture's instructions**
Max RPM :	**5800 Rpm**
Type of oil:	**See engine manufacture's instructions**

RESPECT THE INSTRUCTIONS ON THE MANUAL

PRE-FLIGHT INSPECTION

A. Check the status of the propeller and bolts.

B. Open engine cover and check for leaking, loose parts, loosen fasteners, engine mount and dampeners for cracks; Check liquid levels (oil and coolant) and drain the gasoline through the valve gas collector.

C. Check the status of the front suspension, fork, tire wear and pressure.

D. Check the tank cap is closed and the breathing pipe free from obstructions.

E. Landing gear left side, wearing and tire pressure, fastener that hold the wing strut with the upper landing gear, wheel fasteners.

F. Check fastener that connects the wing to the strut on the upper part.

G. Verify that the pitot is free from obstruction

H. Verify the free movement of the aileron and relatives fasteners.

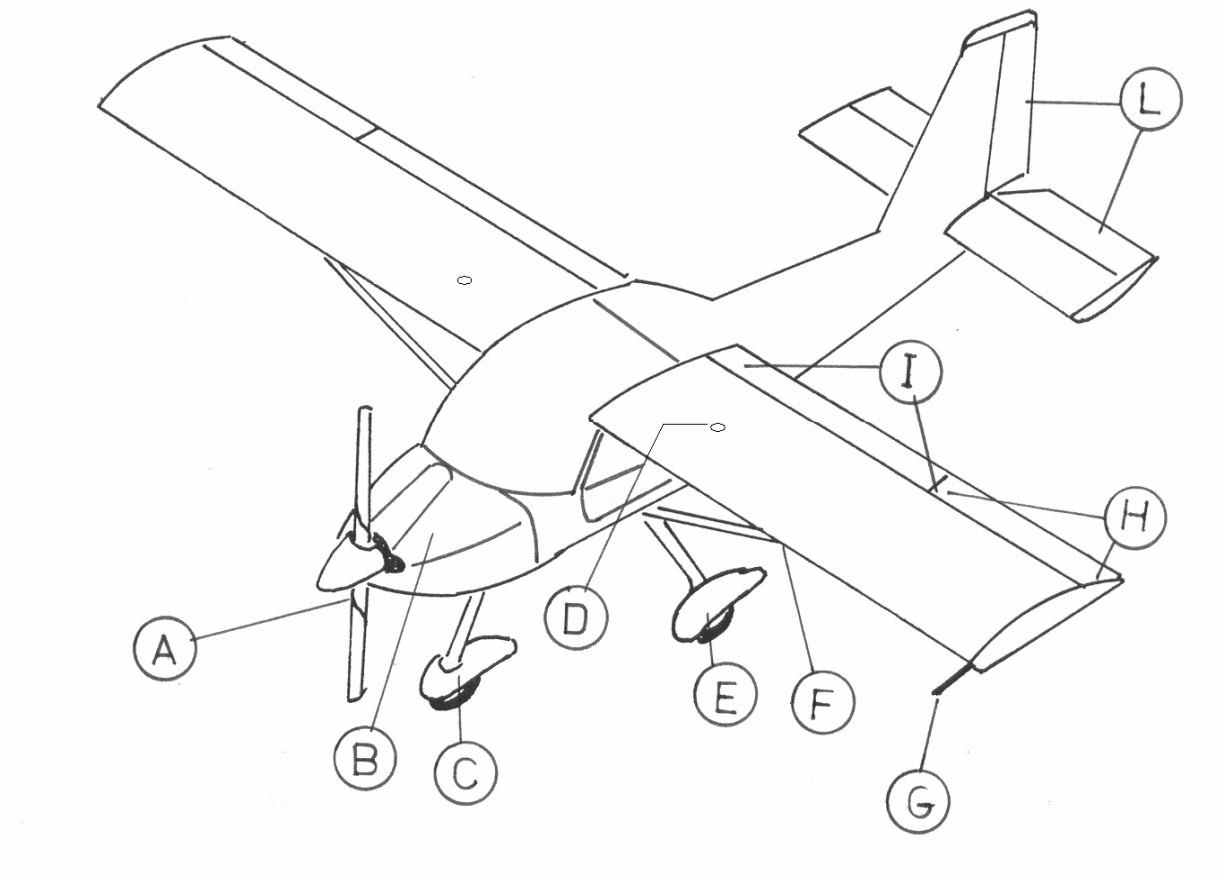
I. Verify the movement of the flap and fasteners.

J. Verify the free movement of the rudder and stabilizer

Repeat the same for the right side from D to I.

IN CABIN:

- **Verify all the movement of the inside control ailerons, elevator and rudder.**
- **Verify all the fasteners relative to controls**
- **Verify the correct tightening of the wing fasteners on the upper part of wings.**



CHECK LIST

BEFORE START

1. Master……OFF
2. Electric switches…… OFF
3. Magnetos…… OFF
4. Walk around……. COMPLETED
5. Fuel level …….. CHECK
6. Documents ……. ON BOARD
7. Seat belt …….. FASTENED
8. Propeller area …….. …….CLEAR

STARTING

1. Fuel valves (left and right)…….. ….ON
2. Master ……...ON
3. Magnetos …… ….ON
4. Throttle …… AS REQUIRED
5. Choke …….. .AS REQUIRED
6. Alternator…… ON
7. Strobe…… ON
8. Engine start
9. As soon as the engine starts bring the RPM to 2200 and check oil pressure
10. Gradually remove choke as needed

BEFORE TAXING

1. Doors……LATCHED
2. Master Radio……ON
3. Radio …… TEST
4. When the CHT is at least at 140°F start taxiing and test brakes.
5. Radio……BROADCAST INTENTION

BEFORE TAKE OFF

1. Position the aircraft facing the wind and with sufficient visibility area to check the traffic landing and departing and with the back clear of parked aircraft.
2. Brakes……..ON
3. Throttle……..…3000RPM
4. Magneto…..TEST (max drop 300RPM)
5. Flaps ……..……AS REQ'D
6. Engine instrument……CHECK
7. Controls……..FREE
8. Traffic……CHECK
9. Radio…….BROADCAST INTENTION

TAKE OFF

1. Throttle……...GRADUALLY TO MAX
2. Elevator ……..as required to release front wheel pressure
3. At 45 Mph (70km/h) start rotation.

CLIMBING

1. Engine instrument ……CHECK
2. At 1000feet (300m) at 65 Mph (110km/h) put flaps to 0.
3. Best rate climb no flaps……. 75 Mph
4. Best angle of climb flaps 10°… 60mph
5. As soon as you reach the desired altitude reduce the engine power and level the airplane.
6. Radio…….BROADCAST INTENTION

CRUISING

1. Engine instrument ……CHECK
2. Flying instrument …….. CHECK
3. Engine rpm ……..4500 – 5200RPM

NOTE:
It is prohibited to move the controls at the end of the stroke over the Va speed 80mph (130km/h) even in calm area.

