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FLIGHT MANUAL

M - 24C PLUS

PILOT OPERATING HANDBOOK FOR THE MAGNI GYRO M24C PLUS

Registration marks: _____

Constructor serial number: _____

Engine serial number: _____

Aircraft designed and constructed by Magni Gyro Srl.

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SECTION 1

AMENDMENTS RECORD

1.1 AMENDMENTS RECORD

This page and subsequent amendment pages will be reissued as necessary with each amendment list.
A copy of each amendment list will be sent to the registered owner of each aircraft.
It is the responsibility of the registered owner to insure that the amendments are incorporated in the Pilot Operating Handbook, that the superseded pages are removed and that the receipt form, enclosed with the amendment list is signed and returned to Magni Gyro UK Ltd.

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SECTION 2

GENERAL

2.1 OBJECT

This manual is intended to give all the necessary information, which the operator flying the M-24C Plus gyroplane must comply with in order to ensure the safety and effective operation.

The instructions provide the pilot with a general knowledge of the gyroplane and of its features, as well as with a specific knowledge of the normal and emergency operation procedures.

The manual is aimed at experienced pilots and is therefore devoid of any basic flight principles. It does not replace a practical training course conducted by a QUALIFIED INSTRUCTOR.

Finally, the manual provides the pilot with the recommended procedures to deal with circumstances such as emergencies, adverse meteorological conditions, etc.

2.2 PERMITTED OPERATIONS

The manual defines the allowed manoeuvres and operating limitations.

WARNING DANGER:
Unless otherwise specified, unusual manoeuvres, operations outside the defined parameters and aircraft configurations outside the defined limits are strictly forbidden.

2.3 LAY-OUT

The manual is divided into 6 sections in order to be easier to read.

Each section is dedicated to a different subject related to flight operations.

2.4 CHECKLISTS

The manual contains various indexed procedures, which are described with the necessary clarifications or definitions.

The checklist are published as indexed procedures and are not developed further.

2.5 DEFINITIONS

2.5.1 MANUAL ICONS

To ensure safe functioning of the gyroplane, specific symbols are used in this manual to highlight the relative importance of particular items.

The symbols used in this manual are as below:

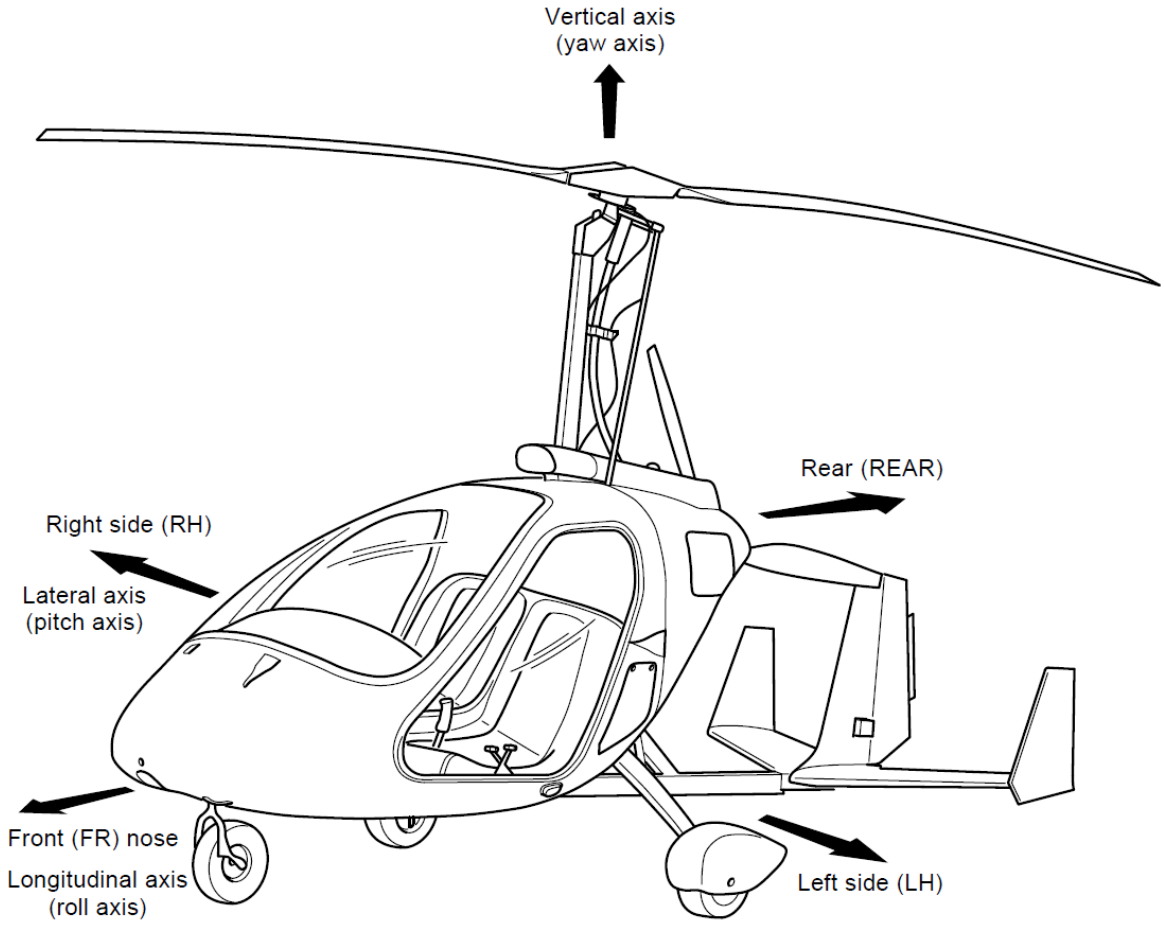
WARNING DANGER:
Operation, technical and other procedures which, if not followed carefully, may expose the operator to the risk of serious accident or death.

WARNING:
Operation, technical and other procedures which, if not followed carefully, may expose the gyroplane and its equipment to damage.

NOTE:
Operation, technical and other procedures which deserve special attention.

CAUTION:
A statement that has to be followed with particular attention.

2.5.2 GYROPLANE FRAME



2.6 LIST OF ABBREVIATIONS

agl	Above ground level
CT	Coolant Temperature
ECU	Engine Control Unit
EGT	Exhaust Gas Temperature
EMS	Engine Monitoring System
ft	Feet
g	Gravitational acceleration
G	Gravitational constant
GA	Glide Angle
GPS	Global Positioning System
h	Hour
hp	Horse power
hPa	Hecto Pascal
inHg	Inches of mercury
IAS	Indicated Air Speed
ISA	International Standard Atmosphere
kn	Nautical miles per hour (knots)
l	Litre
lb	Pound
m	Metre
MAP	Manifold Pressure
MAUW	Maximum All Up Weight

mb	Millibar
min	Minute
mph	Miles per hour (statute)
MTOW	Maximum Take-Off Weight
N	Newton
QFE	Q Field Elevation
RG	Rough Ground
ROC	Rate Of Climb
rpm	Revolutions per minute
Vo	Slow flight speed
Va	Design maneuver speed
Vapp	Approach speed
VMC	Visual Meteorological Conditions
Vmc	Minimum control speed
Vmin	Minimum level flight speed
Vmra	Minimum rudder authority speed
Vne	Never-Exceed speed
Vno	Normal Operation speed
Vx	Steepest climb speed (best climb angle)
Vy	Fastest climb speed (best ROC)

2.7 UNITS OF MEASURE

The following units are used in this handbook and where appropriate on the instruments and placards.

Airspeed..... nautical miles per hour [kn]

Altitude.....feet [ft]

Distance (aircraft performance) .....feet [ft] or metres [m]

Length (aircraft geometry).....millimetres [mm]

Liquid volume..... litres [l]

Moment.....kilogram metre [kgm]

Pressure ..... bars [bar]

Temperature..... Celsius degree [C°]

Weight..... kilograms [kg]

2.8 GENERAL DATA

The M24C Plus is a single engine, two-seat gyroplane. Its primary structure is steel and the fuselage is made from carbon fibre.

The airframe has three main sections:

− The forward fuselage

− The aft fuselage

− The tailplane

The forward section of the fuselage contains the pilot compartment and fuel tank. The two seats are side-by-side in a staggered configuration to maximise comfort.

The gyroplane is equipped with a fixed, front tricycle landing gear.

The power unit is a piston engine in a pusher configuration driving a four-bladed propeller with ground adjustable pitch.

The tailplane is made of composite material. The tailplane consists of a fixed horizontal stabilizer with three vertical fins of which the central fin is subdivided into a fin and rudder.

The rotor, tailplane and main undercarriage are made of composite material.

The tailplane has a fixed horizontal stabilizer with three vertical fins of which the central fin is subdivided into a fin and rudder.
There is a baggage compartment inside the cockpit, under the right seat cushion.

2.9 TECHNICAL DATA

Weights:

- Dry weight ..... 307 kg
- Empty weight ..... 315 kg
- MTOW ..... 535 kg

Performance:

See Chapter 3.18.

Fuel supply:

- Fuel ..... Petrol
- Fuel tank capacity ..... 82 litres
- Usable fuel quantity ..... 78.5 litres
- Reserve ..... 10 litres
- Unusable fuel quantity ..... 3.5 litres

For more information on acceptable fuel and oil please see Chapter 3.17.

Engine:

- Engine type ..... Rotax 915 iS A
- Power ..... 141 hp
- Maximum engine rpm (5 minutes) ..... 5800 rpm
- Maximum continuous rpm ..... 5500 rpm
- Maximum MAP (5 minutes) ..... 51 inHg
- Cylinders 4
- Fuel Consumption/hour (cruise) ..... 18 - 27 litres
- Fuel Consumption/hour (max power) ..... 47 litres

Operating temperatures:

	min	normal	max
OIL [°C]	50	90 - 110	130
CT [°C]	40	90 - 110	120
EGT [°C]		750 - 850	950

Cooling system:

- Cooling system type ..... air / liquid
- Coolant radiator ..... 3 litres
- Oil radiator ..... 4 litres

Electrical Installation:

- Operating voltage ..... 12 V

Tyres:

- Nose wheel ..... 4.00 - 4
- Inflating pressure ..... 2.2 - 2.5 bar
- Main wheels ..... 4.00 - 6
- Inflating pressure ..... 2.8 - 3.0 bar

2.10 GYROPLANE DIMENSIONS

The overall dimensions are indicated below:

Rotor diameter .....8574 mm (28.20”)
Total length ..... 4400 mm
Width..... 1608 mm
Height (without rotor) ..... 2700 mm
Maximum height (with stick forward) ..... 2740 mm

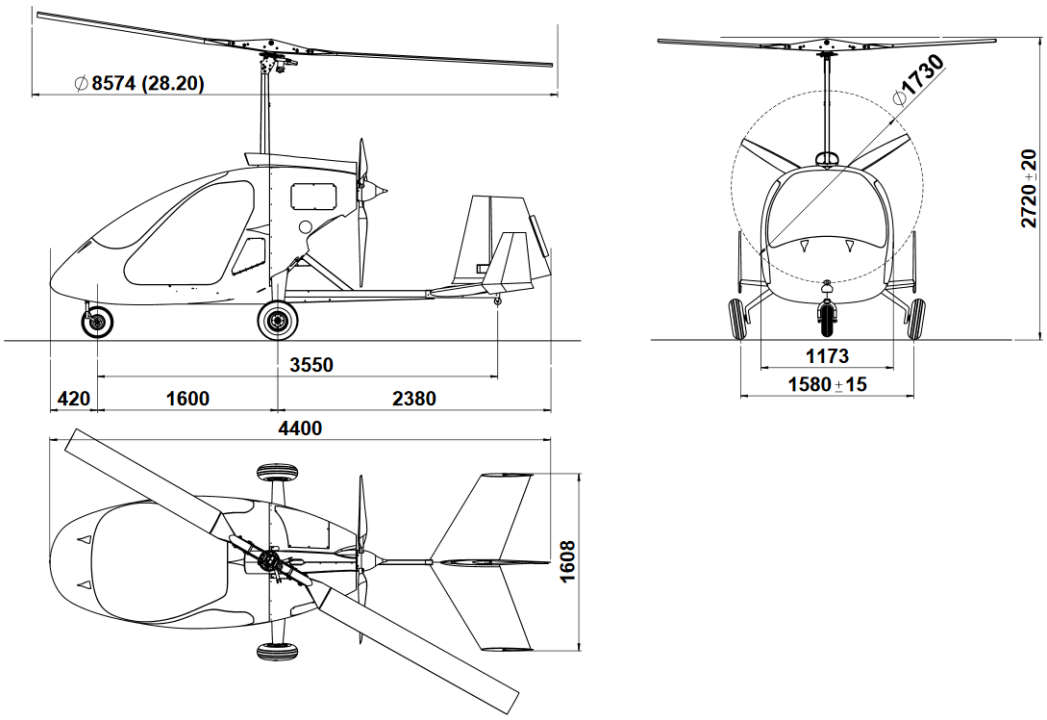


Figure 2.1: Overall dimensions

SECTION 3

OPERATING LIMITS

3.1 INTRODUCTION

This section contains and describes the operation limits to observe when using the gyroplane.

WARNING DANGER:
Should one of the limits specified in this section be exceeded, all the components of the gyroplane must be carefully inspected. This event must be recorded in the aircraft logbooks. Before flying again, make sure that all the necessary checks have been completed.

3.2 MINIMUM CREW

All flights require a crew of at least one pilot.

NOTE:
Smoking in the aircraft is prohibited.

3.3 ENGINE OPERATIONAL LIMITS

	min	normal	max
OIL [°C]	50	90 - 110	130
CT [°C]	40	90 - 110	120
EGT [°C]	-	750 - 850	950
Oil pressure [bar]	2.0	2.0 - 5.0	7.0
Max engine rpm (5 minutes) [rpm]	-	-	5800
Max continuous engine rpm [rpm]	-	-	5500
Max MAP [inHg]	-	-	51
Fuel consumption CRUISE [l/h]	-	-	18 - 27
Fuel consumption MAX POWER [l/h]	-	-	47
Fuel pressure [bar]	2.5	2.9 - 3.1	3.5

The Rotax 915 engine can provide maximum power of 141 hp for 5 minutes at a maximum engine speed of 5.800 rpm and 135 hp continuously at a maximum engine speed of 5.500 rpm.

The relation between rpm and manifold pressure is described in Chapter 3.19.

3.4 ENGINE OVERSPEED

The engine maximum speed is **5.800 rpm.**

In case of overspeed:

- From 5.800 up to 6.000 rpm: find the cause of the problem and correct it

- Over 6.000 rpm: inspect the engine in accordance with the manufacturer instructions

WARNING DANGER:
As the gyroplane is equipped with a ground adjustable pitch propeller. The standard propeller pitch is set in the factory. The pitch angle of the propeller may not be altered as the performance of the gyroplane may be severely reduced.

WARNING:
It is possible to exceed maximum rpm limits in level flight with throttle lever at 100%.

3.5 SPEED LIMITS

Never exceed speed (Vne): 85 kn

This speed must never be exceeded in order not to stress the gyroplane beyond its structural limits.
This speed is indicated by a red mark on the air-speed indicator.

Normal operating speed (Vno): 75 kn

This is the highest speed which may be maintained in turbulence and in any flight configuration without risk of damaging the gyroplane structure (green range in the air-speed indicator).

WARNING:
Above 75 kn, movements in pitch must be limited to avoid overstressing the airframe. At speeds above 75 kn only small, gentle pitch control movements should be used.

3.6 FLIGHT MANOEUVRE LIMITATIONS

- Any flight manoeuvres with constant load lower than zero g are prohibited.

- Flight at or below zero g is prohibited

- Aerobatic manoeuvres are prohibited.

3.7 LOAD FACTOR LIMITATIONS

With a total aircraft weight of 535 kg, the maximum permissible acceleration load factor is equal to +3 g. A higher load factor will permanently deform the gyroplane structure.

When the gyroplane flies in a lightly loaded configuration with less than 400 kg weight, the maximum permissible acceleration load factor is equal to +4 g. A higher value will permanently deform the gyroplane structure.

Aircraft weight [kg]	Maximum load factor [g]
400	+4
535	+3

3.8 FLIGHT ENVELOPE

The height-velocity diagram shows the height and speed limits. The area delimited by the curve on the graph shows the conditions where a safe landing is not possible in case of an engine failure.

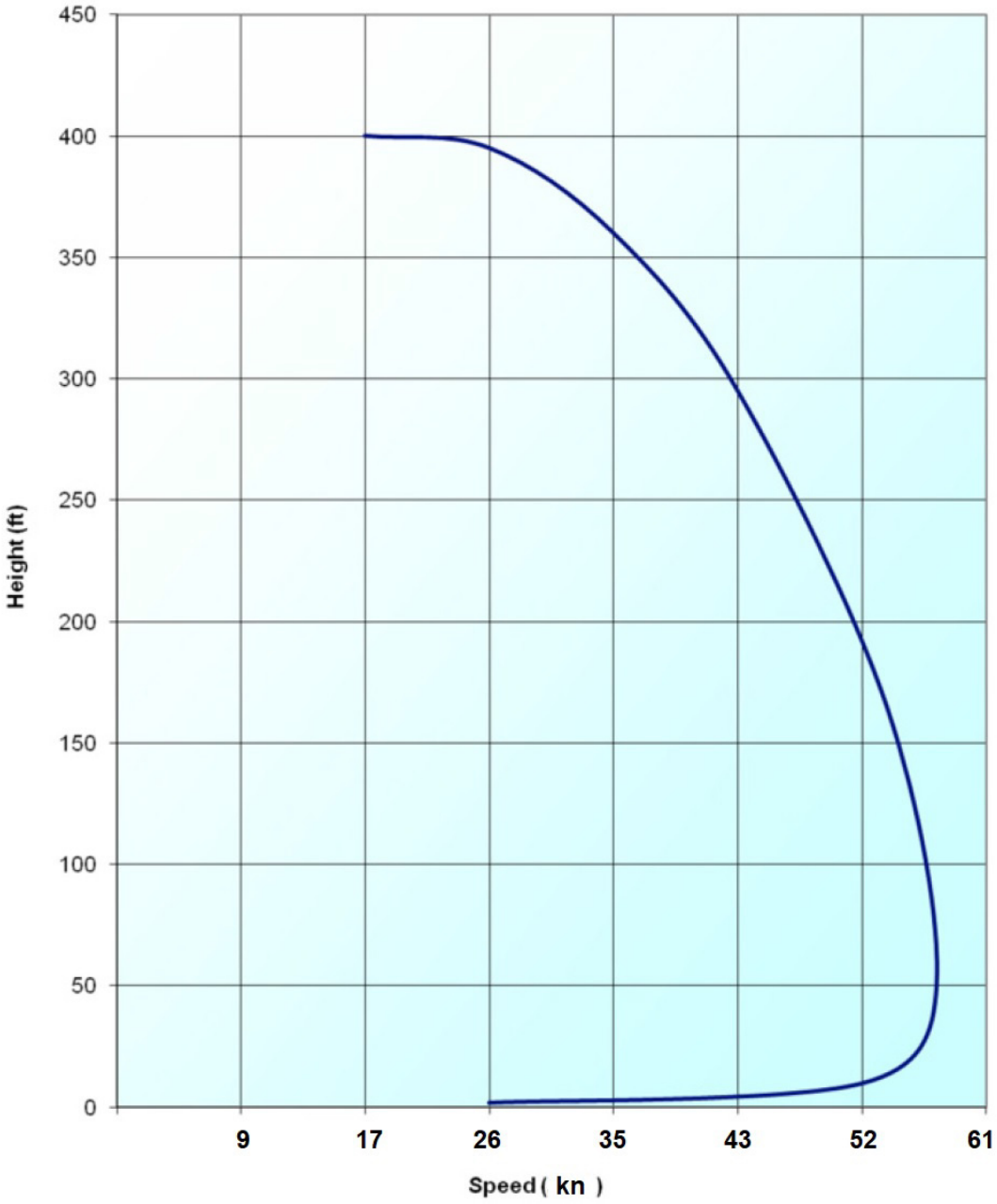


Figure 3.1: Height vs velocity diagram

3.9 CENTRE OF GRAVITY LIMITATIONS

In order to avoid moving the centre of gravity beyond the front and rear limits, the gyroplane loading limits are as follows:

- minimum pilot weight = 60 kg
- maximum pilot weight = 120 kg

See Chapter 7 for centre of gravity limitations data.

WARNING DANGER:
- Flight without an occupant of at least 60 kg in the left seat is prohibited
- Left seat is the main pilot seat
- Max pilot weight is subject to MTOW limitations (see section 3.10)

3.10 LOAD LIMITATIONS

Maximum take-off weight.....535 kg
Maximum landing weight.....535 kg

3.11 BAGGAGE COMPARTMENT

The baggage compartment under the co-pilot can hold a maximum of 10 kg.
The baggage compartment “glove box” can hold a maximum of 2 kg.

3.12 EXTERNAL LOADS

WARNING DANGER:
Carrying loads or luggage on the outside of the fuselage is forbidden.

3.13 TAKEOFF AND LANDING LIMITATIONS

The maximum crosswind component allowed for takeoff and landing operations is 25 knots.

3.14 MAX ROTOR RPM

Max rotor rpm.....550 rpm

3.15 ELECTRICAL LOAD LIMITATIONS

The Rotax 915 iS is fitted with two integrated AC generators with regulators. These two generators supply the utilities by two independent lines.

The generator 1 produces 14V 16A and it supplies the engine management system.
The generator 2 produces 14V 30A and it supplies the remaining gyroplane utilities.

In case of failure of one generator, this will be indicated by the warning LED “Line A” and/or ”Line B” switching on. The standard emergency procedures, as defined in Section 5, must be adhered to.

The following table shows that there is an excess of more than 11A which can be used for extra utilities.

	ITEM	EQUIPMENT	UNITS	TOTAL DEMAND PER UNIT [Amp]	TIME [min]	SIMULTANEOUS DEMAND [Amp]
Generator 1 16 A	Engine management system	FUEL PUMPS	2	16	CONT	16
		ECU	1			
		FUSE BOX	2			
Generator 2 30 A	Aircraft electrical item	LANDING LIGHT	1	2.92	INT	2.92
		TRIM	1	2.0	INT	2.0
		DOOR WARNING	1	0.02	CONT	0.02
	GPS		1	1.5	CONT	1.5
	RADIO VHF		1	1.8	INT	1.8
	TRANSPONDER		1	0.42	CONT	0.42
	POWER SOCKET		2	3.0	CONT	6
	POSITIONING/ STROBE LIGHTS		3	1.4	CONT	4.2
				TOTAL		34.86

3.16 WIND LIMITATIONS

The wind component chart is shown below.

Example:

Known:

Take-off heading 270°

Reported wind direction 230°

Reported wind speed 25 kt

Determine:

− Crosswind component

− Headwind component

Solution:

− Crosswind component = 16 kt

− Headwind component = 19 kt

1. Wind direction relative to take-off heading is 270° - 230° = 40°.

2. Enter chart at reported wind speed (25 kt).

3. Move upward, follow the shape of the curved lines to wind direction relative to take-off heading (40°).

4. Move vertically upward (read 19 kt headwind component) and horizontally right (read 16 kt crosswind component).

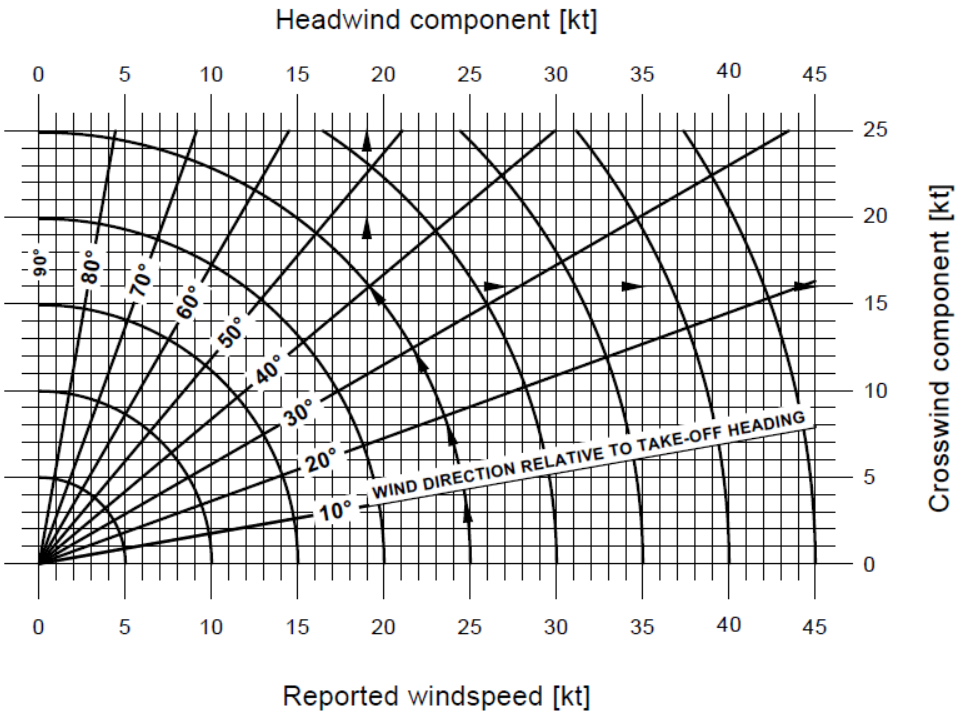


Figure 3.2: Wind component chart

3.17 REFUELLING DATA

3.17.1 FUELS

The following fuels can be used:

	Usage / Description
	915 iS
MOGAS	
European standard	EN 228 Super [1]
	EN 228 Super plus [1]
	ASTM D4814
Canadian standard	CAN/CG SB-3.5 [2] Quality 3
AVGAS	
US standard	AVGAS 100 LL
	ASTM D910

1 = min ROZ 95
2 = min AKI 91

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. AVGAS should only be used in case of problems with vapour lock or when other types of gasoline are unavailable.

MOGAS should not be used if the fuel temperature exceeds 20°C or at altitudes above 6000ft due to the increased risk of vapour bubble formation in fuel lines. In these conditions AVGAS 100LL should be used.

3.17.2 BRAKE OILS

The type of oil used in this system is DOT 4.

3.17.3 LUBRICANTS

Oil: motorcycle oil of a registered brand with gear additives
if using aircraft engine oil, then only blended one

Oil specification:

- Use only oil with API classification “SG” or higher

- Due to high stresses in the reduction gears, oils with gear additives such as high performance motorcycle oils are required

- Because of the incorporated friction clutch, oils with friction modifier additives are unsuitable as this could result in a slipping clutch during normal operation.

- Heavy duty 4-stroke motorcycle oils meet all the requirements. These oils are normally not mineral oils but semi or fully synthetic oils

- Oils for Diesel engines are generally unsuitable due to insufficient high temperature properties and additives which cause clutch slipping

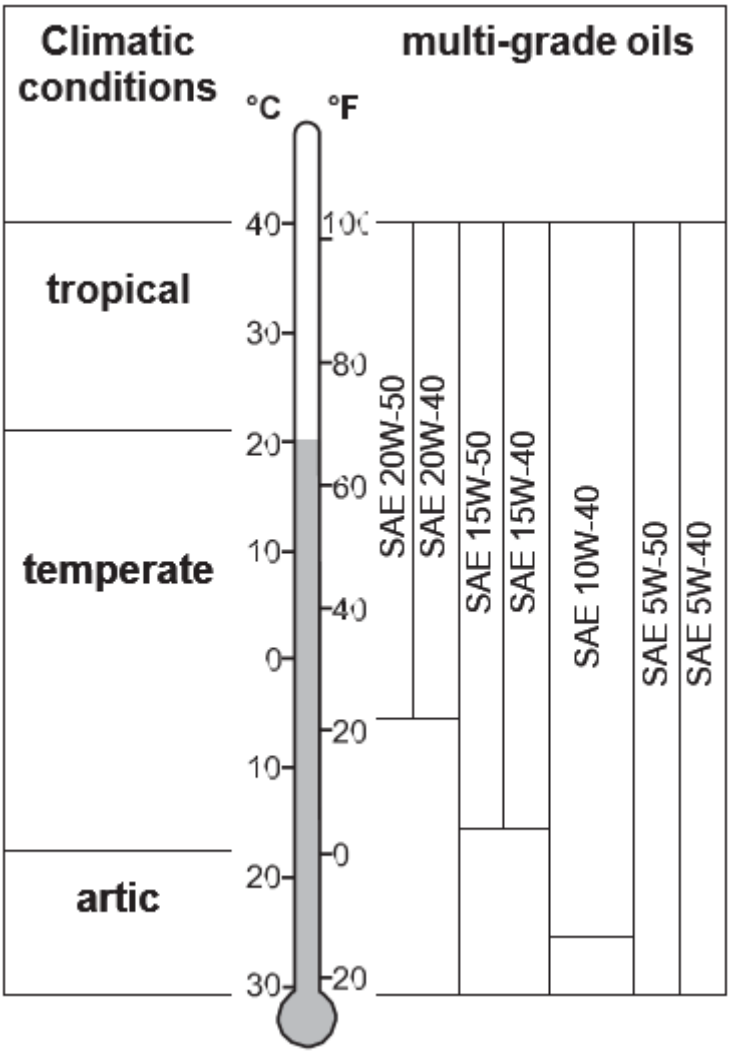
WARNING:
If the engine is mainly run on AVGAS, more frequent oil changes will be required.

Oil consumption..... max 0.06 l/h
Oil viscosity.....use of multi-grade oils is recommended

NOTE:
Multi-grade oils are less sensitive to temperature variations than single grade oils. They are suitable for use throughout the seasons, ensure rapid lubrication of all engine components from cold start and become less fluid at higher temperatures.

Table of lubricants

Since the temperature range of neighbouring SAE grades overlap, there is no need to change oil viscosity during short term fluctuations of ambient temperatures.



3.17.4 COOLANT

Standard coolant has a better thermal heat transfer capability than waterless coolant.

Standard coolant is used with a mixture of 50% concentrate and 50% water. The coolant quantity can be increased to a maximum of 60% with 40% water.

3.18 PERFORMANCE DATA

Speeds:

- Vy ..... 55 kn
- Vx ..... 50 kn
- Vne ..... 85 kn
- Va ..... 60 kn
- Vmin ..... 25 kn
- Vapp ..... 55 kn
- Vmc (power OFF) ..... 15 kn
- Vmc (power ON) ..... 15 kn
- Vno ..... 75 kn
- Vmra ..... 15 kn
- Vo ..... 35 kn

Distances:

- Take-off ..... 320 ft
- Take-off (to 50 ft) ..... 950 ft
- Landing ..... from 0 to 100 ft
- Landing (from 50 ft) ..... 430 ft

Climb and glide:

- ROC at MAUW, max power, ISA conditions ..... 980 ft/min
- Glide rate at MAUW ..... 1250 ft/min
- Glide rate at minimum weight ..... 1000 ft/min

Crosswind:

- Maximum demonstrated crosswind component for take-off ..... 25 kn
- Maximum demonstrated crosswind component for landing ..... 25 kn

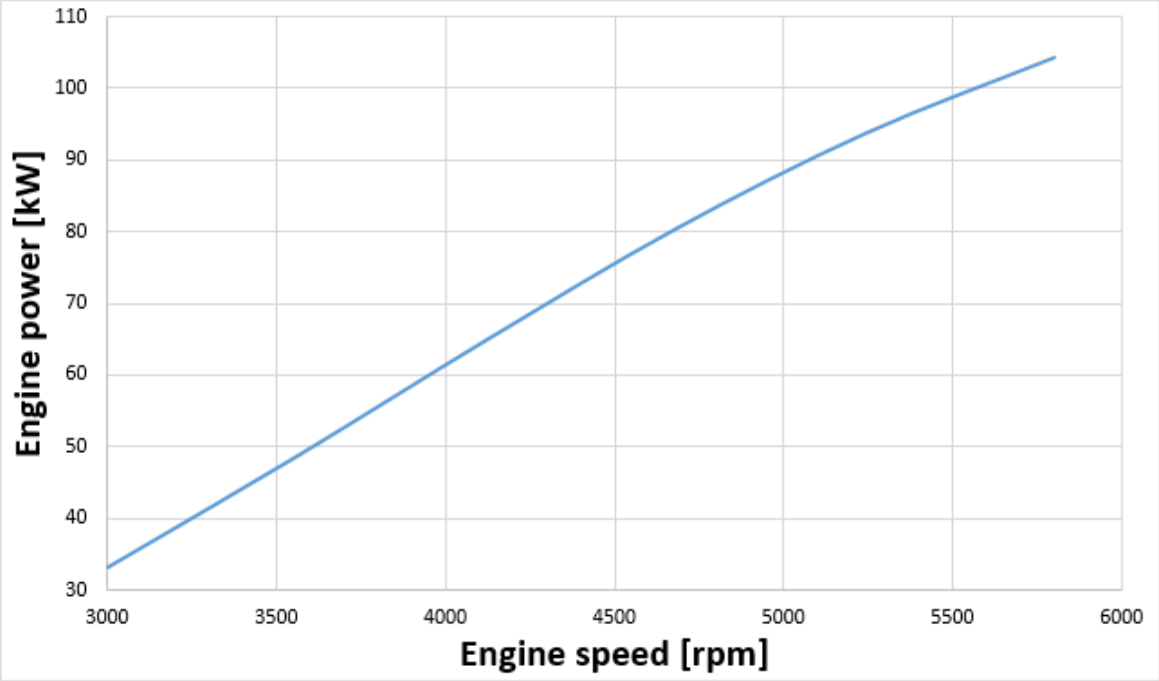
Service ceiling:

- Maximum service ceiling ..... 10000 ft

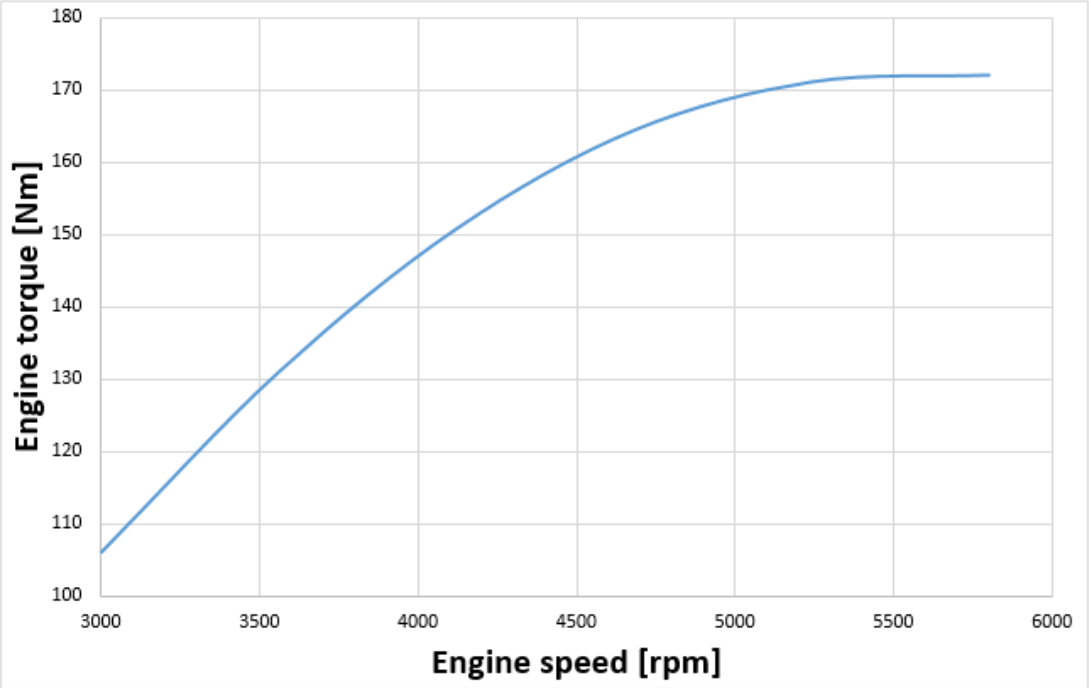
3.19 ENGINE PARAMETERS

The following graphs have been obtained using the Rotax engine performance calculator. In 3.19.1 and 3.19.2 the curve is relative to 100% throttle percentage. In 3.19.3 and 3.19.4 the curves are relative to different throttle percentages which are indicated aside. The red region indicates the usual throttle percentage range during flight.

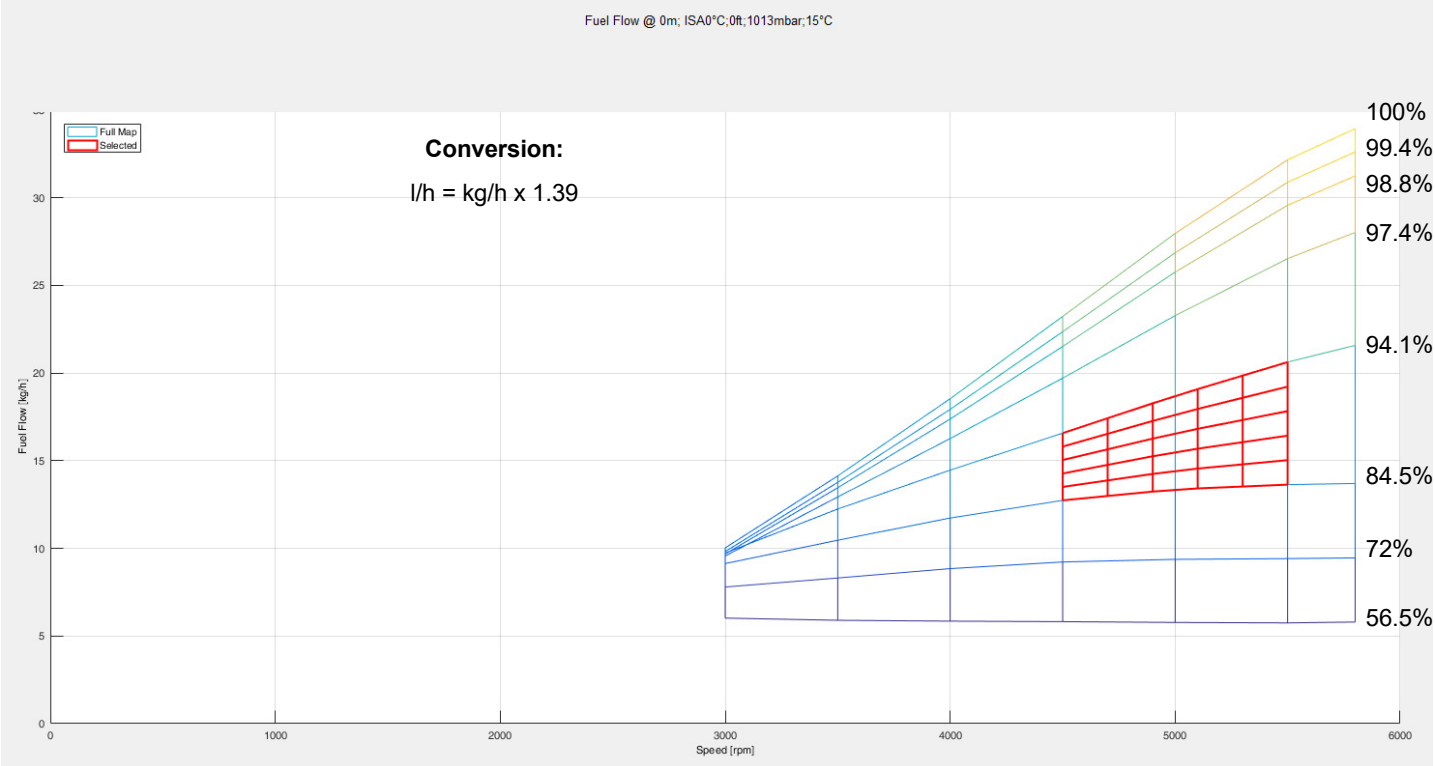
3.19.1 ENGINE PERFORMANCES



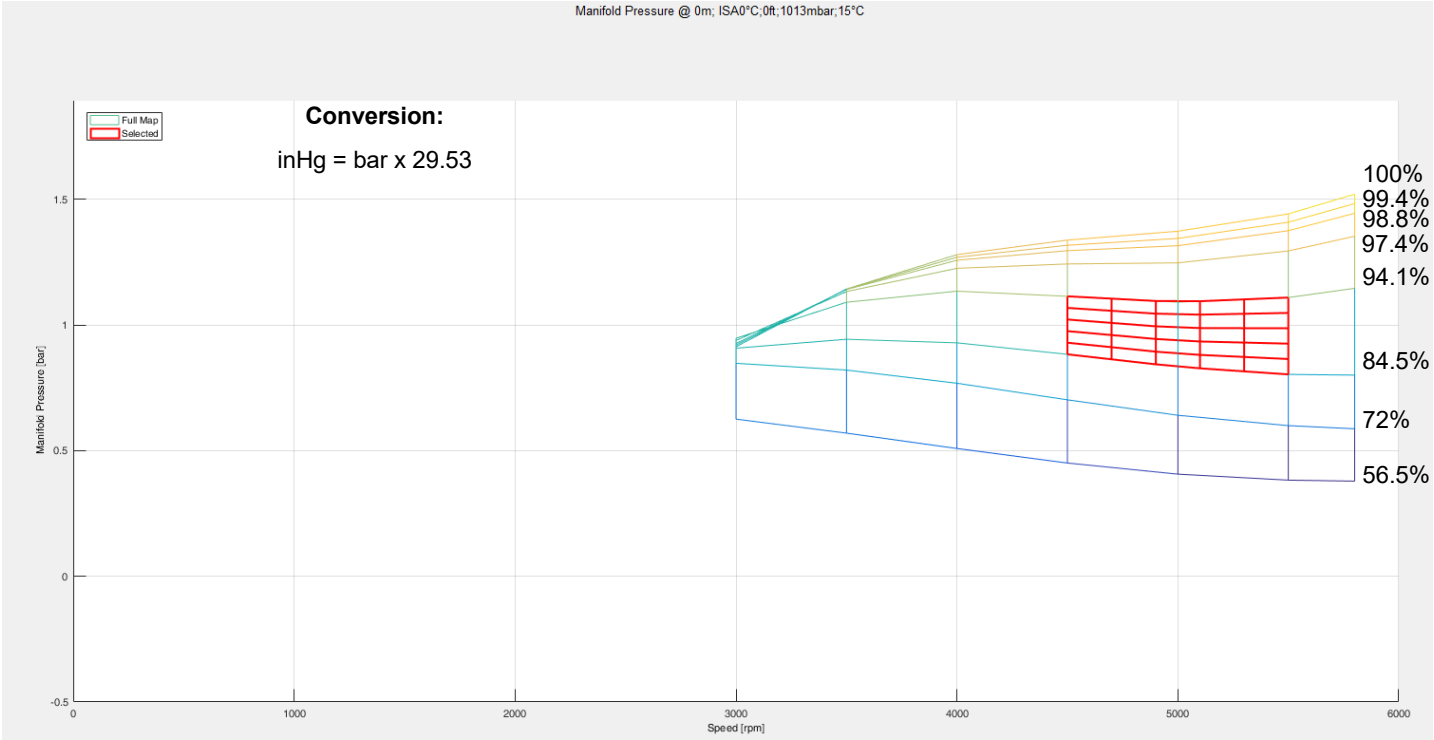
3.19.2 ENGINE TORQUE



3.19.3 FUEL CONSUMPTION

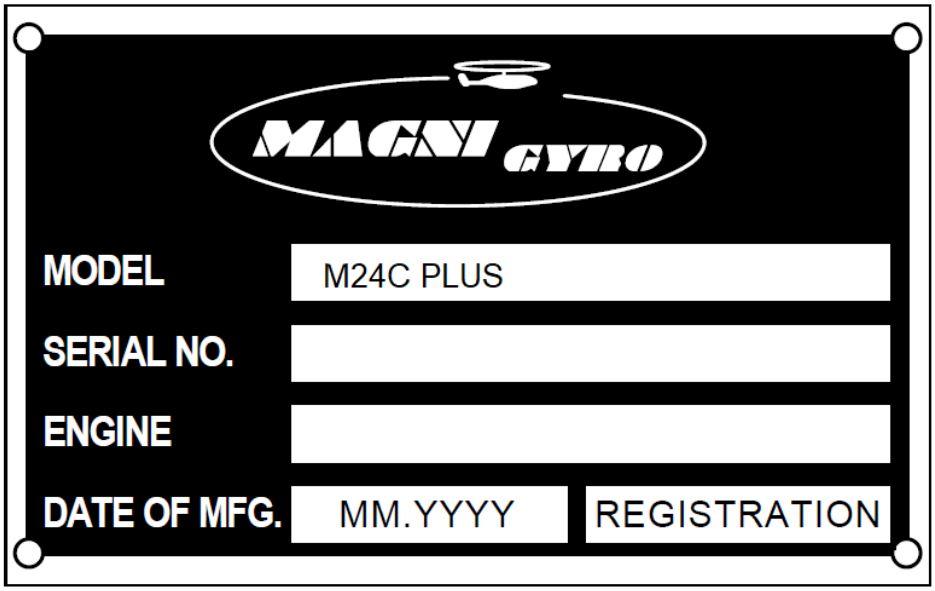


3.19.4 MANIFOLD PRESSURE

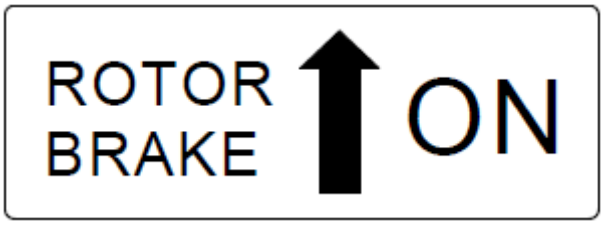


3.20 PLACARDS AND MARKINGS

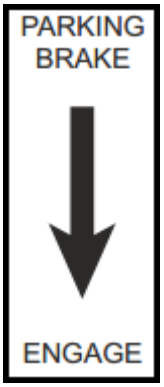
The manufacturer's identification placard is located inside the cockpit, on the lower right side of the central console.



Next to rotor brake lever:



Next to the parking brake and throttle levers:



SECTION 4

EMERGENCY PROCEDURES

4.1 GENERAL

This section contains the procedures to be followed in case of emergency.
It is extremely important to know these procedures so as to be able to manage any emergency situation and apply the appropriate actions, thus resolving the situation as safely as possible. Multiple emergencies, unfavourable weather conditions and particular conditions require specific adaptations of the following procedures.
To address an emergency in the most effective way, the decisions taken by the pilot must be rational and follow common sense logic.

4.2 CRITICAL EMERGENCY PROCEDURES

The emergency procedures may be classified in critical and non-critical ones.
Critical emergencies are defined as emergency situations which require a rapid and immediate response that must be instinctive, without reference to any checklist and must be learned by the pilot through training.

4.3 IN-FLIGHT ENGINE FIRE

In the event of a fire in the engine compartment the fire detection light (red “FIRE” indicator) will be illuminated in a constant blinking manner.

Proceed as follows:

1. FUEL PUMPS - OFF
2. THROTTLE LEVER - OPEN
3. MASTER - OFF
4. MAINTAIN ATTITUDE TO ENSURE ADEQUATE MANOUEVRE SPEED
5. PROCEED IN LINE WITH PROCEDURES OUTLINED FOR AN EMERGENCY LANDING

After emergency landing:

6. ROTOR BRAKE - ON
7. ABANDON THE GYROPLANE
8. CALL EMERGENCY SERVICES

4.4 IN-FLIGHT ELECTRICAL FIRE

If smoke/fire appears to be originating from instrument panel area, switch off non-essential equipment (and pull circuit breakers) and carry out precautionary landing. If smoke persists carry out actions as for fire in engine bay area.

4.5 GROUND EMERGENCIES

Ground emergencies are given in:

− Engine failure Chapter 4.5.1

− Fire during starting Chapter 4.5.2

− Abandoning the aircraft Chapter 4.5.3

4.5.1 ENGINE FAILURE

In case of engine failure the following actions are recommended.

Taxing, prior to take-off:

Maintain directional control, brake and stop where safe.

4.5.2 FIRE DURING STARTING

In the event of a fire in the engine compartment the fire detection light (red “FIRE” indicator) will be illuminated in a constant blinking manner.

Proceed as follows:

1. FUEL PUMPS - OFF
2. LINE A - OFF
3. LINE B - OFF
4. THROTTLE LEVER - OPEN
5. MASTER - OFF
6. ABANDON THE GYROPLANE
7. CALL EMERGENCY SERVICES

4.5.3 ABANDONING THE AIRCRAFT

In normal circumstances occupants should not leave the aircraft while either the propeller or the rotor are turning to prevent risk of the occupants being struck by moving blades.

If abandoning the aircraft in an emergency, the pilot should turn the off the engine magneto switches and flick the Master switch to “OFF”.

If abandoning the aircraft with either the propeller and/or the rotor turning, the occupants should follow a path out of the cockpit straight forward away from the nose of the aircraft, to minimise the risk of injury.

4.6 INITIALIZATION EMERGENCIES

Initialization emergencies are given in:

− Take-off emergencies Chapter 4.6.1

− Engine failure immediately after take-off Chapter 4.6.2

4.6.1 TAKE-OFF EMERGENCIES

If an emergency occurs during takeoff, the pilot must decide whether to continue the takeoff or abort it.
His decision might be influenced by the nature of the malfunction, by the speed, by the point of takeoff when the malfunction was recognized, by the pilot training to land safely or continue with the takeoff.

4.6.2 ENGINE FAILURE IMMEDIATELY AFTER TAKE-OFF

Land immediately ahead.
If higher than 300 ft - consider wind speed and direction. Select a forced landing site, in to wind and/or up any slope.

4.7 SYSTEM RELATED EMERGENCIES

System related emergencies are given in:

- Lights Chapter 4.7.1

4.7.1 LIGHTS

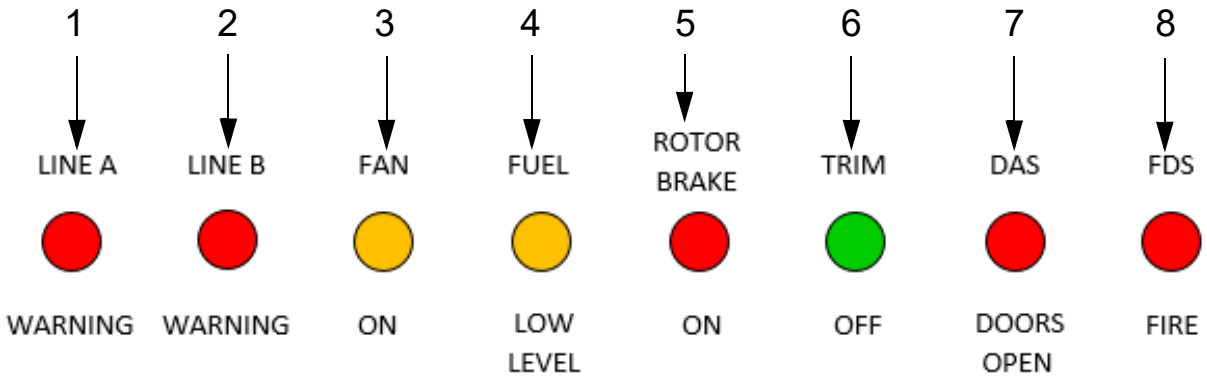


Figure 4.1: LED strip

ID	LIGHT TYPE	STATUS	WARNING (light on)	DESCRIPTION	ACTION TO BE TAKEN
1	RED	Blink	WARNING	Error with lower severity	Follow procedures described in 4.8.4
		Fix	DANGER	Line A voltage drop	Follow procedures described in 4.8.3
2	RED	Blink	WARNING	Error with lower severity	Follow procedures described in 4.8.4
		Fix	DANGER	Line B voltage drop	Follow procedures described in 4.8.3
3	YELLOW	Fix	Fan engaged	The cooling fan has been activated	No actions required, check the CT
4	YELLOW	Fix	Low fuel level	Fuel level is low	Land in 10 minutes to avoid the shut down of the engine because of lack of fuel
5	RED	Fix	WARNING	The lever of the brake rotor is in ON position and consequently the rotor brake is engaged	Keep the rotor brake engaged during the taxing and parking operations. Disengage the rotor brake before driving the strip and the beginning of the operations
6	GREEN	Fix	Trim disengaged	Trim nose down end stroke	No actions required
7	RED	Fix	WARNING	Door Incorrectly latched and locked	Follow procedures described in 4.9
8	RED	Blink	DANGER	Fire in engine bay	Follow procedures described in 4.3
		Fix	WARNING	Fire sensor damaged	Check wiring and call the assistance

4.8 ENGINE FAILURES

Engine failures are given in:

− In-flight engine failure Chapter 4.8.1

− Example of teaching procedure for engine failure Chapter 4.8.2

− In-flight generators failure Chapter 4.8.3

− Line A and/or Line B led blinking Chapter 4.8.4

4.8.1 IN-FLIGHT ENGINE FAILURE

- If at reasonable altitude:

1. Check Line A and Line B switches are ON
2. Check fuel pumps are ON
3. Check fuel gauge to confirm sufficient fuel
4. Attempt engine re-start

- If engine fails to re-start:

1. Switch fuel pumps, Line A and Line B to OFF
2. Flick Master switch to “OFF”
3. Check harnesses are tight
4. Consider wind speed and direction
5. Select a forced landing site, in to wind and/or up any slope

4.8.2 EXAMPLE OF TEACHING PROCEDURE FOR ENGINE FAILURE

The teaching procedure for engine failure is shown in the following figure.

Preparation:

- Altitude 500 ft
- Speed Vy
- Direction across used runway end
- Theoretical runway available for landing: 300m

Execution:

- Intervention of instructor with reduction of throttle to idle
- Check the attitude to maintain Vy

- Locate landing area Wind evaluation
- Master and fuel pumps - OFF (verbal indication of execution)
- Land within pre-set constraints

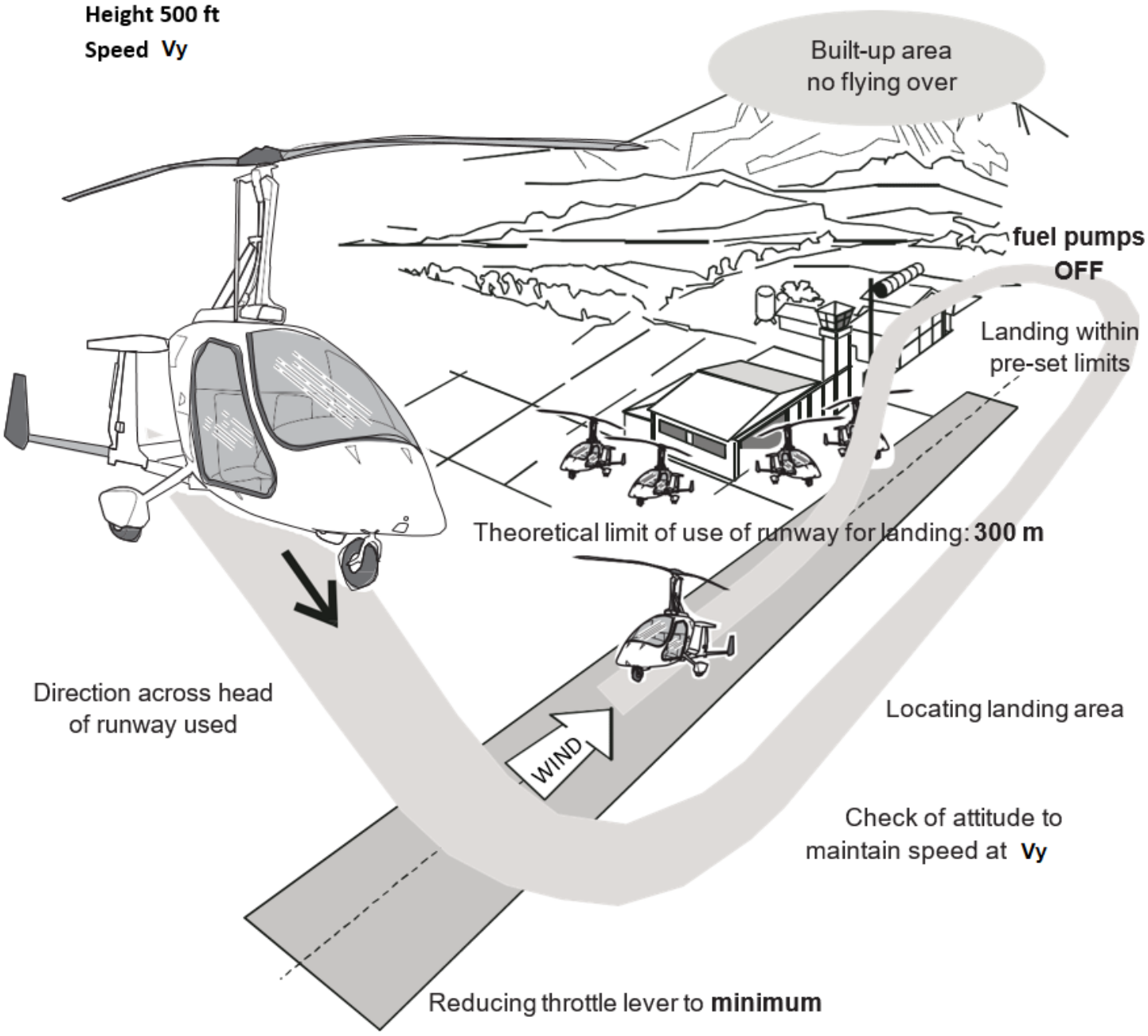


Figure 4.2: Teaching procedure for engine failure

4.8.3 IN-FLIGHT GENERATORS FAILURE

During flight if one of the two generators fails the ECU automatically switches over to supply the engine management system.

In case of a failure of both generators, in order to avoid the engine stoppage, the engine management system has to be powered by an external backup system using the battery backup switch.

In both cases, the failure is indicated by the fixed lighting in DANGER mode of the warning LED “Line A” and/or “Line B”.
Since it is not possible to distinguish the two cases, the pilot has to proceed as follows.

A. Fixed red LED 1 “Line A”:

1. Trim the gyroplane at safe altitude and speed (if flying)
2. Line A switch ..... OFF
3. Line A switch ..... ON

If after 5 seconds the LED is ON:

4. Execute the generator failure emergency procedure (described below)

If after 5 seconds the LED is OFF:

4. Continue flying monitoring tension values till destination
5. Once landed, contact the assistance service

B. Fixed red LED 2 “Line B”:

1. Trim the gyroplane at safe altitude and speed (if flying)
2. Line B switch ..... OFF
3. Line B switch ..... ON

If after 5 seconds the LED is ON:

4. Execute the generator failure emergency procedure (described below)

If after 5 seconds the LED is OFF:

4. Continue flying monitoring tension values till destination
5. Once landed, contact the assistance service

Generator failure emergency procedure:

1. Lift the battery backup guard
2. Battery backup switch.....ON
3. Not essential electrical utilities....OFF
4. Land at the closest airport, monitoring tension values of the implants. In case of tension value in the red sector, prepare for an emergency landing
5. After landing, call for assistance at the authorized centres.
6. Stop flying

4.8.4 LINE A AND/OR LINE B LED BLINKING

In case of an anomaly due to an uncertain connection, one parameter or one engine management sensor, the failure is indicated by the flashing of the WARNING LED “Line A” and/or “Line B”. The pilot has to proceed as follows.

A. Red LED 1 “Line A” flashing:

1. Trim the gyroplane at safe altitude and speed (if flying)
2. Line A switch.....OFF
3. Line A switch.....ON

If after 5 seconds the LED is still flashing:

4. Continue flying till the destination
5. Once landed, contact the assistance service

If after 5 seconds the LED is OFF:

4. Continue flying
5. Once landed, log the anomaly on the logbook

B. Red LED 2 “Line B” flashing:

1. Trim the gyroplane at safe altitude and speed (if flying)
2. Line B switch .....OFF
3. Line B switch .....ON

If after 5 seconds the LED is still flashing:

4. Continue flying till the destination
5. Once landed, contact the assistance service

If after 5 seconds the LED is OFF:

4. Continue flying

5. Once landed, log the anomaly on the logbook

4.9 DOOR WARNING

- Door warning on ground

The door warning system indicates an incorrectly latched and locked door. The doors should be checked as being pulled fully closed and the locking handles pushed fully forward into the over-centre locked position. If the fault cannot be identified then maintenance of the system should be carried out by a qualified engineer prior to flight.

- Door warning during take-off

If the door warning system becomes active during the pre-rotate the take-off should be aborted.

If the door warning system activates during the take-off and it is safe to land ahead the take-off should be aborted.

If there is any doubt that there is sufficient clear distance to abort a landing the flight should be continued and the procedures for “during flight” followed as defined below.

Investigation of the activation should then be carried out before further flight.

- Door warning during flight

If the door warning system becomes active during flight the pilot should establish trimmed safe and level flight, with the airspeed limited to Vx. If safe to do so the door locking handles should be checked to ensure they have not inadvertently been moved from the over-centre locked position. If the warning system remains activated the aircraft should be landed at the nearest available safe airfield and the fault investigated before further flight is undertaken.

SECTION 5

FLIGHT PROCEDURES

5.1 GENERAL

This section supplies information about the correct take-off, flight and landing procedures.

With the aim of improving clarity, the operating limits, emergency procedures and the procedures to apply when flying in adverse conditions are described in separate chapters:

Operating limits = Section 3

Emergency procedures = Sectio 4

Flight in adverse conditions = Chapter 6.4

5.2 FLIGHT PLANNING

The reference data for flight planning are described in Chapter 3.19.

5.3 TAKEOFF AND LANDING DATA

The information necessary to find the takeoff and landing data (TOLD) is contained in Chapter 3.18.

5.4 WEIGHT AND BALANCE

The limits of weight and balance are quoted in Section 7.

5.5 PILOT CHECKLIST

A concise pilot checklist is supplied as a separate document.

5.6 DAILY PRE-FLIGHT CHECKS

Perform these checks before the first flight of the day (with the gyroplane rigged and fuelled). A diligent and comprehensive pre-flight check is an essential factor for safe operation of any aircraft. It is strongly recommended that the pre-flight checks be carried out systematically and thoroughly prior to flight.

The daily/pre-flight checks can seem to be a long procedure. Over time, when you do the checks again and again, the checks can be done quickly. The pilot will quickly get to know the aircraft and what is correct or not. The check is done as a circular procedure. The sequence starts with the inspection of the instrument panel and continues clockwise around the gyroplane.

Good flight safety is helped with a good daily/pre-flight check.

5.6.1 INTERNAL CHECKS

A. INSTRUMENT PANEL

1. MASTER switch	OFF
2. All breakers	OFF (pulled out)
3. Instrument panel and instruments	Serviceable
4. Nameplates, markings and placards	Installed and readable

B. PEDALS

5. Rudder pedals	Condition and linkage tight
	Full and free movement over the full range (nose wheel off ground)
	Function and correct adjustment for the pilots height
6. Control rods	Condition
7. Pedal assemblies	Correctly attached to the floor

C. CONTROL STICKS

8. Control sticks	Full and free movement
9. Control rods	Attached correctly and not damaged
10. Pre-rotator lever	Function

D. INSIDE OF COCKPIT

11. Cargo	Stored
12. Equipment	Attached
13. Debris	None
14. Seats	Attached and not damaged
15. Pilot and passenger restraint systems	Not damaged
	Free of cuts, chafing, contamination, worn latches, loose or pulled stitching
	Serviceable

E. LEVERS

16. Throttle lever	Full and free movement

17. Brake lever ..... Check condition and that maximum braking power is available

Lever returns to the OFF position when released

F. DOORS

18. Doors ..... Correct attachment
19. Opening system and stays ..... Operational condition
20. Locking system ..... Operational condition
21. Hinges ..... Condition
22. Transparencies and bonding of transparencies to the frame of the door ..... Condition

5.6.2 EXTERNAL CHECKS

The external check walk-round should be performed clockwise as shown in the following picture.

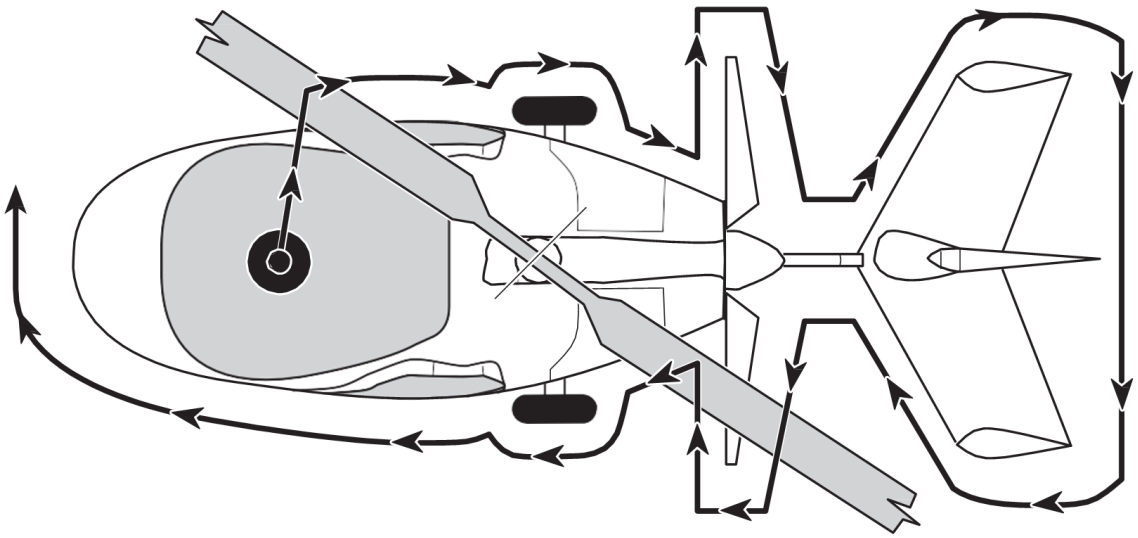


Figure 5.1: External checks

A. COCKPIT AND FUSELAGE - RIGHT HAND SIDE

1. External surface of the fuselage ..... Condition

Foreign objects

Clean

2. Windscreen ..... Not damaged
Clean
Visually clear
3. Static port right hand side ..... Clean and not blocked
4. Fuel cap ..... Condition
Installed correctly
5. Engine hatches ..... Installed correctly
All screws are installed and tight

B. UNDERCARRIAGE - RIGHT HAND SIDE

6. Undercarriage leaf spring and mounting bolts ..... Condition
Bolts installed and tight
Free of cracks or impact marks and not damaged

C. WHEEL AND WHEEL PANT - RIGHT HAND SIDE

7. Wheel attachment, hub and axle ..... Condition
Bolts are installed and tight
8. Tire ..... Correct inflation pressure
Condition
Free of rubbing marks and not damaged
9. Brake system ..... Condition
Components are not damaged
No fluid leaks or chafing of brake lines
Brake line pipes

5.6.3 ENGINE COMPARTMENT INSPECTION - RIGHT HAND SIDE

Inspection of the engine compartment must be performed after opening the right fairing by using a screwdriver to release the fasteners.

NOTE:

There is a coolant expansion tank Fig. 5.2 [2] and a coolant overflow bottle Fig. 5.2 [3] installed in the engine compartment. Make sure you correctly identify the coolant expansion tank. The cap Fig. 5.2 [1] of the coolant expansion tank must be removed carefully. Hot fluids will burn you.

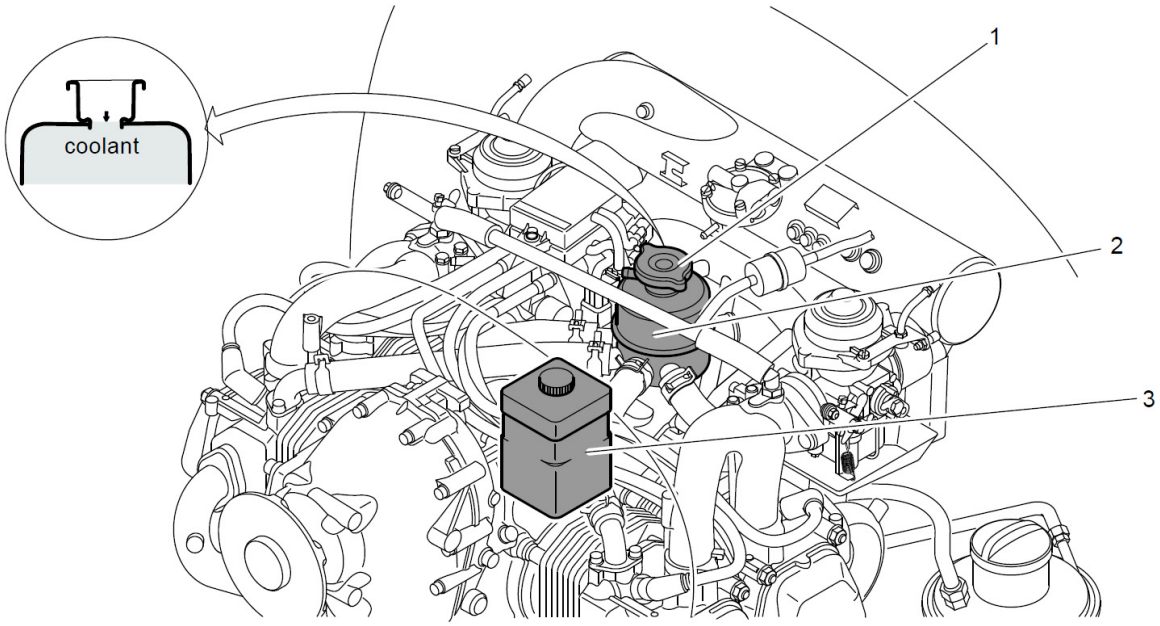


Figure 5.2: Coolant level check

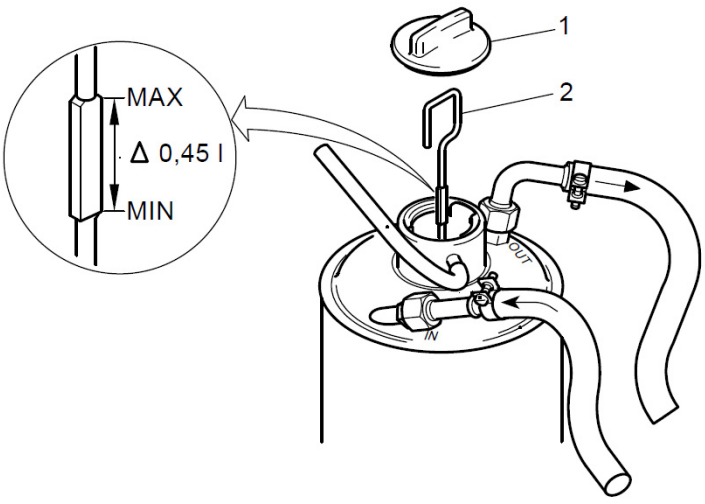


Figure 5.3: Engine oil level check

A. COOLANT LEVEL

1. Expansion tank ..... Correct coolant level, see Fig. 5.2

2. Overflow bottle ..... Correct coolant level (between minimum and maximum marks)

B. ENGINE OIL LEVEL

3. Remove the cap Fig. 5.3 [1].

Before you check the oil level turn the propeller several times by hand in the direction of engine rotation.

NOTE:

The oil level must be in the upper half of the MIN and MAX indication and never fall below the MIN mark. Before long flights oil must be added up to the MAX mark. Make sure that the oil level is not more than MAX, otherwise oil can get into the venting system. The difference between the MIN and MAX marks is 0.45 l.

4. Check the oil level as indicated on the dipstick Fig. 5.3 [2] The correct oil level is between the minimum and maximum marks in the upper half. If necessary, add more oil.

C. ENGINE MOUNT - RIGHT HAND SIDE

5. Welding points ..... Free of cracks, signs of corrosion, chafing and not damaged

6. Vibration dampers ..... Condition and age

Bolts are tight

7. Linkages and cables ..... Tight

Condition

Free of corrosion, leaks or chafing and not damaged

8. Airbox fixing ..... Tight

Condition

Free of corrosion or chafing and not damaged

9. Wirings and connections ..... Tight

Condition

Free of corrosion or chafing and not damaged

10. Cooling system	Tight
	Condition
	Free of corrosion, leaks or chafing and not damaged
11. Oil reservoir	Tight
	Condition
	Free of corrosion, leaks or chafing and not damaged
12. Oil filter	Tight
	Condition
	Free of corrosion, leaks or chafing and not damaged
13. Spark plugs and their connection coverings	Tight
	Condition
	Free of corrosion, leaks or chafing and not damaged
14. Engine probes, connectors and fasteners	Tight
	Condition
	Free of corrosion, leaks or chafing and not damaged
15. Oil and coolant hoses and clamps	Tight
	Condition
	Free of corrosion, leaks or chafing and not damaged
16. ECU and its mount	Tight
	Condition
	Free of corrosion, leaks or chafing and not damaged
17. Exhaust system, joints and mounts	Tight
	Condition
	Free of corrosion, leaks or chafing and not damaged

18. Pre-rotation assembly, belts, cables and flexible shaft..... Tight

Condition

Free of corrosion, leaks or chafing and not damaged

19. Battery and connecting wires ..... Tight

Free of signs of overheating, excessive venting, corrosion of terminals or leakage of acid

20. Voltage regulator and starter contactor ..... Free of signs of overheating, short circuits or corrosion

D. CONTROL RODS

21. Safety points on the control rods, linkages, bearings and fiberlock nuts..... Tight

Condition

22. Rod end bearings ..... Insignificant play in the Uniball

Free of corrosion and not damaged

23. Control rods ..... Shape (straight)

Not damaged

Free to rotate a small amount around their axis when given a small twist. If unwanted force is necessary or they will not rotate it can indicate a problem with the bearing

E. TRIM SYSTEM

24. Trim actuator..... Correct attachment

25. Control cable, springs and electrical connections..... Condition

F. CLOSURE OF THE RIGHT HAND SIDE FAIRING

Close the right hand engine hatch and tighten the fasteners with a screwdriver a 1/4 turn. Make sure the right hand engine fairing is closed and fastened correctly.

5.6.4 ROTOR HEAD - RIGHT HAND SIDE

NOTE:
A ladder is necessary for the pre-flight checks that follow.

1. Nuts of the rotor head ..... Tight
   All safety visible locking systems are installed and functional
2. Rotor head and hub bar assemblies ..... No cracks, wear, corrosion or rubbing and not damaged
3. Ring gear ..... Condition
   Ring gear teeth are not damaged
4. Flexible shaft and Bendix pre-rotation gear... Sufficiently coated with grease

5.6.5 REAR SECTION

A. RADIATORS

1. Radiator surfaces ..... Free of fluid leaks or chafing and not damaged
2. Clamps and fixing points ..... Tight
3. Fan and its support ..... Fixed and free to spin

B. PROPELLER

3. Whole surface of each blade ..... Not damaged or detached
   Clean
4. Hub and bolts of the propeller support flange ..... Tight
5. Spinner ..... Condition
   Tight

C. PREROTATION SYSTEM

6. Pre-rotation assembly ..... Correct position
7. Belts ..... Correct tension
   Condition and wear
8. Pre-rotation system ..... Function
9. Belt tension pulley lever ..... Free movement
10. Pulley brake shoe ..... Correct position

11 Pulleys ..... Condition (wear)

D. TAILPLANE

12. Tailplane surfaces ..... Free of cracks and not damaged
Clean

13. Connecting bolts ..... Tight

NOTE:
To check the free movement of the rudder, push down on the fin so that the nose wheel is clear of the ground.

14. Rudder ..... Installed correctly
Free movement

15. Tail wheel ..... Condition
Free movement

16. Rudder cables ..... Correct tension

17. Wire-locking of the turnbuckles ..... Lock-wire installed and serviceable

5.6.6 ENGINE COMPARTMENT - LEFT HAND SIDE

Open the cowl by releasing the fasteners.

1. Air filter ..... Condition
Tight

2. Turbocharger unit and waste gate ..... Serviceable

3. Intercooler ..... Serviceable
Tight

4. Fuel pipes and connectors ..... Serviceable
Leaks

5. Close the left hand engine hatch and tighten the fasteners with a screwdriver a 1/4 turn. Make sure the left engine hatch is closed and fastened correctly.

5.6.7 EXTERNAL CHECKS - LEFT HAND SIDE

A. UNDERCARRIAGE - LEFT HAND SIDE

1. Undercarriage leaf spring and installation bolts ..... Condition

   Bolts installed and tight

   Free of cracks or impact marks and not damaged

B. WHEEL - LEFT HAND SIDE

2. Wheel attachment, hub and axle ..... Condition

   Bolts installed and tight

3. Tire ..... Correct inflation pressure

   Condition

   Free of rubbing marks and not damaged

4. Brake system ..... Condition

   Components are not damaged

   No fluid leaks or chafing of brake lines

   Brake line pipes and cables secured correctly

NOTE:
The check that follows uses the fuel tank transparency. The gyroplane must be on all three wheels (nose down). This will make sure you can correctly make an estimate of the quantity of fuel in the tank.

NOTE:
To check the fuel level the left hand hatch must be opened.

C. FUEL LEVEL

5. Fuel level ..... Check
6. Fuel pump assembly and fuel filter ..... Tight

NOTE:
To check the fuel, drain a sample of fuel from the drain point.

7. Fuel ..... Check for water or other contamination

8. Close the left hand hatch

☞ **NOTE:**

Proceed as for the right hand side checks. The following checks must be done additionally.

D. ROTOR HEAD AND CONTROL RODS - LEFT HAND SIDE

9. Rotor brake and cables ..... Condition
   Free movement

10. Rotor tachometer pick-up ..... Condition
    Installed correctly

E. COCKPIT AND FUSELAGE - LEFT HAND SIDE

11. External surface of the fuselage ..... Condition
    Foreign objects
    Clean

12. Static port left hand side ..... Clean and not blocked

F. NOSE WHEEL

13. Nose wheel ..... Condition
    Full rotary movement
    Operates in the correct direction with the rudder
    Free to spin, without play in the bearings

14. Tire ..... Correct inflation pressure

15. Fork ..... Not damaged or bent

16. Axle nut ..... Tight

G. PITOT INTAKE

17. Pitot intake ..... Free of blockages, dirt or other debris

H. ROTOR BLADES

18. Rotor blades ..... Serviceable and not damaged
    Clean

5.6.8 LIGHTING SYSTEM

1. Landing light .....Function
2. Navigation lights .....Function
3. Strobe lights.....Function
4. Anti-collision light .....Function

5.6.9 DOOR WARNING SYSTEM

Check the function of the door warning system.
The door warning system is designed to warn the pilot if either of the doors are not correctly latched and locked. The system incorporates four push-button switches (two on each door) which detect the location of the aft door pins and the position of the locking handles.
The daily check is designed to confirm correct functionality of the system and detect whether an open circuit situation has occurred (e.g. a wire has become detached from one of the switches).

Prior to engine start on the first flight of the day the functioning of the door locking system should be confirmed by the following tests.

1. With both doors in 'OPEN' position and the Master switch 'ON' close the pilot door and then move the pilot handle to the locked position. Then move the co-pilot handle to the locked position. The warning light should remain illuminated and the rotor rpm gauge should remain inactive because the co-pilot door is open.

2. Move the co-pilot handle to the open position; move the pilot handle to the open position and open the pilot door. Close the co-pilot door and move the co-pilot handle to the locked position; then move the pilot handle to the locked position. Again the warning light should remain illuminated and the rotor rpm gauge should remain inactive because the pilot door is open.

3. Move the pilot handle to the open position; close the pilot door and move the pilot handle into the locked position. The warning light should extinguish and the rotor rpm gauge becomes active as all doors and handles are now closed and locked. Open the co-pilot handle to confirm that the light becomes illuminated once more and the rotor rpm gauge deactivates.

WARNING DANGER:
It is essential that the checks on the door warning system are performed as described and in this exact order. This will enable each of the four switches functionality to be determined in turn and a single fault with any of the switches will be detected.

5.7 NOTES ON ENGINE USE

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

WARNING DANGER:
This manual must be read and fully understood before starting the engine. Failure to do so will lead to an extremely hazardous situation with great risk of injury or death.

Once the engine is started and warmed up, carry out a full functional check of all the engine indicating systems.

The engine is cooled by airflow past the cylinders and by the radiators. The flow of cooling air is provided by the movement of the gyroplane.

During ground operations, the following precautions are recommended in order to avoid any overheating:

- As far as possible, keep the gyroplane in to wind

- Avoid any prolonged waiting

- Constantly check the engine operating temperature

During flight, always respect the following recommendations:

- Do not exceed the maximum engine rpm limits

- Do not exceed the maximum temperature limits

- Do not exceed the maximum and minimum oil pressure limits

- Carefully follow the limits set by the engine manufacturer and indicated in the operators manual

5.7.1 ENGINE STARTING PROCEDURE

WARNING DANGER:
Before starting the engine, make sure that the area surrounding the propeller is free of objects and people.

1. Enter the cockpit via the doors, releasing the door locks using the lever

2. Sit on the gyroplane seats, fasten seat belts and head set

3. Control stick .....forward position with retainer applied

4. Breakers .....ON

5. Wheel brake.....ON and LOCKED

6. Master.....ON

7. Start power .....ON

8. Line A.....ON

9. Fuel pump A.....ON

10. Line B.....ON

11. Throttle lever .....40% (in case of low temperature starting see chapter 6.6.1)

12. Propeller .....clear

WARNING DANGER:
Shout “CLEAR PROP”.

13. Starting .....push start button

WARNING:
If starting results difficult, keep the starter push button pressed for several seconds. In order not to damage the starting system, it is recommended to press the button for not more than 10 seconds at a time and then to wait at least 1 minute before pressing again.

14. Oil pressure .....from 1.5 up to 5.0 bar

WARNING:
Should the pressure not reach the minimum specified level within 10 seconds, stop the engine and look for the defect.

15. Throttle lever.....set to reach a speed of 1800 - 2000 rpm

16. Fuel pump B .....ON / check “Fuel pressure” > 3 bar

If the engine started:

17. Start power .....OFF
18. Navigation lights .....As necessary
19. Radio .....ON (if necessary)
20. Intercom.....ON (if necessary)
21. Navigation systems .....ON (if necessary)
22. Hour counter, clock.....Check
23. Radio call .....As necessary

5.8 TAXIING

WARNING DANGER:
It is necessary to proceed very carefully during all ground operations.
The control stick must be kept in the fully-forward position (nose down), either by hand or by using the dedicated control lock.
Keep an appropriate safety distance from people and objects, especially when the rotor is turning.

WARNING DANGER:
It is strictly forbidden to leave the gyroplane while the rotor is turning.

WARNING:
Taxiing with the doors closed is recommended if there is a strong wind or wind gusts. This to avoid damage to the doors and stress to the locking/hinge system.

WARNING:
To reduce the lateral dimensions when the gyroplane is stationary, the rotor should always be aligned with the longitudinal axis of the gyroplane. Additionally, the rotor brake should always be engaged when the gyroplane is not moving.

5.8.1 BEFORE TAXIING CHECKLIST

1. MOVEMENT AREA .....clear
2. THROTTLE LEVER.....40%
3. ROTOR.....rotor aligned along longitudinal axis
4. BRAKE .....applied
5. PARKING BRAKE .....released
6. FLIGHT INSTRUMENTS.....check

WARNING:
The nose wheel is fixed mechanically to the rudder pedals through the steering system.
Do not apply too much pressure to the pedals when the gyroplane is stationary.
The brakes must be used only at the end of the landing roll or when stopping the gyroplane during taxiing operations, and only with the engine at minimum rpm.

5.8.2 TAXIING

CAUTION:
Do not move the stick rapidly back-wards after you release the stick lock. If there is a gust of wind the propeller can strike a rotor blade.

NOTE:
The minimum turning radius of the gyroplane is shown in Fig. 5.4.

1. Move the control stick to the fully forward position and use the stick lock as necessary.
2. Do a visual check for obstructions.
3. Release the brakes as necessary.
4. Gently increase the throttle to start taxiing.
5. Control the direction with the rudder pedals.
6. Control taxiing with the throttle lever and brakes.

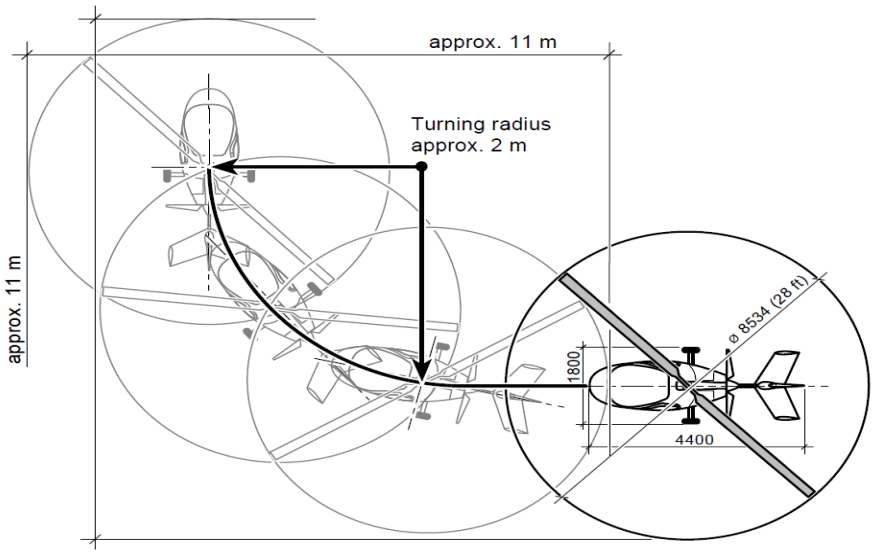


Figure 5.4: Minimum turning radius

5.9 BEFORE TAKE-OFF CHECKLIST

NOTE:
Before entering the runway and while at the holding point, execute the before take-off checklist as diligently as possible.

1. Master.....Check ON
2. Start power .....Check OFF
3. Line A.....Check ON
4. Fuel pump A.....Check ON
5. Line B.....Check ON
6. Fuel pump B .....Check ON
7. Landing light switch .....ON
8. Strobe lights.....As necessary
9. Breakers .....ON
10. Minimum temperatures.....Minimum (50°C OIL and CT)
11. Engine instruments .....Check (within limits)
12. Doors .....Correctly closed (lock lever lowered and doors engaged, DOORS warning light OFF)
13. Safety harness.....Check
14. Trim fully forward .....Move the trim switch forward
    Check that trim end-of-run light is ON
15. Stick lock.....Release and check freedom of control
16. Control stick.....Keep at forward limit stop
17. Flight instruments .....Check (set altimeter)
18. Rotor brake.....OFF (rotor brake lever down)
19. Rotor brake warning light.....OFF

20. Parking brake .....OFF

21. Warning lights .....Check all OFF

WARNING:
It is imperative that the security of the door latching is checked prior to take-off as the door may come open on take-off, if incorrectly latched. After engaging the latching lever both the pilot and passenger doors should be pushed from inside the cabin to ensure both forward and aft catches are secure. See emergencies procedures Chapter 4.9.

5.10 ROTOR PRE-ROTATION PROCEDURE

NOTE:
The rotor rpm gauge will remain inactive until both doors are securely closed and both handles placed in the over-centre "LOCKED" position.

CAUTION:
Keep the control stick fully forward until reaching 130 rpm rotor speed.

1. Alignment.....runway alignment
2. Engine speed.....set at 1800 rpm

CAUTION:
A lower or higher engine speed may worsen the pre-rotation procedure performances.

3. Pre-rotation .....ENGAGE, gently operate the pre-rotation lever
4. Engine.....keep at 1800 rpm

CAUTION:
The pre-rotator must be engaged in a gentle manner, without sudden movements of the lever, so as not to stress the system and avoid stopping the engine.

5. Rotor .....130 rpm
6. Control stick .....take-off position (rear limit stop)
7. Pre-rotation lever .....gently reach the limit stop while keeping a constant engine speed

WARNING DANGER:
In windy conditions, or if the payload is light, it is possible that the gyroplane will lift up onto the tail wheel. If this occurs, the pre-rotator should be released and the stick moved forward to balance the gyroplane on the main wheels, some engine power should be applied to prevent the gyroplane from moving backward. The rotor rpm will continue to increase. When the rotor speed is equal or greater than 200 rpm, proceed as for take-off. This should be practiced with an instructor before proceeding in these conditions.

8. Pre-rotation lever .....at limit stop

9. Engine.....increase its speed until reaching a rotor speed of 220 rpm (standard pre-rotation)

WARNING DANGER:
The minimum rotor pre-rotation speed is 150 rpm It is strictly forbidden to proceed with takeoff operations if the rotor rpm is lower than the minimum value.

NOTE:
Under identical conditions, the length of the take-off run depends on the rotor rpm reached during pre-rotation.
The maximum speed of the pre-rotation system is 300 rpm.
The life of the pre-rotation system and its inspection frequency depend on the average rotor rpm applied during the pre-rotation operation.

WARNING DANGER:
If it is not possible to reach the minimum rotor rpm during pre-rotation, stop the operation and return to the parking area.

10. Brakes.....release

11. Rotor .....220 rpm

12. Pre-rotation lever .....release

WARNING DANGER:
It is strictly forbidden to operate the pre-rotation lever other than during the pre-rotation procedure.

5.11 TAKE-OFF

With the take-off the gyroplane becomes airborne.

NOTE:
DEFINITIONS:

PATTERN: is composed of four legs connected by 90° turns

TAKEOFF LEG: climb

CROSSWIND LEG: climbing until reaching the circuit level

DOWNWIND LEG AND BASE: in level flight

FINAL: alignment for landing

1. Engine starting
2. Holding point, pre-flight checks
3. Rotor pre-rotation (220 rpm)
4. Take-off run
5. Balancing leg
6. Take-off
7. Take-off distance above obstacles (15 m)
8. Climb
9. Turn in crosswind
10. Crosswind leg
11. Built-up area, no flying over

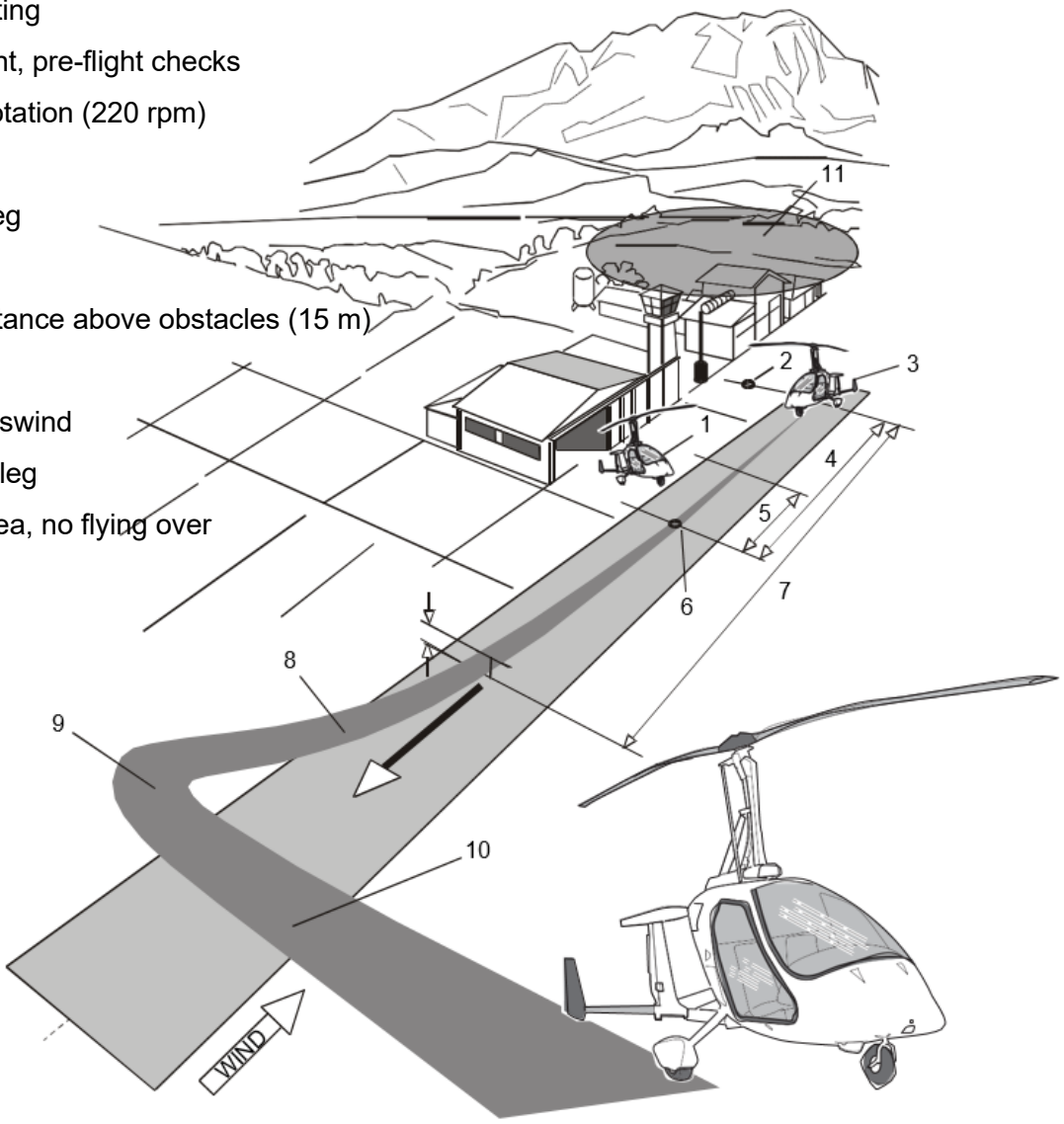


Figure 5.5: Take-off phases

5.11.1 NORMAL TAKE-OFF

1. Throttle lever ..... increase in a progressive and uniform manner

NOTE:
Increasing the engine power progressively guarantees the same level of progressive attitude of the gyroplane, thus simplifying the management of this procedure.

WARNING DANGER:
In order to guarantee a safe takeoff, the engine's power must increase progressively until reaching the maximum allowed value.

WARNING:
If a rotor speed of less than 200 rpm is achieved during pre-rotation, acceleration must be gradual. Engine rpm must be increased very carefully.

2. Alignment ..... use the rudder pedals to keep the alignment on the runway

WARNING:
During the balancing phase, the attitude must be so that neither the nose wheel (pitch down) nor the rear wheel (pitch up) touch the ground.

3. When the nose wheel has lifted ..... Move the control stick forward and balance the gyroplane on the main wheels

4. Control stick ..... take-off position

NOTE:
Refer to Chapter 3.18 for more information on take-off.

5. Take-off ..... correct the roll induce by the engine torque (stick to the left)

reach and maintain the attitude

6. Climb speed ..... Vy (best ROC)

7. Throttle ..... check, fully open (5800 rpm at 100%)

NOTE:
See Chapter 3.18 for more information on speed and rates of climb.

8. Trim.....as desired

NOTE:
TRIMMING AFTER TAKEOFF
Maintain the required attitude in the climb by maintaining rearward pressure on the stick. Operate the trim switch to trim nose up (backward) until the load on the control stick is reduced.

NOTE:
If the trimming operation is undertaken after the first takeoff or with the trim fully forward, 15 to 20 seconds of action are necessary before the trim control becomes effective.
Once you feel that the load on the control stick has been reduced as required, reduce the rearward pressure on the control stick and maintain a constant speed.

NOTE:
TRIM SWITCH BACKWARD = nose up trim = reduced speed
TRIM SWITCHCONTROL = nose down trim = increased speed
Operate the trim switch with small impulses to nose up or nose down until reaching and stabilizing the desired speed.
Carefully release the control stick to check if the speed is maintained correctly.

NOTE:
Trimming may start during the climb after the takeoff. Trimming must be stopped and corrected after the levelling off, during straight and level flight.

NOTE:
Always wait a few seconds after making an adjustment using the trim switch. This allows correct trimming and avoids too many attitude variations preventing the gyroplane from maintaining a constant attitude and speed.

Operations upon reaching a safe altitude (300 - 500 ft):

9. Brakes.....apply to stop wheels rotation

10. Throttle.....reduce power if there are no obstacles

11. Landing light.....OFF

12. Engine indications .....check

5.11.2 CROSSWIND TAKE-OFF

During take-off with crosswind, pay attention to maintain the alignment with the runway.
The take-off procedure with cross wind is identical to the procedure without wind. It is only necessary to use the rudder pedals and control stick conventionally.

NOTE:
Normally, when taking-off with crosswind, as compared to a no-wind condition, the rudder pedals should be used to keep the aircraft straight whilst applying into-wind control stick.
The degree of control inputs will be proportional to the wind strength and speed and should be appropriate to keep the gyroplane aligned with the runway axis.

WARNING DANGER:
Before taking-off with strong crosswind, it is necessary to evaluate its intensity and to operate only if it is possible to respect the limits of that intensity.
Inexperienced pilots should be consider their own skill level and not attempt to take-off in cross wind conditions which exceed their own capability.

5.12 FLIGHT MANEUVERS

5.12.1 CLIMB

NOTE:
Best rate of climb speed .... Vy (see chapter 3.18)
Best angle of climb speed .... Vx (see chapter 3.18)

1. Purpose .....gain of altitude

2. Preparation: .....level attitude
select the desired speed
select the desired altitude
select the reference point

3. Climb.....increase power (min 5000 rpm)
maintain airspeed
attitude control
maintain reference point

NOTE:
Levelling off must be achieved by reducing the engine power until reaching the level flight parameters 50 ft before reaching the desired altitude.

5.12.2 TRANSITION TO CRUISE

1. Level-off check.....Reduce the engine power as necessary for level flight 50 ft before you get to the applicable altitude

   Lower the nose to maintain airspeed.

5.12.3 DESCENT

1. Purpose .....loss of altitude

2. Preparation .....level attitude

   select the desired speed

   select the desired altitude

   select the reference point

3. Descent.....decrease power

   maintain airspeed

   attitude control

   maintain reference point

☞ **NOTE:**
Max efficiency speed..... .....Vy

5.12.4 LEVEL FLIGHT

1. Purpose .....Flight at the desired safe altitude (AGL) and speed given by weather, terrain and obstacles

2 Prepare .....Constant heading

3. Level flight.....Set the engine power necessary to maintain the applicable safe altitude (AGL)

   Adjust the attitude with small corrections of the trim so as to maintain the speed

   Check all the flight parameters are not more than the specified values

Adjust trim as necessary

5.12.5 LEVEL TURNS - MORE THAN 15° OF BANK ANGLE

1. Purpose: .....heading variation with constant altitude

2. Preparation: .....level flight
pre-set speed
pre-set altitude
clear airspace
select reference point

3. Turn.....increase power as necessary
start turning with the control stick
use the pedals to assist the turn
reach and maintain the desired bank angle
manage attitude and airspeed
reach the reference point
centralize the pedals
reduce power
regain straight flight

5.12.6 LEVEL TURNS - LESS THAN 15° OF BANK ANGLE

1. Purpose .....heading variation with constant altitude

2. Preparation .....level flight
pre-set speed
pre-set altitude
clear airspace
select reference point

3. Turn.....start turning with the control stick
reach and maintain the desired bank angle
manage attitude and airspeed

reach the reference point

regain straight flight

5.12.7 TURNING WHILE CLIMBING OR DESCENDING

1. Purpose .....turning while gaining or losing altitude

2. Preparation .....level flight

pre-set speed

pre-set altitude

clear airspace

select reference point

3. Turn.....increase or reduce power as necessary

start turning with the control stick (less than 15° of bank angle)

reach and maintain the desired bank angle

manage attitude and airspeed

reduce or increase power 50 ft in advance

reach the reference point

regain straight flight

5.12.8 SPEED CHANGE

1. Purpose .....change speed maintaining constant altitude and heading

2. Preparation .....level flight

constant speed

constant altitude

select reference point

3. Change speed .....increase power as necessary

manage attitude as necessary

maintain alignment with the reference point

reach pre-set speed

trim as necessary

5.13 UNUSUAL MANEUVERS

5.13.1 SLOW FLIGHT AND FLIGHT BEHIND THE POWER CURVE

1. Purpose ..... reduce speed until reaching flight behind the power curve, Vo < Vx

2. Preparation ..... constant heading

head-wind

level flight 400 ft - Vy

3. Decrease speed ..... decrease power

maintain attitude

reach Vo

increase power to maintain altitude

4. Recovery..... change attitude to increase airspeed

reduce power upon reaching Vy

5.13.2 VERTICAL DESCENT

1. Purpose ..... descend vertically at zero forward speed

2. Preparation ..... head-wind

safe height

3.Descent..... decrease power

pull the nose up gently

reduce forward speed

keep aligned with a reference on the horizon

do not increase the nose-up attitude

reach zero airspeed

4. Recovery.....move the control stick forward

increase power

keep aligned with a reference on the horizon

WARNING DANGER:

Low speed manoeuvres with a tail wind are forbidden.
Low speed manoeuvres are only allowed at a minimum height of 600 ft agl and recovery from a vertical descent must commence above 400 ft agl.

WARNING:

We recommend the use of gentle and progressive pitch movements in order to avoid excessive nose up pitch attitudes and obtain a more efficient recovery whilst minimising height loss.

5.13.3 IN-FLIGHT ENGINE RESTART

The engine must not be deliberately stopped in flight unless as part of forced landing training. A competent instructor must control this training and only if aviation regulations permit this procedure.

1. Where practical let the engine idle at 3000 rpm for about 30 sec to cool before switching it off. This is to avoid engine damage.

2. Stop the engine as described in Chapter 5.14.6.

3. Start the engine as described in Chapter 5.7.1.

5.14 LANDING PROCEDURE

NOTE:
DEFINITIONS
PATTERN: composed of 4 legs connected by 90° turns
DOWNWIND LEG AND BASE in level flight
ALIGNMENT: on runway centreline / commence descent
CONTROL attitude until close to ground while maintaining alignment

1. Flight altitude (600 - 1000 ft QFE)
2. Runway
3. Pattern
4. Pattern entries, according to wind direction
5. Final landing
6. Take-off leg
7. Cross wind leg
8. Windward side
9. Hangar
10. Wind sock
11. Built-up area, no flying over

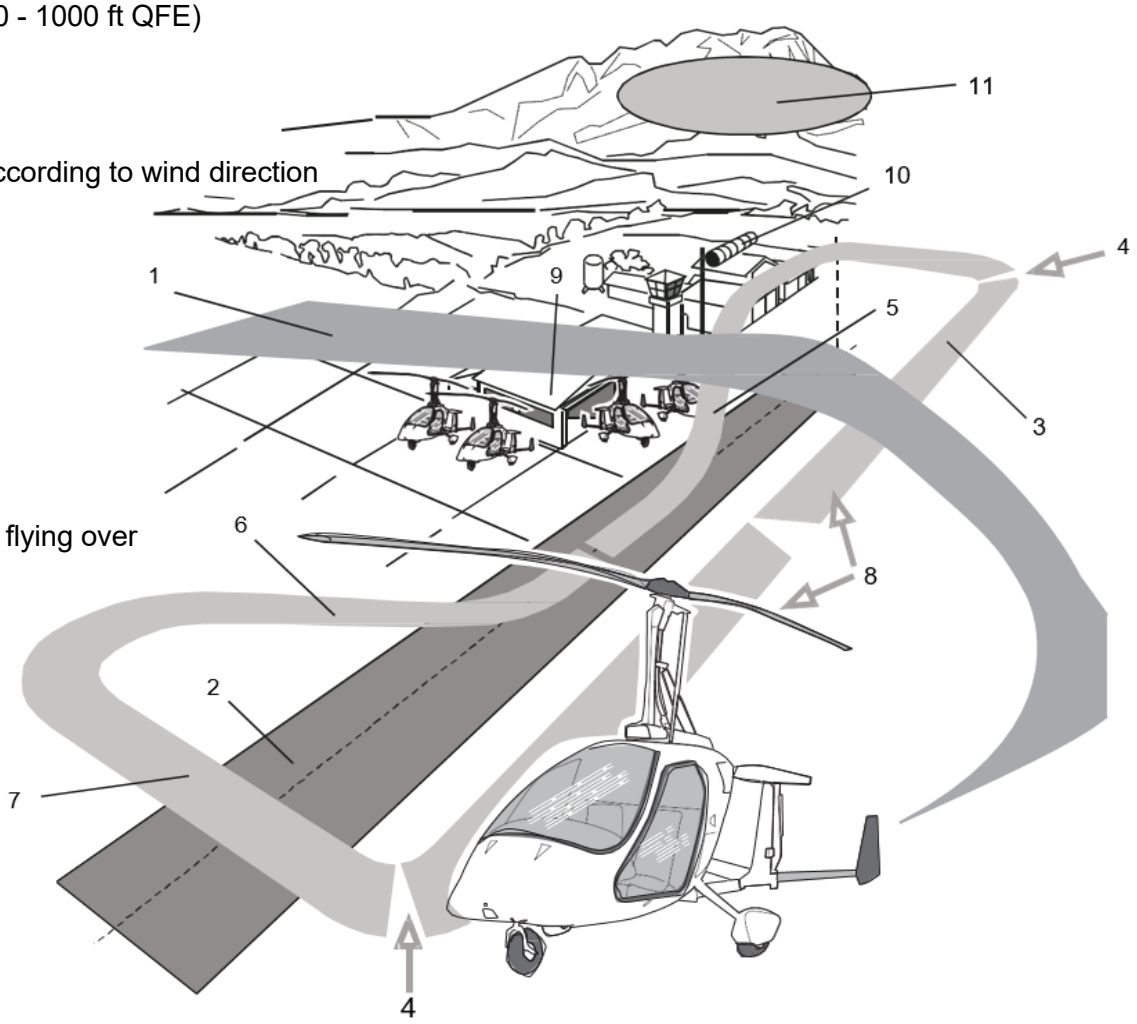


Figure 5.6: Before landing phases

5.14.1 BEFORE LANDING CHECKLIST

1. Before entering the circuit..... contact airport facilities via radio (if necessary)
   check traffic
   cross the runway and check wind direction and strength
   identify the runway to use

2. Entering the circuit..... check traffic pattern
   correct attitude and power to reach Vapp
   enter the runway downwind at 45°

3. Downwind ..... enter according the parameters indicated for the pattern
   check engine parameters

4. Base leg..... maintain specified altitude and speed
   check traffic on final and on the runway

5. On final ..... align with runway
   reduce power to IDLE
   keep best glide speed - Vapp
   maintain alignment with the runway (left pedal)

☞ **NOTE:**
If there is no airport activity and/or assistance and if the pilot does not know the runway, before landing he should execute a low altitude pass along the runway to verify its general condition (surface, obstacles, length, etc.).

5.14.2 NORMAL LANDING

1. Power ..... IDLE

2. Speed ..... Vapp

3. Align with the runway ..... keep aligned with pedals and control stick

4. At 2-3 meters from ground ..... first flare gently to reduce the angle of descent with a slight reduction of speed

5. Close to the ground ..... start soft and progressive flare to level-off in ground effect

6. In ground effect ..... with a nose-up attitude continue the flare until the main wheels touch the ground.

7. To stop the gyroplane ..... With the main wheels on the ground, gradually move the control stick to the aft limit stop to stop the gyroplane

8 Direction of gyroplane ..... Use the rudder pedals to control the direction of the gyroplane

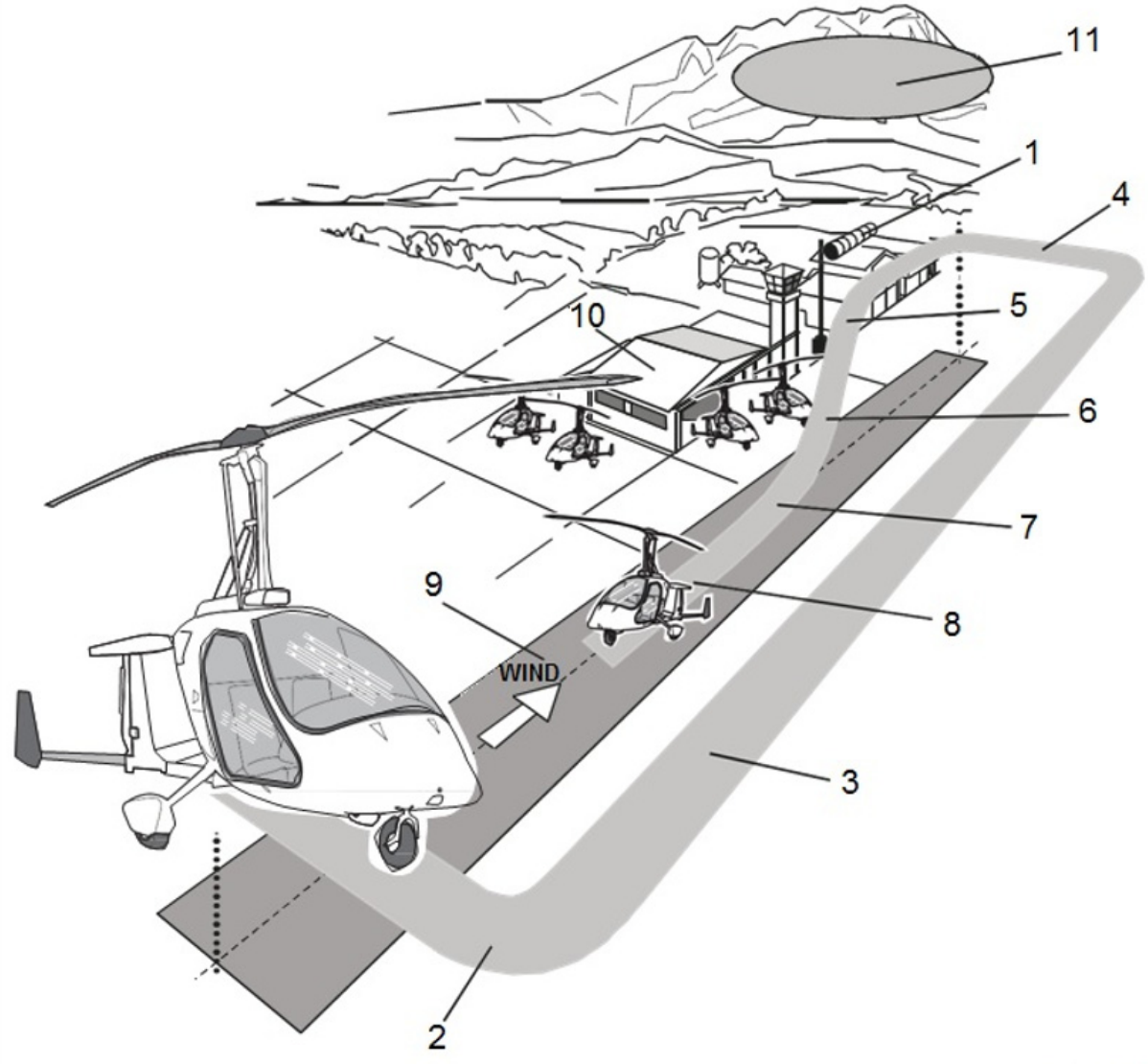


Figure 5.7: Approach and landing phases

1. Wind sock
2. Pattern crosswind leg
3. Downwind, check landing parameters
4. Base, check traffic in final
5. Final, alignment and descent (Vapp, IDLE)
6. First flare
7. Flare in ground effect
8. Contact with ground (control stick backward)
9. Runway
10. Hangar
11. Built-up area, no flying over

5.14.3 LANDING WITH CROSSWIND

The procedure for landing with crosswind is identical to that of normal landing.

Alignment with the runway must be maintained with the control stick into wind and rudder in the opposite direction.

WARNING DANGER:
Maximum crosswind component for landing is 25 kn.
Inexperienced pilots should consider their own skill level and not attempt to land in cross wind conditions which exceed their own capability. It may be more appropriate to land diagonally across the runway in order to limit the crosswind component.

5.14.4 GO-AROUND

1. Throttle.....increase to full power

2. Pedal.....use right pedal to maintain aligned with the runway

3. Nose .....move to nose-up position

4. Speed .....reach and maintain Vy while climbing

5. Runway.....get away from the runway axis and keep to the “dead” side

5.14.5 AFTER LANDING

1. Gyroplane stop .....control stick to front limit stop position

2. Clear the runway .....steer with the pedals and clear the runway

3. Stop the gyroplane.....stop with the brakes

4. Trim.....fully forward - green light ON

5. Control lock.....connect the control lock, keep the stick fully forward

6. Rotor.....engage rotor brake - brake light ON

7. Strobe lights.....OFF

8. Navigation lights .....as necessary

WARNING:
Move towards parking area. First stop the rotor.
When the rotor is stopped then drive slowly towards the appropriate parking area.

5.14.6 ENGINE STOP CHECKLIST

1. Rotor brake ..... ON - brake light ON
2. Landing light ..... OFF
3. Navigation lights ..... OFF
4. Radio ..... OFF
5. Navigation instruments ..... OFF
6. Fuel pump B ..... OFF
7. Line B ..... OFF
8. Fuel pump A ..... OFF
9. Line A ..... OFF
10. Master ..... OFF

5.14.7 DOORS OPENING

Lift the locking lever to unlock the door, then push the door outward to open it.

WARNING:
In strong winds push the door by hand to assist with opening.

WARNING:
Taxiing with the doors closed is recommended in case of strong winds or wind gusts.
This to avoid damage to the doors or stress on the locking/hinge system.

5.14.8 BEFORE LEAVING THE GYROPLANE

NOTE:
During cold weather operations at temperatures below 0°C it is recommended that the parking brake is released after the tie down procedure. Temperatures below 0°C can freeze the parking brake in the applied position.

1. Apply the parking brake .....parking brake lever to ON

2. Tie down the gyrocopter and chock the wheels.....wheels chocked

   Gyrocopter tied down

3. Post-flight inspection .....no damage, impacts from foreign objects, leaks or loss of fluid

SECTION 6

OPERATIONAL CHARACTERISTICS

6.1 INTRODUCTION

This chapter describes the procedures that have to be followed when flying in adverse weather conditions.

6.2 GENERAL FLIGHT CHARACTERISTICS

Aerobatics are not permitted.

6.3 FLIGHT CHARACTERISTICS IN LEVEL CONDITIONS

6.3.1 LOW SPEED

The flight characteristics and manoeuvrability at low speed are excellent.

In any flight conditions, the roll and pitch controls are effective down to zero airspeed.

In any flight conditions, yaw control is effective down to Vmra. Yaw control can be maintained down to zero airspeed by maintaining engine rpm at more than 3.000 rpm.

6.3.2 HIGH SPEED AND CRUISING SPEED

The Magni M24C Plus has been shown to meet the stability requirements of BCAR Section T.

6.3.3 STALL

There is no stalling speed.

The gyroplane remains controllable down to zero airspeed.

WARNING:
It is not possible to maintain continuous level flight at airspeeds of less than Vmin. At lower airspeeds a controlled descent occurs.

6.3.4 SPINNING

Spinning is impossible as an asymmetric stall of a rotary wing cannot occur.

6.3.5 SIDE SLIP

It is not permitted to side slip the gyroplane.

6.4 TURBULENCE OR STORM

WARNING DANGER:
It is forbidden to fly in storms or strong turbulence.

If a storm occurs during a flight, change route or look for a suitable place to land.

In case of strong turbulence, proceed as follows:

1. Altitude: in case of strong downdraught, maintain sufficient altitude to avoid impact with the ground or other obstacles. When flying in mountains, flying at an altitude above the highest mountain crests should reduce turbulence and increase the steadiness of the wind.

2. Indicated speed: adjust the attitude in order maintain the best gust penetration speed

6.5 SNOW, ICE AND RAIN

The gyroplane is not fitted with anti-icing systems for the control surfaces of both propeller and rotor.

Taxiing operations are allowed on surfaces covered with ice or snow with the following warnings:

1. Increased braking distance
2. Reduced directional control

WARNING DANGER:
It is forbidden to fly whenever there is a possibility of ice formation on aerodynamic surfaces.

Flight in snow is prohibited.

Flight in hail is prohibited.

WARNING:
Flying in rain conditions is permitted only if the visibility is sufficient to guarantee safe flying.

NOTE:
Extended flying in heavy rain conditions may cause wear of the paint on the end of the rotor and propeller leading edges.

WARNING DANGER:
Take-off operation is prohibited if the runway is covered with ice or snow or if it the runway is flooded.

WARNING:
In case of rain, take off is only permitted if visibility is sufficient to guarantee a safe flight.

6.5.1 EFFECTS OF SNOW, ICE AND RAIN DURING LANDING

Landing on a snowy, icy or wet runway requires maximum attention and care.

In order to reduce speed as much as possible, land with nose high and keep the gyroplane flying as long as possible.

To completely stop the gyroplane, gently pull the control stick back when the main wheels touch the runway.

Taxi slowly. Use the brakes gently and only when necessary.

6.6 LOW AND HIGH TEMPERATURES

6.6.1 PROCEDURES UNDER LOW TEMPERATURE CONDITIONS

Starting the engine may be difficult in low temperatures.

The use of external power supply units is allowed in case of problems starting due to low efficiency of the gyroplane battery.

In order to make the engine starting easier at low temperatures it is necessary to increase the throttle percentage at the starting moment as shown in the following figure.

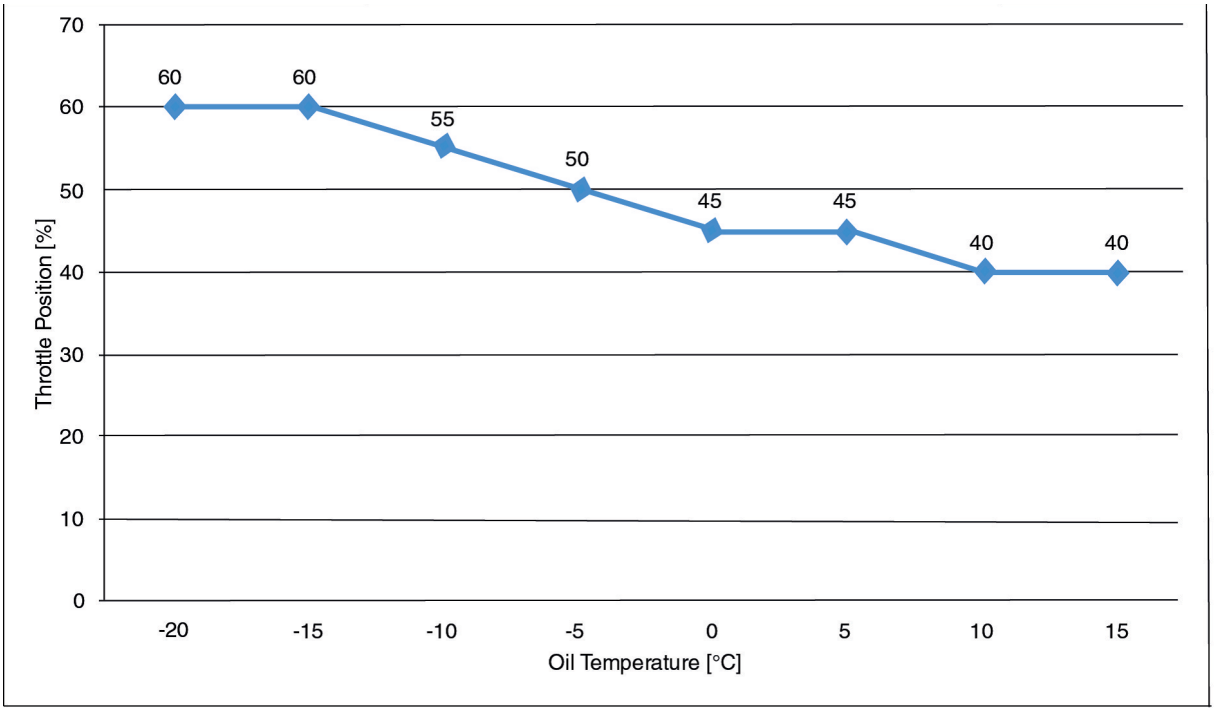


Figure 6.1: Throttle position vs Oil temperature

6.6.2 PROCEDURES UNDER HIGH TEMPERATURE CONDITIONS

No special precautions are needed when using the gyroplane under high external temperature conditions.

The following advices should however be followed:

1. Do not stop for too long during taxiing or at the holding point.

☞ **NOTE:**
The radiator is equipped with a fan that automatically switches ON when the temperature reaches the value of 110°C. It switches OFF automatically.

2. When using maximum power for long periods, check the indicated temperatures of the heads and oil and make sure they do not exceed the maximum allowed values.

3. After flying with nose-up attitude and at slow speed, check the indicated temperature of the heads and oil and make sure they do not exceed the maximum allowed values.

☞ **NOTE:**
High temperature conditions have negative effects on flight and climb characteristics and on takeoff distances.

SECTION 7

MASS AND CG DATA

7.1 GENERAL

The gyroplane must be operated within its mass and balance limits. Load conditions more than the permitted weight and permitted centre of gravity can result in control problems and thus decrease flight safety.

7.2 CG DATA

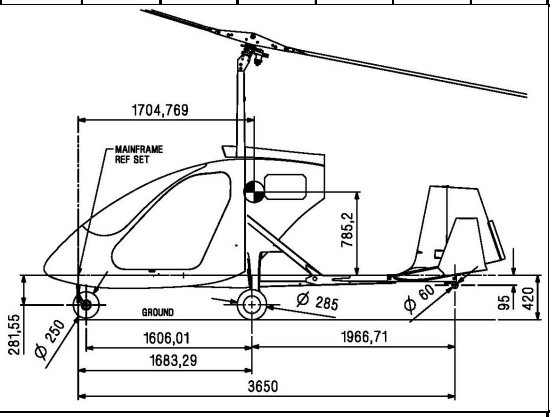
Here an example of weighing report:

Aircraft Type	Aircraft Registration	Construction N°		Date
M-24C PLUS	NA	NA		21/05/2019

Weighing Results				Empty Weight and C.G.			Mass tot Max [kg]	C. G. Limits			
Angle [degr.]	Left Weel [kg]	Right Weel [kg]	Tail Weel [kg]	Empty Mass [kg]	X_{Cg} [mm]	Y_{Cg} [mm]		$X_{Cg\ min}$ [mm]	$X_{Cg\ max}$ [mm]	$Y_{cg\ min}$ [mm]	$Y_{cg\ max}$ [mm]
0	135,2	135,70	3,05	316,45	1703	855	535	1409	1589	518	688
10,6	124,6	125,25	24								

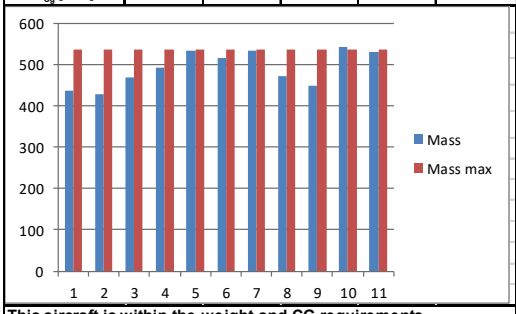
Fuel tank capacity		Pilot		Copilot
Volume max [liters]	Mass max [kg]	Mass max [kg]	Mass min [kg]	Mass max [kg]
82	59,0	120	55	120

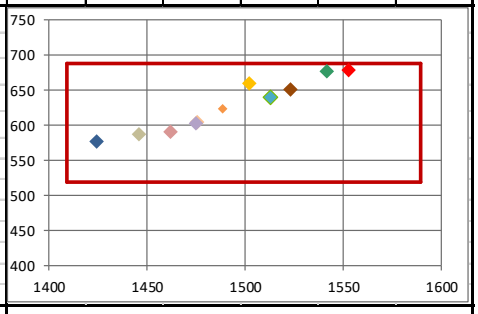
Major Items C.G.		
Item	X_{Cg} [mm]	Y_{Cg} [mm]
Empty Gyro	1703	855
Seat Bagage	1064	0
Back Bagage	1576	644
Pilot	975	170
Copilot	1073	204
Fuel	1375	290



Weight and C.G. Configurations

Item	Mass [kg]	Mass [kg]	Mass [kg]	Mass [kg]	Mass [kg]	Mass [kg]	Mass [kg]	Mass [kg]	Mass [kg]	Mass [kg]	Mass [kg]
Empty Gyro	316	316	316	316	316	316	316	316	316	316	316
Seat Bagage	0	0	0	0	0	0	0	0	0	0	0
Back Bagage	0	0	0	0	10	0	0	10	7	2	10
Pilot	65	80	55	120	100	80	75	90	120	110	75
Copilot	0	0	55	0	90	65	90	0	0	110	75
Fuel	56	30	42	55	18	55	52	55	5	5	55
XXXXXX	0	0	0	0	0	0	0	0	0	0	0
Total	437	426	468	491	534	516	533	471	448	543	531
X_{Cg} [mm]	1553	1541	1513	1488	1446	1476	1462	1523	1502	1424	1475
Y_{Cg} [mm]	679	676	639	622	587	604	590	651	659	576	602





This aircraft is within the weight and CG requirements

Signed:	Date:	Inspector No:

Figure 7.1: Weight and balance report

NOTE:

Conversion rate for fuel mass is 1 litre fuel = 0.72 kg.

Max permissible fuel loading is:

535 kg - aircraft empty weight - occupant weights

Example fuel mass calculation:

535 kg - 316.5 kg (aircraft empty weight) - 85kg (pilot) - 92kg (co-pilot) = 41.5 kg fuel

Fuel volume = 41.5/0.72 = 57.6 litres

SECTION 8

SYSTEM DESCRIPTION

8.1 GENERAL CONFIGURATION

All the main components of the gyroplane are listed in this chapter.
Whenever communicating with MAGNI GYRO (via telephone, e-mail, fax, etc.), pilots and operators should always use the terminology used in the section in order to identify the components consistently.

8.1.1 MAIN COMPONENTS DESCRIPTION

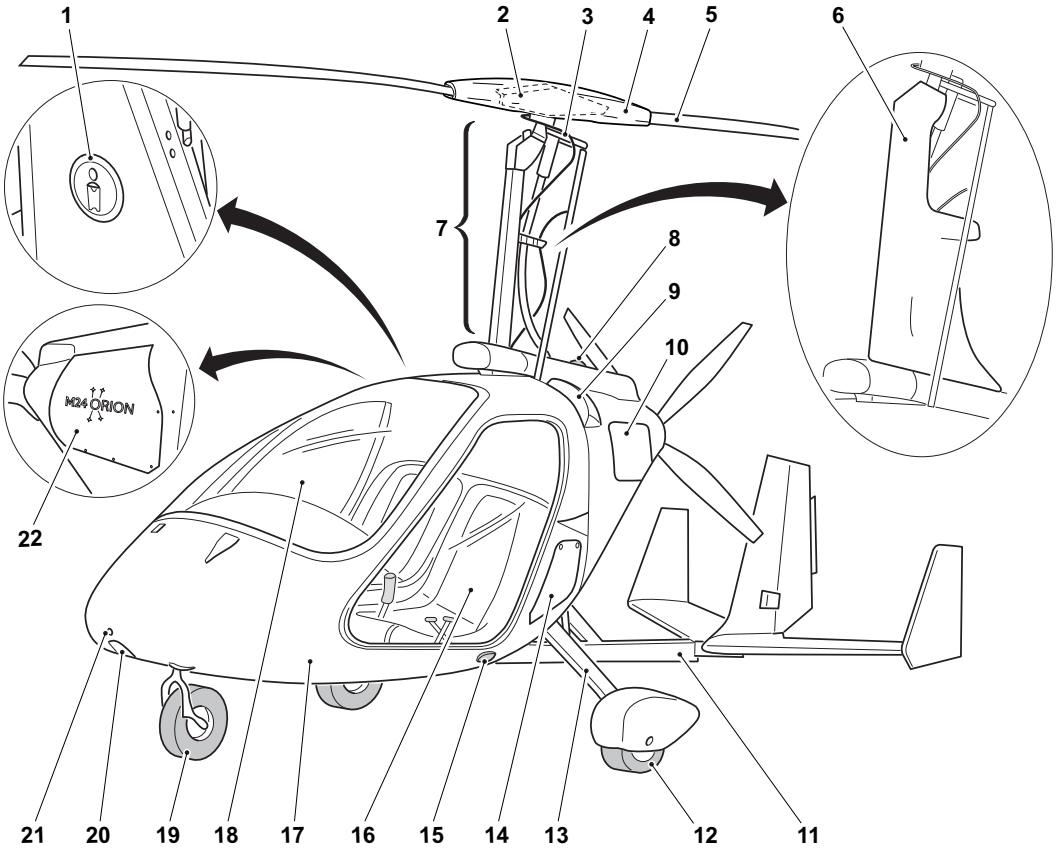


Figure 8.1: External - Front view

1. Fuel tank filler
2. Rotor hub bar
3. Rotor head
4. Rotor hub fairing (optional)
5. Rotor
6. Mast fairing (optional)
7. Mast upper section
8. Anticollision light
9. Intercooler air intake
10. Left engine hatch
11. Airframe
12. Main wheel
13. Main landing gear
14. Side access to tank
15. Position/strobe lights (optional)
16. Door
17. Cockpit
18. Windscreen
19. Nose wheel
20. Landing light
21. Pitot intake
22. Right engine hatch

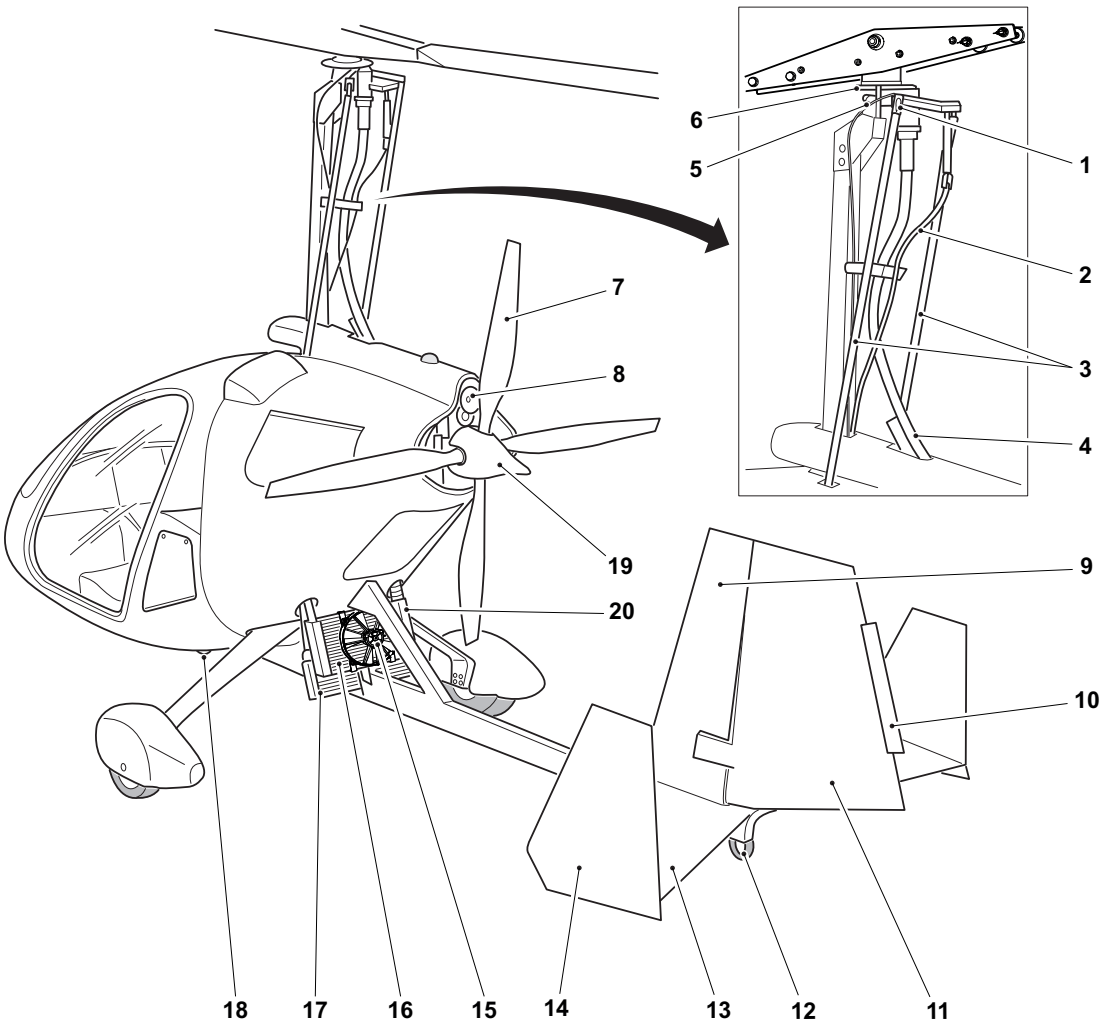


Figure 8.2: External - Rear view

1. Bendix gear
2. Trim control
3. Control rods
4. Pre-rotator flexible shaft
5. Control forks assembly
6. Rotor brake
7. Four blade propeller with ground adjustable pitch
8. Pre-rotator assembly
9. Vertical fin
10. Trim tab
11. Rudder
12. Tail-wheel
13. Horizontal stabilizer
14. Winglet
15. Cooling fan
16. Radiator
17. Oil cooler
18. Drain plug
19. Spinner (optional)
20. Heating (optional)

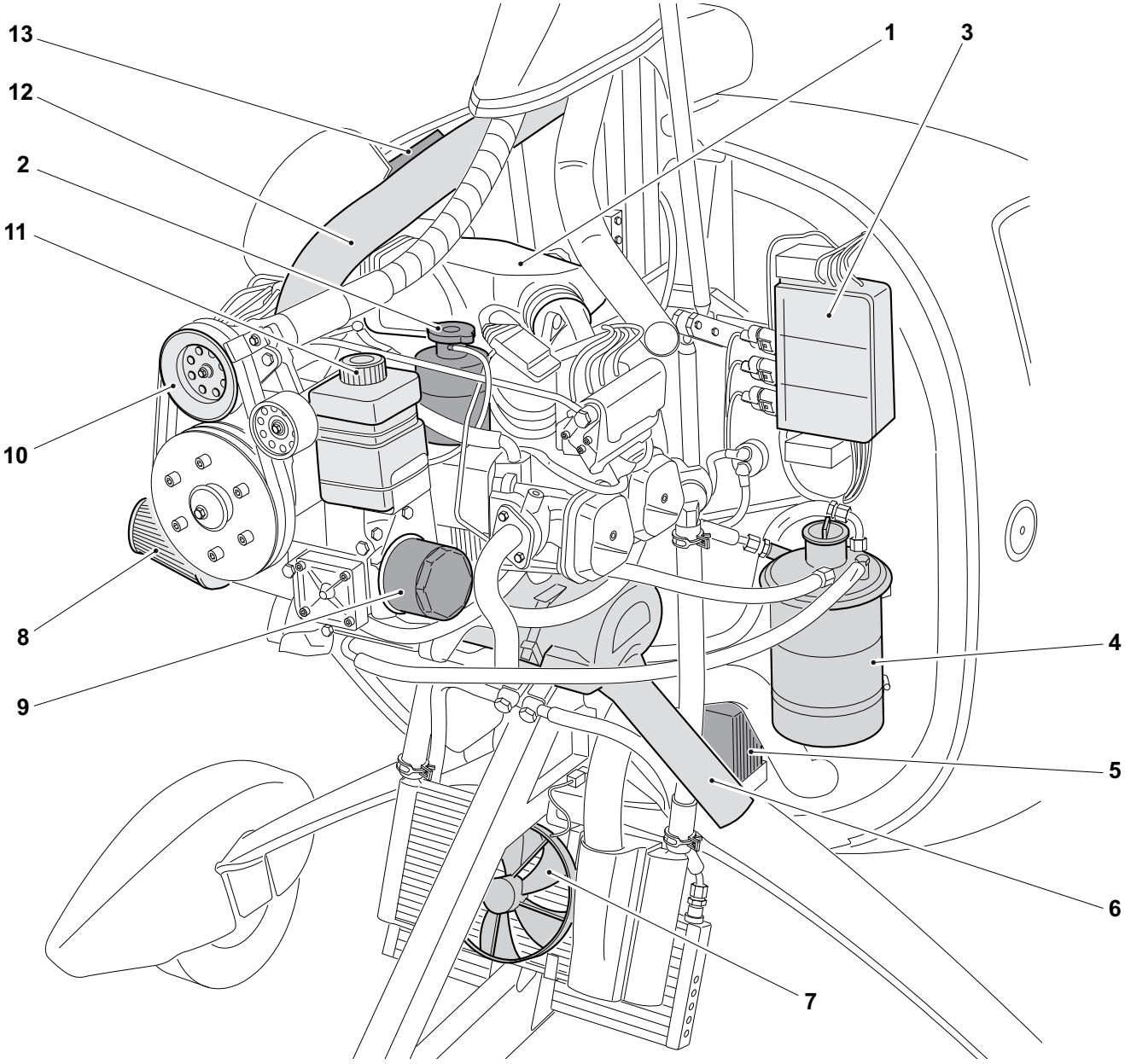


Figure 8.3: Engine bay

1. Engine
2. Radiator cap
3. Fuse box
4. Oil tank
5. Battery
6. Exhaust system muffler
7. Cooling fan
8. Air filter
9. Oil filter
10. Pre-rotation assembly
11. Overflow bottle
12. Cylinders cooling duct
13. Intercooler

8.1.2 COCKPIT LAYOUT

Figure 8.4: Cockpit

1. Compass
2. EMS/Communications panel
3. Co-pilot panel / Glove box
4. Switch panel
5. Co-pilot pedals
6. Parking brake lever
7. Co-pilot control stick
8. Co-pilot throttle lever
9. Seats
10. Pilot control stick
11. Seat belt
12. Pre-rotation control lever
13. Pilot throttle lever
14. Pilot brake lever
15. Door locking lever
16. Rotor trim control
17. Rotor brake lever
18. Pilot pedals
19. Flight instrument panel

8.2 INSTRUMENTS AND CONTROLS

8.2.1 FLIGHT INTRUMENT PANEL

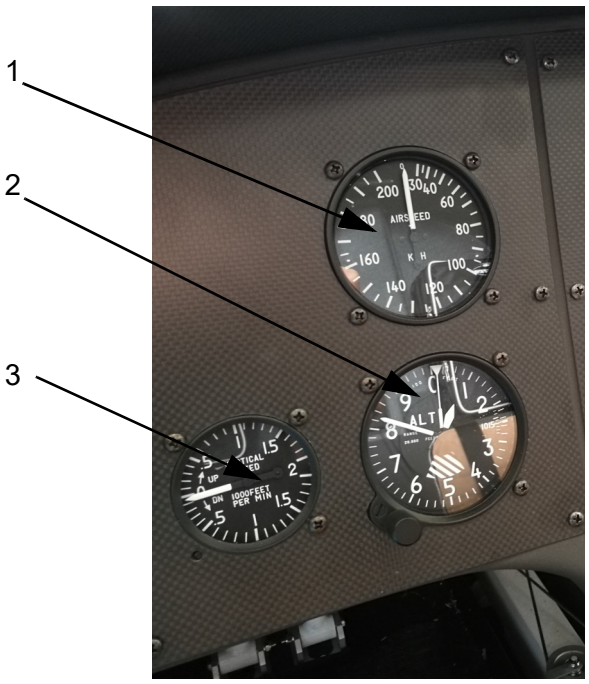


Figure 8.5: Flight instrument panel

1. AIR-SPEED INDICATOR (ASI)
The indicated speed is derived from the difference between total pressure and static pressure.
The pitot tube is located at the front of the fuselage.
The static intake is connected to the two static ports located on the side of the fuselage.

2. ALTIMETER
The indicator is supplied with a barometric scale to adjust for atmospheric pressure.
Pressure is monitored through the static port.

3. VERTICAL SPEED INDICATOR (VSI) (optional)
The vertical speed indicator is an optional instrument. It is positioned next to the altimeter.
It is connected to the static head port.

8.2.2 EMS/COMM PANEL

1. Red - LINE A: lane A voltage drop
2. Red - LINE B: lane B voltage drop
3. Yellow - FAN: cooling fan enabled
4. Yellow - RESERVE: low fuel level
5. Red - BRAKE: rotor brake (ON when engaged)
6. Green - TRIM: ON when in end position
7. Door warning system
8. Red - FIRE: fire detection system light
9. Fuel level gauge
10. Kanardia Digi engine monitor system
11. Transponder (optional)
12. Radio VHF (optional)
13. Rotor RPM: rotor rpm gauge

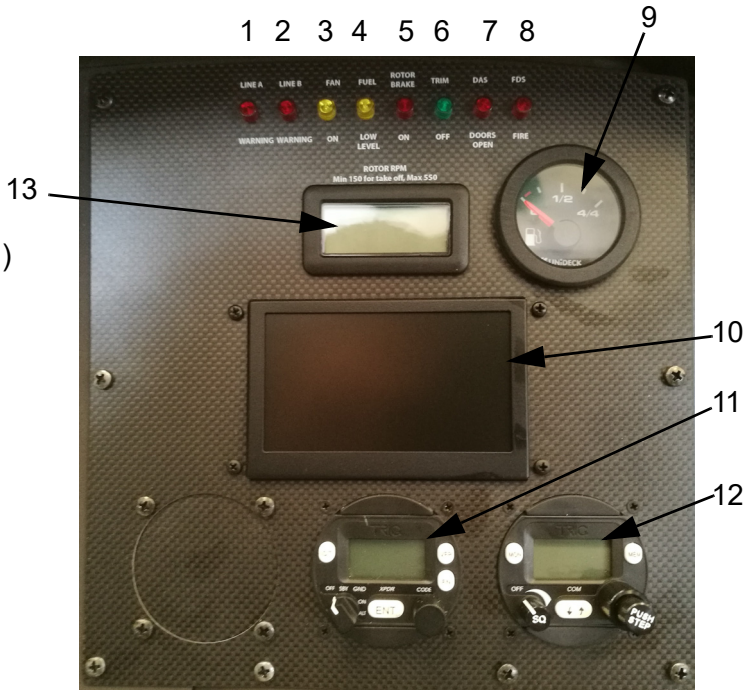


Figure8.6:EMS/COMM panel

1. Red - LINE A: lane A voltage drop
This warning light indicates a voltage drop in the lane A.

2. Red - LINE B: lane B voltage drop
This warning light indicates a voltage drop in the lane B.

3. Yellow - FAN: cooling fan enabled
This light indicates that the cooling fan mounted on the radiator is running to improve the cooling action.

4. Yellow - RESERVE: low fuel level
When this lights up it indicates that there are about 10 litres of fuel remaining, corresponding to approximately 20 minutes of flight at maximum power. Land within 10 minutes from the activation of this light to avoid engine shut down due to lack of fuel.

5. Red - BRAKE: rotor brake (ON when engaged)
When this light is “ON” the rotor brake lever is engaged.

6. Green - TRIM: on when in end position
When this light is “ON” the pitch trim is fully forward.

7. Door warning system
When illuminated one of the sensor switches on the door warning locking system has not been activated. This light will extinguish when both doors have been fully shut and both handles placed in the over-centre locked position. In combination with this light becoming illuminated the rotor RPM gauge will become de-activated.

8. Red - FIRE: fire detection system light
When illuminated during normal flight it indicates a fault in the fire detection system. If the light is blinking with a regular beat it indicates that one of the sensors in the engine bay has detected temperatures above 120 degrees, or the cable of the sensor are in short circuit and therefore the possible presence of fire. For the procedure to be adopted in this case, refer to Chapter 4.

9. Fuel level gauge
Indicates the quantity of fuel remaining in the tank. When there are approximately 10 litres of fuel remaining the yellow reserve light comes on.

NOTE:
The fuel gauge fitted to the M24C Plus reads "FULL" when the contents of the tank are over 42 litres. For fuel levels above 42 litres the pilot should verify the tank contents by use of the markings on the tank.

Gauge reading	Fuel quantity [l]
Full	42
3/4	30
1/2	20
1/4	12

10. Digital engine monitoring system - Kanardia Digi
All the engine instruments are grouped in the Kanardia Digi digital instrument

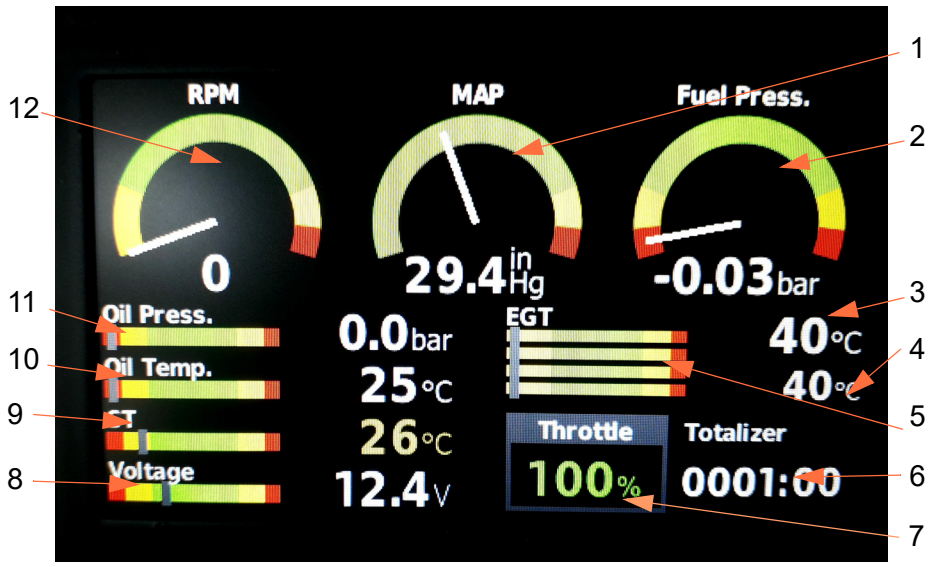


Figure 8.7: Kanardia Digi

1 - MAP
2 - Fuel pressure
3 - Maximum EGT value
4 - Minimum EGT value
5 - Exhaust gas temperatures bars
(from cylinder No. 1 (top) to No. 4 (bottom))
6 - Engine time totalizer
7 - Throttle percentage
8 - Voltage
9 - Coolant temperature
10 - Oil temperature
11 - Oil pressure
12 - Engine RPM

11. Transponder (optional)
For details see instructions/manual supplied with the instrument.

12. Radio VHF (optional)
For details see instructions/manual supplied with the instrument.

13. Rotor RPM: rotor rpm gauge
When the rotor is turning, if doors are properly closed this digital tachometer indicates the rotor rpm.

If doors are open or not correctly closed, the instrument remains switched off (no indications provided on the display)

8.2.3 SWITCH PANEL

1. EMS circuit breaker
2. Accessories circuit breaker
3. Accessories fuses
4. Strobe light switch (optional)
5. Landing light switch
6. Starter: start push button
7. Start power switch
8. Battery backup guard
9. Battery backup switch
10. Master switch
11. Line A switch
12. Fuel pump A switch
13. Line B switch
14. Fuel pump B switch
15. F2 circuit breaker
16. F1 circuit breaker

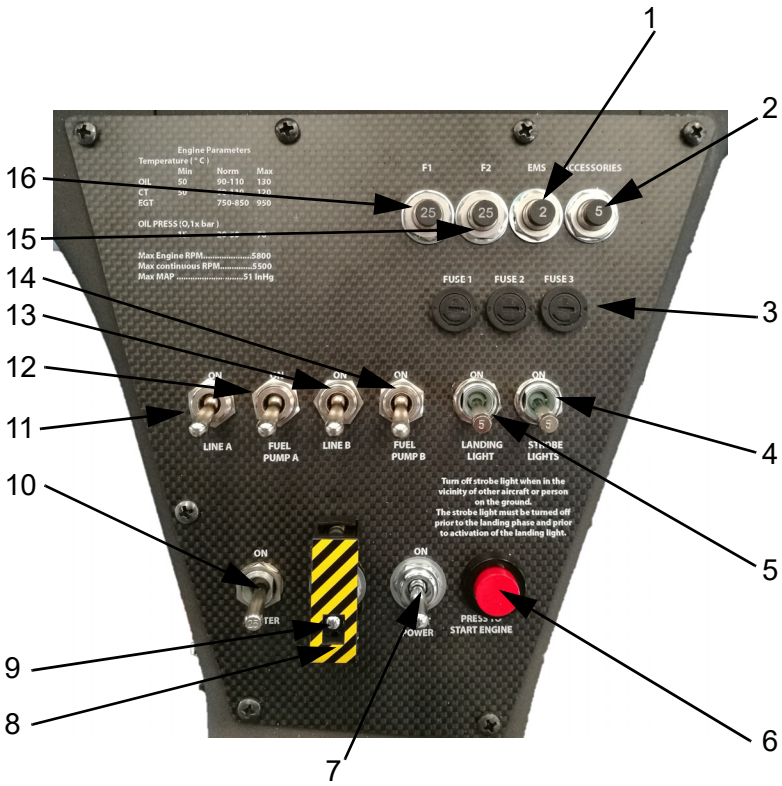


Figure 8.8: Switch panel

1. EMS circuit breaker
This circuit breaker protects the Kanardia instrument and the rotor tachometer.

2. Accessories circuit breaker
This circuit breaker protects the secondary electrical systems:
- Fuel pump B
- Warning lights
- Fuel level gauge
- Trim
- Optional systems

3. Accessories fuses
Fuses that protect the secondary utilities: radio, transponder and GPS.

4. Strobe light switch
Push the lever of the switch upward to the ON position to turn on the side strobe lights. The strobe lights should be switched on during flight.

5. Landing light switch
Push the lever of the switch upward to ON position to turn on the front mounted landing light. The landing light should be switched on during approach and landing.

6. Starter: start push button
The MASTER switch ON enables the engine start push button.

7. Start power switch
This switch enables the engine starting.

8. Battery backup guard
Guard to protect the battery backup switch.

9. Battery backup switch
This switch enables the backup battery to supply the ECU in case of failure of both generators.

10. Master switch
Push the lever of the switch upward to ON position to power all electrical utilities.

11. Line A switch
This switch powers the ECU lane A of the engine.

12. Fuel pump A switch
Push the lever of the switch upward to ON position to turn the fuel pump A on. This switch must be ON during all flight operations.

13. Line B switch
This switch powers the ECU lane B of the engine.

14. Fuel pump B switch
Push the lever of the switch upward to ON position to turn the fuel pump B on. This switch must be ON during all flight operations.

15. F2 circuit breaker
This circuit breaker protects the F2 circuit.

16. F1 circuit breaker
This circuit breaker protects the F1 circuit.

8.2.4 THROTTLE LEVER

The throttle lever allows the engine rpm to be varied and thus to vary the power delivered. One lever is located at the pilot left side and the other one at the co-pilot left side, as shown in the figure.

Moving the throttle forward opens the throttle valve, thus increasing the power delivered.

Moving the throttle backward reduces the power delivered.
Throttle movement goes from 0 to 100% of maximum continuous power.

NOTE:
The maximum available power (100% - 5800 rpm - 51 inHg MAP) can only be used for not more than 5 minutes.

8.2.5 ROTOR BRAKE LEVER

This lever is used to stop the rotation of the rotor after landing and during all taxiing, holding-point and parking operations. It is located at the side of the pilot right leg.
To engage the brake pull up the lever to vertical position; when the rotor brake is engaged the warning light “BRAKE” lights on.

8.2.6 BRAKE CONTROL LEVERS

The gyroplane is equipped with a brake system fitted to the main wheels. The system can be controlled by two levers.

1. Main brake lever: to apply the brakes pull the lever backwards. The braking action is proportional to the pull applied on the lever.

2. Parking brake lever: to apply the brakes pull the lever backward. The braking action is proportional to the pull applied on the lever. To release the parking brake, lift up the top section of the lever and move the lever forward.

8.2.7 DIRECTION CONTROLS

The control pedals operate the rudder as well as the front wheel, thus allowing steering whilst taxiing.
In particular, a pressure on the right pedal will cause right yaw/turn, a pressure on the left pedal will cause left yaw/turn.

8.2.7.1 PEDAL POSTION ADJUSTMENT

It is possible to adjust the pedal position to the height of the pilot. The procedure is the following:

- Extract pin (1) and move the pedal (2) to the desired position corresponding to one of the positioning holes on the pedal

- Re-insert pin (1) back into its position

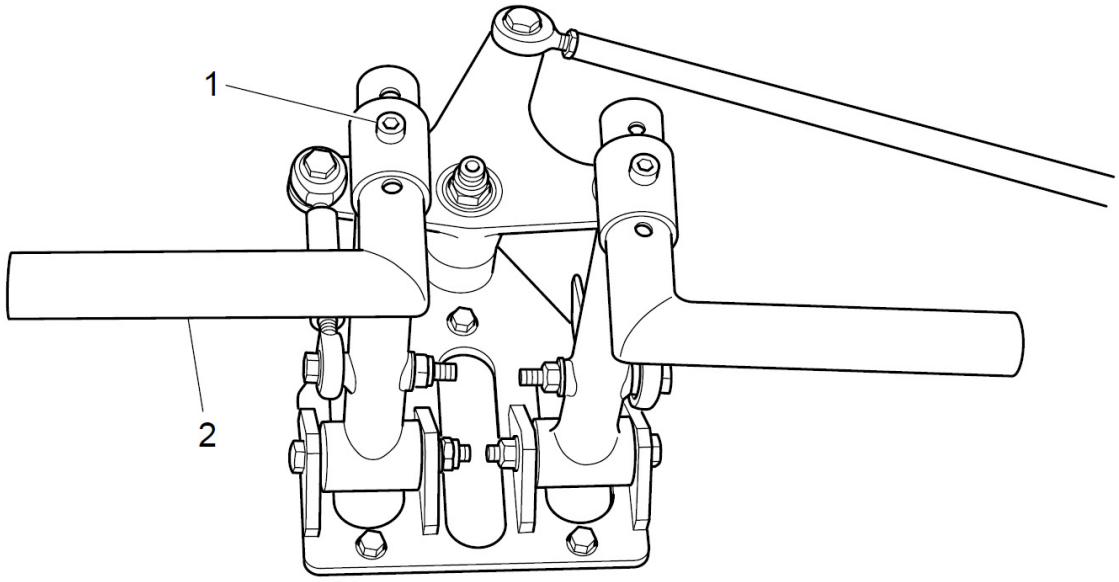


Figure 8.9: Pedal position adjustment

8.2.8 CONTROL STICK

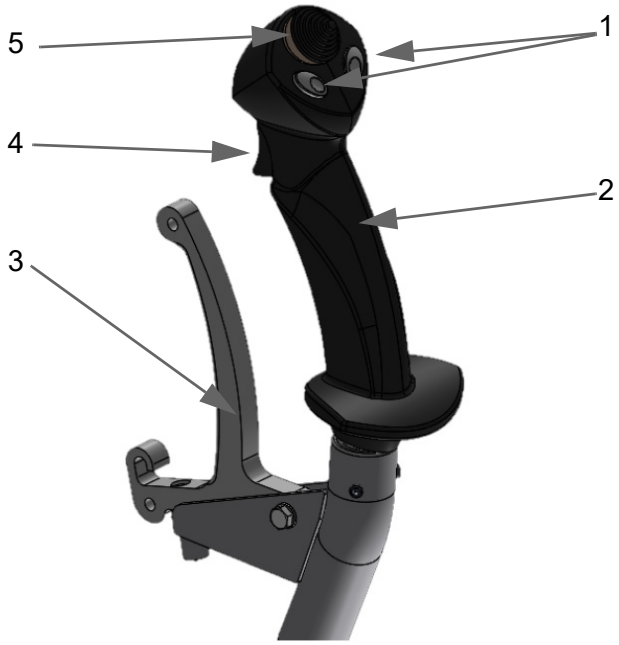


Figure 8.10: Control stick

1. AUX buttons

No function has been assigned to these buttons.

2. Control stick
The movements of the control stick are:

- backwards and forwards, changing the angle of attack/attitude of the gyroplane which in turn controls the airspeed

- sideways left/right changes the angle of bank of the gyroplane and consequently the direction of flight (heading)

3. Pre-rotation lever
This lever allows the activation of the pre-rotator. It is used during pre-takeoff procedures. The degree of engagement of the pre-rotator is proportional to the degree of movement of the lever.

4. Push to talk (trigger)
This trigger allows the speaking via radio VHF.

5. Trim control switch
Trim switch is located on top of the control stick and allows in-flight adjustment of the aircraft attitude allowing controlling aircraft trimmed speed.

- Backwards movement of the switch: **nose-up attitude** = reduction of the speed

- Forwards movement of the switch: **nose-down attitude** = increase of the speed

NOTE:
Adjustment of the aircraft trimmed speed must be made by means of brief movements of the trim switch.

8.3 SEAT BELTS

The seat belts for both seats are 4-point “lap and shoulder belt” type with quick release buckle. (Variable with gyroplane configuration)

8.4 DOOR WARNING SYSTEM

The M24C Plus incorporates a warning system to maximise the awareness of occupants of the fully enclosed M24C Plus gyroplane as to the latching and locking status of the door mechanism.

The visual warning system is manifested by two methods, the activation of a warning light and the de-activation of the rotor rpm gauge.

The red warning light is located on the starboard of the existing warning light cluster and is marked ‘DOORS OPEN’. When this light is illuminated it indicates that at least one of the doors has not been latched and locked correctly.

Additionally, if the system registers an incorrectly closed door then the rotor rpm gauge is rendered inactive and will not register a reading until both doors have been correctly latched and locked.

- Sensor Switch Location

The system incorporates four switch sensors, all of which have to be activated in order for the door warning system to be de-activated.

The doors on the M24C Plus are capable of being held closed by the operation of a single pin. As a visual inspection of the aft door pin is difficult, once the occupants harness has been secured, then the warning system aims to detect the location of the aft door pin and the locking position of the handle.

A single switch has been incorporated onto each of the aft door latch blocks, behind the seats. This switch detects whether the door pin has been fully drawn into place within the latching receptacle.

A further switch is mounted on a bracket, located below each of the door locking handles. This switch will only be activated once the handle has been fully pushed into the over-centre locked position.

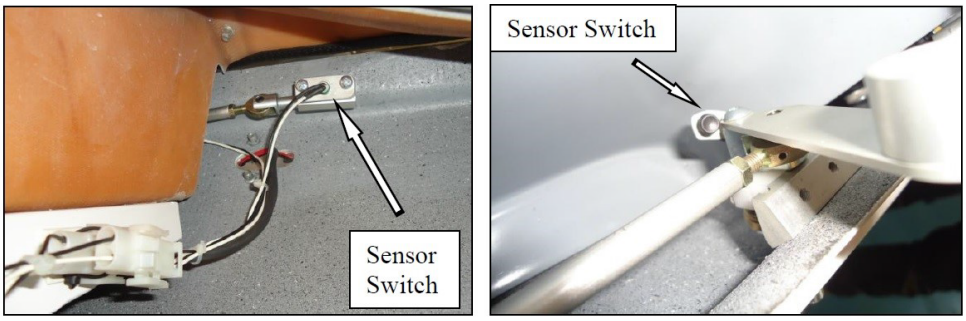


Figure 8.11: Door warning system

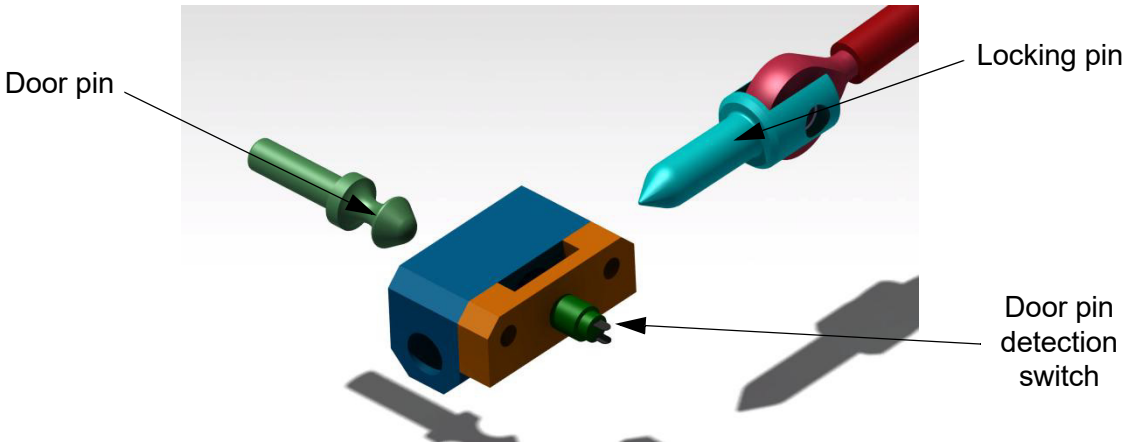


Figure 8.12: Door locking mechanism

SECTION 9

HANDLING AND SERVICING

9.1 INSPECTIONS

Correct maintenance of the gyroplane is necessary for the safety of flight operations.
It is strongly recommended that users obey the Maintenance schedule document 045-00-24C.