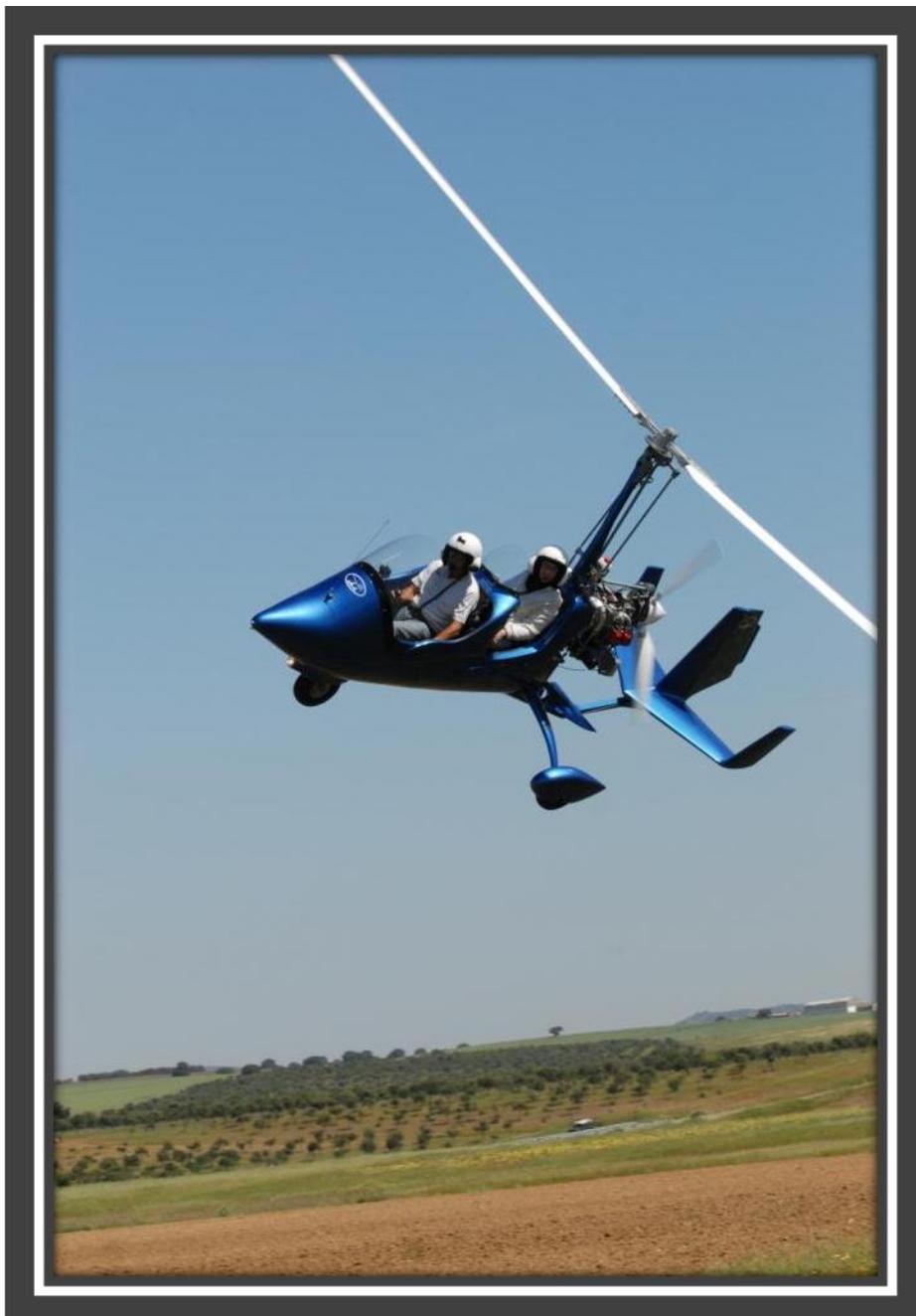




ELA 07-07S PILOT OPERATOR 'S HANDBOOK
Version: V07-04

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Warning

Flying a gyroplane is a skill which requires proper tuition. Do not try to fly this aircraft on your own unless you have completed a flight course by a qualified instructor for ELA 07 gyroplanes. Before flying this aircraft, read this manual as it contains important safety relevant information.

No part of this manual may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording or by any information storage or retrieval system, without permission from ELA Aviación, S.L.



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PILOT OPERATOR 'S HANDBOOK FOR ELA 07-07S GYROPLANE

- Gyroplane model ELA 07.
- Gyroplane serial N°
- Engine model Rotax
- Engine serial N°
- Registration marks
- Aircraft manufacturer and type certificate holder: ELA Aviación, S.L.
- Owner
.....
.....
.....



Amendments to this Manual

As necessary, ELA Aviación S.L. will issue updates to this manual and will notify owners in the form of replacement pages with changes identified by change bars in the margin.

Aircraft operators must ensure that amendments to their publication are effected immediately on receipt, in accordance with the amendment instructions which will accompany the updates.

Amendment Record

Amend't No.	Description of Amendment	Pages affected	Date



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Section I – Introduction.

- 1.1 General.
- 1.2 Applicability.
- 1.3 Acceptance of risk.
- 1.4 Terminology.
- 1.5 Conversion table.

Section II – Description of the aircraft.

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- 2.3 Overall dimensions.
- 2.4 Technical data and performances.
- 2.5 Engine.
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Section III – Operational limits.

- 3.1 General
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- 3.4 Load factor.
- 3.5 Height/Speed envelope.
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- 3.8 Limitations table.
- 3.9 Fuel.
- 3.10 Weight and balance.

Section IV – Normal procedures.

- 4.1 Pre-flight check procedure.
- 4.2 Starting the engine.
- 4.3 Taxiing procedure.
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- 4.5 Rotor prerotation.
- 4.6 Takeoff.
- 4.7 Flight maneuvers.
- 4.8 Landing.
- 4.9 After landing.



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Section V – Emergency procedures.

- 5.1 Engine failure during takeoff run.
- 5.2 Engine failure in takeoff (below 150 ft).
- 5.3 Engine failure in takeoff (above 150 ft).
- 5.4 Engine failure in flight.
- 5.5 Engine restart procedure.
- 5.6 Engine fire on the ground.
- 5.7 Engine or electrical fire in flight.
- 5.8 Rudder flutter.

Section VI – Handling and servicing.

- 6.1 Maintenance.
- 6.2 General.
- 6.3 Ground handling.
- 6.4 Cleaning.
- 6.5 Refuelling.
- 6.6 Checking oil level.
- 6.7 Checking coolant level.
- 6.8 Tires pressure.
- 6.9 Road transport.



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SECTION I – INTRODUCTION

1.1 GENERAL

This manual is always to be carried on board on the aircraft and must be kept in current up-to-date status. The latest revisions and version status are available at www.elaaviacion.com.

This Flight Manual contains the necessary information for safe and efficient operation of the ELA 07 series of gyroplanes. It provides a general knowledge of the aircraft, its characteristics, limitations and specific Normal and Emergency operating procedures. This manual is aimed at experienced pilots and is therefore devoid of any basic flight principle. It does not substitute a practical training course conducted by a qualified instructor.

This manual provides complete operating instructions for those circumstances in which the aircraft is legally cleared to fly. Logically, it cannot cover every possible situation which might occur. With multiple emergencies, unexpected bad weather, difficult terrain etc., the pilot's best judgment, aided by his skill and experience, may justify modification of these procedures.

Sections dedicated to Aircraft description, Operational limits, Normal procedures, Emergency procedures and Handling and servicing procedures that provides you with all required information to understand and use your aircraft in safety.

The operating procedures have been developed by experienced test pilots and company engineers to give you the best information possible.

Before flying the aircraft, carefully read this manual and also the airframe and engine maintenance manuals. A good pilot will always be fully informed about his aircraft, its flight data and permitted operating limits. Sound knowledge of these are essential to allow you to operate with safety. This aircraft has been designed and built to operate safely and correctly within the limits defined in this manual.



Airmanship, combined with correct and timely maintenance, as detailed in the Maintenance manual, will ensure that these optimal characteristics endure for the lifetime of the aircraft.

Warning

Flying a gyroplane is a skill which requires proper tuition. Do not try to fly this aircraft on your own unless you have completed a flight course by a qualified instructor for ELA 07 gyroplanes.

1.2 APPLICABILITY

This manual is applicable for all ELA 07/07S gyroplanes.