DESCENDING AND LANDING

1. Engine instrument ……CHECK
2. Best glide ratio is (1:11) at 60 MPH
3. Speed ……reduces to 65 MPH
4. Flaps ……AS REQ'D
5. Landing light……..ON
6. Approaching speed 60 Mph (100km/h)
7. After landing, if necessary apply brakes gradually keeping the elevator up to release load from the front wheel.
8. In wind condition, especially if coming from the side, increase the approaching speed (about double of the wind speed), and reduce flaps.

NOTE:
The landing gear is designed to work on grass.
Avoid landing on irregular fields.
If you damage the landing gear you may prejudice the safety of the aircraft

TAXIING

After landing, taxi slowly towards to the parking area at an appropriate speed, be careful the grass may hide branches rocks etc…
Do not stress the landing gear.

1. Flaps ……0°

PARKING

2. RPM……..MINIMUM
3. Radio…….. OFF
4. Landing light ……OFF
5. Strobe……OFF
6. Master Radio ……OFF
7. Magnetos …….. OFF
8. Master …….. OFF
9. Alternator …….. OFF

Best endurance speed (Vbe)	**Mph 90**
Design cruising speed at s.l.m. (sea level)	**Mph 100**
Best power off glide speed (Vbg)	**Mph 60**
Speed best rate of climb (Vy)	**Mph 75**
Speed best angle of climb (Vx) with 10° flaps	**Mph 60**
Vertical speed	**f/min 1000**
Take off distance (cond. ISA + 15°)	**feet 328**
Landing distance (cond. ISA + 15°)	**feet 394**
Take off distance obstacle 15 meter height	**feet 722**
Landing distance obstacle 15 meter height	**feet 590**
Glide ratio at 100 km/h	**11:1**
Service ceiling	**feet 12000**
Fuel reserve	**min15**

Field color	Speed field (MPH)	Meaning
White arc	45 – 65	Flaps fields fully extended
Green arc	45 – 95	Manoeuvring field at any time
Yellow arc	95 – 125	Field speed with calm air
Red arc	140	Speed never exceed

ALLOWABLE TURNS

Bank angle	Turning speed	Min Radius
30°	57Mph (92km/h)	427feet (130m)
45°	65 Mph (105km/h)	295feet (90m)
60°	75 Mph (120km/h)	256feet (78m)

NOTE:

Remember that a turn of 180° requires a space twice that of the turning radius.

Glide ratio

No power (engine off) at 60Mph (100 Km/h) has a glide ratio of **11:1**

Cross wind

The maximum cross wind for this aircraft is 15 Mph (25 km/h).

EMERGENCY PROCEDURE

Following emergency situations:

Situation #1 On the ground

- Fire

Situation #2 Taking off

- Power loss
- Engine failure
- Irregular control responds
- Fire
- Impact with birds or other objects.

Situation #3 During the flight

- Instrument indicates parameter out of the normal
- Irregular running engine
- Engine failure
- Irregular control responds
- Fire
- Smoke in cabin or windshield fogging
- Impact with birds or other objects
- Accidental spin

General condition in emergency landing

If you have to do an emergency landing, note the follows points.
Check your flying parameter (max gliding speed, and attitude) check the right tension of the safety belts.
Check the ground under you and choose the most suitable place for landing, if altitude allow, start to do wide turn 360 and check for obstacle (Electric cables, trees, constructions, ditch, etc…) also check the direction of the wind on the ground by looking at the trees or smoke. Remember that the leaf on the trees are more clear up wind, if there is no wind try to land with the sun on your back.
Once you decide in where to land, try to find the touch down point and keep it in sight.
If altitude permits do normal landing turns (partial or complete) maintain the gliding speed. As soon as you touch ground pull the brakes and stop the airplane as quick as possible to avoid collision with objects not visible from the sky.
In case of landing in terrain with angle, always land (even if you have tail wind) upward to the slope and at higher speed than usual proportionate to the slope angle. This is to compensate for the suddenly loss of speed due to the nose up attitude.
Once landed pull brakes and lock them on once you stop.

NOTE:

Once you choose the field to land, do not change it for any reason at the last moment.
Even if you think that another field may be better, keep going on the one you have chosen.

Engine considerations

In the above mentioned emergency situations, the problems are related to the engine. Structural problems are very easy to avoid if you do proper maintenance and pre-flight inspection.

Remember that this ultralight does not have a certified engine this may increase the chance of failure.

NOTE:

With the use of non certified engines, you may increase the probability of engine failure over the one that is certified.

Certified engines required certified mechanics, while in ultralight this it is the owner responsibility.

The ROTAX engine used in the PUMA aircraft is not certified but has a very good reputation for reliability.

The ROTAX engine when sold there is a warning that state engine is not certified and an engine failure may occur.

The owner has to remember all this and do the maintenance as per ROTAX manual in doing so you can enjoy better and safer flying.

NOTE:

This engine is for use in experimental and ultralight uncertified aircraft only and only in circumstances in which an engine failure will not compromise safety.
Before installing or operating this engine, read the appropriate, current relevant instructions, manuals and guides

Suggestions

Engine failure can always occur and you have to consider it in your flight plan.

Pilot:

- You have to be sure that all the maintenance is properly done according to the engine manual
- Evaluate the space in case of engine failure during take off
- Try the engine at max RPM for ten seconds, and than try one magneto at the time at 3000 RPM (max 300rpm of drop).
- Check engine instruments
- Must wait before take off so that all the temperature are at the right value.
- Reduce power once you reach your safe altitude and avoid stressing the engine.

During the flight, avoid descending and flight at low altitude.
Cross country flying must be done according to the safety rules of Transport Canada.
During your flight plan take in consideration altitude, distance, safety landing areas, fuel.
The pilot is encouraged with an instructor to execute simulated emergency landing procedure.
Mastering this type of manoeuvre reduces the probability of accident in the case of emergency landing even at low altitude (100m).

Situation #1 On the ground

Fire

1) Close the fuel valve turn off the Master.
2) Brake and bring the throttle at the max to consume the gas in the fuel lines turn off the engine.
3) Abandon the aircraft
4) Use fire extinguisher rated for gasoline.

Situation #2 Taking off

Power loss

- Before the aircraft leaves the ground do as follows:

1) Put the throttle at the minimum
2) Brake

- After the aircraft lifts off (if there is not enough space to land):

a) If engine power allows:

1. Complete take off manoeuvre
2. Go back and land as soon as possible

b) If the power is not enough:

1. Nose down immediately to maintain the speed
2. Direct the aircraft to a landing area in front of you
3. Execute emergency landing procedure. If there is a risk of impact with obstacle, turn off Master switch, magneto and turn off fuel valve.
4.

