

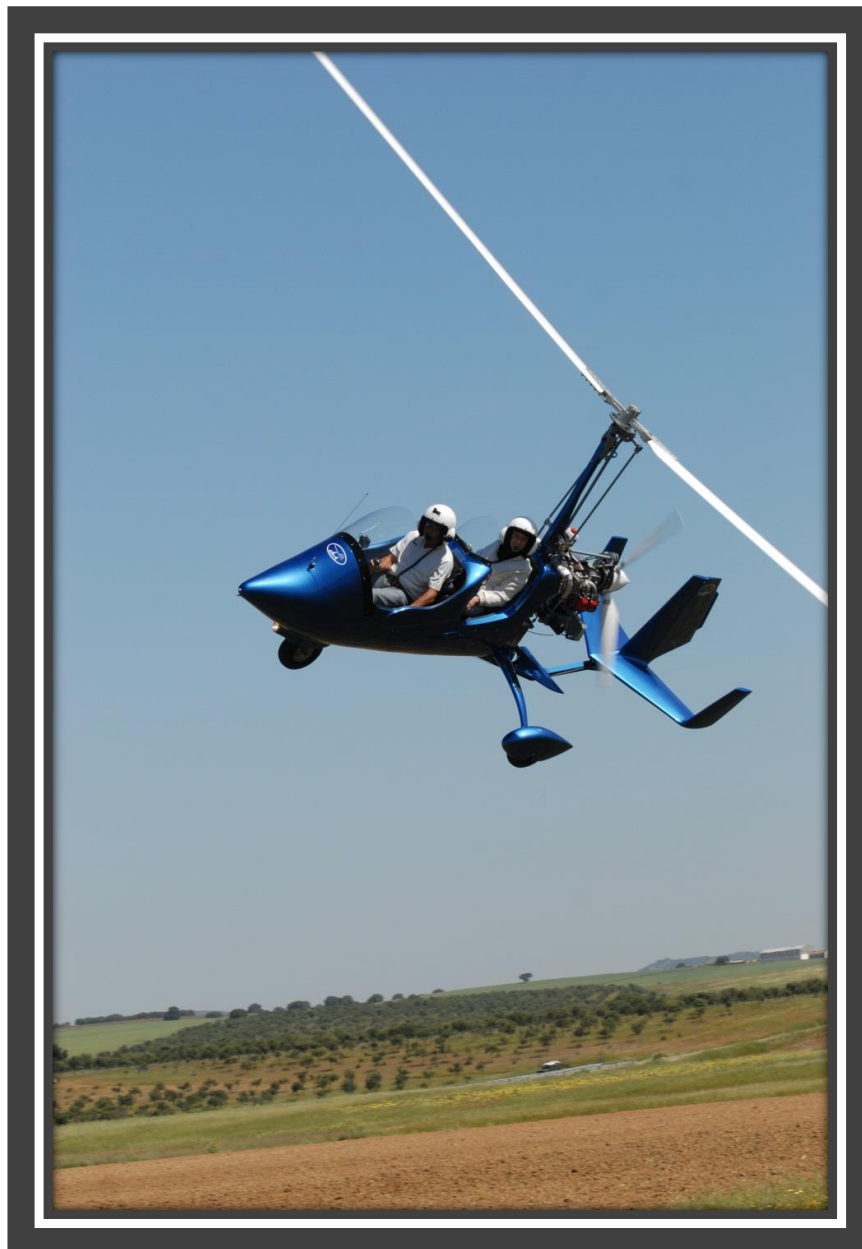


ELA 07-07S PILOT OPERATOR 'S HANDBOOK
Version: V07-05

Last modification: September 2017.

ELA AVIACIÓN, S.L.

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ELA 07-07S PILOT OPERATOR 'S HANDBOOK

Version: V07-05

Last modification: September 2017.

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.

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ELA 07-07S PILOT OPERATOR 'S HANDBOOK
Version: V07-05

Last modification: September 2017.

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ELA 07-07S PILOT OPERATOR 'S HANDBOOK
Version: V07-05

Last modification: September 2017.

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
.....
.....
.....



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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



Contents

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.

- 2.1 General.
- 2.2 Constructional details.
- 2.3 Overall dimensions.
- 2.4 Technical data and performance.
- 2.5 Engine.
- 2.6 Gyroplane identification.
- 2.7 Main parts.

Section III – Operational limits.

- 3.1 General
- 3.2 Speed limits
- 3.3 Aerobatic manoeuvres.
- 3.4 Load factor.
- 3.5 Height/Speed envelope.
- 3.6 Weather.
- 3.7 Wind.
- 3.8 Limitations tables.
- 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.
- 4.4 Pre-take-off checks.
- 4.5 Rotor pre-rotation.
- 4.6 Take-off.
- 4.7 Flight manoeuvres.
- 4.8 Landing.
- 4.9 After landing.



