ELA 10-Eclipse PILOT OPERATOR´S
HANDBOOK
Version: V10-03

Issue date: 26th July 2016.
Last modification: September 2017.

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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 gyroplanes.
Before flying this aircraft, read this manual as it contains important safety relevant information.

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PILOT OPERATOR´S HANDBOOK FOR ELA 10-Eclipse GYROPLANE

- Gyroplane model ELA 10-Eclipse
- Gyroplane serial Nº ……..
- Engine model Rotax …….
- Engine serial Nº …….
- 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

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Contents

Section V – Emergency procedures.

Section VI – Handling and servicing.

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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 10-Eclipse gyroplane. 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.

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 gyroplanes.

1.2 APPLICABILITY

This manual is applicable for the ELA 10-Eclipse gyroplane.

1.3 ACCEPTANCE OF RISK

Manned flight is not considered 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 exits.
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 Aviacion 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 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.

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	*from*	**Symbol**	*to*	**Symbol**	*Factor*
	Fahrenheit	ºF	Celsius	ºC	5/9*(F-32)
	Celsius	ºC	Fahrenheit	ºF	9/5*C+32
Weight	*from*		*to*		
	Kilograms	kg	Pounds	lb	*2,205
	Pounds	lb	Kilograms	kg	* 0,4536
Speed	*from*		*to*		
	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	kph	Knots	Kts	* 0,54
	Knots	kts	Kilometres per hour	Kph	* 1,852
	Knots	Kts	Miles per hour	mph	* 1,15
	Miles per hour	mph	Knots	Kts	* 0,87
Pressure	*from*		*to*		

	Atmospheres	Atm	Pounds per square inch	psi	* 14,8
	Pounds per square inch	psi	Atmospheres	Atm	* 0,06756
Distance	*from*		*to*		
	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	*from*		*to*		
	Litres	lt	US Gallons	US gal	* 0,2642
	US Gallons	US gal	Litres	lt	* 3.785
Area	*from*		*to*		
	Square Meters	m²	Square Feet	ft²	* 10,76
	Square Feet	ft²	Square Meters	m²	* 0,0929

Section II – DESCRIPTION OF THE AIRCRAFT

2.1 GENERAL

The ELA 10-Eclipse gyroplane is designed as a 2-seater, tandem-configured three-axis aircraft with single or dual controls and single engine, ideal for leisure flight or training 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** (mast, engine support and tail boom) is one single part built from chromoly AISI 4130 steel, TIG (tungsten-inert-gas) welded. The gyroplane is a tricycle landing gear with front wheel.

The **cockpit** is a monocoque made from carbon fibre and epoxy resin with a built-in fuel tank, ensuring high strength with low weight. The canopy is made from aeronautical Plexiglass to protect the occupants from cold and wind.

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

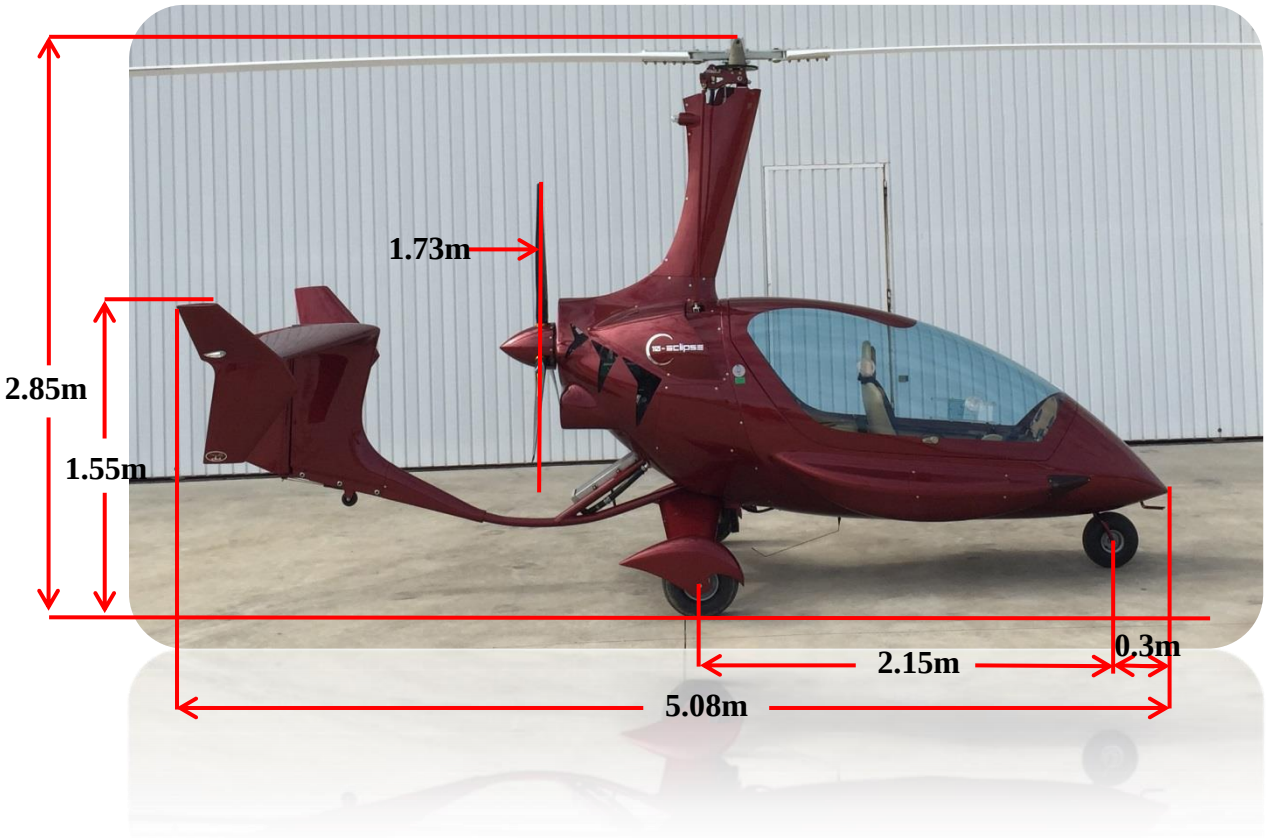
The **rotor blades** are made from aluminium and composite materials.

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

The **tailplane** are made from carbon fibre and consist of a fixed horizontal stabilizer with winglets at the ends and a vertical surface in the centre subdivided into a vertical stabilizer and a rudder.

2.3 OVERALL DIMENSIONS

MEASUREMENT	METRIC	IMPERIAL
Total length	5.08 m.	16.67 ft.
Total height	2.85 m.	9.35 ft.
Landing gear width	1.75 m.	5.74 ft.
Rotor diameter	8.50 / 8.65 m.	27.89 / 28.38 ft.