NOTE:

Try to avoid unnecessary take off with the best angle of climb, because in case of engine failure it will be harder to control the airplane.
Remember that in a turn the stall speed increases therefore do not turn too steep

Engine failure

Before leaving the ground

Brake and shut off the fuel valve, turn off master and magneto

After leaving the ground

1) Nose down immediately and maintain speed

2) If necessary if speed permits, turn left or right, with a max angle of 35° and direct the aircraft to a safe landing area

3) Execute emergency landing. Execute emergency landing procedure. If there is a risk of impact with obstacle, turn off Master switch, magnetos and turn off fuel valve.

NOTE:
Do not try to go back to the runway max turn allowed 30°/35° from your heading. If you turn too steep you may loose altitude quick and since the altitude is not enough you may crash during the manoeuvre or stall the airplane.

Irregular commands respond

If you find any irregularity on the controls respond you must park the airplane and check for the problem before take off.
If the problem is during take off, immediately complete the circuit and land.

Fire

Before leaving the ground

1. Abort take off, close the fuel valve and turn off the master
2. Brake and bring the throttle at the max to consume the gas in fuel line turn off the magneto.
3. Abandon the aircraft
4. Use extinguisher devices rated for gasoline.

After leaving the ground

1) Nose down immediately and maintain speed
2) Shut off the fuel valve, full throttle to consume the gas in pipe line and turn off the magnetos.
3) If necessary if speed allow, turn left or right, with a max angle of 35° and direct the aircraft in a safe landing area
4) Execute emergency landing. Execute emergency landing procedure. If there is a risk of impact with obstacle, turn also Master switch.

5) After the landing abandon the aircraft
6) Use extinguisher rated for gasoline fuel.

NOTE:

Do not try to go back to the runway max turn allowed is 30°/35° from your heading. If you turn too steeply you may loose altitude quickly and with insufficient altitude you may crash in attempting the manoeuvre or stall the airplane.

Impact with birds or other objects

During take off

Abort take off and check for damage

After take off or during flight

If the impact creates vibration, try to reduce rpm and safely land, if vibrations are severe than make a landing emergency above mentioned.

Situation #3 During the flight

Engine parameters anomalies

If the anomalies are caused by the pilot, correct parameters during the flight and be more careful. In case of persisting anomalies start to look for a safe place to land.

Irregular running engine

Check the quantity of fuel and the fuel valve, the correct position of the magneto switch the choke closed, then test the magneto one at the time, look for a place to land safely.

Engine failure

Immediately bring the airplane to the best glide ratio (100 Km/h) and execute an emergency landing.

Fire

1) Bring the airplane to the best glide ratio (100 Km/h)
2) Shut off the fuel valve, full throttle to consume the gas in fuel line and turn off the magnetos. Don't turn off the master in case you need flaps.
3) Immediately execute emergency landing procedure.
4) After the landing abandon the aircraft.
5) Use fire extinguisher rated for gasoline.

Smoke in cabin or windshield fogging

1) Reduce speed to 100 km/h and open doors to ventilate the cabin
2) Turn off master
3) Try to land as quick as possible
4) If in winter time the windshield fogs open the ventilation situated on the door, if not enough open the doors.

Impact with birds or other object

According to the severity of the impact reduce rpm and land as soon as possible.
If vibrations are severe turn off engine and land in emergency.

Accidental spin

Causes and definition:
After a stall situation if the pilot does not try to correct the airplane, the airplane will go in autorotation and will go in to **a spin**. The spin diving is a non controlled stall situation.
Is not a manoeuvre but is more an uncontrolled flight condition in which the airplane rotates in its own axis while diving.
It is very important that the pilot execute the correct movement to recover from this situation.

Exiting from a spiral diving

1 - Throttle to minimum
2 - Push the pedal opposite to the rotation
3 - Horizontal stabilizer level
4 - Center all the commands as soon as the rotation stops
5 - Recover the airplane slowly
6 - Put power enough to cruise

It's very important that the pilot perform the correction in the above mentioned sequence.

NOTE:

To avoid unintentional spins, remember that at low speed you have to keep the slip indicator centered and avoid cross controlling.
In case of stalling situation, the manoeuvre to execute is standard:
Push the stick forward, push the rudder on the opposite side to the wing drop and full power right after, center the commands.

Intentional spins are prohibited

TECHNICAL PROCEDURE AND MAINTENANCE

Transport on the road

To be able to transport the airplane on the road you must do the follow:

- Detach right wing
- Detach left wing
- Mounting group left and right wing
- Fix movement on the rudder and elevator

NOTE:

The transport on the road is very simple operation; if you need more details or special support for the wings please contact the manufacture.
Avoid damage to any part during the transportation a very small damage may compromise safety during flight.

It is not necessary to remove the rudder and the elevator to transport the airplane on the road. The dimensions are not long enough to compromise the safety on the road.
In the case of disassembly and assembly of the wings, rudder, elevator does not compromise the adjustment of the commands.

NOTE:

Do not substitute any fastener with others different from those supplied by the manufacturer.

DETACHING WINGS FROM THE FUSELAGE

As we mentioned before the PUMA has a folding wing option which allow easy storage and transportation.
If you plan long trip is recommended to detach completely the wings from the fuselage and this operation can be done with the help of another person in a few minutes.
The follow procedure is for the left wing:

1) Detach the tube for the airspeed indicator and the static tube for the static at the junction inside the cabin pull out the cables and remove the nylon tubes inside the strut.
2) Unscrew the 19 mm nut located the strut, but do not remove the bolt
3) Lock the flap in zero position.
4) Unscrew the 24 mm nut of the rotating group
5) On person must hold the wing up at the extreme end (wing tip), the other person remove the bolt on the upper side of the strut and push the strut against the fuselage.
6) Remove the pin that holds the aileron command and the two pins that lock the wing to the fuselage. (see picture below)
7) Once the pins are off slide out the wing horizontally, both person while are removing the wing must hold elevator and flap in horizontal position.
8) Put the wing on the dedicated support with the aileron and flaps level.
9) Remove the strut fastener at the bottom and remove it from the fuselage.

To remove the right wing, repeat the operation 2 –3 – 4 – 5 – 6 - 7- 8.

NOTE: To mount the wings do the reverse operation

After mounting back the wing check that controls are working properly, and pitot + static lines are properly connected.

NOTE:

If the wing is not properly mounted you will compromise your safety

DISSASEMBLY AND ASSEMBLY OF THE RUDDER

The PUMA rudder moves on two external hinges at both extremities.
After you remove the control cable from the yoke remove the top bolt, and gently slide it out.
To reinstall do the inverse operation and grease the hinges.

Filling the fuel tank

Mandatory:	You must have an extinguisher within reach.
Prohibited:	Smoke or be close to a fire in a radius of 70feet (20m).
Prohibited:	Use of plastic that create electrostatic discharge such as PVC.
Advice:	Use of appropriate plastic tank and appropriate tools to transfer gas

NOTE:

Do not operate with electric devices during refuelling.
Prohibited to smoke or making any kind of spark within 70feet (20m).
Have the pump grounded
Have close to you an extinguisher of at least 11lbs (5 kg).
Filter the gasoline with chamois cloth.