ELA 07-07S PILOT OPERATOR 'S HANDBOOK

Version: V07-05

Last modification: September 2017.

Section V – Emergency procedures.

- 5.1 Engine failure during take-off run.
- 5.2 Engine failure on take-off (below 150 ft).
- 5.3 Engine failure on take-off (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.



ELA 07-07S PILOT OPERATOR 'S HANDBOOK

Version: V07-05

Last modification: September 2017.

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SECTION I – INTRODUCTION

1.1 GENERAL

This manual is always to be carried on board 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 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 safely.

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 safely. This aircraft has been designed and built to operate safely and correctly within the limits defined in this manual.



ELA 07-07S PILOT OPERATOR 'S HANDBOOK
Version: V07-05

Last modification: September 2017.

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.



Last modification: September 2017.

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 airspeed. The indicated airspeed corrected for position and instrument error.
IAS	Indicated airspeed. The speed shown by the airspeed indicator.
TAS	True airspeed. The calibrated airspeed corrected for altitude and temperature.
Vb	Turbulence speed. Design speed for maximum gust intensity.
Vne	Never exceed speed.
Vy	Best rate of climb speed.
Vx	Best angle of climb speed.



ELA 07-07S PILOT OPERATOR 'S HANDBOOK
Version: V07-05

Last modification: September 2017.

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>		



ELA 07-07S PILOT OPERATOR 'S HANDBOOK

Version: V07-05

Last modification: September 2017.

	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



Last modification: September 2017.

Section II – DESCRIPTION OF THE AIRCRAFT

2.1 GENERAL

The ELA 07 gyroplane 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 polycarbonate 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.

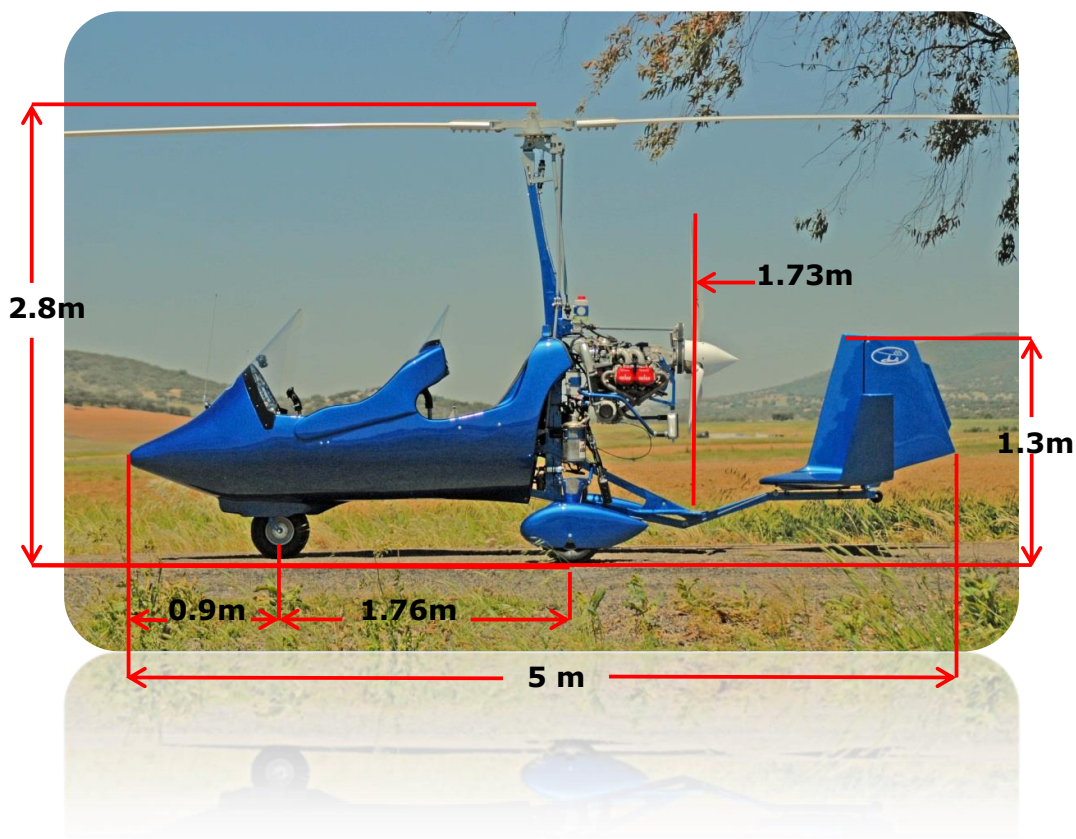
The **tailplane** is made from composite materials and consist of a fixed horizontal stabilizer with winglets at the ends and a vertical surface in the center subdivided into a fixed vertical stabilizer and rudder.