1.3 ACCEPTANCE OF RISK

Manned flight is not considered as totally risk-free. With the purchase and use of this aircraft, the owner and the pilot, as well as any passenger, tacitly accept that such risk exists.

All flights must be carried out where emergency landings can be made in case of engine failure. The pilot in command is responsible in law for the safety of the aircraft and its passengers at all times.

In the knowledge that this risk has been accepted, ELA Aviación S.L. does not accept liability or responsibility for any death, injury or damage arising from the operation of this aircraft, including damage to persons or property due to landing with engine failure or through situations which are attributable to pilot error or imprudence.

The responsibility of ELA Aviación S.L is limited to the repair or the replacement of parts which are ascertained as being defective due to manufacturing processes during their statutory warranty period.



1.4 TERMINOLOGY

In this manual, these words have the following meanings:

Warning

An Operational Procedure or technique etc. which could result in personal injury or loss of life if not carefully followed.

Caution

An Operational Procedure or technique etc. which could result in damage to the gyroplane and its equipment if not carefully followed.

Note

An Operational Procedure or technique etc. which is considered essential to emphasize but has no specific safety implications.

Aerodynamics

CAS	Calibrated air speed. The indicated air speed corrected for position and instrument error.
IAS	Indicated air speed. The speed shown by the air speed indicator.
TAS	True Air speed. The calibrated air speed corrected for altitude and temperature.
Vno	Turbulence speed. The max speed to fly in turbulent air.
Vne	Never exceed speed. The max. speed allowable
Vy	Best rate of climb speed.
Vx	Best angle of climb speed and best glide speed.



Meteorology

OAT	Outside Air Temperature expressed in degrees Celsius (°C).
ISA	International Standard Atmosphere.
Hp	Standard altimeter setting. 1013 mb (or hectopascals).

1.5 CONVERSION TABLE

Temperature	<i>from</i>	Symbol	<i>to</i>	Symbol	<i>Factor</i>
	Fahrenheit	F°	Celsius	C°	$5/9*(F-32)$
	Celsius	C°	Fahrenheit	F°	$9/5*C+32$
Weight	<i>from</i>		<i>to</i>		
	Kilograms	Kg	Pounds	Lb	*2,205
	Pounds	Lb	Kilograms	Kg	* 0,4536
Speed	<i>from</i>		<i>to</i>		
	Metres per second	m/s	Feet per minute	ft/min	* 196,86
	Feet per minute	ft/min	Metres per second	m/s	* 0,00508
	Kilometres per hour	km/h	Knots	Kts	* 0,54
	Knots	kts	Kilometres per hour	Km/h	* 1,852
	Knots	Kts	Miles per hour	mph	* 1,15
	Miles per hour	mph	Knots	Kts	* 0,87
Pressure	<i>from</i>		<i>to</i>		



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	Atmospheres	Atm	Pounds per square inch	psi	* 14,8
	Pounds per square inch	psi	Atmospheres	Atm	* 0,06756
Distance	<i>from</i>		<i>to</i>		
	Kilometres	Km	Nautical Miles	nm	* 0,540
	Nautical miles	nm	Kilometres	Km.	* 1.852
	Statute miles	sm	Nautical Miles	nm	* 0,87
	Nautical Miles	nm	Statute miles	sm	* 1,15
	Meters	m	Feet	ft	* 3.281
	Centimetres	cm	Inches	in	* 0,3937
	Inches	in	Centimetres	cm.	* 2.54
Volume	<i>from</i>		<i>to</i>		
	Litres	lt	US Gallons	US gal	* 0,2642
	US Gallons	US gal	Litres	lt	* 3.785
Area	<i>from</i>		<i>to</i>		
	Square Meters	m ²	Square Feet	ft ²	* 10,76
	Square Feet	ft ²	Square Meters	m ²	* 0,0929



Section II – DESCRIPTION OF THE AIRCRAFT

2.1 GENERAL

The ELA 07 gyroplanes is designed as a 2-seater, tandem-configured three-axis aircraft with dual controls and single engine, ideal for flight instruction purposes. In addition to flight training and general recreational flying, the flight characteristics of this gyroplane make such aircraft ideally suited for tasks such as air transportation, forestry, border, livestock and traffic surveillance, electrical pylon inspection, aerial still and film photography, fumigation, crop spray etc. These are typically the kind of activities which benefit from the very low speeds at which this gyroplane can operate as well as its characteristic zero downwash. The manoeuvring capability of the aircraft in all configurations is exceptionally high, and since it is impossible for the machine to enter into a stall or a spin, it has an unequalled flight safety record. Its characteristic short take-off and landing runs make it particularly suitable for operation from fields of modest dimension.

2.2 CONSTRUCTIONAL DETAILS

The **Airframe** is one single part built from stainless steel TIG (tungsten-inert-gas) welded to guarantee lifetime freedom from corrosion. The gyroplane is a tricycle landing gear with front wheel.

The **cockpit** is made from composite materials, ensuring high strength with low weight. The high sided open cockpits have clear Plexiglas windshields to protect the occupants from wind effects but offer excellent all-round visibility.

The layout of the **instrument panel** house switches which fall easily to hand around the desired set of instruments.

The **rotor blades** are made from aluminium and composite materials.

The **power unit** consists of a pusher piston engine and three bladed composite propeller.



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The **tail planes** are made from composite materials and consist of a fix horizontal stabilizer with winglets at the ends and a vertical surface in the centre subdivided in a fix fin and rudder.

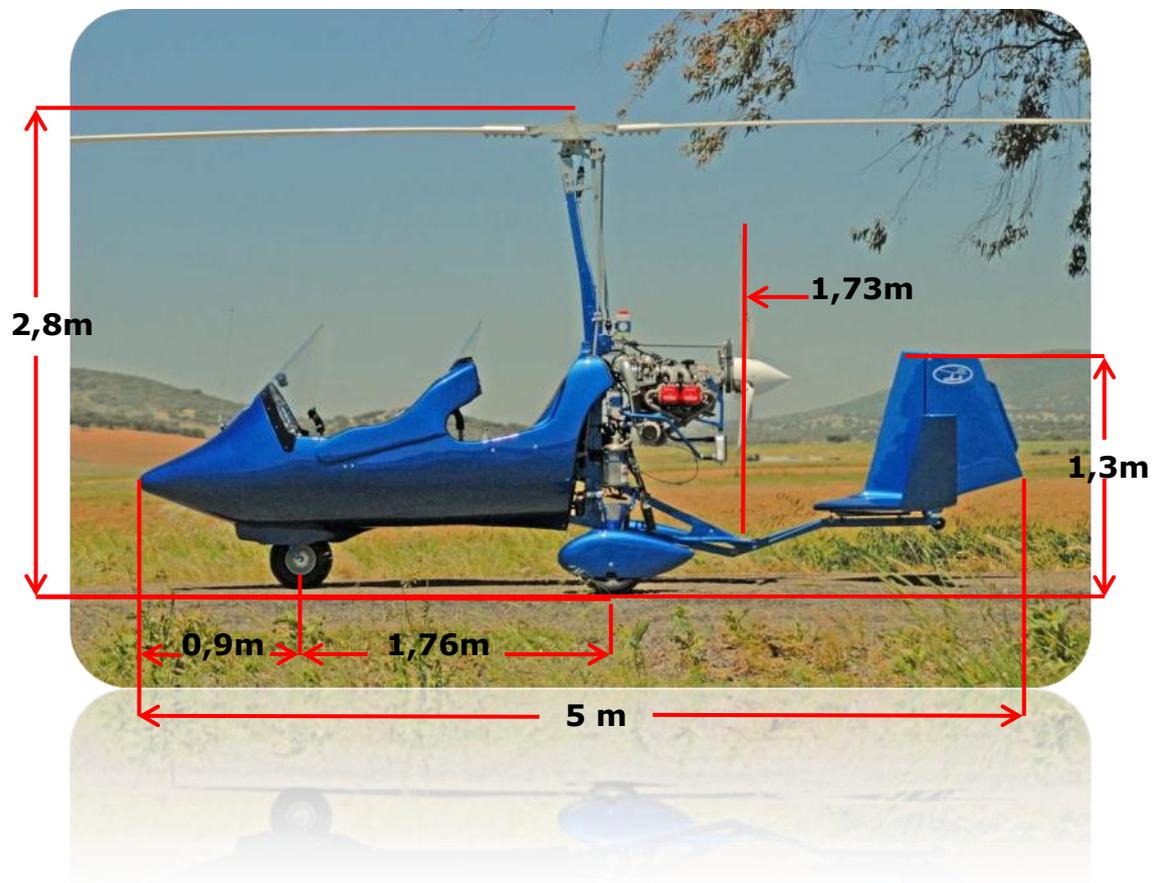
2.3 OVERALL DIMENSIONS

Total length: 5,0 meters

Cockpit Width: 0,75 meters

Landing Gear width: 1,8 meters

Rotor diameter: 8,25 / 8,50 meters.