ENGINE GROUP

ENGINE INSPECTION

The power of the engine is controlled by the throttle lever (lever **Y** page 10.) located on the center console. Pushing forward increase the power and pulling reduces the power.
The choke lever is situated under the dashboard on the right side, and you must use it at cold engine. Once the engine starts to warm up reduce it gradually until the end.

ENGINE INSTRUMENTS

The engine group has the follow instruments:
1 RPM gage
2 CHT
1 Oil Temperature
1 Oil pressure

START THE ENGINE

Switch on both magnetos and turn the master switch on.

TURN OFF THE ENGINE

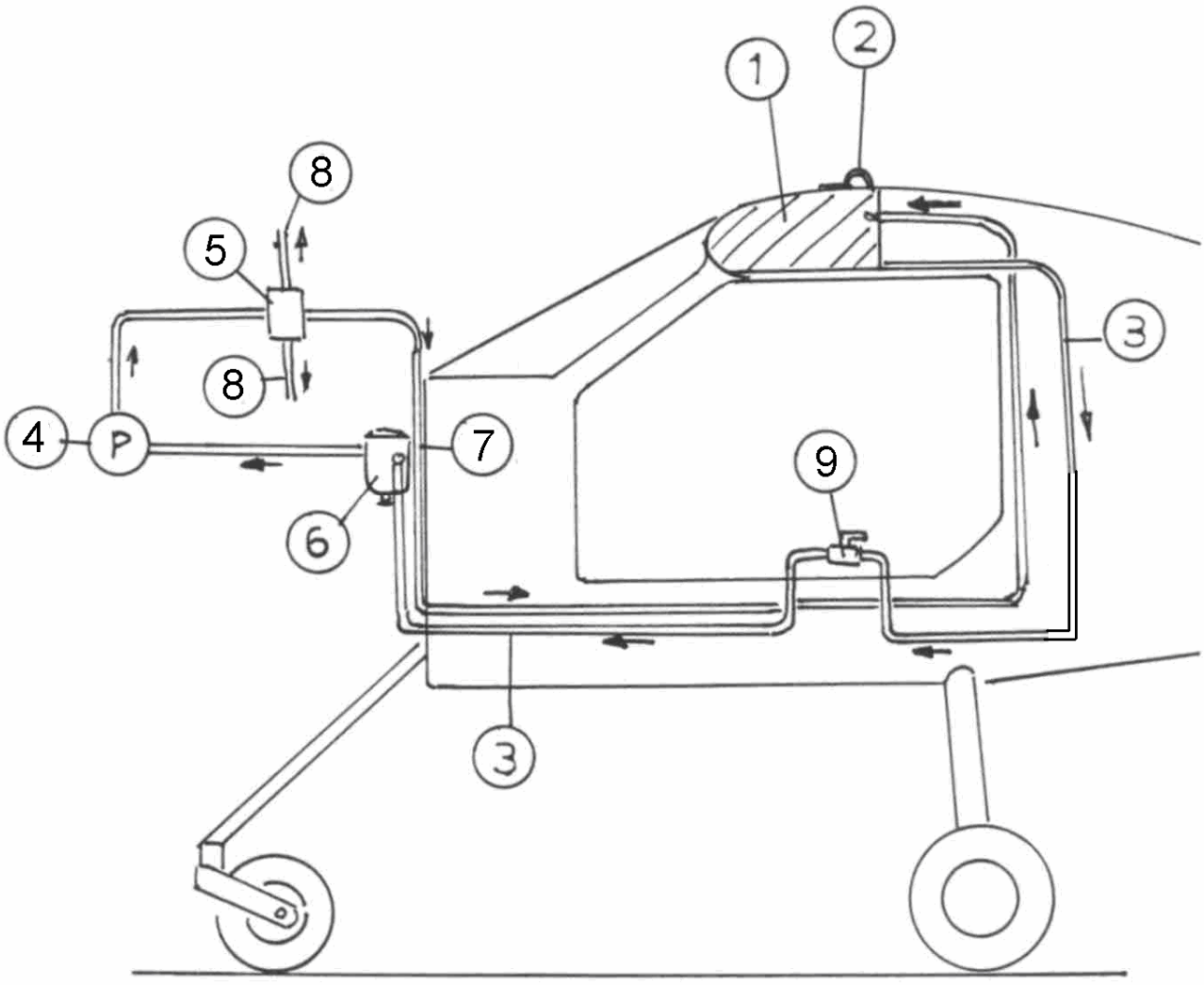
Switch off one magneto at the time and then turn off the master switch

NOTE: Read the engine manual for further information.