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2.3 OVERALL DIMENSIONS

MEASUREMENT	METRIC	IMPERIAL
Total length	5.0 m.	16.40 ft.
Total height	2.8 m.	9.19 ft.
Cockpit width	0.75 m.	2.46 ft.
Landing gear width	1.75 m.	5.74 ft.
Rotor diameter	8.5 m.	27.89 ft.





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2.4 TECHNICAL DATA AND PERFORMANCE

The following performance parameters were determined by flight testing with average piloting skills, aircraft with 450 kg MTOW, 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)	
	METRIC	IMPERIAL	METRIC	IMPERIAL
Empty weight (minimum equipment)	260 kg	575 lb	265 kg	585 lb
MTOW*	450 kg	1000 lb	500 kg	1100 lb
Useful load (minimum equipment)	190 kg	420 lb	235 kg	520 lb
Vne	160 kph	100 mph (85 kts)	160 kph	100 mph (85 kts)
Cruise speed	100 – 135 kph	60 – 85 mph (55 – 73 kts)	100 – 145 kph	60 – 90 mph (55 – 78 kts)
Min speed (level flight/full power))	40 kph	25 mph (22 kts)	35 kph	22 mph (19 kts)
Rate of climb	3.3 m/s	650 ft/min	5 m/s	1000 ft/min
Take-off distance (roll)	100 m	330 ft	70 m	230 ft
Landing distance	0 – 30 m	0 – 65 ft	0 – 30 m	0 – 65 ft
Fuel	Gasoline			
Fuel capacity	75 l		20 gal	
Unusable fuel	3 l		0.8 gal	
Fuel consumption	13 – 20 l/h		3.5 – 5.5 gal/hr	

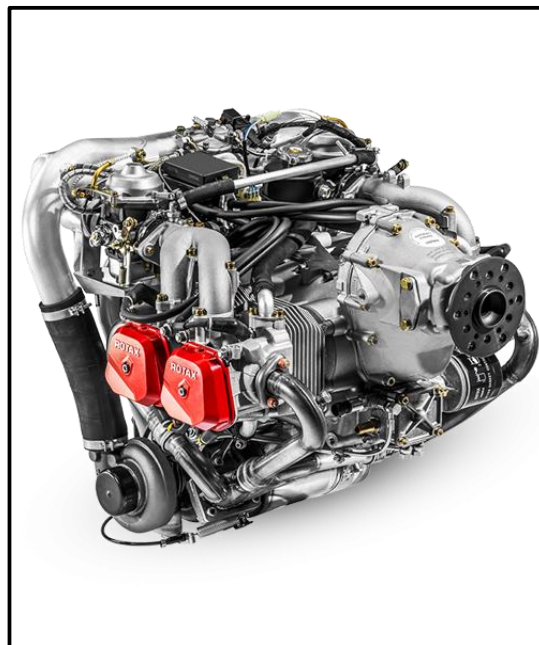
* See the MTOW limitations for your country.



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2.5 ENGINE

- 1) Manufacturer Rotax
- 2) Take-off power:
 - a. 912 ULS..... 100 hp
 - b. 914 UL..... 115 hp
- 3) Max. engine speed..... 5800 rpm
- 4) Cooling system..... Air/liquid
- 5) Coolant..... 50% water/antifreeze
- 6) Electric installation..... 12v





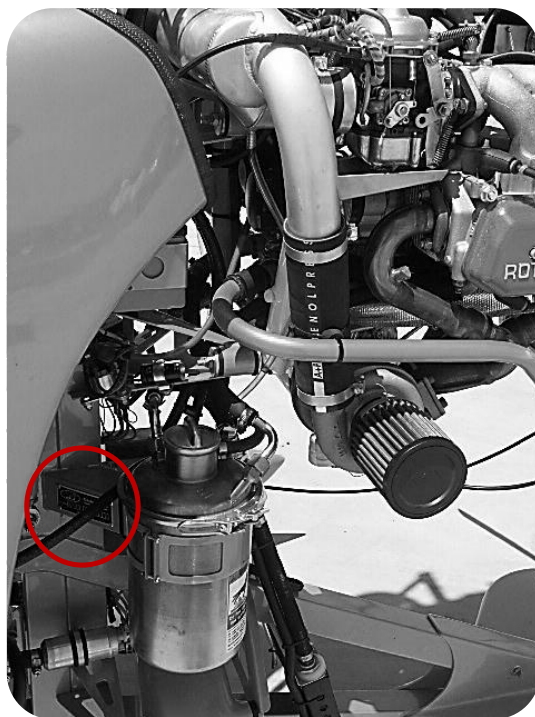
ELA 07-07S PILOT OPERATOR 'S HANDBOOK
Version: V07-05

Last modification: September 2017.

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



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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 - Tailplane.



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Parts:

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



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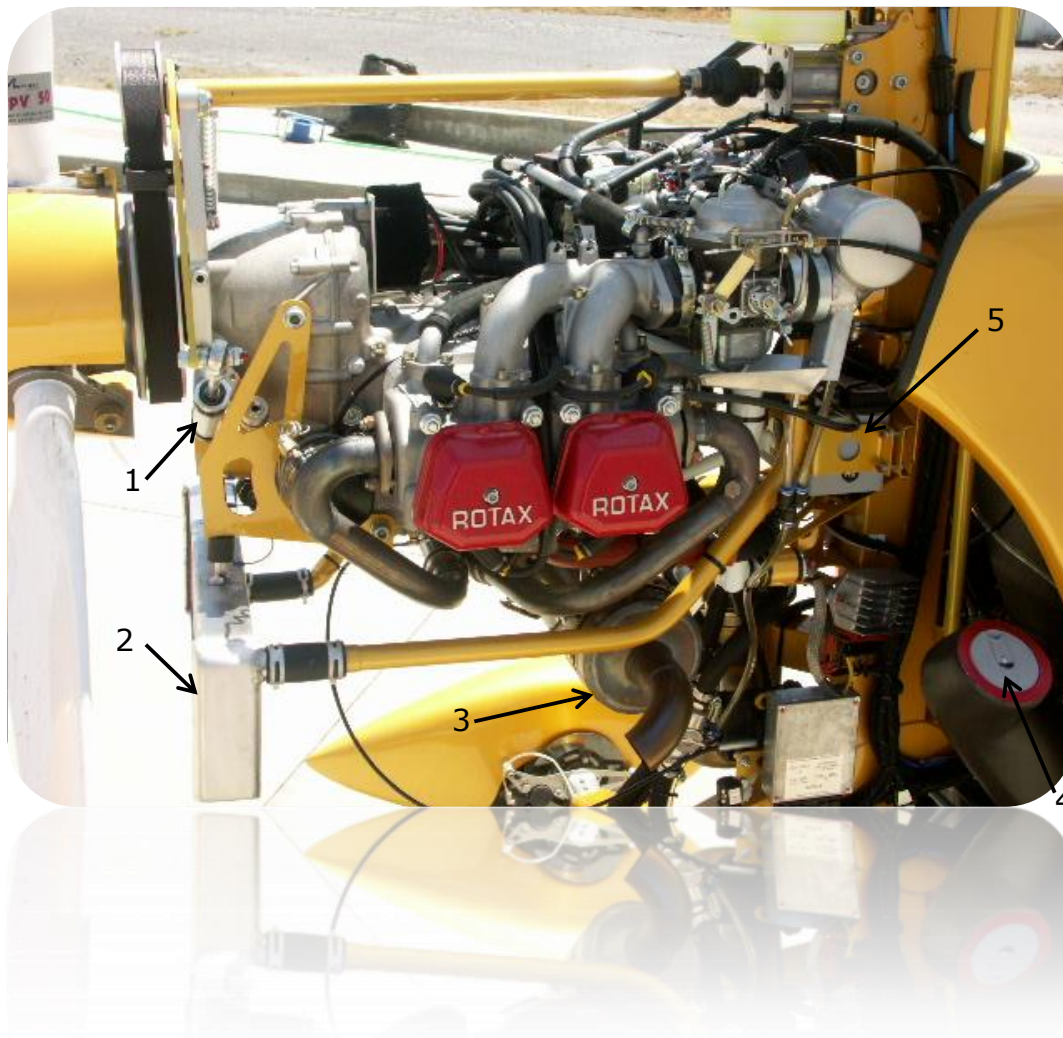


Parts:

- 1 - Engine.
- 2 - Water tank.
- 3 - Horizontal pre-rotator drive shaft.
- 4 - Pre-rotator clutch.
- 5 - Carburettor.
- 6 - Oil tank.
- 7 - Air filter (914).



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Parts:

- 1 - Pre-rotator piston.
- 2 - Water cooler.
- 3 - Exhaust muffler.
- 4 - Fuel tank filler.
- 5 - Battery.



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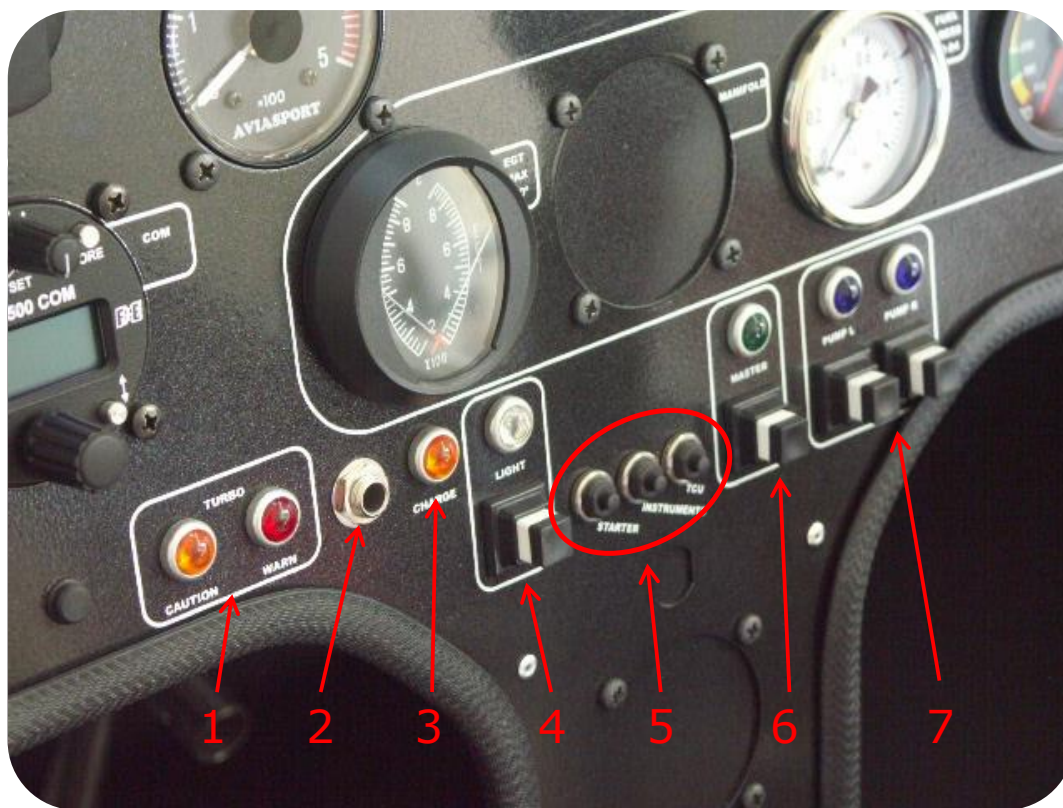
Parts:

- 1 – Compass.
- 2 – Altimeter.
- 3 – Airspeed indicator.
- 4 – Vertical speed indicator.
- 5 – Rotor tachometer.
- 6 – Engine tachometer.
- 7 – Oil pressure.
- 8 – Trim pressure.
- 9 – Radio.
- 10 - EGT.
- 11 – Manifold pressure.
- 12 – Fuel pressure.
- 13 – Oil temperature.
- 14 – Cylinder head temperature.
- 15 – Flight/brake selector.
- 16 – Ignition switch.



ELA 07-07S PILOT OPERATOR 'S HANDBOOK
Version: V07-05

Last modification: September 2017.



Parts:

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



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Front/Rear Stick



Trim

Pre-rotator

PTT Radio

Front pedals



Throttle, brake and roll trim



Roll trim

Throttle

Wheel brake





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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 of this gyroplane demands professional pilot instruction by a qualified instructor. It must not be operated without a valid license.

WARNING

Smoking on board is prohibited!



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3.2 SPEED LIMITS

- Velocity never exceed (**Vne**): 160 kph (100 mph / 86 kts)
Do not exceed this speed as it may cause structural damage to the aircraft.

- Turbulence speed (**Vb**): 105 kph (65 mph / 57 kts)
When flying in high turbulence conditions reduce the speed as it may cause structural damage to the aircraft.

3.3 AEROBATIC MANOEUVRES

- Any aerobatic manoeuvre is prohibited.

- Low-G manoeuvres are prohibited.

WARNING

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

3.4 WEIGHT AND LOAD FACTOR

- Maximum take-off weight (**MTOW**):
 - o 912 ULS engine ----- 450 kg (990 lb).
 - o 914 UL engine ----- 500 kg (1100 lb).

- Maximum load factor is **+3.5g**. A higher value could permanently deform the gyroplane structure.



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CAUTION

This gyroplane has been designed and tested for a maximum load factor of +3.5g with MTOW. Flying at high speeds with aggressive manoeuvres or a steep turn can easily create higher loads on the aircraft.

- Maximum bank angle: Do not exceed **60°** angle of bank.
- Maximum rotor speed is **550 rpm**.
- When flying solo, the pilot should be seated in the **front position**.

Note

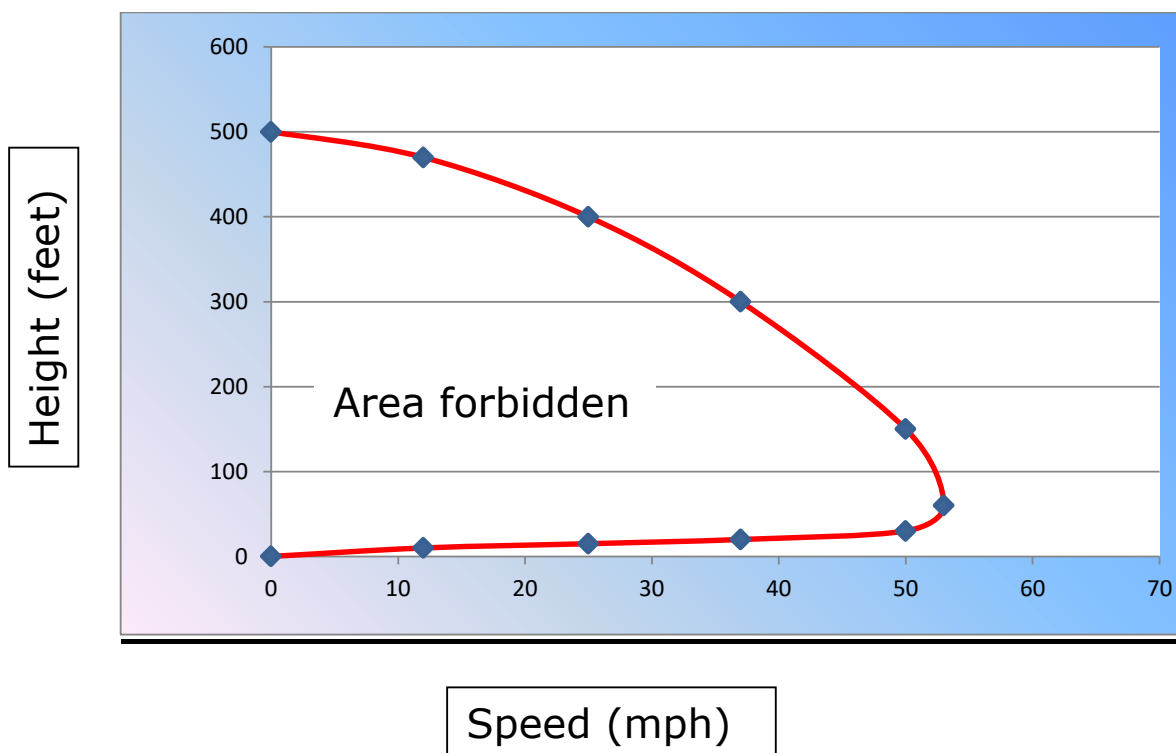
When flying solo, rear safety belt should be fastened.

- Min. front pilot weight: **60 kg** (130 lb).
- Max. front pilot weight: **100 Kg** (220 lb).



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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** (-4 – 105°F).
- When flying in high **turbulence conditions**, reduce the speed to 105 kph (65 mph / 57 kts) as it may cause structural damage to the aircraft.



Last modification: September 2017.

- This gyroplane has no anti-icing system for the rotor and propeller. It is 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 the runway is covered with **ice, snow** or if it is **flooded**.

3.7 WIND

- Maximum **wind or gust intensity: 40 kts.**
- **Cross wind:** Maximum cross wind for take-off and landing is **16 Kts**, always keeping the nose wheel off the ground until fully stopped.
- **Tail wind:** Maximum tail wind for take-off and landing is **5 Kts.**

CAUTION

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



ELA 07-07S PILOT OPERATOR 'S HANDBOOK
Version: V07-05

Last modification: September 2017.

3.8 LIMITATIONS TABLES

DATA	LIMITATION
Take-off weight (MTOW) 912 ULS engine *Take-off weight (MTOW) 914 UL engine	450 kg (990 lb) 500 kg (1100 lb)
Pilot weight (front)	60 – 100 kg 130 – 220 lb
Load factor	+3.5g
Bank angle	60°
Ambient temperature	-20 – 40°C -4 – 105°F
Turbulence speed (Vb)	105 kph 65 mph 57 kts
Wind or gust	40 kts
Cross wind take-off and landing	16 kts
Tail wind landing	5 kts

* See MTOW limitation for your country

Data	Caution	Normal	Caution	Max
Speed	0 – 80 kph 0 – 50 mph 0 – 45 kts	80 – 145 kph 50 – 90 mph 45 – 78 kts	145 – 155 kph 90 – 97 mph 78 – 84 kts	160 kph< 100 mph< 86 kts<
Rotor speed (rpm)	*300	300 - 500	500 - 550	550<
Engine speed (rpm)	0 - 1400	1400 - 5500	5500 - 5800	5800<
Oil temp	<90°C <194 °F	90 – 110°C 194 – 230°F	110 – 130°C 230 – 265°F	130°C< 265°F<
Oil press	0 – 2 bar 0 – 30 psi	2 – 5 30 – 75 psi	5 – 7 75 – 100 psi	7 bar< 100 psi<
CHT	<60°C <140°F	60 – 110°C 140 – 230°F	110 – 120°C 230° - 250°F	120°C< 250°F<
Man. press. 912 ULS (in.HG)	-	0 – 27	27<	-
Man. press. 914 UL (in.HG)	-	0 – 35	35 – 39	39<

* Max. Pre-rotator speed: 300 rpm.



Last modification: September 2017.

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 lt (20 gal).

Unusable fuel ----- 3 lt (0.8 gal).

3.10 WEIGHT AND BALANCE

The maximum take-off weight of the ELA-07 is 450/500 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 aircraft configuration with the standard equipment: Oil and coolant in normal levels and 3 lt (0.8 gal) of unusable fuel. No ballast is required in any allowed weight distribution, so no ballast is included in the empty weight calculation.

A weight and balance report and equipment list showing the 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.



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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 pre-flight 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. The correct tire pressure is 1.5 bar (15 psi).

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. Pre-rotator lever (if fitted) Ok

Pull the pre-rotator lever and verify it returns by itself.



Last modification: September 2017.

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. The correct tire pressure is 2 bar (30 psi).

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 plugs connections are secure, no visible signs of damage or leaks.

13. Propeller Condition

Check each propeller blade and hub for signs of damage, delamination, etc.

14. Propeller protector (if fitted) Secure

Make sure that the propeller protector is secure.



Last modification: September 2017.

15. Tailplane 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 stabilizer to the frame are secure. Lift the nose of the gyroplane and move the rudder by hand and make sure it is free to move on its axis without any slackness. Check that front wheel turns at the same time 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. Pre-rotator system:

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 is braked**. Check that the universal joints are secure and that no distortion or play can be seen.

18. 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.

19. Engine cooling fluid Level

Make sure the white tank has at least ¼ of its capacity of cooling fluid.

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

20. 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. The correct pressure is 2 bar (30 psi).

21. 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 strobe light on the mast is secure.



Last modification: September 2017.

22. 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.

23. Control fork Check

Make sure the rotor control fork bolts are secure and verify the red paint marks all align.

24. 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.

25. Fuel Drain, inspect for water

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

26. Fuel quantity As required

Verify fuel quantity of the tank is sufficient for the planned flight.

27. Cockpit left side Secure

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

28. If solo flight: Rear seat safety belts Fastened

For solo flight, the pilot must be in the front seat. Ensure that the pilot equipped weight is within allowable range. The safety belts for the passenger must be fastened and secured so they cannot block any control or cause damage during the flight.

29. Rotor control system No play

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



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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 selector is in "Brake" position. Check the trim pressure shows "zero".
- 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.



Last modification: September 2017.

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 rises to a correct value.

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 engine rpm until the oil temperature rises to 50°C (120°F)

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.



Last modification: September 2017.

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-TAKE-OFF CHECKS

Before take-off 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 engine speed to 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 take-off.

4.5 ROTOR PRE-ROTATION

1. Alignment: Runway alignment.

2. Engine: Move the throttle until the engine speed reaches 2200 rpm.

3. Brakes: Disengage the wheels parking brake and hold the brake lever with your left hand.



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WARNING

Do not engage the pre-rotator with the wheels parking brake ON. Hold the brake lever with your left hand. It is extremely dangerous to start the take-off run if the parking brake is not disengaged!

- 4. Flight position:** Hold the stick **fully forward** and **centred** with your right hand. With your left hand, move to "Flight" position the selector. Wait five seconds for the pneumatic system to fully charge.
- 5. Pre-rotation:** Push and hold the pre-rotator button on the control stick with your thumb. This causes the pre-rotator to engage. You will hear the pre-rotator belt making some squeak, wait until the pre-rotator belt doesn't make noise, then increase the engine power slowly and gradually until reaching 220 rotor rpm.

WARNING

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

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

CAUTION

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



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4.6 TAKE-OFF

Once the pre-rotation 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 take-off run.
A take-off run with flat rotor may have fatal consequences.**

CAUTION

Check the engine speed is 5400 rpm or more. If not, abort the take-off.

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

Once the nose wheel lifts, gently move the control stick forward to keep it at approx. 10 cm (4 in) off the ground while the gyroplane accelerates.

When the gyroplane takes-off perform a level flight until reaching 100 kph (60 mph/55 kts) 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.



ELA 07-07S PILOT OPERATOR 'S HANDBOOK
Version: V07-05

Last modification: September 2017.

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

TAKE-OFF WITH CROSS WIND:

The maximum permitted cross wind for take-off and landing is 16 Kn.

The procedure to take-off 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 TAKE-OFF

If the during the pre-rotation or the take-off there is any disadvantage such not enough runway, the pilot should abort the take-off operation. The procedure is to reduce the engine power, use the left pedal to keep the alignment with the runway and flare to land. It is important to train this manoeuvre to fly safely.

4.7 FLIGHT MANOEUVRES

CLIMB and DESCEND

Best rate of climb speed (V_y): 100 kph (60 mph/55 kts).

Best angle of climb speed (V_x): 90 kph (55 mph/50 kts).

Best power-off glide speed (V_{bg}): 105 kph (65 mph/57 kts).

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



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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, it would be necessary to increase the engine power in order to keep height/speed and use the rudder pedals to favour the turn.

Max. Bank angle: 60°.

SLOW FLIGHT

Before performing this manoeuvre, be sure you have at least 500 ft above the ground and go **into the wind**.

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

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

VERTICAL DESCENT

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

Before performing this manoeuvre, be sure you have at least 500 ft above the ground and go **into the wind**.

Reduce the engine speed to approximately 3000 rpm and 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**.



Last modification: September 2017.

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

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

4.8 LANDING

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

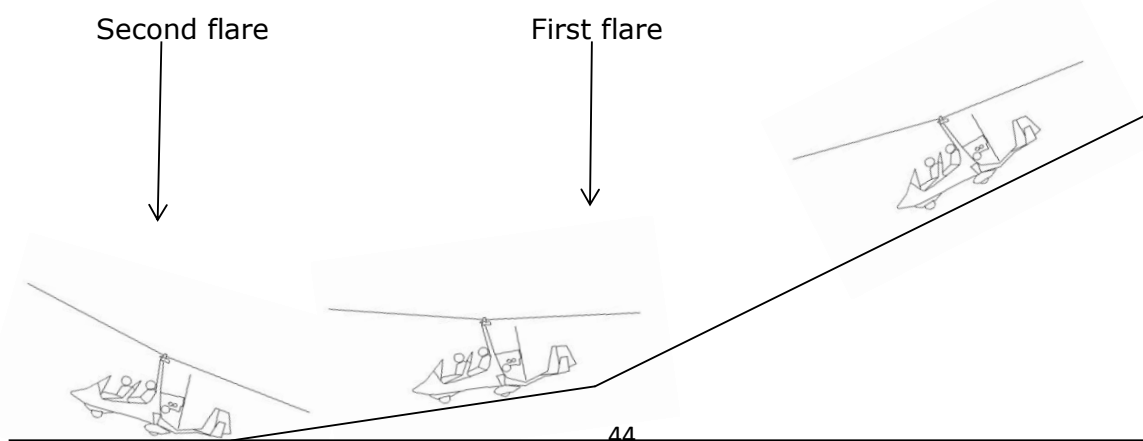
Adjust speed to 105 kph (65 mph/57 kts) and enter the circuit. On final, align to the runway, reduce the power to descend and keep a speed of approximately 95 kph (60 mph/52 kts). Keep the gyroplane aligned to the runway using the pedals and control stick.

At 5 metres (15 ft) from the ground make a first flare to reduce the glide path and slightly reduce the speed.

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

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

From the first reduction of power to the end of the landing, use the rudder pedals to keep the gyroplane properly aligned with the runway.





Last modification: September 2017.

LANDING WITH CROSS WIND

The maximum permitted cross wind for take-off 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 the wind.

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

Move the control stick against the wind direction and use the opposite pedal to maintain 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 problem, the pilot should abort the landing. The procedure is to increase the engine power, use the right pedal to counter the engine torque, level flight to reach 100 kph (60 mph/55 kts) 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 off the runway.

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

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



Last modification: September 2017.

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 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 take-off run.
- 5.2 Engine failure on take-off (below 150 ft)
- 5.3 Engine failure on take-off (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.

5.1 ENGINE FAILURE DURING TAKE-OFF 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.



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5.2 ENGINE FAILURE ON TAKEOFF (below 150 ft)

INSTRUCTIONS:

1. Close throttle. Engine failure may be sudden or accompanied by misfiring, typical of fuel starvation.
2. Keep heading. Lower the nose to keep best glide speed 105 kph (65 mph/57 kts) and look for an area for landing in front of you. Do not turn as you don't have an 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 a 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 ON TAKEOFF (above 150 ft)

INSTRUCTIONS:

1. Close throttle. Engine failure may be sudden or accompanied by misfiring, typical of fuel starvation.
2. Lower the nose to keep best glide speed of 105 kph (65 mph/57 kts) and look for an area for landing into the 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.



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The rotor will come to a 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. Lower the nose to keep best glide speed of 105 kph (65 mph/57 kts) and look for an area for landing into the 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 on 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.



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5.6 ENGINE FIRE ON THE GROUND

INSTRUCTIONS:

1. Close the throttle and apply brakes.
2. If rotor is turning, select rotor brake ON.
3. Ignition and fuel pumps OFF.
4. Master OFF.
5. If rotor is turning, abandon the aircraft with great care. Help your rear seat occupant to do the same.
6. 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 when fire is apparent.
2. Ignition and fuel pumps OFF.
3. Master OFF.

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 105 kph (65 mph/57 kts). Look for an area for landing into the 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.



Last modification: September 2017.

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 responsible to keep it properly maintained according to 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 lead to fatigue or damage.



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6.4 CLEANING

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

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

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 sprayers as they can damage electrical connections, bearings or paint.
Do not use solvents or gasoline as they can damage some parts of the gyroplane.

Use car soap with water to clean the external parts. Windscreens should only be cleaned with polycarbonate soap 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.



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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 direction 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 lt (0.12 gal).

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 bar (30 psi).

Front wheel ----- 1.5 bar (22.5 psi).



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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.