2.4 TECHNICAL DATA AND PERFORMANCES

The following performance parameters were determined by flight testing with average piloting skills, aircraft in good conditions and clean rotor blades and propeller. The parameters apply to standard conditions ISA (15°C temperature, sea level and standard pressure).

<u>Gyroplane data</u>	With Rotax 912 ULS (100 HP)	With Rotax 914 TURBO (115 HP)
Empty weight (standard equipment)	258 kg	264 kg
MTOW	450 kg	450 kg
Useful load	192 kg	186 kg
Vne	100 mph	100 mph
Cruise speed	60 – 85 mph	60 – 90 mph
Min speed (level flight/full power))	25 mph	20 mph
Rate of climb	650 ft/min	1000 ft/min
Take-off distance	100 m	70 m
Landing distance	0 – 30 m	0 – 30 m
Fuel	Gasoline	
Fuel capacity	75 l	
Unusable fuel	3 l	
Fuel consumption	15 – 20 l/h	

2.5 ENGINE

- Manufacturer Rotax
- Take-off power:
 - o 912 ULS..... 100 hp
 - o 914 UL..... 115 hp
- Max. engine speed..... 5800 rpm



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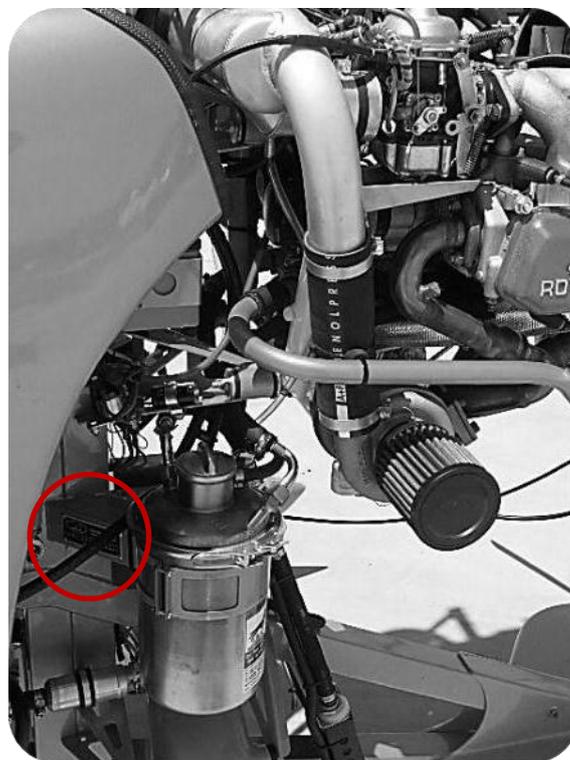
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- Cooling system..... Air/liquid
- Coolant..... 50% water/antifreeze
- Electric installation..... 12v

2.6 GYROPLANE IDENTIFICATION

The gyroplane identification placard is placed on the left side of the mast, oil tank bracket.

If you need to contact ELA Aviación, S.L. for any reason please, use your gyroplane serial number for identification.



Identification placard

2.7 MAIN PARTS



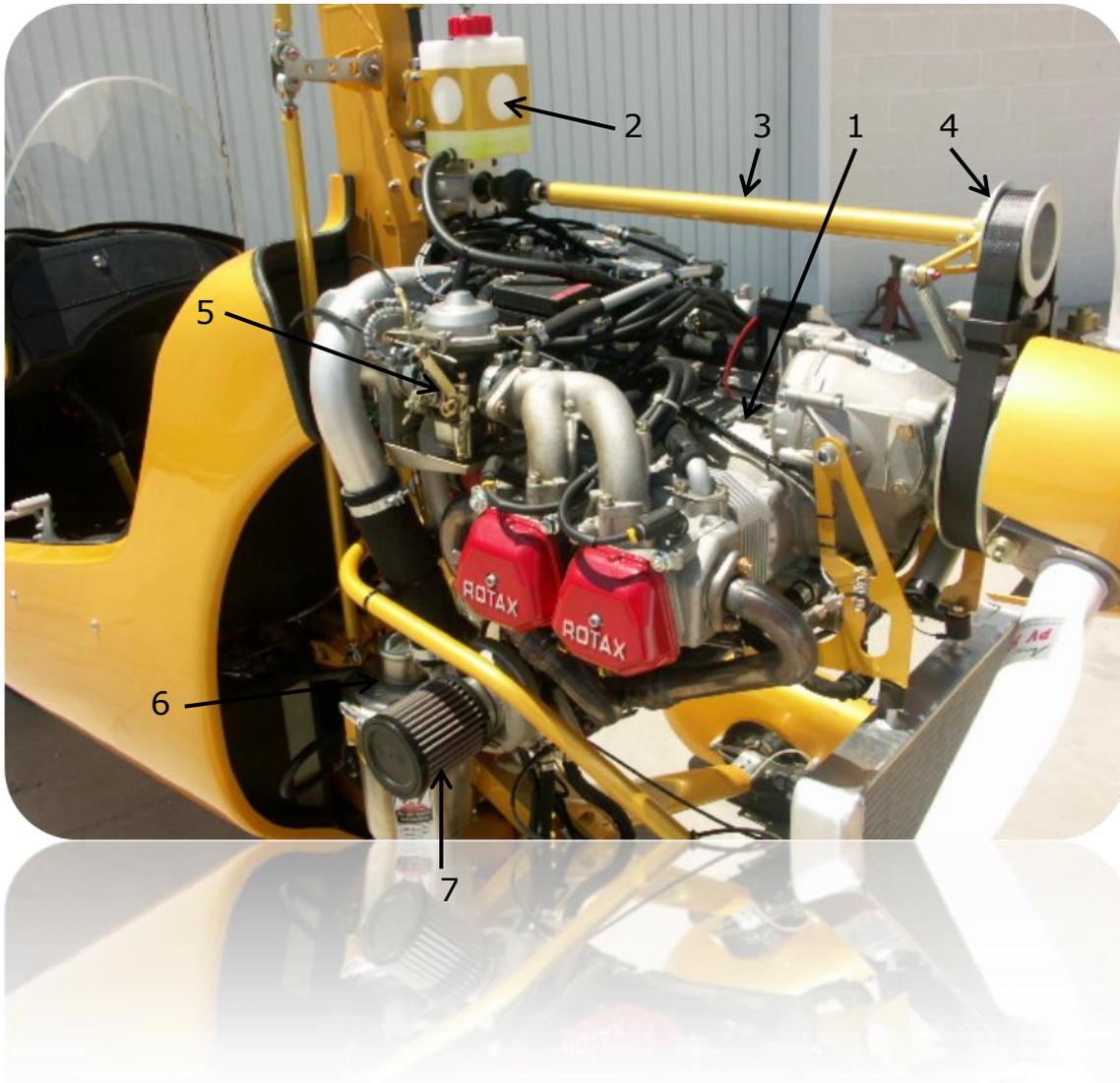
Parts:

- 1 - Rotor blades.
- 2 - Hub bar.
- 3 - Rotor head.
- 4 - Mast.
- 5 - Rear keel.
- 6 - Landing gear.
- 7 - Main wheels.
- 8 - Front wheel.
- 9 - Cockpit.
- 10 - Landing light.
- 11 - Windscreens.
- 12 - Engine.
- 13 - Tail planes.