SCHEMATICS

FUEL SYSTEM

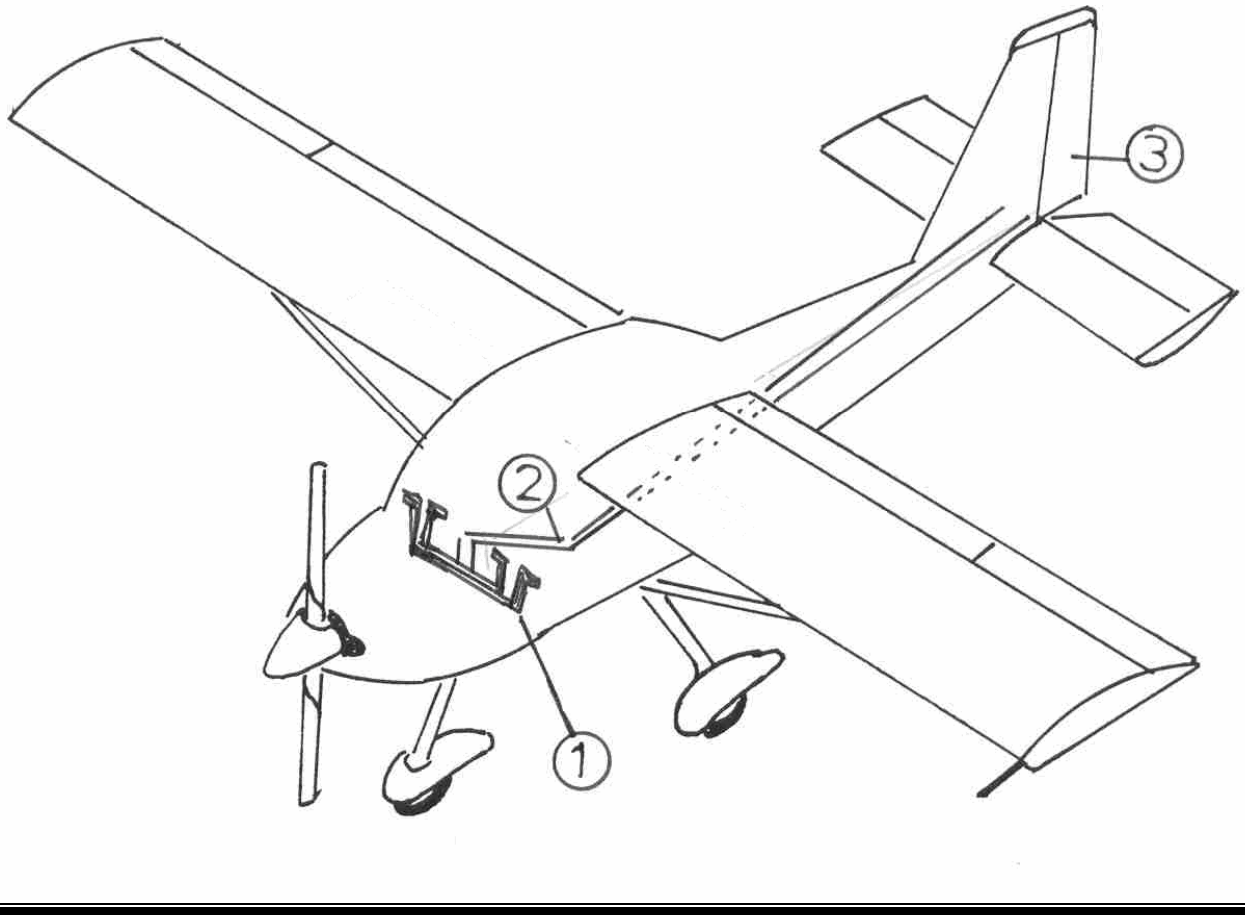
Fig. 9



1) Wing tank
2) Vented Cap
3) Fuel line
4) Mechanic fuel pump
5) Tee
6) Gascolator
7) Return Line from carburator
8) To carburetor
9) Fuel valve (one per side)