2.4 TECHNICAL DATA AND PERFORMANCE

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 (15ºC temperature, sea level and standard pressure).

Gyroplane data	**With Rotax 912 ULS (100 HP)**		**With Rotax 914 TURBO (115 HP)**	
	METRIC	IMPERIAL	METRIC	IMPERIAL
Empty weight (minimum equipment)	283 kg	625 lb	293 kg	650 lb
MTOW*	500 kg	1100 lb	530 kg	1170 lb
Useful load (minimum equipment)*	217 kg	475 lb	237 kg	520 lb
Vne	190 kph	120 mph (103 kts)	190 kph	120 mph (103 kts)
Cruise speed	120 – 160 kph	75 – 100 mph (65 – 85 kts)	120 – 160 kph	75 – 100 mph (65 – 85 kts)
Min speed (level flight/full power))	45 kph	30 mph (24 kts)	40 kph	25 mph (22 kts)
Rate of climb	3 m/s	600 ft/m	5 m/s	1000 ft/m
Take-off distance (roll)	120 m	400 ft	100 m	330 ft
Landing distance (roll)	0 – 30 m	0 – 65 ft	0 – 30 m	0 – 65 ft
Fuel	Gasoline			
Fuel capacity	87 l		23 gal	
Unusable fuel	2 l		0.5 gal	
Fuel consumption	12 – 20 l/h		3 – 5.5 gal/hr	

* See the MTOW limitations for your country.

2.5 ENGINE

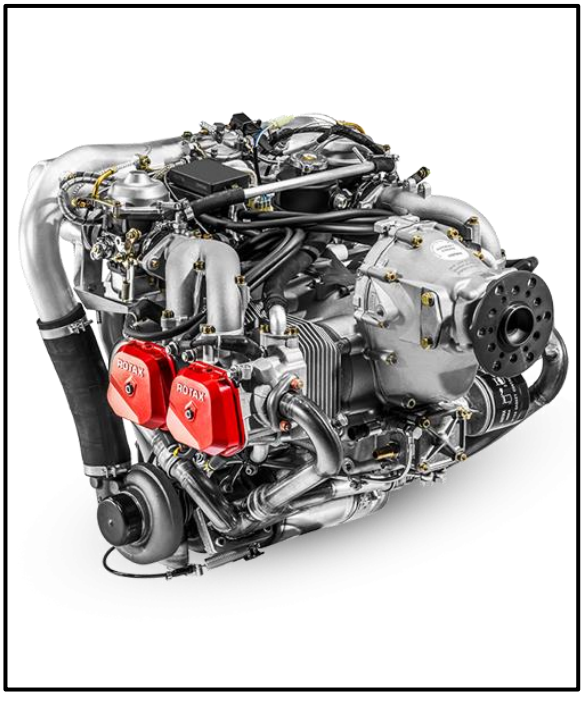
i) Manufacturer ..... BRP Rotax

ii) Take-off power:
   a. 912 ULS..... 100 hp
   b. 914 UL..... 115 hp

iii) Max. engine speed..... 5800 rpm
iv) Cooling system..... Air/liquid

v) Coolant..... 50% water/antifreeze

vi) Electric installation..... 12v

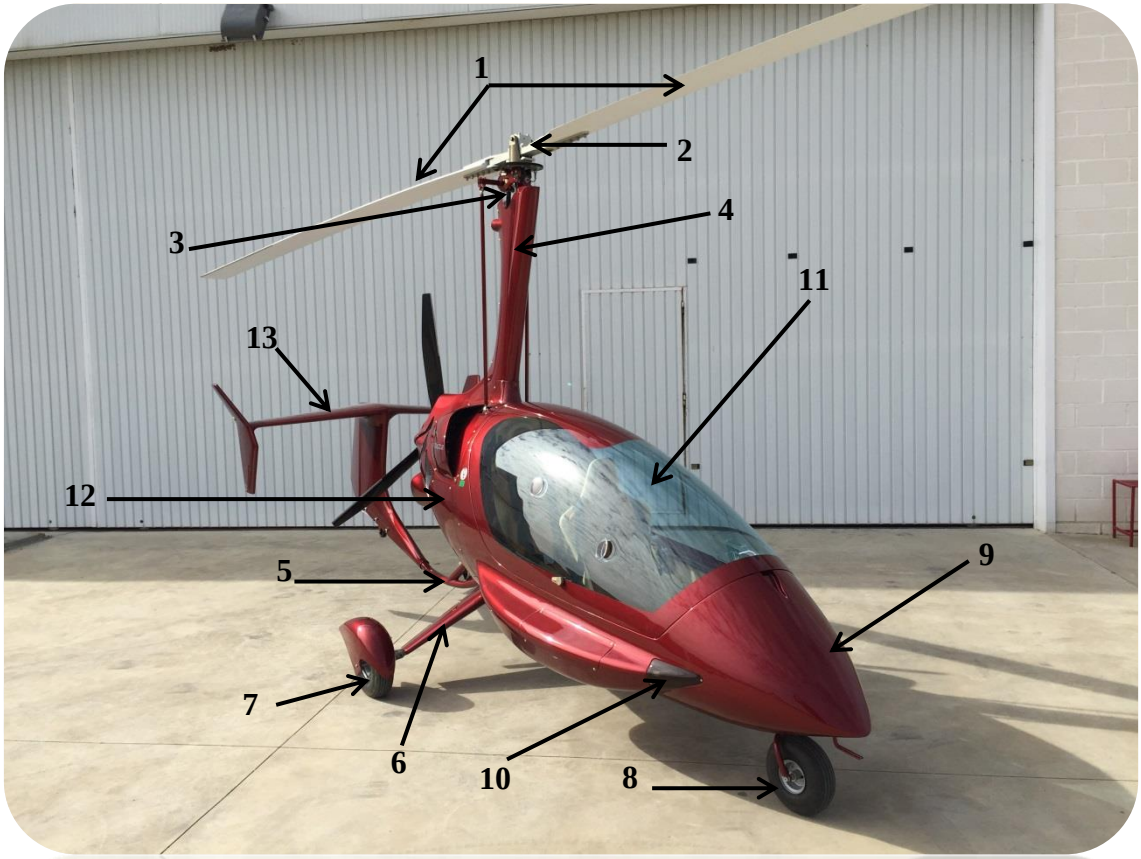


2.6 GYROPLANE IDENTIFICATION

The gyroplane identification placard is placed on the left side of the mast, cockpit 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

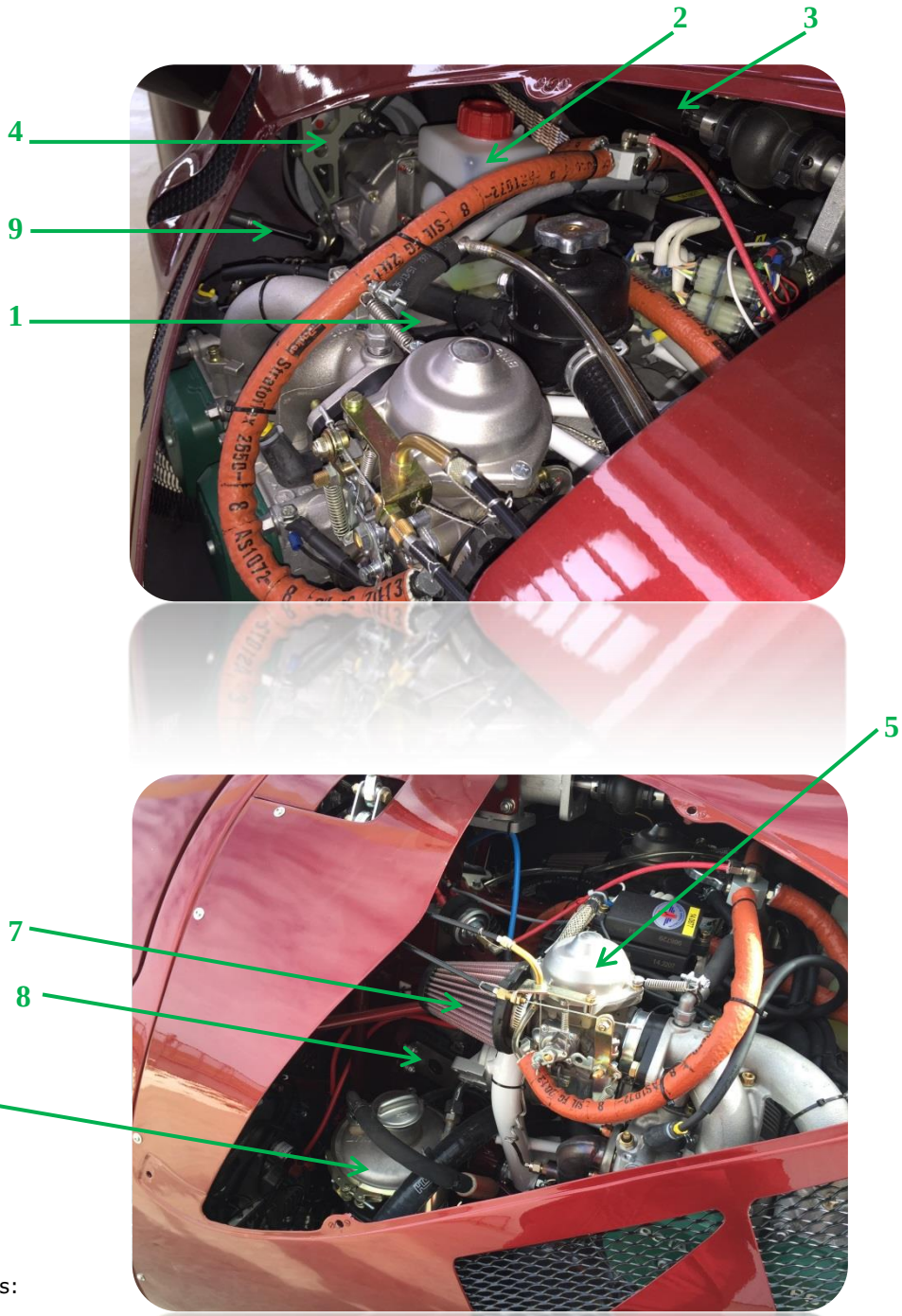


Parts:

1 – Rotor blades.
2 – Hub bar.
3 – Rotor head.
4 – Mast and mast fairing.
5 – Rear keel.
6 – Landing gear.
7 – Main wheels.
8 – Front wheel.
9 – Cockpit.
10 – Landing lights.
11 – Canopy.
12 – Engine compartment.
13 – Tailplane.

Parts:

1 – Propeller.
2 – Oil cooler.
3 – Water cooler.
4 – Vertical stabilizer.
5 – Rudder.
6 – Winglet.
7 – Horizontal stabilizer.
8 – Control rods.
9 – Fuel tank filler.



Parts:

1 – Engine.
2 – Water tank.
3 – Horizontal pre-rotator drive shaft.
4 – Pre-rotator clutch.
5 – Carburettor.
6 – Oil tank.
7 – Air filter (912).
8 – Battery.
9 – Pre-rotator piston.

Parts:

1 – Compass.
2 – Altimeter/VSI
3 – Airspeed indicator.
4 – KANARDIA EMSIS (to control engine parameters, rotor tachometer and fuel consumption)
5 – TRIM pressure
6 – Radio.
7 – Transponder.
8 – Flight/brake selector.
9 – Fuel level indicators.
10 – Ignition switch.
11 – 12V or USB power outlet.

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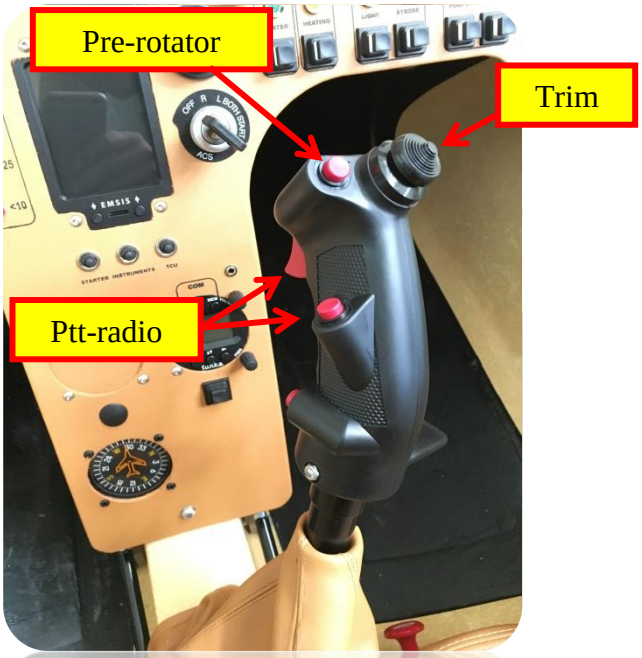
Parts:

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

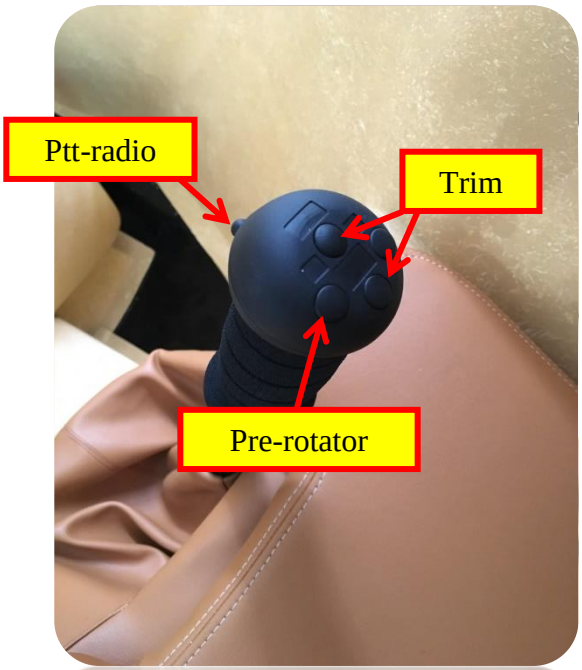
2.8 CONTROLS

Front Stick

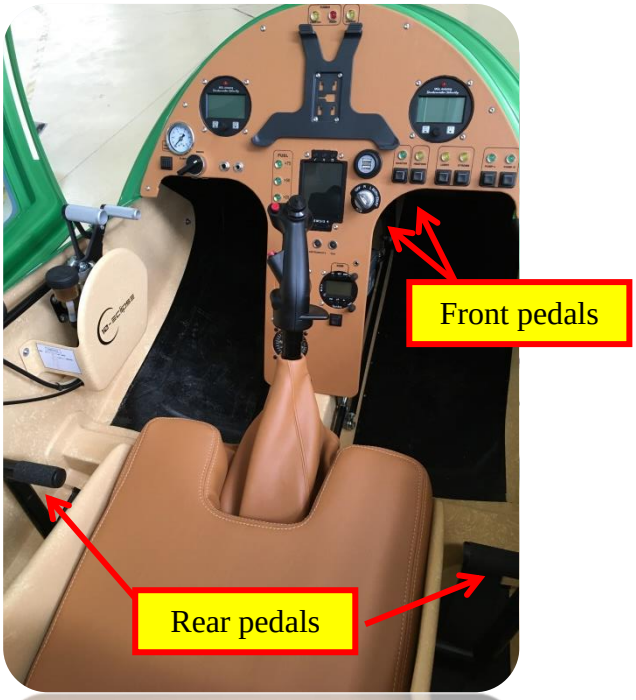


Note: PTT radio in front stick is installed in the trigger in the new gyroplanes

Rear Stick



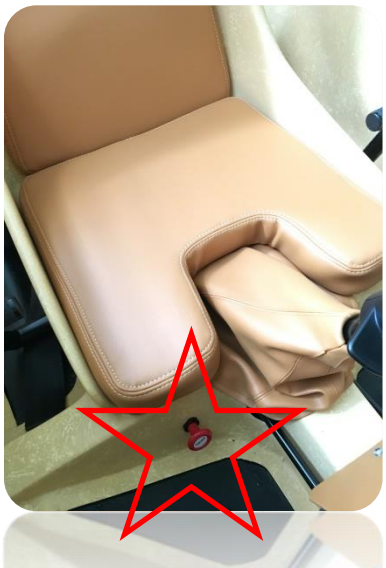
Pedals



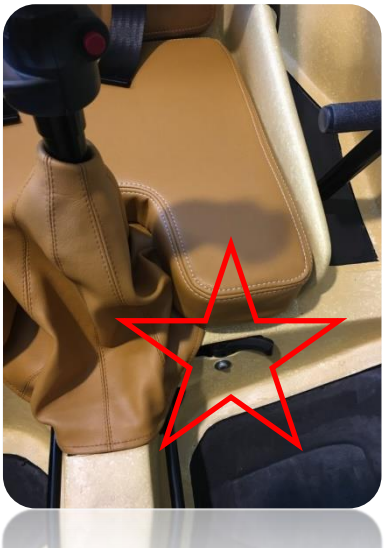
Throttle and wheel brakes

Choke

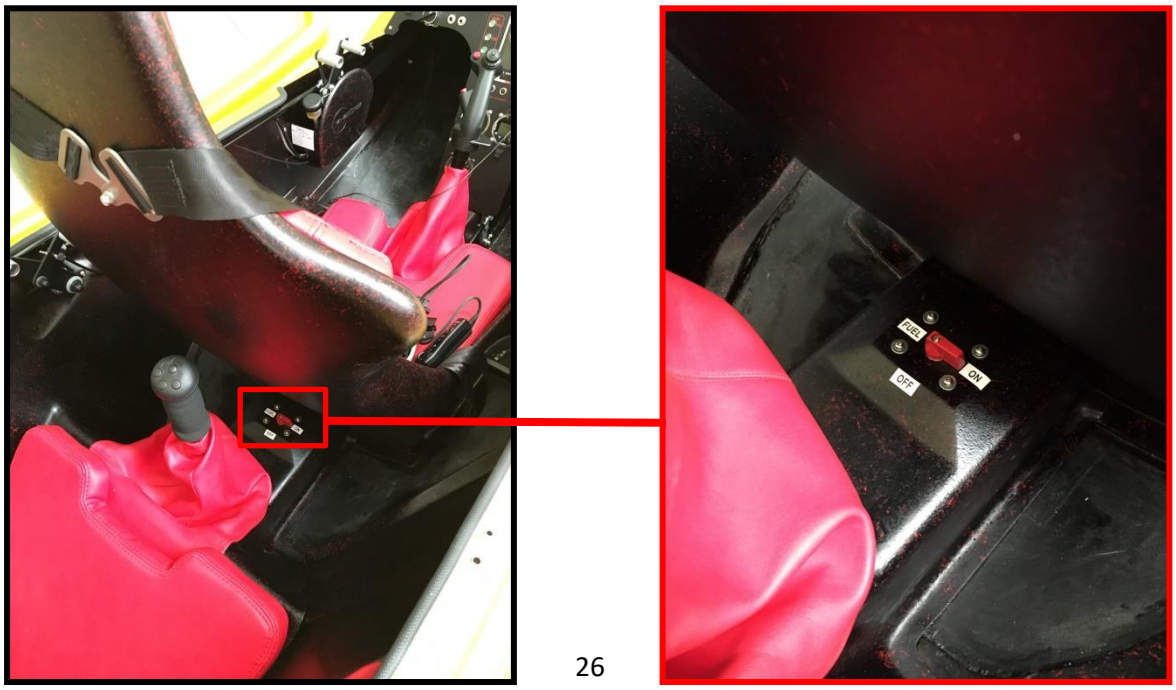
Old system



New system



Shut-off valve: This valve interrupts the fuel supplied to the engine. In case of fire, turn-over or crash, shut off the fuel as soon as possible to prevent risk of fuel burning.



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 flight license

WARNING

Smoking on board is prohibited!

3.2 SPEED LIMITS

- Velocity never exceed **(Vne)**: 190 kph (119 mph / 103 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 MAOEUVRES

- 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**):
  - 912 ULS engine ---------- 500 kg (1100 lb).
  - 914 UL engine ---------- 530 kg (1170 lb).

Note

In some countries, the ultralight (ULM) category is limited to a MTOW of 450 kg (990 lb).

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

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.

CAUTION

The maximum take of weight of the ELA 10-Eclipse must never be exceeded.

The MTOW represents the empty weight adding crew, fuel and luggage weight.

The pilot is responsible for ensuring the aircraft is not flying over weight. A weight and balance report and an 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.

- Maximum bank angle: Do not exceed **60º** angle of bank.
- Maximum rotor speed is **560 rpm.**
- When flying solo, the pilot should be seated in the **front position.**

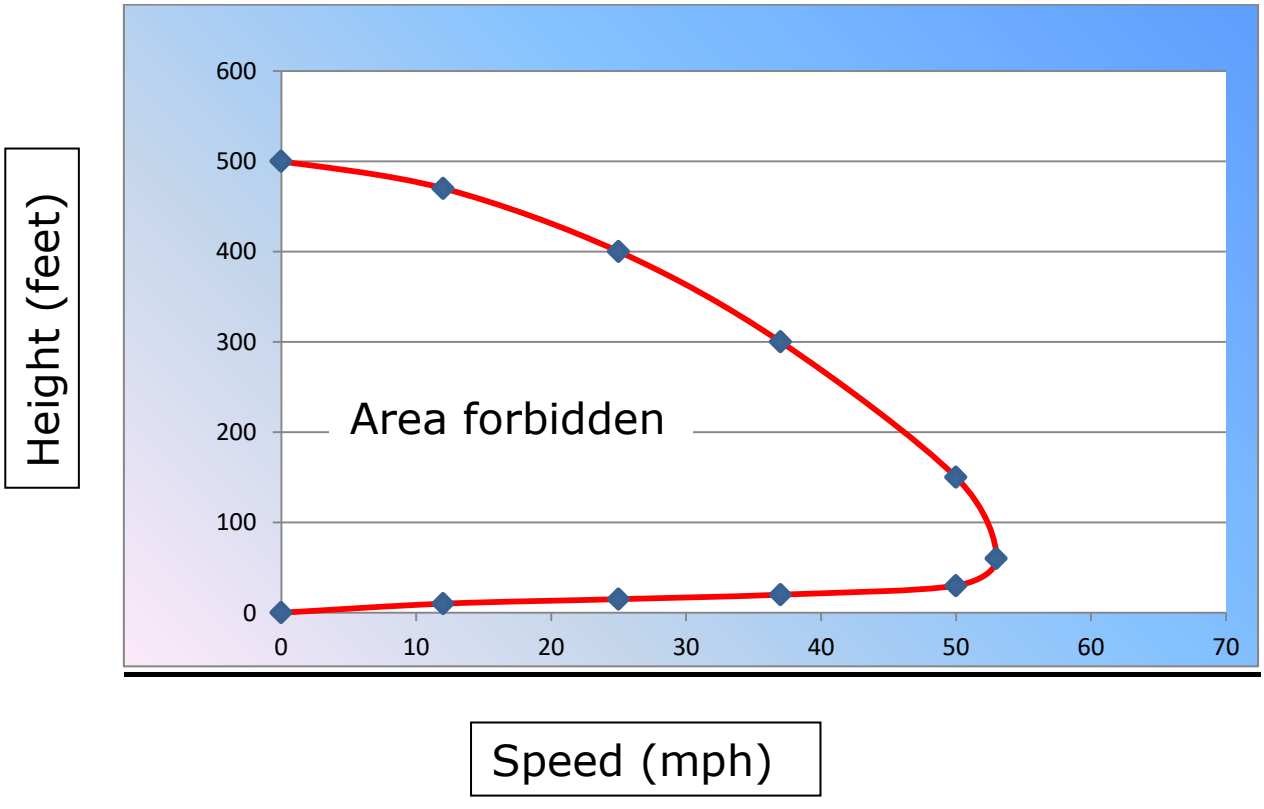
Note

When flying solo, rear safety belt should be fastened.

- *Min. front pilot weight: **60 kg** (130 lb).
- *Max. front pilot weight: **110 Kg** (240 lb).
- *Max. weight in left or right baggage compartment: **2 kg** (4.4 lb).
- *Max. weight in rear baggage compartment ------- **10 kg** (22 lb).

* Placarded.

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 **-20ºC to +40ºC** (-4 – 105ºF).

- 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.

- 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 **15 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.

3.8 LIMITATIONS TABLES

DATA	LIMITATION
Take-off weight (MTOW) 912 ULS engine *Take-off weight (MTOW) 914 UL engine	500 kg (1100 lb) 530 kg (1170 lb)
Pilot weight (front)	60 – 110 kg 130 – 240 lb
Load factor	+3.5g
Bank angle	60º
Ambient temperature	-20 – 40ºC -4 – 105ºF
Turbulence speed (Vb)	105 kph 65 mph 57 kts
Wind or gust	40 kts
Cross wind take-off and landing	15 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 – 160 kph 50 – 100 mph 45 – 86 kts	160 – 180 kph 100 – 112 mph 86 – 97 kts	190 kph< 119 mph< 103 kts<
Rotor speed (rpm)	*300	300 - 500	500 - 560	560<
Engine speed (rpm)	0 - 1400	1400 - 5500	5500 - 5800	5800<
Oil temp	<90ºC <194 ºF	90 – 110ºC 194 – 230ºF	110 – 130ºC 230 – 265ºF	130ºC< 265ºF<
Oil press	0 – 2 bar 0 – 30 psi	2 – 5 30 – 75 psi	5 – 7 75 – 100 psi	7 bar< 100 psi<
CHT	<60ºC <140ºF	60 – 110ºC 140 – 230ºF	110 – 120ºC 230º - 250ºF	120ºC< 250ºF<
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.

3.10 FUEL

Fuels that can be used:

- Recommended:

  - EN 228 Super or EN 228 Super Plus (min. Roz 95) / MOGAS.

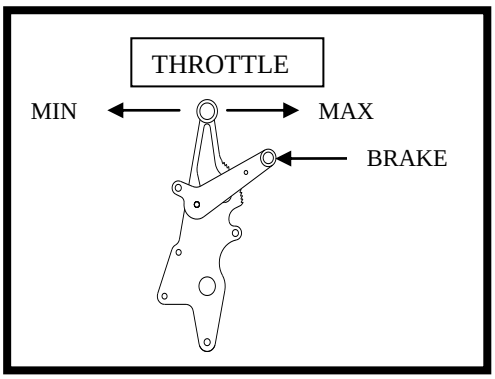
- Alternative:

  - AVGAS 100LL (ASTM D910) or AVGAS UL91 (ASTM D7547).

Fuel tank capacity ---------- 87 lt (23 gal).
Unusable fuel ---------- 2 lt (0.5 gal).

3.12 PLACARDS

Throttle: In clear view to the pilot



Operating limitations: Placard in clear view to pilot and co-pilot. It is placed between the front and the rear seats, at the left side of the cockpit.

ELA 10-Eclipse 912 ULS

OPERATING LIMITATIONS

Aerobatic manoeuvres are prohibited.
Manoeuvres involving a deliberate reduction in normal 'g' shall be avoided.
CG Range Limits (Gyroplane) – refer to Pilot Operator´s Handbook.
Maximum Indicated Airspeed (Vne): 190 kph (119 mph/103 kts)
This aircraft shall be flown by day and under Visual Flight Rules only.
Smoking in the aircraft is prohibited

AIRCRAFT PAYLOAD SPECIFICATION

Front seat pilot weight: 60 – 110 kg (130 – 240 lb)
Rear seat pilot max. weight: 110 kg (240 lb)
In solo flight, the pilot should be seated in the front position
MTOW: 500 kg (1100 lb)

ELA 10-Eclipse 914 UL

OPERATING LIMITATIONS

Aerobatic manoeuvres are prohibited.
Manoeuvres involving a deliberate reduction in normal 'g' shall be avoided.
CG Range Limits (Gyroplane) – refer to Pilot Operator´s Handbook.
Maximum Indicated Airspeed (Vne): 190 kph (119 mph/103 kts)
This aircraft shall be flown by day and under Visual Flight Rules only.
Smoking in the aircraft is prohibited

AIRCRAFT PAYLOAD SPECIFICATION

Front seat pilot weight: 60 – 110 kg (130 – 240 lb)
Rear seat pilot max. weight: 110 kg (240 lb)
In solo flight, the pilot should be seated in the front position
MTOW: 530 kg (1170 lb)

Canopy handle: In clear view to pilot and co-pilot. Placed near the canopy handle.

Pull up to OPEN
Push down to CLOSE

Occupant warning: In clear view to the co-pilot. Placed at the left hand of the rear seat.

OCCUPANT WARNING

This aircraft has not been certificated to an International Requirement

Fuel quality information: Near the fuel filler.

UNLEADED PETROL
(AVGAS PERMITTED)

MAX. CAPACITY
87 Lt (23 gal)

- Small baggage compartment (left or right): Inside each baggage compartment.

MAX. 2 kg
(4.4 lb)

- Rear baggage compartment: Inside the baggage compartment.

MAX. 10 kg
(22 lb)

Section IV - NORMAL PROCEDURES

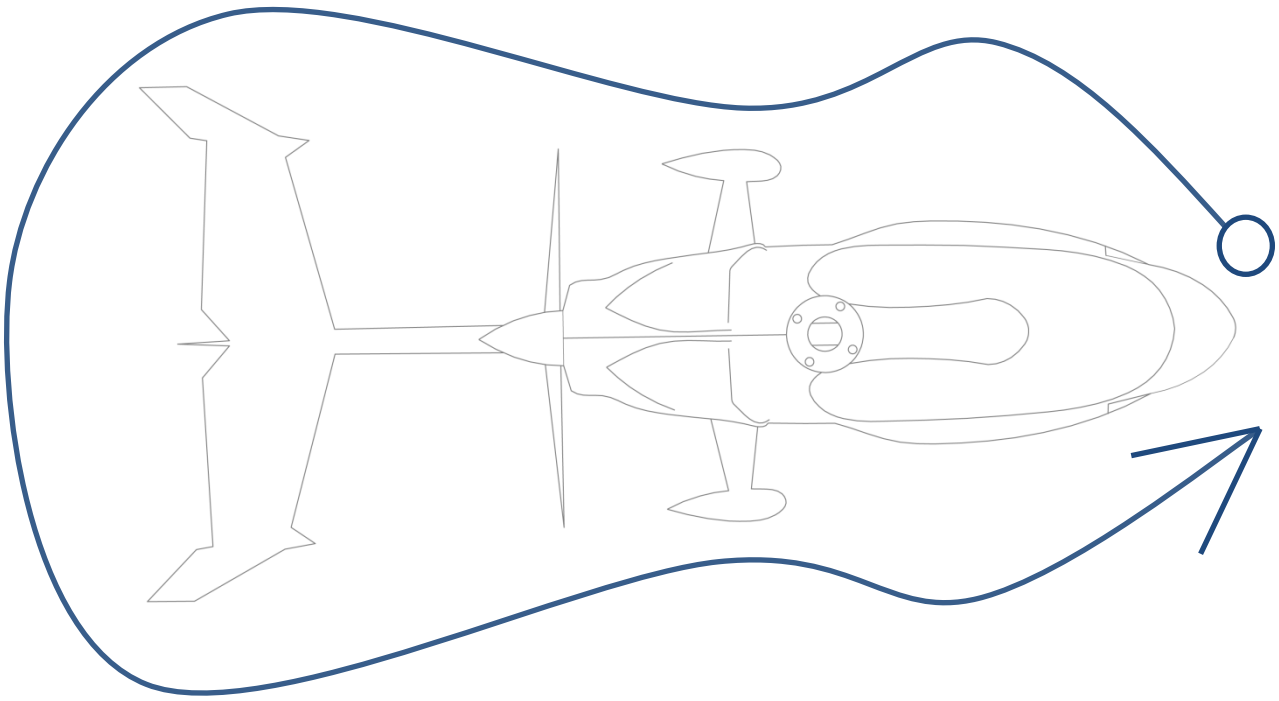
4.1 PRE-FLIGHT CHECK PROCEDURE

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. Engage the parking brakes 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 counter clockwise direction.



OUTSIDE CHECKS

Protection and pitot tube covers ..... Removed

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. Correct pressure is 1,5 bar (22.5 psi). Check the slip mark.

Pitot tube ..... Condition.

Sliding window canopy ..... Condition.

Left cockpit storage compartment door ..... Secure.

Canopy hinges (2) ..... Secure.

Left wheel ..... Condition & pressure.

Check the physical condition of the left wheel. Look for any damage to the tire including worn or damaged tread. Correct pressure is 2 bar (30 psi). Check the slip mark.

Left wheel fairing ..... No cracks & secure.

Left landing gear fairing .....No cracks & secure.

Fuel system ..... Drain.

Take a glass and open the drain valve of the gascolator for a few seconds. Verify the absence of water in the fuel collected.

REMOVE LEFT ENGINE AIR INTAKE

Oil level ..... Check.

Verify the ignition switches are OFF. Open the oil filler cap. Turn the propeller counter-clockwise until you hear a gurgle. Verify the oil level is within limits.

914 Air filter ..... Secure.

912 left air filter ..... Secure.

Spark plugs left ..... Secure.

Universal joints of pre-rotator gearbox ..... No play.

Left carburettor Bowden cables ..... Condition.

Left vertical rotor control rods ..... Condition.

INSTALL LEFT ENGINE AIR INTAKE

Left engine fairing ..... No cracks & secure.

Water cooler ..... No leaks & secure.

Propeller blades ..... No cracks & clean.

Tailplane ..... No cracks & secure.

Tail navigation and strobe lights (if fitted) ..... Secure.

Rudder ..... No cracks & secure.

Verify the general condition of the rudder, its hinges points and the control cables ends.

Tail wheel ..... Condition.

REMOVE RIGHT ENGINE AIR INTAKE

912 right air filter ..... Secure.

Coolant level ..... Verify.

Spark plugs right ..... Secure.

Right carburettor Bowden cables ..... Condition.

Right vertical control rods ..... Condition.

INSTALL RIGHT ENGINE AIR INTAKE

Right (rear) storage compartment door ..... Secure.

Right engine fairing ..... No cracks & secure.

Mast fairing ..... No cracks & secure.

Right wheel ..... Condition & pressure.

Check the physical condition of the right wheel. Look for any damage to the tire including worn or damaged tread. Correct pressure is 2 bar (30 psi). Check the slip mark.

Right wheel fairing ..... No cracks & secure.

Right landing gear fairing ..... No cracks & secure.

Fuel quantity .....As required.

Verify also the condition of the fuel filler cap.

Radio/transponder antennas ..... Secure.

Canopy lock system ..... Condition.

Open and close the canopy to verify the locking system.

Right cockpit storage compartment door ..... Secure.

Right air vents ..... Condition.

CLIMB A LADDER

Rotor head ..... Condition.

Verify the good condition of the rotor head. Verify the safety pins of the pivot bolts and teeter bolt.

Bendix and ring gear ..... No excessive wear.

Teeter towers and hub-bar ..... Condition.

Rotor blades ..... Condition.

Verify the absence of cracks or deformities in the rotor blades and hub-bar.

Verify the cleanness of the rotor blades.

OPEN THE CANOPY

Canopy telescopic rod ..... Condition.

Rear safety belt ..... Secure.

Rear stick (if fitted) ..... No play & secure.

Rear throttle lever (if fitted) ..... Good handling.

Loose objects ..... Removed & secure.

Rear pedals ..... Condition.

Front stick ..... No play & secure.

Front throttle lever and brake ..... Good handling.

Brake fluid level ..... Check.

Choke handle ..... Good handling.

Steering rods ..... Condition.

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:

Pre-flight check ..... Completed.

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.

Wheel brakes ..... ON.

Safety belts ..... Fastened.

Master switch ..... ON.

Confirm the generator warning light is ON.

Rotax 914 engine: Warning and caution boost lights ON for a few seconds.

Electrical fuel pumps ..... ON.

Verify correct fuel pressure.

Cold engine: Use the choke and set throttle in idle position.

Warm engine: Don't use the choke. Throttle slightly open.

Verify the propeller is CLEAR!

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.

Start: Turn right the ignition switch to start the engine.

Note

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

ONCE THE ENGINE STARTS

Oil Pressure: Once the engine starts, make sure that the oil pressure rises to a correct value.

CAUTION

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

Choke: After a few seconds, if choke was applied, disengage slowly.

Warm-up: Move the throttle to hold 2500 rpm until the oil temperature rises to 50°C (120ºF).

Radio: ON if required.

Transponder: ON if required.

Altimeter: QNH or QFE as appropriate

Navigation system and lights: ON if necessary.

4.3 TAXIING PROCEDURE

Do not exceed 15 kph (10 mph) during taxiing. Use gently the wheel brakes to reduce the speed and do not forget to reduce the throttle to idle position.

Rotor: Align the rotor with the gyroplane during taxiing.

Engine: Make sure the oil temperature is not less than 50°C before taxiing to the runway.

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.

It is very important to proceed very carefully during taxiing:

CAUTION

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

CAUTION

Close the canopy when taxiing on uneven ground or lateral wind to avoid damage in its hinges or frame.

CAUTION

When taxiing on uneven ground with stopped rotor, go very slowly to avoid high vertical loads on the rotor blades.

4.4 PRE TAKE-OFF CHECKS

Wind: Check direction of wind for take-off.

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 ON during the whole flight.

Ignition check: Apply parking brakes.

Increase the throttle to reach 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).

Engine parameters: Confirm engine parameters are ready for take-off.

4.5 ROTOR PRE-ROTATION

Alignment: Runway alignment.

Engine: Move the throttle until the engine speed reaches 2200 - 2500 rpm.

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

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!

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.

WARNING

Before engaging the pre-rotator, check area is clear

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.

Note

For shorter take-off distance it is possible to increase the rotor up to 280 – 300 rpm but note that the pre-rotation system will suffer greater effort so the parts life will be shorter.

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.

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 could 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 aligned with the runway.

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

When the gyroplane take-offs perform a level flight until reach 90 - 100 km/h (best rate of climb) and then raise the nose to climb and maintain this speed until reaching the desired altitude.

WARNING

Gyroplanes are very controllable at low speeds. However, operation "behind the power curve" at low altitude could have fatal consequences.

Check all engine parameters are in green arc.

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 reaching a 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 15 Kts.

The procedure to take-off with a cross wind is the same as 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 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 to minimum, 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 speed (Vy): 120 kph (75 mph/65 kts).

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

Best power-off glide speed (Vbg): 120 kph (75 mph/65 kts).

Best range speed (Vbr): 130 kph (81 mph / 70 kts).

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 15º angle, it would be necessary to increase the engine power in order to keep height/speed and slightly use the rudder pedals to favour the turn.

Max. Bank angle: 60º.

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 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 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**.

WARNING

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 to attain desired speed.

4.8 LANDING

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

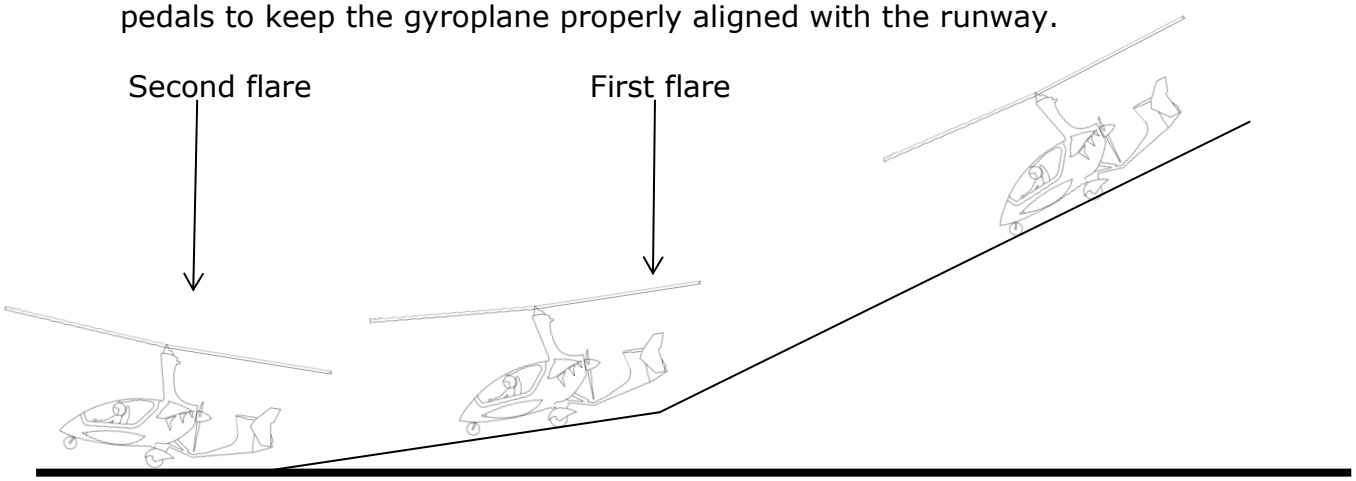
Adjust speed to 105 kph (65 mph/57 kts) and enter the circuit. On final, align to the runway, reduce the power to descend and keep a speed of approximately 95 kph (60 mph/52 kts). Keep the gyroplane aligned to the runway using the pedals and control stick.

At 5 metres 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 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 gyroplane is totally stopped.

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.



LANDING WITH CROSS WIND

The maximum permitted cross wind for take-off and landing is 15 Kts.

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 fully forward and into wind.

ABORT LANDING

If 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 (Vy) of 105 kph (65 mph/57 kts) and climb.

4.9 AFTER LANDING

Once the gyroplane stops move the control stick forward, select the pneumatic valve to "Brake" and decrease the trim pressure with the trim button. Taxi off the runway.

WARNING

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.

Issue date: 26th July 2016.
Last modification: September 2017.

Section V - EMERGENCY PROCEDURES

It is not very probable that a properly pre-flight checked and maintained gyroplane to have an emergency due to a failure. This section contains the procedures to follow in case of emergency. 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.

CAUTION

Do not fly this gyroplane over areas where a forced landing cannot be safely executed.

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 Smoke or fire on the ground.

5.7 Engine or electrical fire or smoke in flight.

5.8 Canopy open in flight.

5.9 Evacuating the aircraft.

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.

5.2 ENGINE FAILURE ON TAKE-OFF (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 power-off glide speed (Vbg) of 120 kph (75 mph/65 kts). 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 TAKE-OFF (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 power-off glide speed (Vbg) of 120 kph (75 mph/65 kts). Look for an area for landing into then wind.
1. If time allows, an engine restart can be attempted, see "Engine restart procedure".
2. If the area for landing is rough or there are obstacles, make a higher flare over the obstacles to reduce forward speed.
3. Ignition and fuel pumps OFF.
4. Rotor brake ON.
5. 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.

5.4 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 power-off glide speed (Vbg) of 120 kph (75 mph/65 kts). 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 re-start the engine.
5. Verify engine parameters are within limits (oil temp/pressure and CHT). If not, try to land with safety.

5.6 SMOKE OR 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 OR SMOKE 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.

5.8 CANOPY OPEN IN FLIGHT

INSTRUCTIONS:

1. Use right pedal to make a side slip to the left so the relative wind can keep the canopy closed.

2. Reduce the speed and try to lock the canopy.

3. If it is not possible to lock it, regain to the aproach speed and try to land immediately. Make an approach doing a side slip pointing to the right (right pedal) and align just before touching the ground.

5.9 EVACUATING THE AIRCRAFT

Occupants should not evacuate the aircraft with the rotor or propeller turning unless it is an emergency.

Switch OFF the ignition and master before evacuating the aircraft. If rotor is still turning, abandon the gyroplane bent over and walking in direction of flight (to the front).

In case of roll over, try to open the canopy before disengaging your safety harness. If it is not possible to open the canopy, break it using the emergency hammer.

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 condition.

6.1 MAINTENANCE

The owner/operator of this aircraft is the 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.

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 be always 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. Windscreen and canopy should only be cleaned with polycarbonate soap or polish (ELA part Nº071717).

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:

- Recommended:

  - EN 228 Super or EN 228 Super Plus (min. Roz 95) / MOGAS.

- Alternative:

  - AVGAS 100LL (ASTM D910) or AVGAS UL91 (ASTM D7547)

Fuel tank capacity ---------- 87 lt (23 gal).
Unusable fuel ---------- 2 lt (0.5 gal).

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 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).

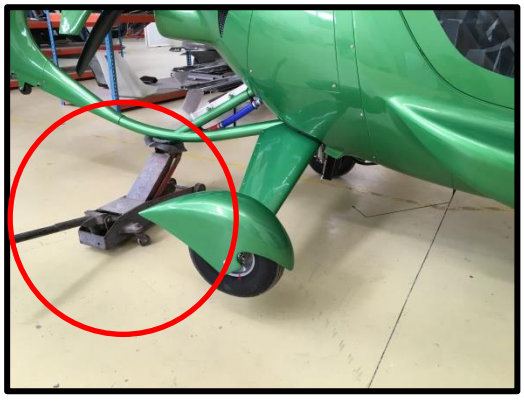
6.9 ROAD TRANSPORT

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.

6.10 LIFTING POINTS

In case it is necessary to lift the gyroplane for maintenance or loading purposes, the most convenient attachment point is the pre-rotator gearbox.

Point to lift the gyroplane to change one of the main wheels.



How to place the gyroplane to change the front wheel.