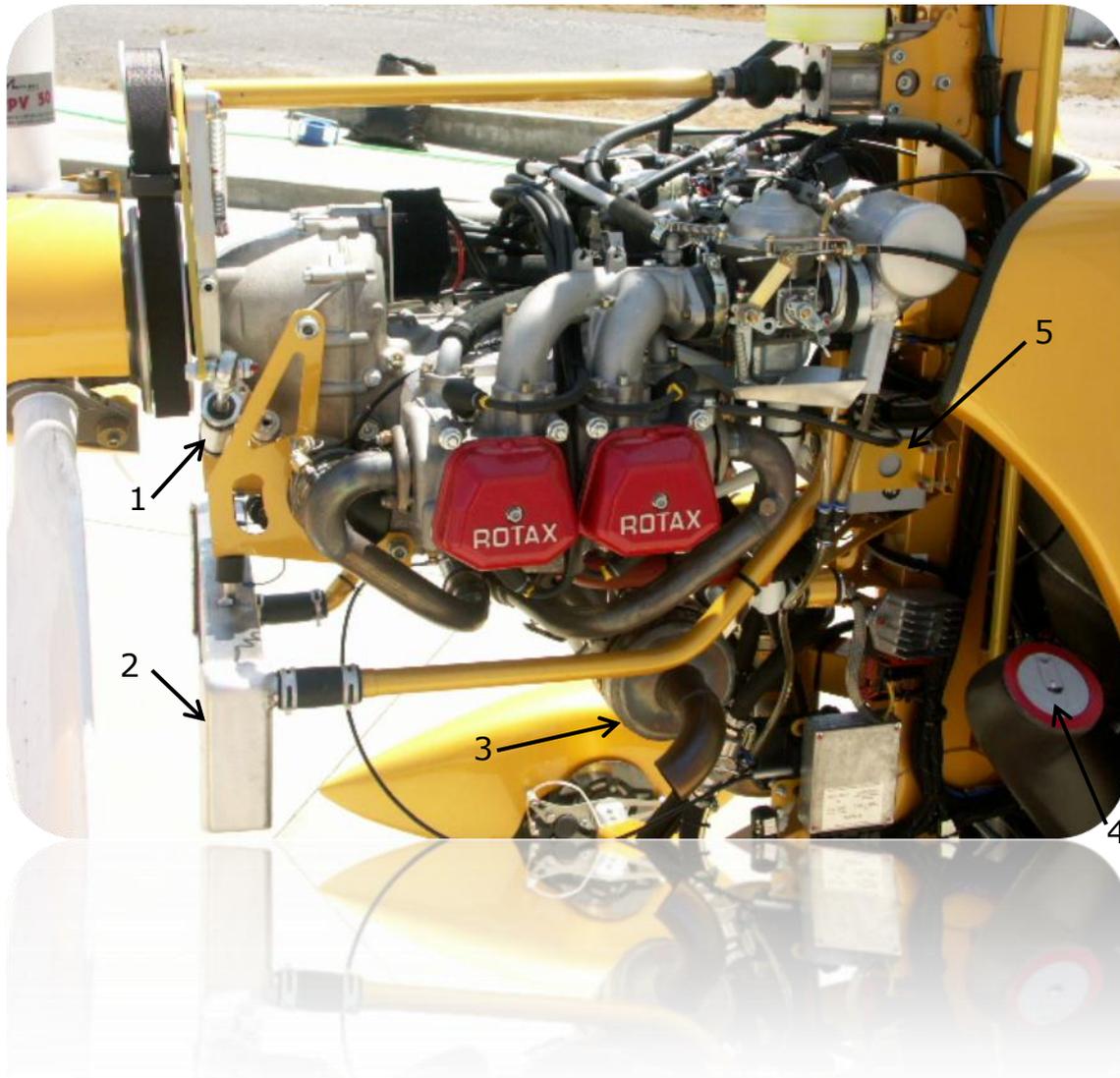
Parts:

- 1 - Propeller.
- 2 - Oil cooler.
- 3 - Water cooler.
- 4 - Vertical stabilizer.
- 5 - Rudder.
- 6 - Winglet.
- 7 - Horizontal stabilizer.
- 8 - Control rods.



Parts:

- 1 - Engine.
- 2 - Water tank.
- 3 - Horizontal prerotator transmission.
- 4 - Prerotator system.
- 5 - Carburettor.
- 6 - Oil tank.
- 7 - Air filter (914).



Parts:

- 1 - Prerotator pneumatic cylinder.
- 2 - Water cooler.
- 3 - Exhaust muffler.
- 4 - Fuel tank filler.
- 5 - Battery.

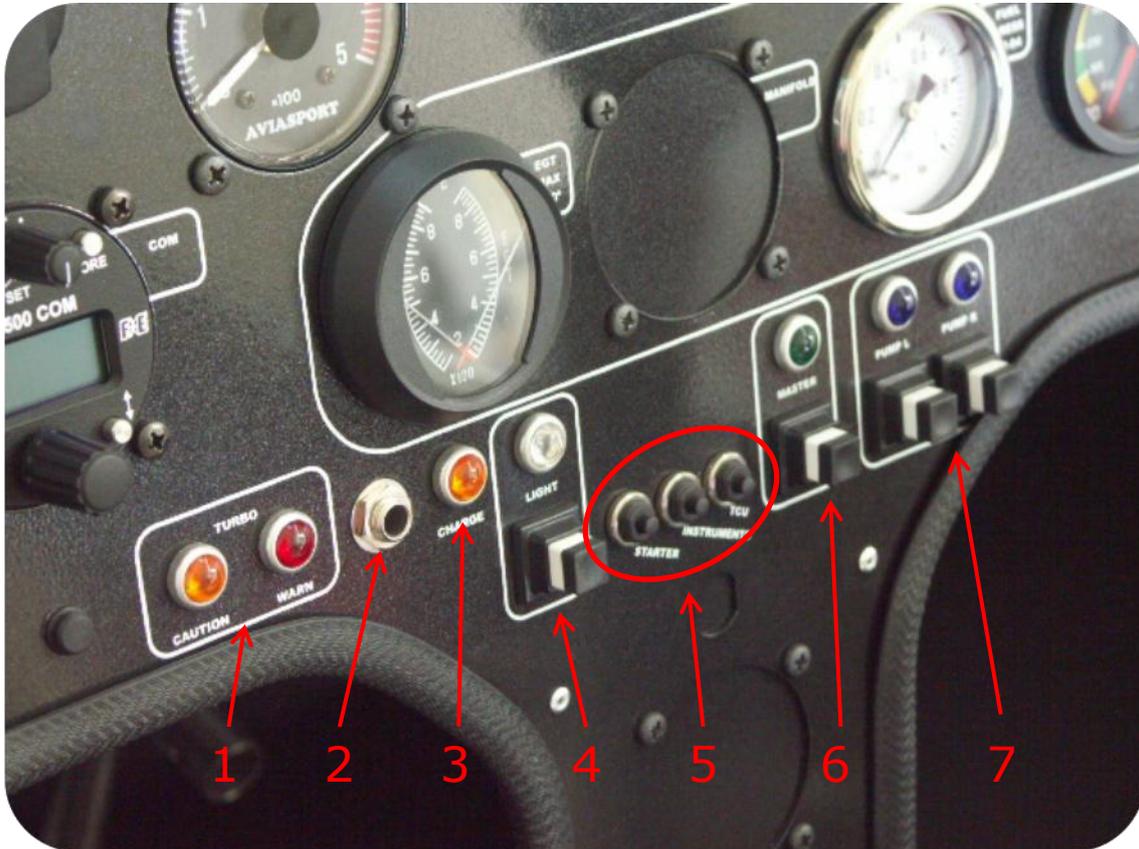


Parts:

- 1 - Compass.
- 2 - Altimeter.
- 3 - Airspeed indicator.
- 4 - Vertical speed indicator (optional).
- 5 - Rotor rpm.
- 6 - Engine rpm.
- 7 - Oil pressure.
- 8 - Trim pressure.
- 9 - Radio (optional).
- 10 - EGT (optional).
- 11 - Manifold pressure (optional).
- 12 - Fuel pressure.
- 13 - Oil temperature.
- 14 - CHT.
- 15 - Pneumatic valve.
- 16 - Ignition key.



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Parts:

- 1 - Caution and warning turbo lights (just in 914 engine).
- 2 - Headset jack.
- 3 - Battery charge.
- 4 - Landing light and strobe (optional).
- 5 - Breakers.
- 6 - Master.
- 7 - Fuel pumps (only one for 912 engine).



Front/Rear Stick



Trim
Prerotator
PTT Radio

Front pedals



Throttle, brake and roll trim



Roll trim

Throttle

Wheel brake





Section III – OPERATIONAL LIMITS

3.1 GENERAL

This section lists the operational limitations of the aircraft. These limitations must not be exceeded to ensure the safe conduct of the aircraft and its systems.

Warning

Should one of the limits specified in this section be exceeded, all parts of the gyroplane that could be affected will have to be carefully overhauled and inspected.

Warning

The operation with this gyroplane demands professional pilot instruction by a qualified instructor. Without a valid flight license must not be operated.

Warning

Smoking on board is prohibited!



3.2 SPEED LIMITS

- Velocity never exceed (Vne): 100 mph.

Do not exceed this speed this speed as it may cause structural damage to the aircraft.

- Turbulence speed (Vno): 70 mph.

When flying in high turbulence conditions reduce the speed as it may cause structural damage to the aircraft.

3.3 AEROBATIC MANEUVERS

- Any aerobatic manoeuvre is prohibited.
- "G" limits: Any manoeuvre which reduces "g" loads below **+1g** is forbidden.

Warning

Maneuvers involving a deliberate reduction in normal g shall be avoided as can cause a significant drop in rotor rpm with resultant loss of control response and danger to life.

3.4 LOAD FACTOR

- Maximum load factor is **+3g**. A higher value could permanently deform the gyroplane's structure.
- Maximum bank angle: Do not exceed **60°** angle of bank.
- Rotor speed: Max. Rotor speed is **550 rpm**.

Caution

This gyroplane has been designed and tested for a maximum load factor of 3g with MTOW. Flying at high speeds with aggressive maneuvers or a steep turn can easily create higher loads on the aircraft.



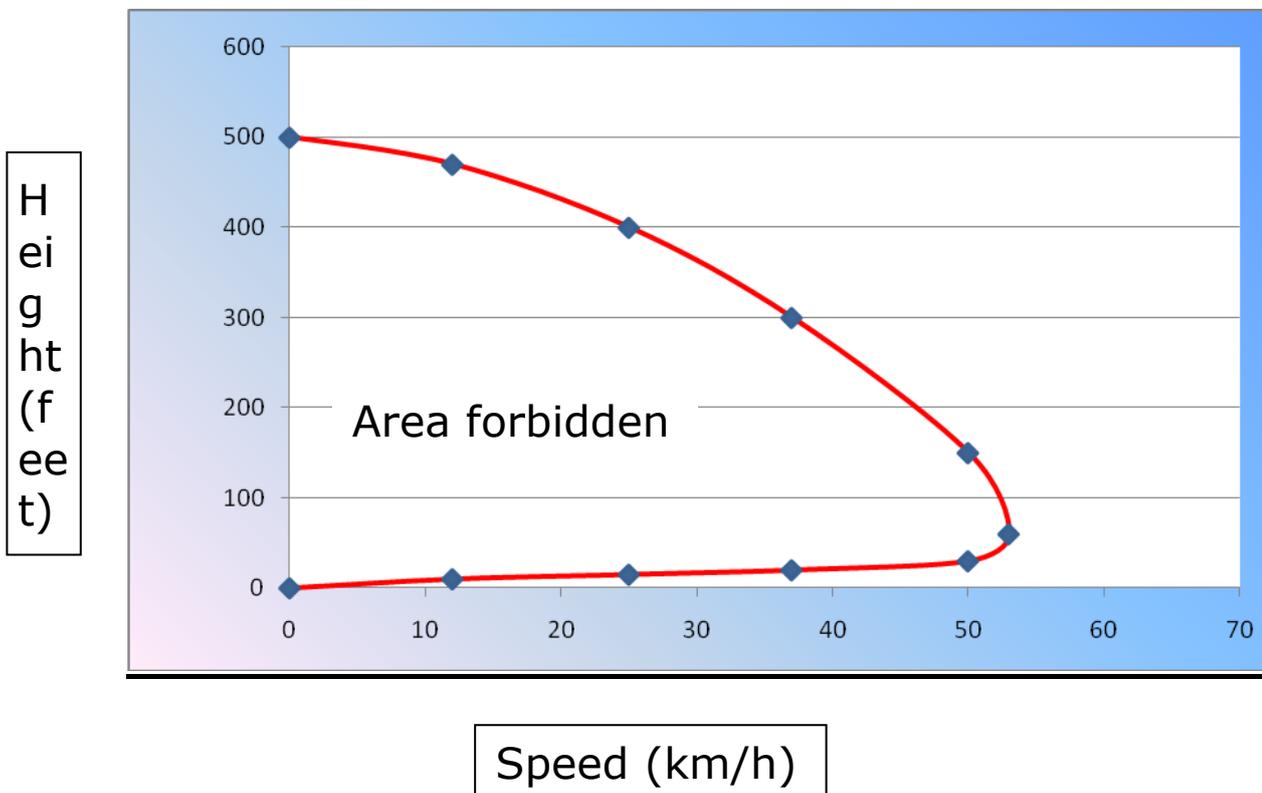
- Maximum take-off weight: **450 Kg.**
- When flying solo, the pilot should be seated in the **front position.**

Note

When flying solo, rear safety belt should be fastened.

- Min. front pilot weight: **60 Kg.**
- Max. front pilot weight: **100 Kg.**

3.5 HEIGHT/SPEED ENVELOPE





3.6 WEATHER

- This aircraft is cleared to fly only in strict Visual Flight Rules **(VFR)** meteorological conditions.
- It is forbidden to fly this gyroplane during a **storm**.
- This aircraft should be flown between **-20°C to +40°C**.
- When flying in high **turbulence conditions** reduce the speed to **70 mph** as it may cause structural damage to the aircraft.
- This gyroplane has not any anti-icing system for the rotor and propeller. Forbidden to fly in **icing conditions**.
- Flying with **heavy rain** will damage the rotor blades and propeller. Flying with light rain is allowed if there is enough visibility to fly safely.
- Take-off is forbidden if runway is covered with **ice, snow** or if it is **flooded**.

3.7 WIND

- **Cross wind:** Maximum cross wind for take-off and landing is **16 Kn**, always keeping the nose wheel off the ground until fully stopped after landing.
- **Tail wind:** Maximum tail wind for take-off and landing is **5 Kn**.

Caution

There is a risk of overturning during landing with high cross wind. In those conditions, always try to land into wind.



- Flight in strong gusty winds or wind higher than **40 Kn** is prohibited.
- 3.8 LIMITATIONS TABLE

<u>Data</u>	<u>Caution</u>	<u>Normal</u>	<u>Caution</u>	<u>Max</u>	<u>Units</u>
Speed	0 - 50	50 - 95	95 - 100	100<	mph
Rotor speed	300*	300 - 500	500 - 550	550<	rpm
Engine speed	0 - 1400	1400 - 5500	5500 - 5800	5800<	rpm
Oil temp	50	90 - 110	110 - 130	130<	°C
Oil press	0 - 2	2 - 5	5 - 7	7<	Bar
CHT	-	60 - 110	110 - 120	120<	°C
EGT	-	750 - 850	-	880<	°C
Manifold press. 912uls	-	0 - 27	27<	30	In Hg
Manifold press. 914ul	-	0 - 31	31 - 35	40	In Hg

*) Max. Prerotator speed: 300 rpm.

3.9 FUEL

Fuels that can be used:

- MOGAS
European standard ----- EN228 Super or EN228 Super Plus (min ROZ 95)
- AVGAS
US standard ----- AVGAS 100LL (ASTM D910)

Fuel tank capacity ----- 75 litres.



Unusable fuel ----- 3 litres.

3.10 WEIGHT AND BALANCE

The maximum take off weight of the ELA is 450 Kg. This represents the empty weight including additional equipment, occupant weight, fuel and luggage.

The pilot is responsible for ensuring. The aircraft is not flying over weight.

Empty weight is the corresponding with the aircraft configuration with the standard equipment. Oil and coolant in normal levels and 3 litres of fuel (unusable). No ballast is required in any allowed weight distribution, so no ballast is included in the empty weight definition.

A weight and balance report and equipment list showing gyroplane configuration, empty weight and centre of gravity documentation is delivered with each gyroplane. Any changes in the configuration should be performed by a qualified maintenance station and documented.



Section IV - NORMAL PROCEDURES

4.1 PRE-FLIGHT CHECK PROCEDURE

The purpose of the Pre-flight check procedure is to verify that the aircraft is fit for safe flight before you start the engine for the **first flight of the day**.

If any item of the Preflight Procedure cannot be satisfied for any reason, advise qualified maintenance personnel and do not attempt to fly before the defect is eliminated.

PRE-FLIGHT INSTRUCTIONS:

Before you start the pre-flight procedure, move the aircraft into a suitable position, ideally on level ground, facing into wind. Switch ON the master to charge the rotor brake air-tank, switch OFF when the compressor stops. Put the parking brakes ON and align the rotor to the straight-ahead position. Make sure the aircraft will not be adversely affected by the airstream from propellers of other aircraft. Once the external covers are removed, the check sequence begins at the nose of the aircraft and goes in a clockwise direction.

1. Protection and pitot tube covers Remove

Take off and stow all protective covers from the aircraft. This means (as applicable): rotor covers, cabin cover, tail surface cover etc. Be careful not to damage or bend any antennas or the wire holder for the sideslip string at the front windshield. Remove the pitot tube cap in the nose of the aircraft.

2. Front wheel Condition, pressure

Check the physical condition of the front wheel. To do this, go down on one knee and lift the nose of the aircraft with your shoulder. Make sure that the wheel rotates easily. Look for any damage to the tire including worn or damaged tread. Inflating pressure is 1,5 bar.

3. Radio and transponder antennas Secure

Make sure that the radio and transponder antennas (where fitted) are not loose. Try to move them gently by hand and make sure there is no movement.



4. Prerotator lever Ok

Pull the prerotator lever (when fitted) and verify it returns to the forward positions by itself.

5. Brake fluid Level

Verify the level of the brake fluid.

6. Throttle Check

Move the front throttle lever through its full range. Check for smooth operation and a suitable amount of friction.

Verify: Throttle fully opened = Carburettors fully opened. Close the throttle.

7. Brake lever Check

Inspect and operate the wheel brakes lever for correct operation.

8. Cockpit left side Secure

Verify the left side of the cockpit is secured to the airframe.

9. Left leg of landing gear, wheel & brake Condition

Check the physical condition of the left main landing gear, the wheel, the fairing and the brakes. Verify tire condition and pressure. Tire pressure is 2 bars.

10. Engine oil level Check

Remove the engine oil filler and remove the dipstick. Wipe the dipstick with a clean paper and carefully insert it fully again. Remove the dipstick and verify that the engine oil level is between limits. Replenish and re-verify if required.

11. Rotor control rods (Left) Check

Inspect the rotor control rods on the left side. Move the rods by hand to make sure the joints are free, the rods are securely attached to the mast and that the red paint marks all align.

12. Cooling pipes, exhaust & spark plugs (left) ... Secure

Make sure that the engine cooling pipes (left side of engine) including the cooler, the exhaust system and the spark plug connections are secure, no visible signs of damage or leaks.



13. Propeller Condition

Check each propeller blade and hub for signs of damage, de-lamination etc.

14. Propeller protector (if fitted) Secure

Make sure that the propeller protector (if fitted) is secure.

25. Tail planes and rudder Secure, condition

Check the physical condition of the tail surfaces for damage and security. Make sure the attachment bolts which hold the horizontal tail plane to the frame are secure. Move the rudder by hand and make sure it is free to move on its axis without any slackness. Check that front wheel turns in the same direction as the rudder. Check the tail wheel for signs of damage.

16. Steering cable Tension

Check the tension of the steering cables by hand. Pull and sharply release the cable to verify it. The cable vibration will produce a low-frequency musical note.

17. Propeller protector (if fitted) Secure

Make sure that the propeller protector (if fitted) is secure.

18. Pre-rotator system:

**Pulley Move, check
self-return and braked**

Inspect the drive elements of the pre-rotator system. Make sure the drive belt is in good condition. Move the piston by hand until the belt tightens. Release the piston and make sure the pulley returns to the "non-drive" position. Try to turn the transmission by hand – make sure it cannot rotate. Check that the universal joints are secure and that no distortion can be seen.

19. Cooling pipes, exhaust & spark plugs (right) Secure

Make sure that the engine cooling pipes (right side of engine) including the cooler, the exhaust system and the spark plug connections are secure, no visible signs of damage or leaks.



20. Engine cooling fluid Level

Make sure the white tank has at least $\frac{1}{4}$ of its capacity of cooling fluid.

Make sure the black tank is full. Open only with cold engine!

21. Left leg of landing gear, wheel & brake Condition

Check the physical condition of the left main landing gear, the wheel, the fairing and the brakes. Verify tire condition and pressure. Tire pressure is 2 bars.

22. Electrical wiring (Right) Condition

Inspect the electrical wiring harness on the right side of the mast up to the rotor head. Make sure all wiring is secure with no damage. Make sure the rear light on the mast is secure.

23. Rotor control rods (right) Check

Inspect the rotor control rods on the right side. Move the rods by hand to make sure the joints are free, the rods are securely attached to the mast and that the red paint marks all align.

24. Control fork Check

Make sure the rotor control fork bolts are secure and verify the red paint marks are in alignment.

25. Rotor head and blades Check

Verify that the rotor head is clean and all bolts are secure (split pins in position and locked). Verify that red paint marks on bolts are in alignment. Check the pre-rotator Bendix pinion.

26. Fuel Drain, inspect for water

Take a fuel sample from the gascolator. Make sure there is no water in the fuel.

27. Fuel quantity As required

Verify fuel quantity of the tank is sufficient for the planned flight (Full tank: 75 litres, of which approx. 3 litres are unusable.)

28. Cockpit left side Secure

Verify the left side of the cockpit is secured to the airframe.



29. If solo flight: Rear seat safety belts Fastened

For solo flight, the pilot must be in the front seat (ensure pilot equipped weight is within range 60 – 100 kg). The safety belts for the passenger must be fastened and secured so that they cannot cause damage during the flight.

30. Rotor control system No play

Hold the front stick and verify there is no play during operation.

4.2 STARTING THE ENGINE

The engine must be started in accordance with the latest applicable version of the relevant Rotax operator 's manual.

STARTING ENGINE INSTRUCTIONS:

1. Pre-flight inspection: Completed

2. Aircraft in Position: Make sure the aircraft is in a suitable position where blast from the propeller will not cause damage to people or other aircraft.

3. Wheel brakes ON: Pull up the parking brake lever on the front cockpit throttle and engage the parking brake lock.

4. Seat belts and helmet fastened: Pilot and passenger both verify that their own seatbelts are fastened.

5. Rotor brake ON: Make sure that the Flight/Brake valve is in the "Brake" position. Adjust the trim to the "zero" using the trim switch on the control handle.

6. Master switch ON:

7. Note: Battery charge indicator light ON.

8. TCU lights (914 UL only): Check that the TCU lights come ON for a few seconds then go OFF.

9. Fuel pumps ON: Switch ON the fuel pump/s. 2 pumps for 914, 1 pump for 912.



- 10. Fuel pressure:** Verify that the fuel pressure gauge indicates 0,2 to 0,4 bar.
- 11. Choke:** Pull the choke handle if the engine is cold and outside temp is low. With warm engine don't use the choke.
- 12.** Variable pitch propeller (if fitted) set to climb.
- 13. Propeller:** Shout "CLEAR PROP"

Warning

Never attempt to start the engine until the area around the engine is completely clear of any persons or objects. Do not start the engine while standing beside the aircraft as you will easily be struck by the propeller in case of a brake failure or an operating error.

- 14. Throttle:** Place your left hand on the throttle. If choke selected reduce the throttle to idle position. Without choke move the throttle lever slightly forward.
- 15. Start:** Turn right the ignition switch to start the engine with your right hand.

Note

If the starting is difficult, use the starter for a max of 10 seconds, wait 1 minute in order not to damage the starting system and try again.

ONCE THE ENGINE STARTS

- 1. Oil Pressure:** Once the engine starts, make sure that the oil pressure gauge shows between 1,5 to 7 bars.

If the oil pressure does not reach the minimum specified in 10 seconds, stop the engine immediately.



2. **Choke:** After a few seconds, if choke was applied, push it to OFF.
3. **Warm-up:** Move the throttle to hold 2500 rpm until the oil temperature rises to 50°C.
4. **Radio:** ON if requested.
5. **Transponder:** ON if requested.
6. **Altimeter:** QNH or QFE as appropriate
7. **Navigation system (GPS):** Switch ON if necessary.

4.3 TAXIING PROCEDURE

It is necessary to proceed very carefully during taxiing:

1. **Rotor:** align the rotor with the gyroplane during taxiing.
2. **Engine:** Make sure the oil temperature is not less than 50°C before taxiing to the runway.
3. **Engine rpm:** Set engine rpm between 1800 to 2000 rpm for taxiing and adjust the speed applying brakes.
4. **Steering:** The aircraft is steered by the pedals which turn the nose wheel in standard fashion (right foot forward, nose wheel turns to the right). Taxi slowly and be extremely careful on rough terrain.

Caution

When taxiing on uneven ground hold the control stick to avoid the rotor blades and control system hitting their mechanical stops.

4.4 PRE-TAKEOFF CHECKS

Before takeoff execute the following checks:

1. **Fuel pressure checks (914 only):** Switch OFF the left pump and verify the fuel pressure is correct, switch it ON and switch OFF the right one to verify the pressure. Switch ON the right again.

Keep both pumps working during all flight.

2. **Ignition check:** Apply parking brakes



Increase the throttle to give 3500 rpm. Select "R" then "L" at the ignition switch, then back to "Both". The maximum drop allowed in rpm is 300, and the difference between "L" and "R" positions must not exceed 150 rpm.

(Max drop 300, difference 150).

3. Engine parameters: Confirm engine parameters are ready for takeoff.

4.5 ROTOR PREROTATION

- 1. Alignment:** Runway alignment.
- 2. Engine:** Move the throttle until the engine speed reaches 2200 rpm.
- 3. Flight position:** Hold the stick **fully forward** and **centred** with your right hand. With your left hand, select the "Flight" position for the pneumatic valve. Wait five seconds for the pneumatic system to fully charge.
- 4. Pre-rotation:** Push and hold the pre-rotator button on the control stick with your thumb. This causes the prerotator to engage. You will hear the prerotator belt making some squeak, wait until the prerotator belt doesn't make noise, then increase the engine power slowly and gradually until reaching 220 rotor rpm.

Warning

Before engage the prerotator, check area is clear and consider the risk that passenger's hair or loose garment can be caught by the prerotator drive shaft.

For shorter takeoff it is advisable to increase the rotor rpm up to 300 but the stress of the prerotation system will be higher so don't do it if it's not necessary.

Caution

Start the takeoff with the rotor between 150 - 200 rpm requires a high skill. It is forbidden to proceed with takeoff operations if the rotor is under 150 rpm.



4.6 TAKEOFF

Once the prerotation procedure is finished gently move the control stick **fully back** to its stop, release wheel brakes and increase the engine power progressively.

Warning

Make sure the control stick is fully back before start the takeoff run. A takeoff run with flat rotor may have fatal consequences.

Use the rudder pedals to keep the alignment of the runway (right pedal).

Once the nose wheel lifts, move the control stick forward to keep it at approx. 10 cm off the ground while the gyroplane accelerates.

When the gyroplane takeoffs do a level flight until reach 100 km/h (best rate of climb) and then raise the nose to keep this speed.

Use the pitch trim to adjust the speed of the gyroplane:

Trim back = Nose up = reduce speed.

Trim forward = Nose down = increase speed.

Note

Remember: adjust the speed with the control stick, climb and descend with engine power.

Once reached the safe altitude, reduce the engine power to maintain the flight level at the desired speed.



TAKEOFF WITH CROSS WIND:

The maximum permitted cross wind for takeoff and landing is 16 Kn.

The procedure to takeoff with cross wind is the same than with no wind but it's necessary to use the controls properly.

In cross wind conditions the control stick should be moved into wind to keep the aircraft's direction whilst the pedals should be used to keep the alignment with the runway.

ABORT TAKEOFF

If the during the prerotation or the takeoff there is any disadvantage such not enough runway, the pilot should abort the takeoff operation. The procedure is to cut the engine power, use the left pedal to keep the alignment with the runway and flare to land. It is important to train this maneuver to fly safely.

4.7 FLIGHT MANEUVERS

CLIMB and DESCEND

Best rate of climb: 60 mph.

Best angle of climb: 55 mph

Max. Efficiency speed: 65 mph

Set the engine power to climb or descend, use the control stick (trim) to set the speed.

TURN IN LEVEL FLIGHT

Select a reference point, set turn with control stick and maintain speed of the gyroplane using the trim.



To make turns above 15° angle, would be necessary to increase the engine power in order to keep height/speed and use the rudder pedals to favour to turn.

Max. Bank angle: 60°.

SLOW FLIGHT

Before perform this maneuver be sure you have at least 500 ft above the ground and go **into wind**.

Reduce the engine power from cruise speed keeping the nose attitude, the gyroplane will decelerate. Before arrive to the desired speed increase the power to keep a level flight.

To regain the speed gently move the nose down and adjust power at desired speed.

VERTICAL DESCENT

To do a vertical descent with zero speed, do the following:

Before perform this maneuver be sure you have at least 500 feet above the ground and go **into wind**.

Reduce the engine power to 3000 rpm approx., gently raise the nose, the gyroplane will decelerate.

Keep aligned with a reference on the horizon using the rudder and control stick.

Vertical descent is permitted but **do not fly backwards**.

Don't do this maneuver with **engine stopped, you will lose the steering control**.



To regain the speed gently move the nose down and adjust power at desired speed.

4.8 LANDING

Contact airport via radio for traffic and runway in use (if necessary).

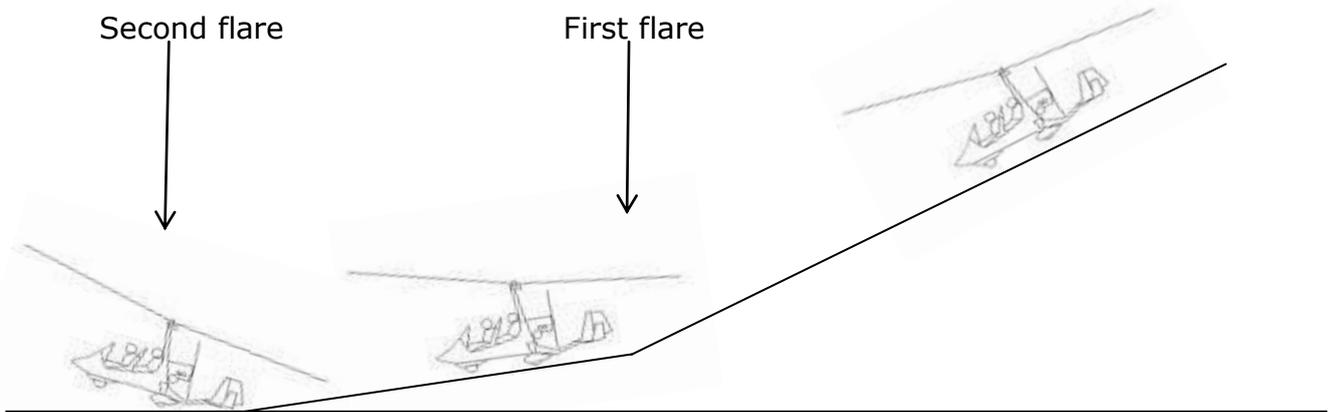
Adjust speed at 65 mph and enter in circuit. In final align to runway, reduce the power to descend and keep the speed 60 – 65 mph. Keep the gyroplane aligned to runway using the left pedal and control stick.

At 5 metres from the ground make a first flare to reduce the glide path and reduce slightly the speed.

Close to the ground make a second flare with nose up to reduce the speed and land with the main wheels. Once the main wheels touch the ground, gently move progressively the control stick back to its rear stop until the gyroplane stops.

Do not move the stick forward until the front wheel drops to the ground by itself.

In all the procedure from the first reduction of power to the end of the land be careful with the rudder pedals to keep the gyroplane properly aligned to the runway.





LANDING WITH CROSS WIND

The maximum permitted cross wind for takeoff and landing is 16 Kn.

Caution

There is a risk of overturning during landing with high cross wind. In those conditions, always try to land into wind.

The procedure for landing with cross wind is the same than with no wind.

Move the control stick against the wind direction and use the opposite pedal to maintain the alignment with the runway. It is advisable to land with some engine power (3000 rpm) in order to control the yaw of the gyroplane with low speed (second flare). Once the gyroplane lands cut the engine power to idle and when the front wheel drops to the ground move the control stick to wind.

ABORT LANDING

If the during the approach or the flare there is any disadvantage the pilot should abort the landing operation. The procedure is to increase the engine power, use the right pedal to counter the engine torque, level flight to reach 60 mph and climb.

4.9 AFTER LANDING

Once the gyroplane lands move the control stick forward, put the rotor brake and decrease the trim pressure. Taxi out of the runway.

Do not taxi close to obstacles or people with the rotor and propeller turning.

Switch OFF radio and lights, fuel pump/s, engine and Master.



Section V - EMERGENCY PROCEDURES

This section contains the procedures to follow in case of emergency. In case of an emergency situation it is important to know these procedures to be able to solve the situation with maximum safety.

This gyroplane, like the most recreational air vehicles is fitted with a non-certified engine. This means that there may be a higher risk of engine failure than with a certified aircraft engine with the associated risks of damage or injury as the result of an unplanned landing.

The "Emergency Procedures" contained in this section consist of the following procedural sets:

- 5.1 Engine failure during takeoff run.
- 5.2 Engine failure in takeoff (below 150 ft)
- 5.3 Engine failure in takeoff (above 150 ft)
- 5.4 Engine failure in flight.
- 5.5 Engine restart procedure.
- 5.6 Engine fire on ground.
- 5.7 Engine or electrical fire in flight.

5.1 ENGINE FAILURE DURING TAKEOFF RUN

INSTRUCTIONS:

- 1. Close throttle, engine failure may be sudden or accompanied by misfiring, typical of fuel starvation.
- 2. Keep heading and flare with nose up.
- 3. Ignition and fuel pumps OFF.
- 4. Rotor brake ON.
- 5. Master OFF.



5.2 ENGINE FAILURE IN TAKEOFF (below 150 ft)

INSTRUCTIONS:

1. Close throttle, engine failure may be sudden or accompanied by misfiring, typical of fuel starvation.
2. Keep heading, low the nose down to keep best glide speed (60 mph), look for an area for landing in front of you, do not turn as you don't have excess of height.
3. If the area for landing is rough or there are obstacles, make a higher flare over the obstacles to reduce forward speed.
4. Ignition and fuel pumps OFF.
5. Rotor brake ON.
6. Master OFF.

The rotor will come to stop with the rotor brake ON. Unless there is danger present, wait until the rotor has stopped before vacating the aircraft.

Get out of the aircraft without panic. Help your rear seat occupant to do the same if necessary.

5.3 ENGINE FAILURE IN TAKEOFF (above 150 ft)

INSTRUCTIONS:

1. Close throttle, engine failure may be sudden or accompanied by misfiring, typical of fuel starvation.
2. Low the nose down to keep best glide speed (60 mph), look for an area for landing into wind.
3. If time allows, an engine restart can be attempted, see "Engine restart procedure".
4. If the area for landing is rough or there are obstacles, make a higher flare over the obstacles to reduce forward speed.
5. Ignition and fuel pumps OFF.
6. Rotor brake ON.
7. Master OFF.



The rotor will come to stop with the rotor brake ON. Unless there is danger present, wait until the rotor has stopped before vacating the aircraft.

Get out of the aircraft without panic. Help your rear seat occupant to do the same if necessary.

5.4 ENGINE FAILURE IN FLIGHT

INSTRUCTIONS:

1. Close throttle, engine failure may be sudden or accompanied by misfiring, typical of fuel starvation.
2. Low the nose down to keep best glide speed (60 mph), look for an area for landing into wind.
3. If time allows, an engine restart can be attempted, see "Engine restart procedure".
4. If the area for landing is rough or there are obstacles, make a higher flare over the obstacles to reduce forward speed.
5. Once in the ground, ignition and fuel pumps OFF.
6. Rotor brake ON.
7. Master OFF.

5.5 ENGINE RESTART PROCEDURE

INSTRUCTIONS:

1. Check fuel pumps ON, check fuel pressure.
2. Check ignition ON.
3. Throttle slightly open.
4. With your left hand, try to restart the engine.
5. Verify engine parameters are within limits (oil temp/pressure and CHT). If not, try to land with safety.



5.6 ENGINE FIRE ON THE GROUND

INSTRUCTIONS:

1. Close the throttle and brake.
2. If rotor is turning select rotor brake.
3. Switch OFF engine, pumps and Master.
4. If rotor is turning, abandon the aircraft with great care. Help your rear seat occupant to do the same.
5. Fight the fire

Caution: Never use a water extinguisher on fuel fires. It will cause the burning fuel to spread the fire to other locations.

5.7 ENGINE OR ELECTRICAL FIRE IN FLIGHT

INSTRUCTIONS:

1. Close the throttle immediately fire is apparent.
2. Switch OFF the ignition and fuel pumps.
3. Switch OFF Master.

DO NOT MAKE ANY ATTEMPT TO RESTART THE ENGINE

4. Close throttle, engine failure may be sudden or accompanied by misfiring, typical of fuel starvation.
5. Keep heading and best glide speed 60 mph, look for an area for landing into wind.
6. If the area for landing is rough or there are obstacles do a higher flare over the obstacles.
7. Once in the ground, ignition and fuel pumps OFF.
8. Rotor brake ON.
9. Master OFF. If rotor is turning, abandon the aircraft with great care. Help your rear seat occupant to do the same.
10. Fight the fire

Caution: Never use a water extinguisher on fuel fires. It will cause the burning fuel to spread the fire to other locations.



5.8 RUDDER FLUTTER

Flutter is a self-feeding vibration due to an aerodynamic instability. The tail rudder is affected by the propeller airstream and could enter in flutter if steering control cable is not assembled with the correct tension. It is so important for your safety to follow the maintenance instructions of the maintenance manual.

If for any reason, you feel some rudder vibration and self-movement in your pedals, you should reduce the airspeed by reducing the engine power and maintain attitude until the vibration stops. Then fly carefully back to the nearest airfield for inspection.



Section VI – Handling and Servicing

This section contains guidelines for correct handling and servicing of the gyroplane as well as the recommendations to keep it in good conditions.

6.1 MAINTENANCE

The owner/operator of this aircraft is the responsible to keep it properly maintained according with the maintenance manuals, provided with this gyroplane.

Maintenance tasks must be performed by authorized and qualified mechanics.

Special inspections have to be performed after any of the follow operational incidents:

- Hard landing.
- Strikes in flight with birds, trees...
- Rotor contact with obstacles.
- Lightning strike.
- Rotor over-speed.
- Engine failure.

6.2 GENERAL

High humidity, especially in combination with salt-laden atmosphere, sunlight and heat impact will lead to degradation or corrosion of some parts of the gyroplane. Whenever possible place the gyro in a protected area. The manufacturer takes no responsibility for damage due to improper usage.

6.3 GROUND HANDLING

Be very careful handling the gyroplane on the ground, especially taxiing in rough terrain when the rotor is stopped. Rotor blades are not designed to withstand high flexion loads so avoid excessive swing when taxiing or parked with high wind as it can leads in fatigue or damage.



6.4 CLEANING

It is important to keep the gyroplane and its engine clean to maintain it in good conditions. When cleaning, some mistakes or damages can be found.

Rotor blades and propeller should be always clean as they are very important to keep the best performances.

In order to protect the gyroplane from dust, humidity, bird soil... is advisable to cover it when parked in the hangar.

Caution

Do not use high pressure water machine as it can damage electrical connections, bearings or paint.

Do not use solvents or gasoline as it can damage some parts of the gyroplane.

Use car soap with water to clean the external parts, windscreen should be cleaned only with polycarbonate soup or polish (ELA part N°071717).

Protect the metal parts of the gyroplane and engine against corrosion, especially in high humidity conditions with "WD-40" spray or equivalent.

6.5 REFUELING

Fuels that can be used:

- MOGAS

European standard - EN228 Super or EN228 Super Plus (min ROZ 95)

- AVGAS

US standard ----- AVGAS 100LL (ASTM D910)

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



To avoid contamination, use a funnel with strainer/filter when refuelling from jerry cans.

6.6 CHECKING OIL LEVEL

Before checking the oil level, be sure the ignition switch is OFF. The oil level should be checked with the aircraft in level attitude.

Remove the oil tank cap, turn the propeller in the correct sense of rotation until you hear the oil gurgle in the tank. Insert the cleaned dipstick fully for measurement and verify the oil level.

The oil level should be in the upper half (between the "50%" and the max. mark) and should never fall below the min. mark.

Difference between "min" and "max" mark is 0,45 litres.

6.7 CHECKING COOLANT LEVEL

Check the coolant level with engine cold!

Open the black expansion tank and verify it is full, the white tank should be approximately in the middle.

Coolant type: Mixture antifreeze concentrate coolant and water;50% - 50%.

6.8 TIRES PRESSURE

Main wheels ----- 2 bars.

Front wheel ----- 1,5 bar.



6.9 ROAD TRANSPORT

Take the rotor blades off and package them carefully as they can be damaged during transportation by road. Transport the gyro with minimum fuel for safety.