RUDDER CONTROLS

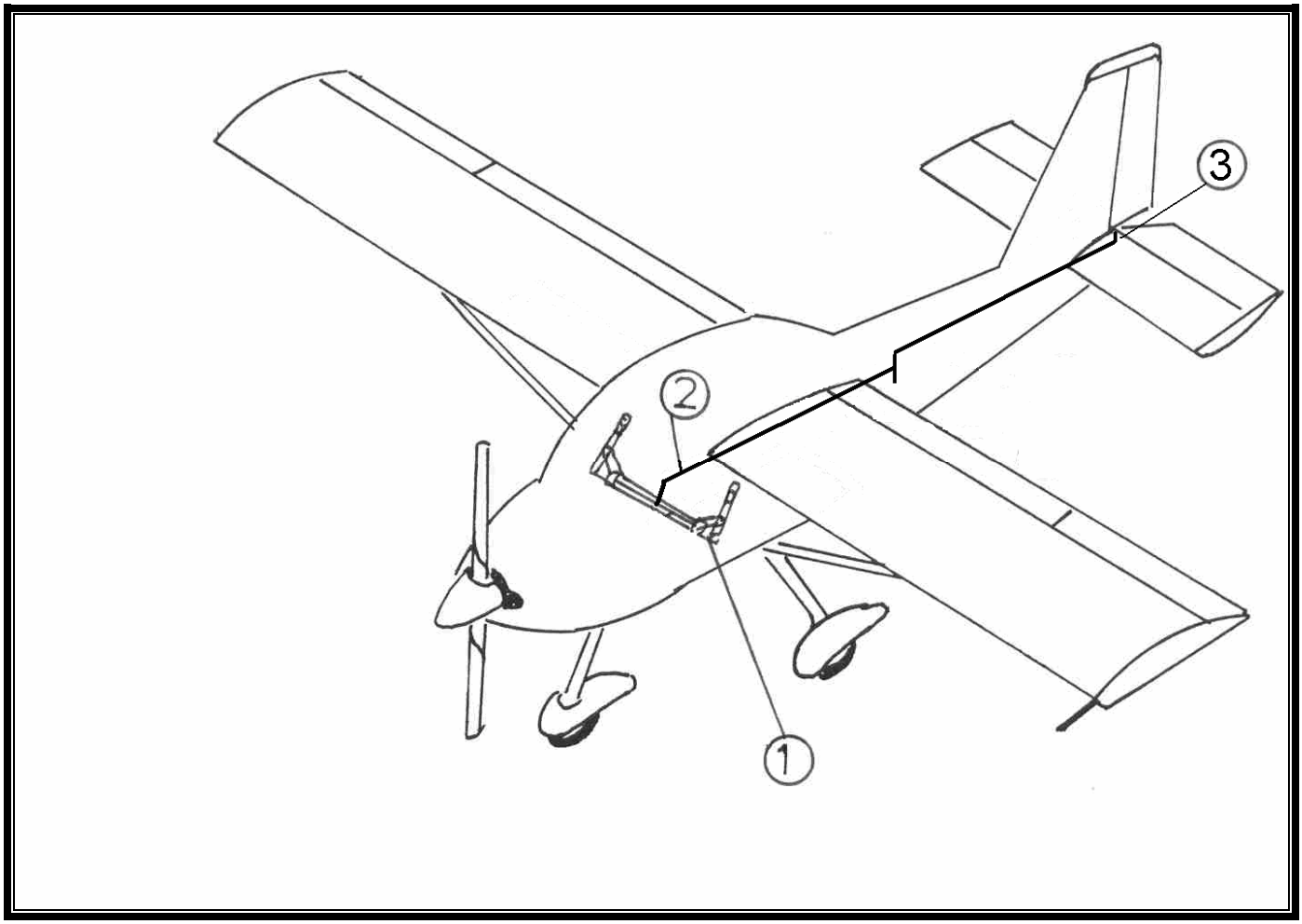
FIG. 10



1. Rudder pedals
2. Rudder cables
3. Rudder

ELEVATOR CONTROLS

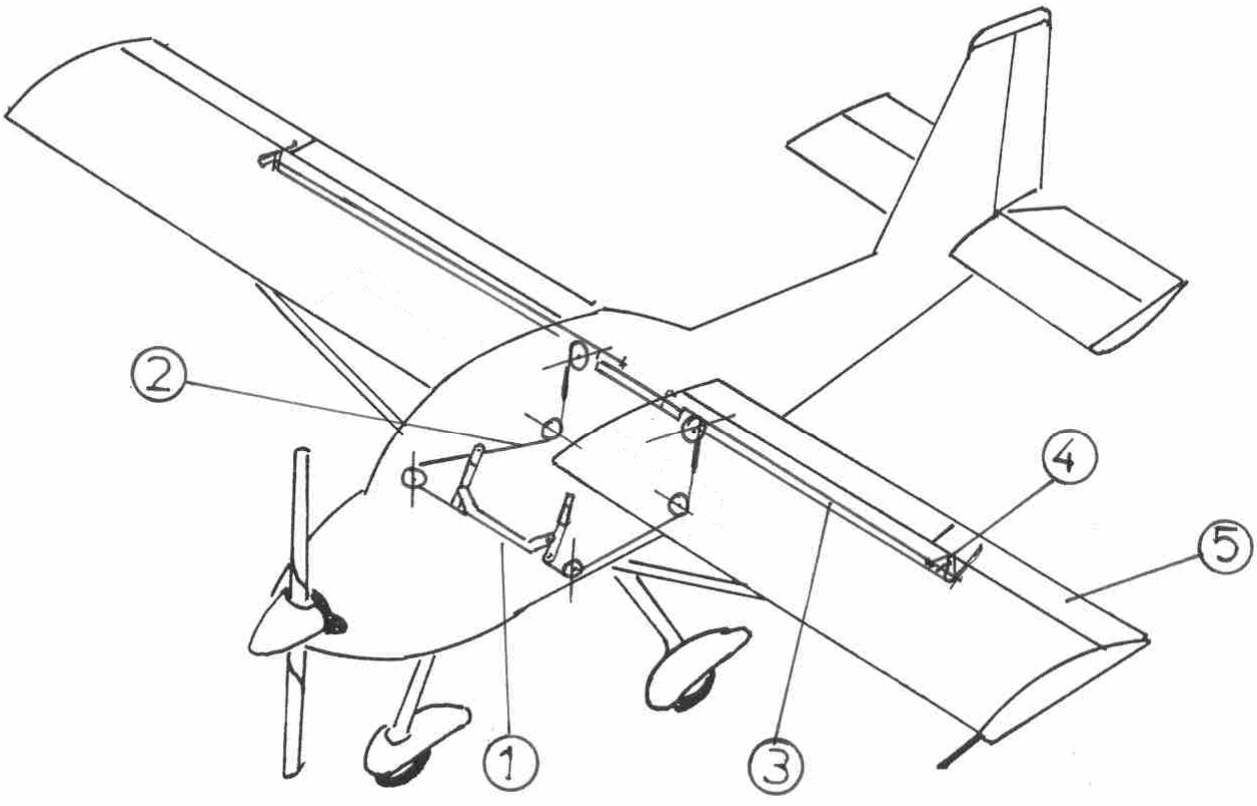
FIG. 11



1. Control group
2. Pushrod elevator
3. Bell crank

AILERONS CONTROLS

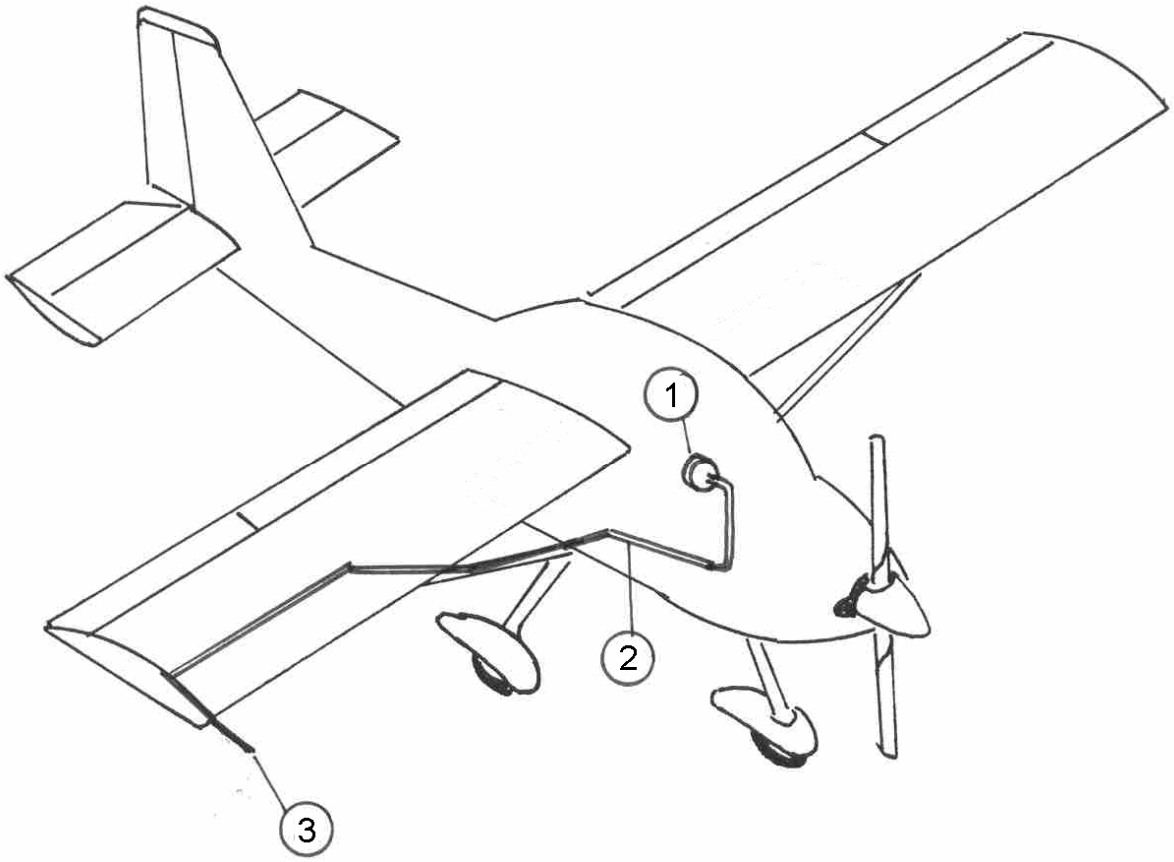
FIG. 12



1. Control group
2. Closed control cable
3. Control bar
4. Bell crank
5. Aileron

PITOT AIRSPEED

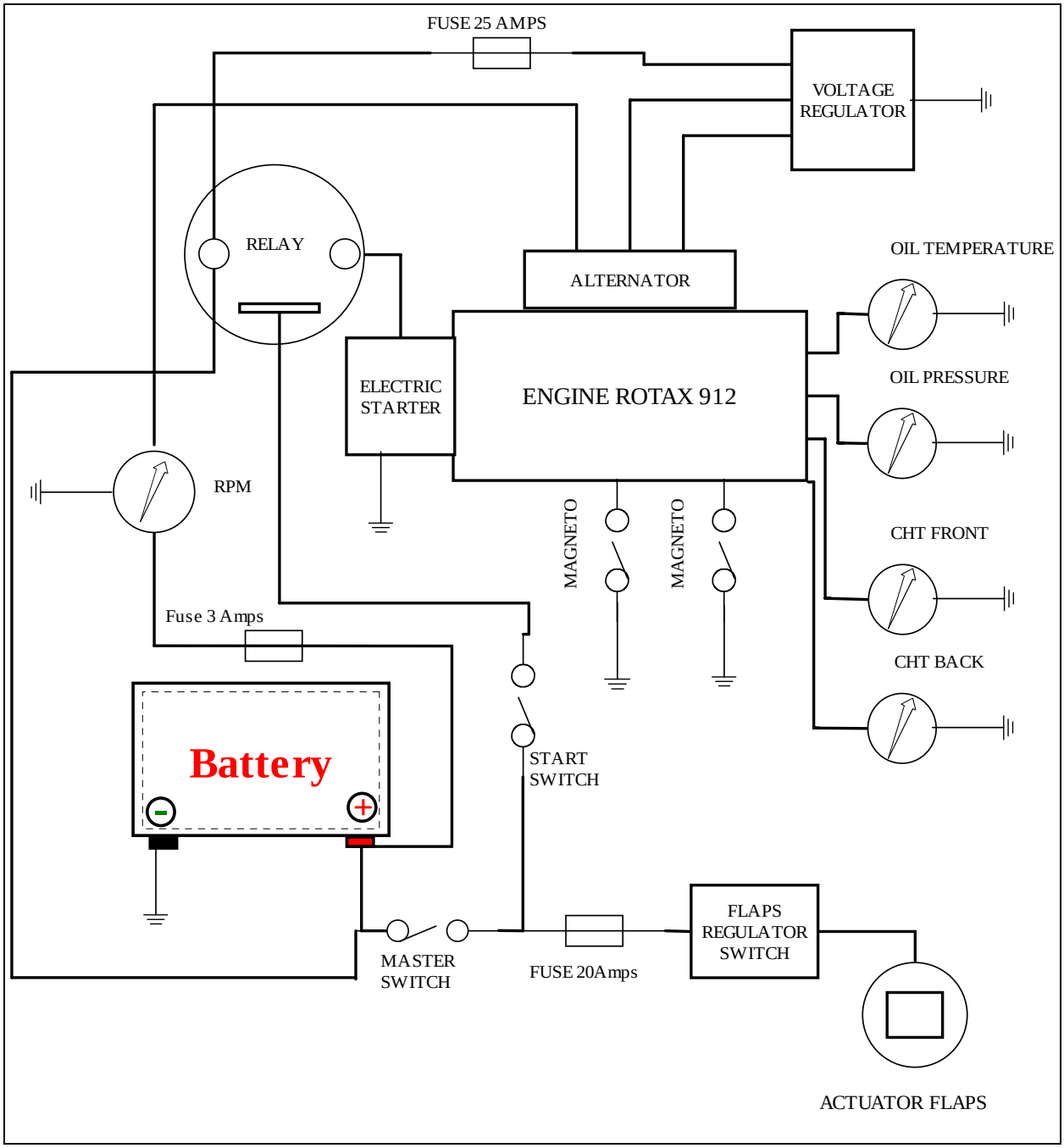
FIG. 13



1. Air speed indicator
2. Pressure line
3. Pitot tube

ELECTRIC SCHEMATIC

Fig. 14

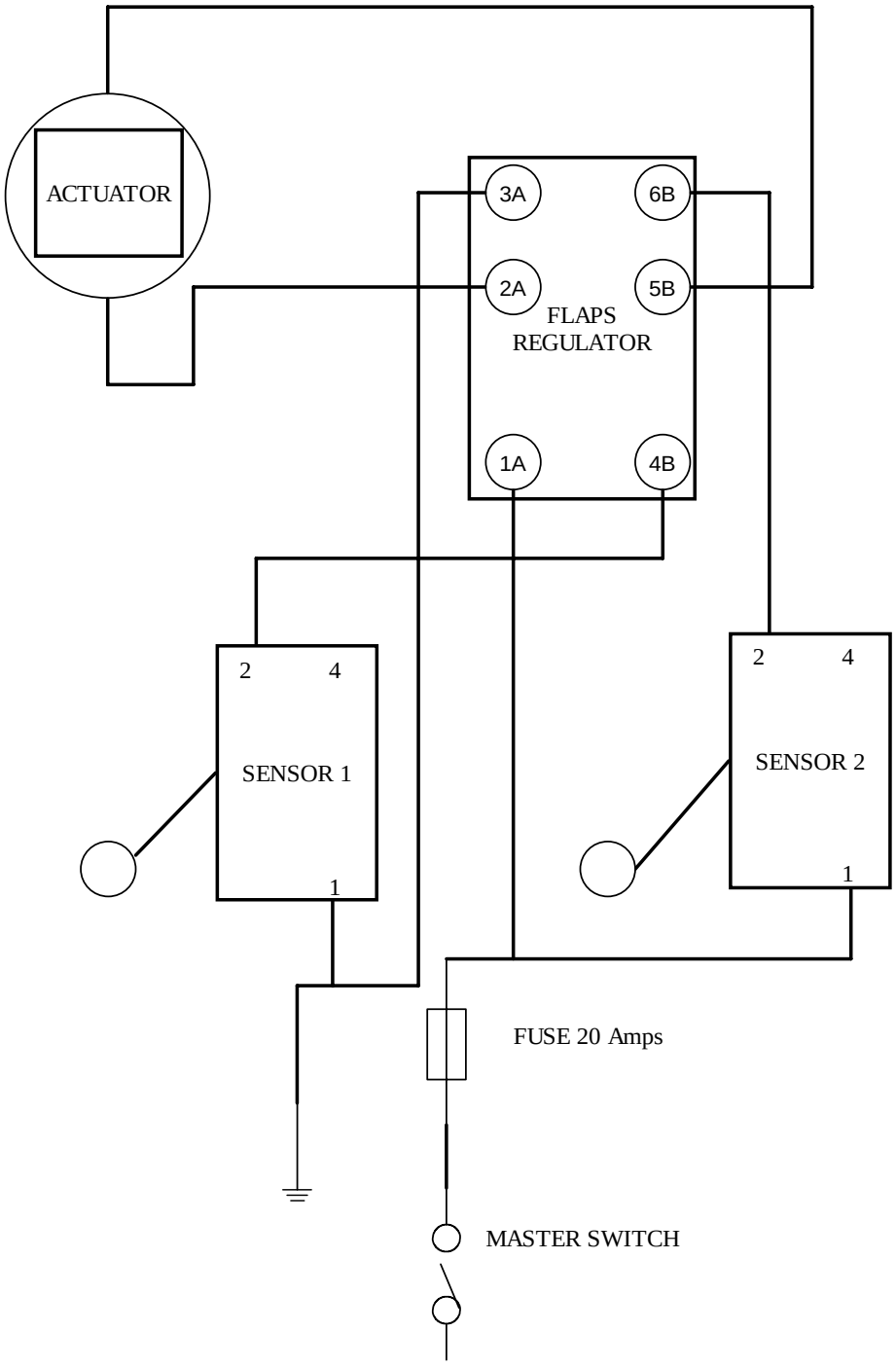


ELECTRIC CIRCUIT

The electric circuit (12 V continuous) is powered by two parallel sources:
Alternator and battery, the last one is for backup.
The alternator has a max power of 250 W, and is connected directly with the engine shaft and produce 12 V thru a voltage regulator.
The flap scheme is reported on the follow picture:

FLAP CIRCUIT

FIG. 15



PERIODIC MAINTENANCE

Introduction

If you respect carefully the following instructions, you can sure that your airplane will be in safe flying condition.
It is very important that you update all the hours in the log book, and you put annotations on the maintenance log book at the end of this manual.
You should put the date and all the operations performed, including all the parts replaced.
In case of problems or questions, before you act do not hesitate to contact the manufacturer.
Be cautions of the suggestions from the "experts" that populate the flying field, the best advisor and the most competent person is the builder of the aircraft!
Is very important to lubricate the moving parts, this operation will force you to check and inspect the parts for damage or wear before they became a serious problem.
Apply quantity needed don't exceed and don't allow grease to come in contact with the fibreglass parts, clean immediately in case of contact.
It is recommended to grease only where it needed.
Do the pre-flight inspection before take off.

NOTE:

It is recommended that every 200 hrs the manufacturer inspect the airplane, a proper inspection will avoid nasty surprises and will guarantee the safe use of the aircraft for many years.

LUBRICATION AND CHECK POINTS

For the follow operations use lubricant and grease rated for the temperature in your area.
In case of dirt clean the part with a non corrosive agent then lubricate with oil or grease accordingly.

Every 50 hours or every 3 months, which ever come first.

Check the follow parts: (refer to pic.16 page 39).

Point (1) - pedals
Point (2) - joystick
Point (3) – pushrod joint
Point (4) - flaps actuator
Point (5) - elevator hinges
Point (6) - rudder hinges
Point (7) - elevator arms
Point (8) - ailerons
Point (9) - flaps
Point (10) - aileron bell crank
Point (11) - Wheel axle
Point (12) - front landing gear
Point (13) - pivoting point front wheel

Note: Repeat the point 8-9-10 11 on the second wing

LUBRICATION POINTS AND INSPECTION

NOTE:

Replace all the fasteners removed with the new one and tight on them with the correct torque. For small fasteners since the torque is low just tight on the fasteners until they touch the part on both sides and add 1/8 of a turn.

If you over-torque the fastener, you may break the thread and it may not be visible to the naked eye.
If you suspect that it may be over tightened replace the fastener with a new one. It is strongly recommended to use a torque wrench.

CONTROL LUBRICATION POINTS

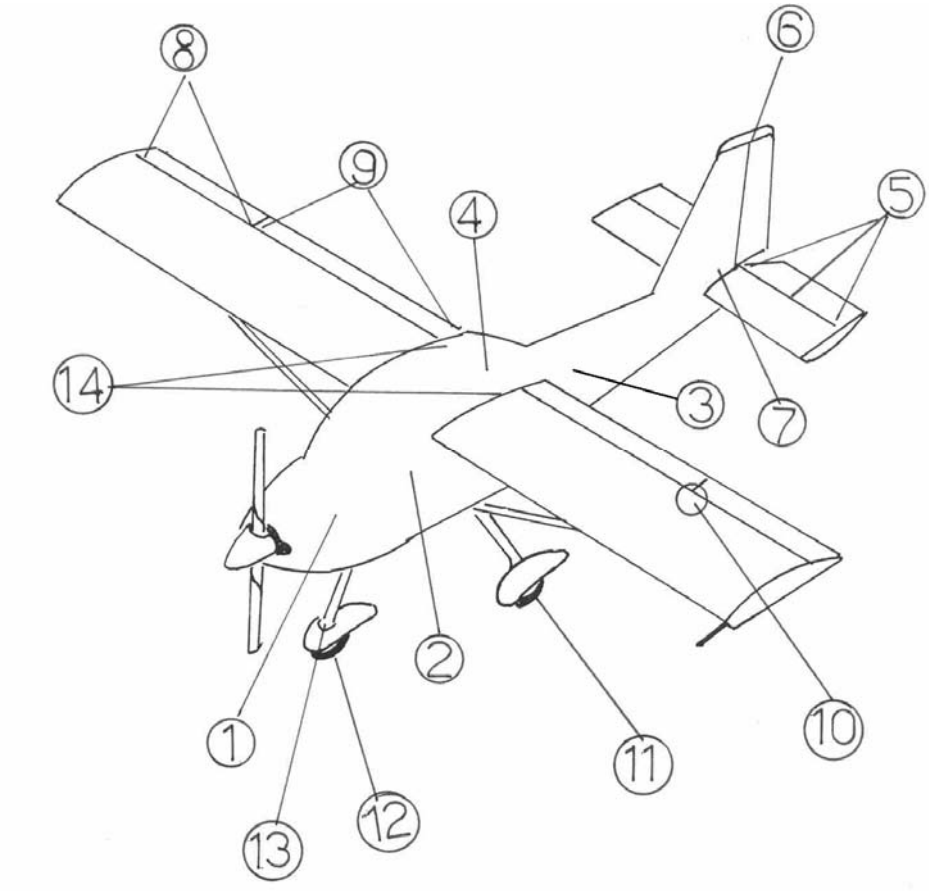


Fig.16

ENGINE MAINTENANCE

See ROTAX Manual.

Standard propeller

Check frequently the status of the propeller. The correct torque for the fasteners is 11.8 foot pounds or 1.6 kgm (16 NM).

NOTE:

Don’t over tight the propeller fasteners, it may damage the propeller hub and compromise the safety.

AIRPLANE CLEANING

Use only mild soap. Do not use unknown products they may damage or cause oxidation the airplane parts.

Polycarbonate parts

Use only water and mild soap. Do not use anything else.

NOTE:

If unleaded fuel comes in contact with the polycarbonate for a few seconds it will damage the structure.

THE MANUFACTURE RESERVES THE RIGHT TO MODIFY AND UPDATE THIS MANUAL ANY TIME.

REGISTERED OWNERS WILL BE UP DATED .

IT IS FORBIDDEN TO MODIFY OR SUBSTITUTE ANY PARTS OF THIS AIRPLANE UNLESS APPROVED BY THE MANUFACTURE.

THIS MANUAL HAS 40 PAGES INCLUDING THE COVER PAGE

DATE	INDICATED HRS	OWNER	FILE #.

MAINTENANCE DONE

- **STANDARD 60 HRS:** ☐
- **STANDARD 100 HRS:** ☐

EXTRA MAINTENANCE:

EXCHANGED PARTS:

DATE	INDICATED HRS	OWNER	FILE #.

MAINTENANCE DONE

- **STANDARD 60 HRS:** ☐
- **STANDARD 100 HRS:** ☐

EXTRA MAINTENANCE:

EXCHANGED PARTS:

DATE	INDICATED HRS	OWNER	FILE #.

MAINTENANCE DONE

- **STANDARD 60 HRS:** ☐
- **STANDARD 100 HRS:** ☐

EXTRA MAINTENANCE:

EXCHANGED PARTS: