



M24C_AUS
M24C FLIGHT MANUAL
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M-24C ORION



Magni Gyro Srl

Sede Legale ed Operativa - Via Volpina, 23
21010 Besnate (VA) – Italy

Tel. +39 0331 274816 – Fax +39 0331 274817

e-mail: info@magnigyro.it sito web: www.magnigyro.it

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PILOTS HANDBOOK FOR THE MAGNI GYRO M24C

Registration Marks: _____

Constructors Serial Number: _____

Engine Serial Number: _____

Aircraft Designed and constructed by: Magni Gyro Srl

Pilot's handbook prepared and issued by: Magni Gyro Srl

This gyroplane shall at all times be operated in accordance with this manual.

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GENERAL

This Pilot Operating Handbook applies only to the aircraft detailed on page 0-4.
It is the responsibility of the pilot to be familiar with the content of this handbook, including any amendments.

Units of measure

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

Weight	Kilograms [kg]
Length (aircraft geometry)	Millimetres [mm]
Distance (aircraft performance)	Feet [ft] or Meters [m]
Altitude.....	Feet [ft]
Airspeed	Mph [mph] and Knots [Kn]
Moments.....	Kilogram meters [kgm]
Pressures	Bars [bar]
Temperatures.....	Degrees Celsius [C°]
Liquid Quantities.....	Litres [l]

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RECORD OF AMENDMENTS

This page 4 and subsequent amendment pages 4/1 etc, will be reissued as necessary with each amendment list.

It is the responsibility of the owner to insure that the amendments are incorporated in the Pilot's Handbook.

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SECTION

INTRODUCTION

1

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1.1 OBJECT

This manual is intended to give all the necessary information, which the operator flying the M-24C Orion 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.

1.2 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.

1.3 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.

1.4 CHECKLISTS

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

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

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1.5 DEFINITIONS

1.5.1 DEFINITIONS USED IN THE MANUAL

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.

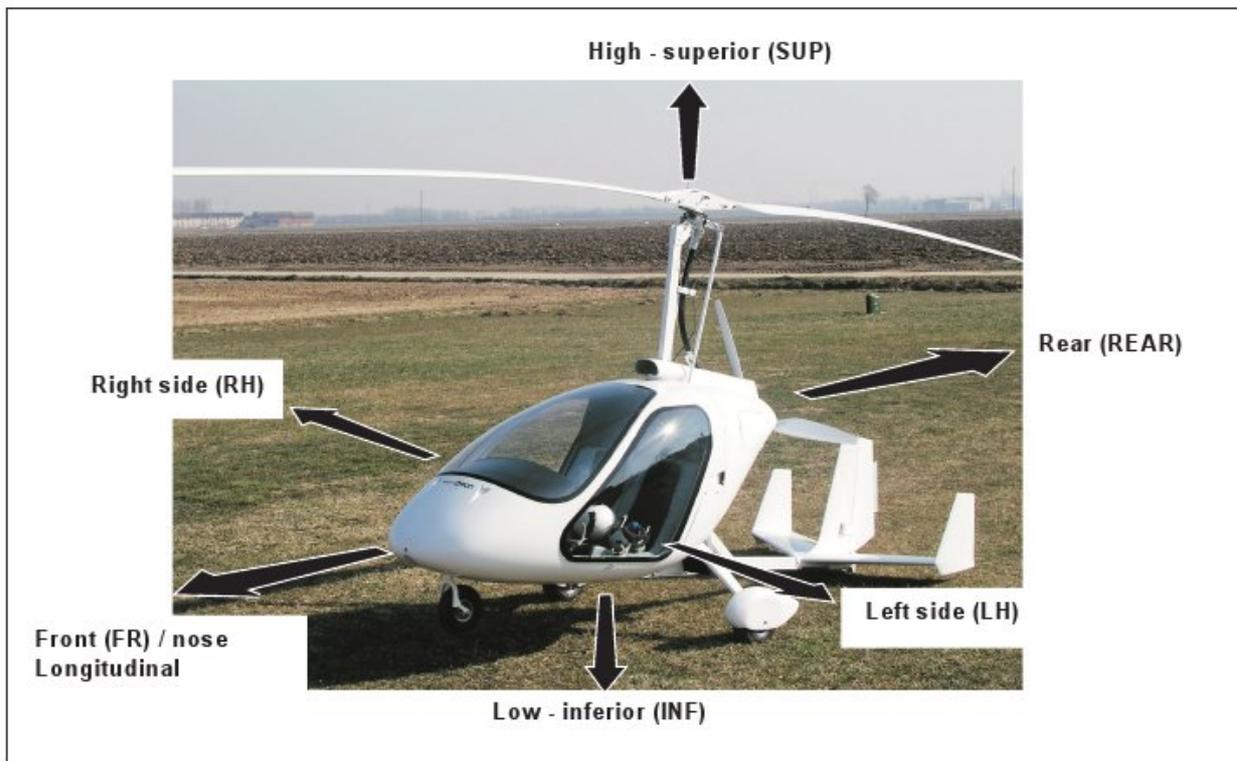


WARNING: Operation, technical and other procedures which, if not followed carefully, may expose the gyroplane and its equipment to damage.



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

1.5.2 DEFINITIONS USED TO IDENTIFY THE PARTS OF THE GYROPLANE



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1.6 DICTIONARY OF COMMONLY USED ABBREVIATIONS

CHT	Cylinder Head Temperature
EGT	Exhaust Gas Temperature
ft	Feet
g	Gravitational acceleration
G	Gravitational constant
GA	Glide Angle
GPS	Global Positioning System
inHg	Inches of Mercury
Kn (Knot)	Nautical mile per hour
IAS	Indicated Air Speed
MAP	Manifold Pressure
mb	Millibar
mph	(statute) Miles per Hour
MTOW	Maximum Take-off Weight
QFE	Q Field Elevation
RG	Rough Ground
r.p.m.	Revolutions per Minute
TCU	Turbo Control Unit
Vne	Never-Exceed speed
Vno	Normal Operation speed
VMC	Visual Meteorological Conditions



SECTION
GENERAL DESCRIPTION AND
INSTRUCTIONS FOR USE

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2.1 THE GYROPLANE

The **M-24C** Orion is a single-engine two-seat gyroplane with a primary structure made of steel and a carbon fibre fuselage.

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

The side-by-side configuration allows for the carriage of two crew members in the cockpit. The power unit is a piston engine in a pusher configuration driving a three-bladed propeller with ground adjustable pitch.

The tail plane is made of composite material. The tail-plane consists of a fixed horizontal stabiliser with three vertical fins of which the central fin is subdivided into a fin and rudder.

The rotor and main undercarriage are also manufactured from composite materials.

The M24C is equipped with a baggage compartment placed inside the cockpit, under the right seat cushion.

2.1.1 GENERAL FLIGHT CHARACTERISTICS

Aerobatics are not permitted.

2.1.2 FLIGHT CONTROLS

The flight controls are of traditional type and operate in three axes (pitch, roll and yaw).

In any flight configuration and condition, only small control movements are required to fly the gyroplane.

Control in roll and pitch is provided through the control stick, through tilting the rotor head and thus the rotor disk.

Control in the yaw axis is provided by the rudder pedals which operate the rudder.

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2.1.3 FLIGHT CHARACTERISTICS IN LEVEL CONDITIONS

2.1.3.a 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 an IAS of 20 mph (17.5 Kn). Yaw control can be maintained down to zero airspeed by maintaining engine rpm at more than 3,000 r.p.m.

2.1.3.b HIGH SPEED AND CRUISING SPEED

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

2.1.3.c 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 30 mph (25 Kn). At lower airspeeds a controlled descent occurs.

2.1.3.d SPINNING

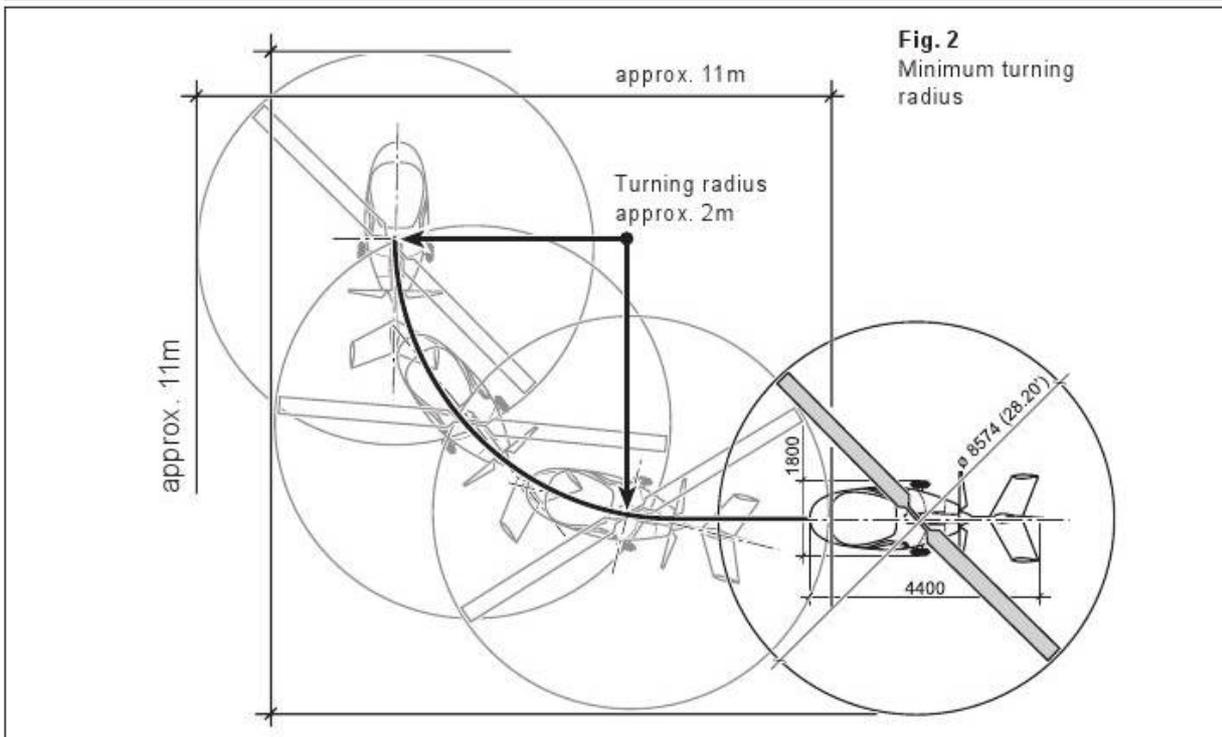
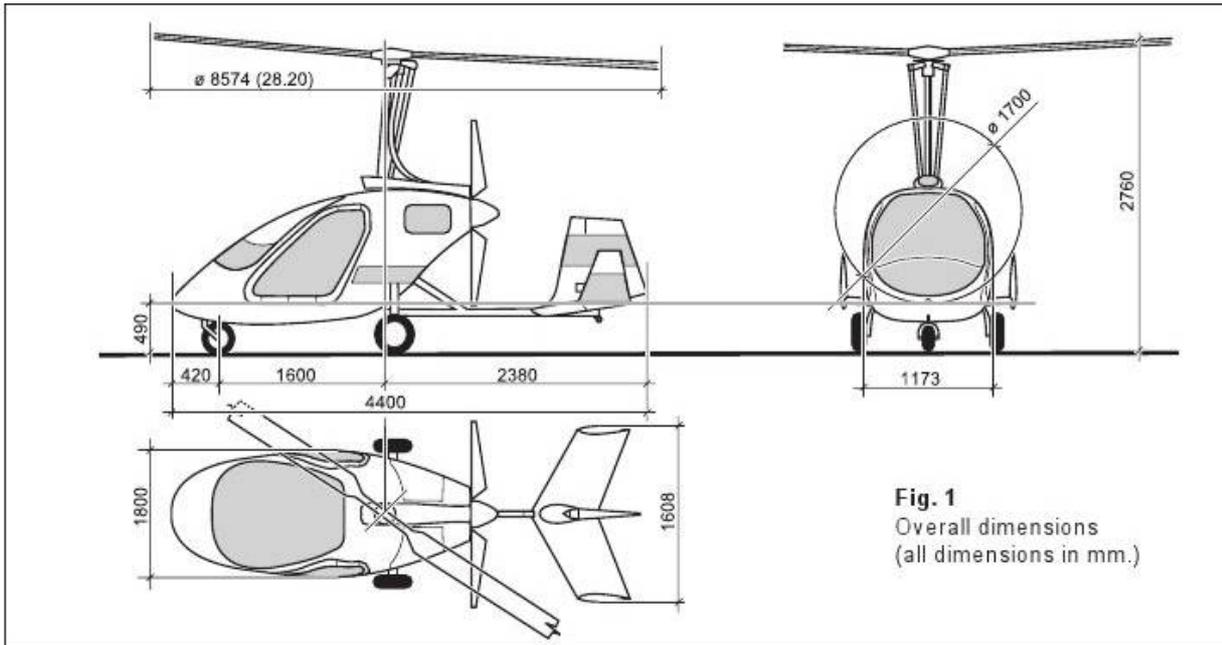
Spinning is impossible as an asymmetric stall of a rotary wing cannot occur.

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2.2 OVERALL DIMENSIONS (Fig. 1 and 2)

The overall dimensions are indicated below:

Rotor diameter.....	8.574 mm (28.20')
Total length	4.400 mm
Width	1.800 mm
Height (without rotor)	2.760 mm
Maximum height (with stick forward)	2.810 mm





2.3 TECHNICAL DATA

Weights

- Dry weight: 290 kg
 - Empty weight 297 kg
 - MTOW: 500 kg
- Limited to 450 Kg if required by the requirements in force in the country the gyroplane is registered in or operated in.

Performance

- V_{NE} - Never Exceed Speed 105 mph (90 Kn)
- V_{NO} - Normal Operating (Cruise) Speed 90 mph (78 Kn)
- V_Y - Best Rate of Climb Speed 65 mph (55 Kn)
- V_{APP} - Landing Approach Speed (Minimum Descent Speed) 65 mph (55 Kn)
- Service ceiling: 10000 ft
- Take-off distance: 250 ft
- Take-off distance to 50ft 1250 ft
- Landing roll from 0 to 100 ft
- Landing distance from 50ft. 430 ft
- Rate of climb at MAUW, max power ISA conditions 625 ft/min

Fuel supply

- Fuel: Petrol
- Fuel tank capacity: 82 Litres
- Usable fuel quantity 78.5 Litres
- Reserve: 8 Litres
- Unusable fuel quantity 3.5 Litres

For more information on acceptable fuel and oil please see Appendix titled "Refuelling".

Engine

- Engine type: Rotax 914 turbo
- Power: 115 Hp
- Maximum engine rpm (5 minutes): 5800 r.p.m.
- Maximum continuous rpm 5500rpm
- Maximum MAP* (5 minutes) 39.9 inHg
- Maximum continuous MAP: 35.4 inHg

***NOTE/CAUTION - Due to the control behaviour an overshooting of the manifold pressure is possible. But within 2 seconds this pressure has to stabilize within the allowance.**

- Cylinders: 4
- Engine operations limits (see below)
- Fuel Consumption/hour (cruise) 16-20 Litres
- Fuel Consumption/hour (max power) 25 Litres

	min.	normal	max
OIL	50	90-110	130
CHT	50	90-110	135
EGT	750-850	950	

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Cruise **at 75% of power**
- MAP 30.5 inHg

Cooling System

- Cooling system type: air / liquid
- Coolant radiator 3 Litres
- Oil radiator 4 Litres

Electrical Installation

- Operating Voltage 12 V
- Battery 12 V - 13 Ah

Tyres

- Nose wheel 4.004 6PLY
- Inflating pressure 1.8 bar
- Main wheels 6-004 6PLY
- Inflating pressure 2.2 bar

2.4 IDENTIFICATION PLACARD (Fig. 1)

The manufacturer's identification placard (1) is located inside the cockpit, on the lower right side of the central console.

Description of the placard

- 1 - Model
- 2 - Serial number
- 3 - Engine type
- 4 - Production date



2.5 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.

2.5.1 DESCRIPTION OF MAIN COMPONENTS

Front - external (Fig. 2)

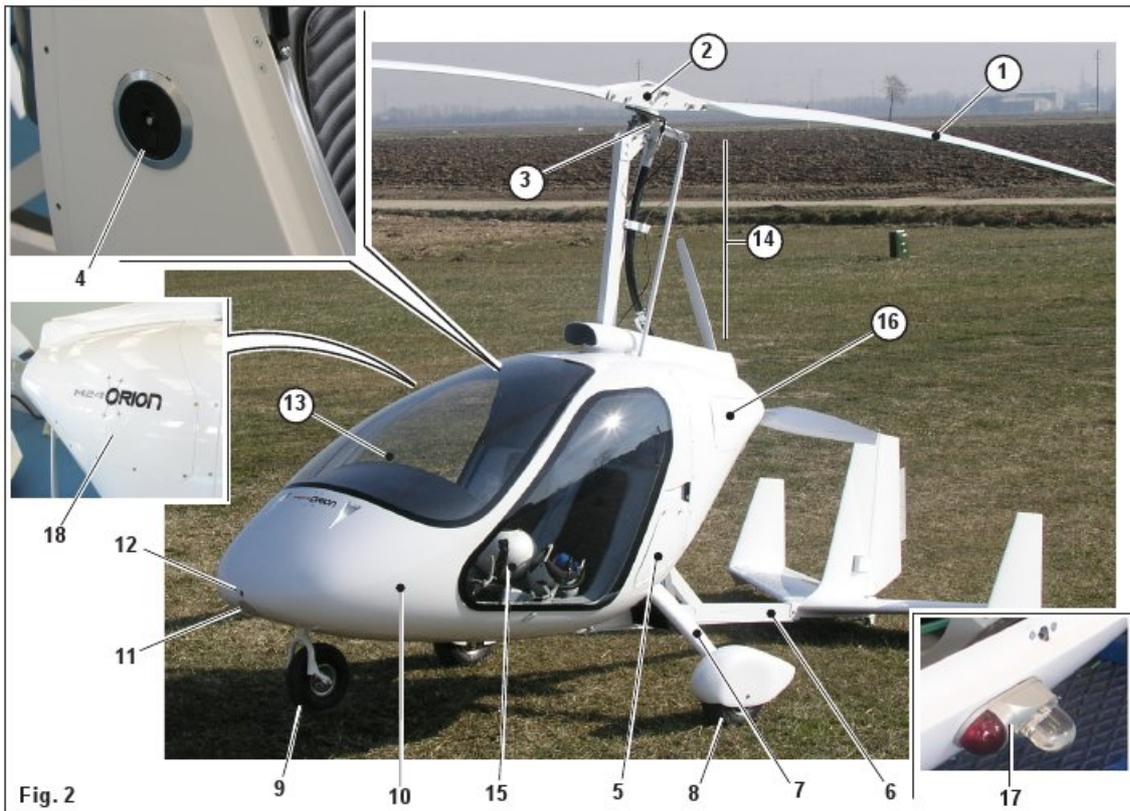


Fig. 2

KEY

- 1 - Rotor
- 2 - Rotor hubbar
- 3 - Rotor head
- 4 - Fuel tank filler
- 5 - Baggage compartment and side access to tank
- 6 - Airframe
- 7 - Main undercarriage
- 8 - Wheel
- 9 - Nose wheel
- 10 - Cockpit
- 11 - Front/landing light
- 12 - Dynamic intake
- 13 - Windscreen
- 14 - Mast upper section
- 15 - Cockpit door
- 16 - Engine cowling left door
- 17 - Strobe/position lights (Option)
- 18 - Engine access panel

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Rear - external (Fig. 3)



KEY

- 1 - Rotor brake
- 2 - Bendix
- 3 - Control rods
- 4 - Trim control
- 5 - Control forks assembly
- 6 - Prerotator flexible shaft
- 7 - Prerotator assembly
- 8 - 3-blade pusher propeller with ground adjustable pitch
- 9 - Radiator
- 10 - Horizontal stabilizer
- 11 - Winglet
- 12 - Rudder
- 13 - Trim tab
- 14 - Vertical Fin
- 15 - Oil cooler

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Rear – outer sight (Fig. 4)

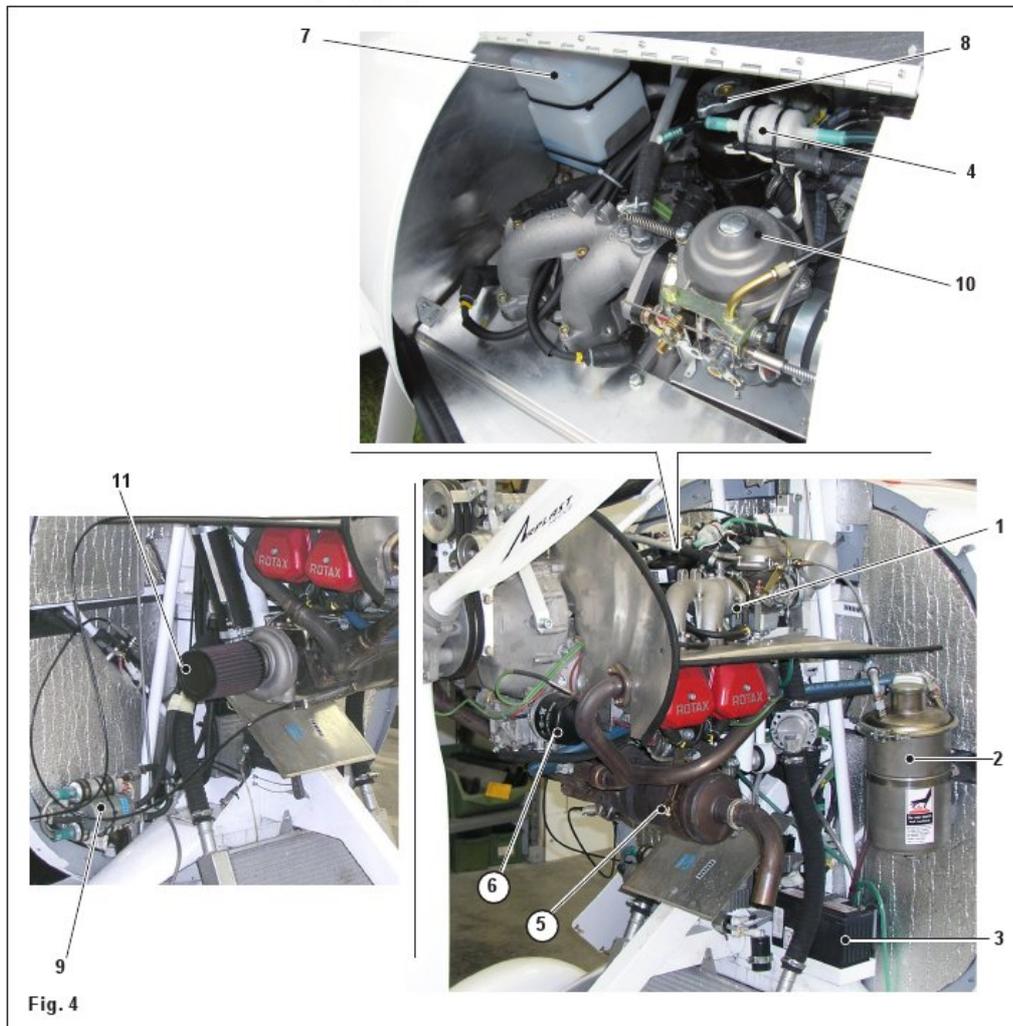


Fig. 4

KEY

- 1 - Engine
- 2 - Oil tank
- 3 - Battery
- 4 - Manifold Pressure (MAP) gauge filter
- 5 - Exhaust system muffler
- 6 - Oil filter
- 7 - Coolant Expansion tank
- 8 - Radiator cap
- 9 - Fuel filter
- 10 - Carburettor
- 11 - Air filter

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2.5.2 COCKPIT LAYOUT (Fig. 5)



Fig. 5

KEY

- 1 - Instrument panel
- 2 - "FLYDAT" Engine data digital display
- 3 - Warning light (See Section 2.6b for details)
- 4 - Fuel Pump controls
- 5 - Flight instruments
- 6 - Circuit breakers
- 7 - Pilot's Pedals (rudder and steering nose wheel)
- 8 - Co-pilot's pedals
- 9 - Control stick grip
- 10 - Prerotation control lever
- 11 - Door locking lever
- 12 - Rotor trim control
- 13 - Brake lever
- 14 - Throttle lever
- 15 - Choke lever
- 16 - Seats
- 17 - Seat belt
- 18 - Rotor brake lever
- 19 - Compass
- 20 - Parking brake lever

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2.6 INSTRUMENTS AND CONTROLS

2.6.a INSTRUMENTS (Fig.6)

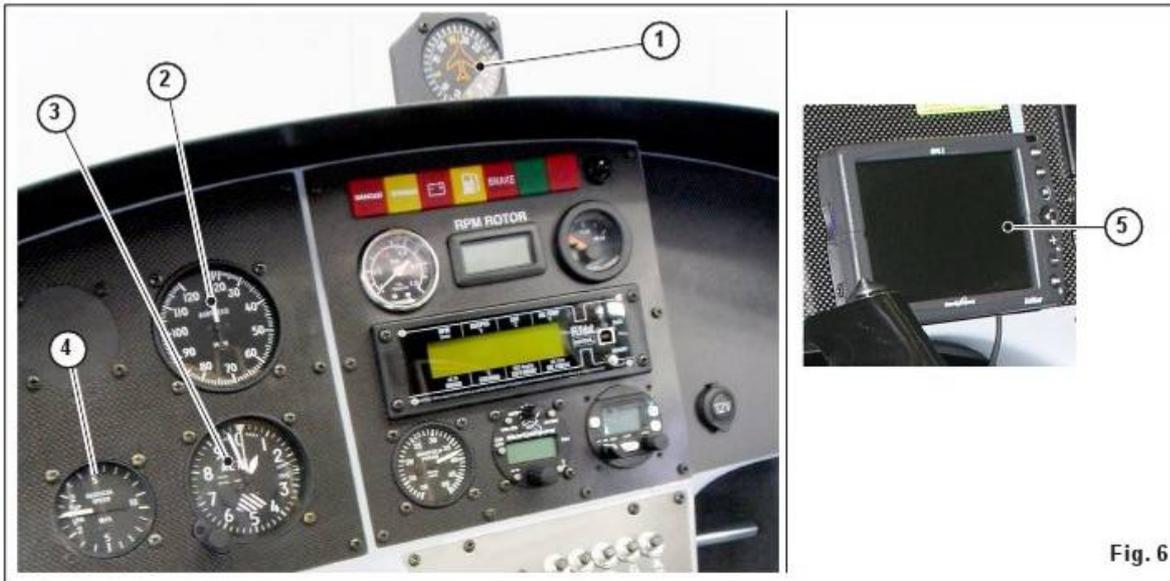


Fig. 6

COMPASS (1)

A standard magnetic compass is installed on the upper part of the instrument panel, in the panel's centre line.

AIR-SPEED INDICATOR (ASI) (2)

The air-speed indicator has a range between 0 and 120 mph. (20-120 Kn when in Knots) The indicated speed is derived from the difference between dynamic 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.

ALTIMETER (ALT) (3)

Three-pointer altimeter with 0 - 20.000 ft scale. The indicator is supplied with a barometric scale (in millibar) to adjust for atmospheric pressure.

Pressure is monitored through the static port.

VERTICAL SPEED INDICATOR (VSI) (4) (Optional)

The vertical speed indicator is an optional instrument. It is positioned next to the altimeter. This instrument is calibrated in ft/min. It is connected to the static head port.

GPS EQUIPMENT (Optional) (5)

The position and type of GPS equipment (global positioning system) is left to the user's discretion.

The operator manual of the GPS is supplied together with the equipment.

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2.6.b INSTRUMENTS - CENTRAL CONSOLE (Fig. 7)

KEY

- 1 - Red - DANGER of turbo overpressure
- 2 - Yellow - engine caution or WARNING
- 3 - Red - BATTERY, generator not working
- 4 - Yellow - RESERVE, low fuel level
- 5 - Red - BRAKE, rotor brake (on when in hangar)
- 6 - Green - TRIM in end position
- 7 - Reserve warning light test push button
- 8 - MAP - manifold pressure
- 9 - Radio (Optional)
- 10 - Fuel level gauge
- 11 - ACC Circuit breaker 10 A
- 12 - GEN Circuit breaker 20A, generator
- 13 - BATT Circuit breaker 20A, battery
- 14 - FD (Flydat) Circuit breaker 2A
- 15 - TCU (Turbo Control Unit) Circuit breaker 5A
- 16 - Strobe lights switch (Optional)
- 17 - Landing Light switch
- 18 - BREAKER 5A push button – main fuel pump
- 19 - Main fuel pump switch
- 20 - Auxiliary fuel pump switch
- 21 - BREAKER 5A push button – auxiliary fuel pump
- 22 - Start push button - STARTER
- 23 - Ignition key
- 24 - MASTER switch
- 25 - RPM ROTOR – rotor rpm gauge
- 26 - Fuel pressure gauge
- 27 - FLYDAT engine monitor
- 28 - RED – Fire detection – system light
- 29 - Transponder (Optional)
- 30 - Fuel shut off valve control (if installed)

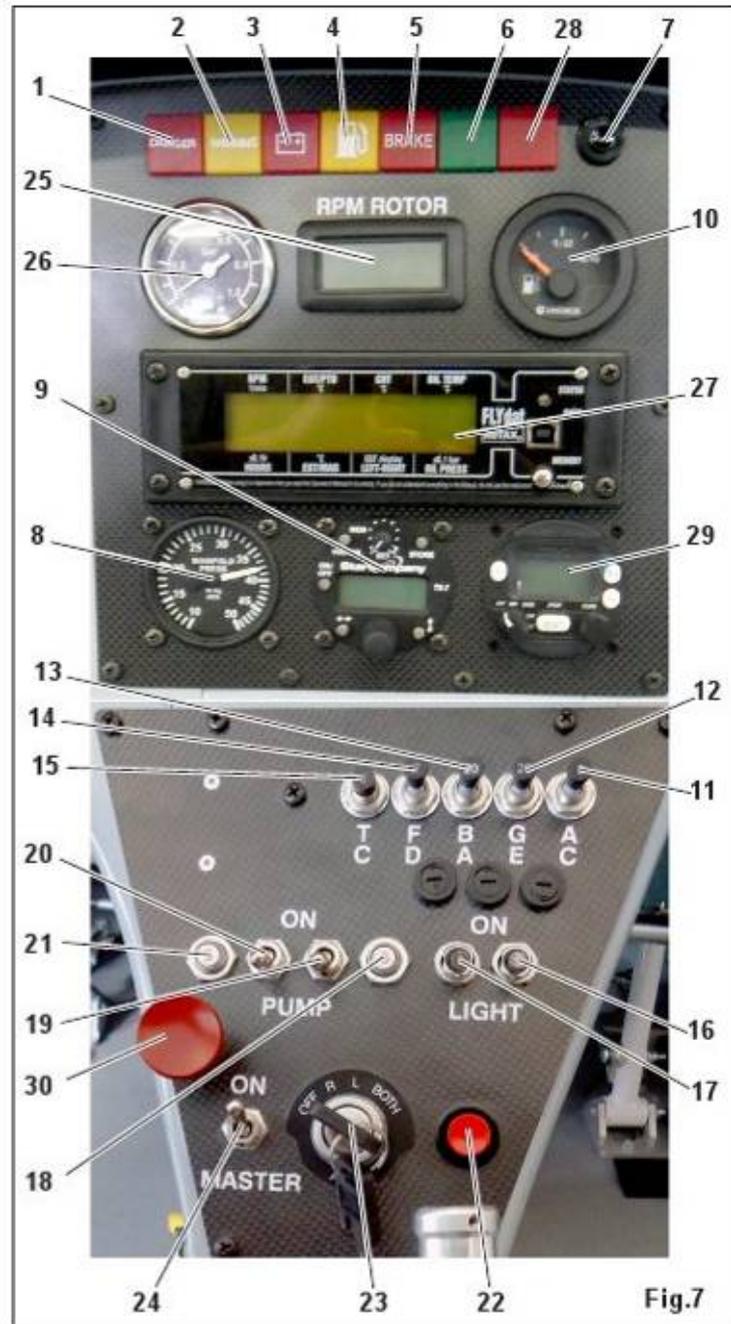


Fig.7



1) RED light - Danger - Overpressure

This warning light indicates an over-pressure condition in the turbocharger. See chapter 5 for the emergency procedure to apply.

2) ORANGE light - Warning

This warning light indicates either an out-of-parameter reading from the turbocharger system or a faulty sensor. See chapter 5 for the emergency procedure to apply.

3) RED light - Battery

This warning light indicates that the battery is not charging. It comes on when the battery charging system is not functioning. When the engine is started it lights up when the MASTER is ON. It should deactivate when engine rpm is over 1500, if it does not, then shut down the engine and get in touch with an authorized maintenance service. See chapter 5 for the emergency procedure to apply in case it activates during flight.

4) YELLOW light - Fuel reserve

When this lights up it indicates that there are about 8 litres of fuel remaining, corresponding to approximately 10 minutes of flight.
Land within 10 minutes from the activation of this light to avoid engine shut down due to lack of fuel.

5) RED light - Rotor brake

When this light is "on" the rotor brake lever is engaged.

6) GREEN light - Trim

When this light is "on" the pitch trim is fully forward.

7) Fuel reserve warning light TEST push button ON

Pushing this button the low fuel warning light (4) should come on; if it does not then maintenance of the warning light is required.

8) Manifold pressure indicator "MAP"

Manifold pressure MAP is detected via a filtered tube inserted into the carburettor balance pipe.

The range of the instrument is 0-50 inch/Hg.

The correct reading for the 100% power is 35.4inch/Hg.

The correct reading for the 115% power is 39inch/Hg.

When applying 115% power a brief transient of 39.9inHg lasting up to 10 seconds may be observed.

9) Radio VHF - Optional

For details see instructions/manual supplied with the instrument.

10) Fuel Level Gauge

Indicates the quantity of fuel remaining in the tank. When there are approximately 8 litres of fuel remaining the yellow reserve light comes on (4).

The reading of this gauge is not linear due to the shape of the tank.

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NOTE: The fuel gauge fitted to the M24C 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.

Typical fuel quantities:

Gauge reading	Approx fuel quantity
Full	42 litres
$\frac{3}{4}$	30 litres
$\frac{1}{2}$	20 litres
$\frac{1}{4}$	12 litres

11) Circuit breaker ACC (10A)

This circuit breaker protects the secondary electrical systems:

- Auxiliary fuel pump;
- Lights;
- Fuel level gauge;
- Trim;
- Optional systems

12) Circuit breaker generator GEN (20A)

This circuit breaker protects the alternator.

13) Circuit breaker battery BAT (20A)

This circuit breaker protects the battery supply line.

14) Circuit breaker FLYDAT FD (2A)

This circuit breaker protects the FLYDAT instrument and the rotor tachometer.

15) Circuit breaker TCU (5A)

This circuit breaker protects the engine Turbo Control Unit.

16) Strobe light switch STR - (Optional)

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.

17) 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.

18) Main fuel pump breaker (5A) button

In case of failure of the main fuel pump electrical system, the magneto-thermic switch activates and its push button pops out. Push in the button to re-arm the breaker.

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19) Main fuel pump switch

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

20) Auxiliary fuel pump switch

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

21) Auxiliary fuel pump breaker (5A) button

In case of failure of the auxiliary pump electrical system, the magneto-thermic switch activates and its push button pops out. Push in the button to re-arm the breaker.

22) Engine start push button

The MASTER switch ON enables the engine start push button.

23) Ignition key

The key allows to open the engine's ignition circuits. It permits to select four positions:

- OFF = ignitions not on - extraction and insertion position of the key
- R = ignition A on
- L = ignition B on
- BOTH = both ignitions activated



WARNING: In flight the key must always be in the 'BOTH' position, except when completing the ignition test during the pre-takeoff checks.

24) MASTER switch

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

25) Rotor tachometer (r.p.m.)

When the rotor is turning this digital tachometer indicates the rotor rpm.

26) Fuel pressure indicator

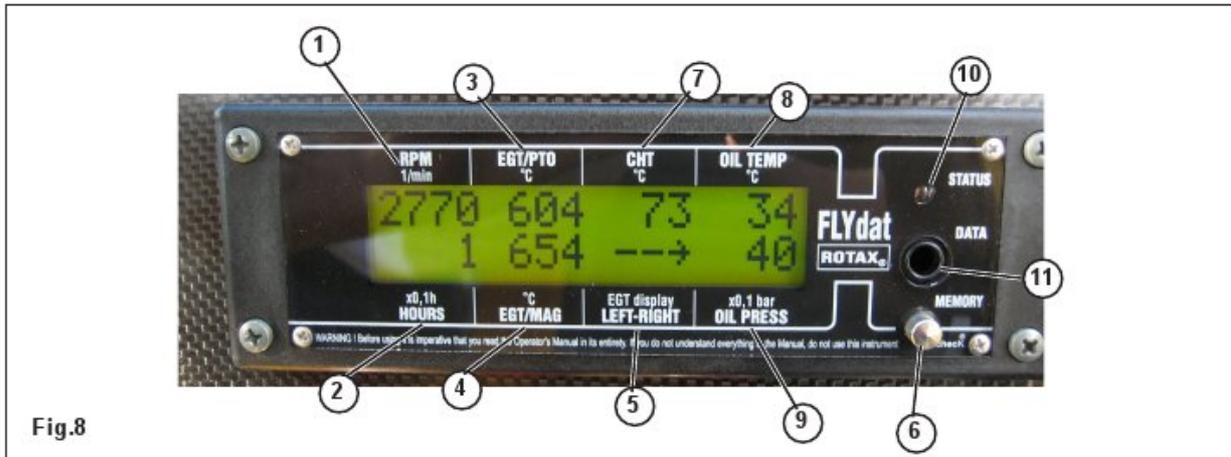
Fuel pressure is measured by means of a reduced diameter tube inserted in the carburettor fuel feed line. The range of this instrument is from 0 to: 1 bar

27) Digital engine monitoring system - FLYDAT (Fig. 8)

All the engine's instruments are grouped in the FLYDAT digital instrument supplied by ROTAX.

The FLYDAT instrument is placed on the upper panel of the central console. It allows the monitoring of 9 engine operational parameters:

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- Fig.8
- 1 - engine rpm (revolution per minute)
 - 2 - hour counter (0.1 h)
 - 3 - exhaust gas temperature EGT/PTO Arrow (5) to the left (LH rear cylinder) arrow (5) to the right (RH rear cylinder).
The EGT reading changes from right to left bank as indicated by the arrow (5). This variation happens every 9 seconds.
"PTO" stands for "POWER TAKE OFF" (rear cylinders). "MAG" stands for "MAGNETO" (front cylinders).
 - 4 - exhaust gas temperature EGT/MAG Arrow (5) to the left (LH front cylinder) arrow (5) to the right (RH front cylinder)
 - 5 - direction arrow (points towards RH or LH)
 - 6 - memory push button; press to monitor the maximum values reached
 - 7 - cylinder temperature CHT (cylinder no. 2)
 - 8 - oil temperature
 - 9 - oil pressure (0.1 bar)

In the standard configuration, all the temperatures are expressed in °C.

FLYDAT also shows:

- 10 - LED
 - if the light is green, indicates that the parameters are normal
 - if the light is red, indicates that the parameters are out of limits
- 11 - Input and output data connection

28) RED light

When illuminated during normal flight it indicates a fault in the fire protection 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 and therefore the possible presence of fire.

For the procedure to be adopted in this case, refer to Chapter 5.

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2.6.c CHOKE CONTROL LEVER (Fig. 9)

The choke (1) provides an increase in the percentage of fuel in the air-gas mixture at low engine r.p.m., so that it is easier to start in case of low ambient temperature.

To engage the choke, place the lever in vertical position. To disengage it, put it back in low position.

WARNING: When starting the engine with the help of the choke, the throttle lever (2) must be kept in its idling position (IDLE). Once the engine is started, do not use the choke for extended periods of time. Do not use the choke if the ambient temperature is greater than 20° C.



Fig.9 - Choke control lever

2.6.d THROTTLE LEVER (Fig. 10)

- The throttle lever (1) allows the engine speed (r.p.m.) to be varied and thus to vary the power delivered.
- Moving the throttle forward opens the carburetors' throttle valve, thus increasing the power delivered.
- Moving the throttle backward reduces the power delivered.
- The throttle's movement goes from 0 to 115% of maximum continuous power.
- During the travel from 0 to 100%, the power is delivered proportionally to the movement of the throttle lever, so that it can be modulated.
- Once the lever moves beyond the 100% position, the power delivered is not proportional to throttle movement, as the engine boosting does not take place in a linear manner and it is engaged abruptly.

Fig.10 - Throttle lever



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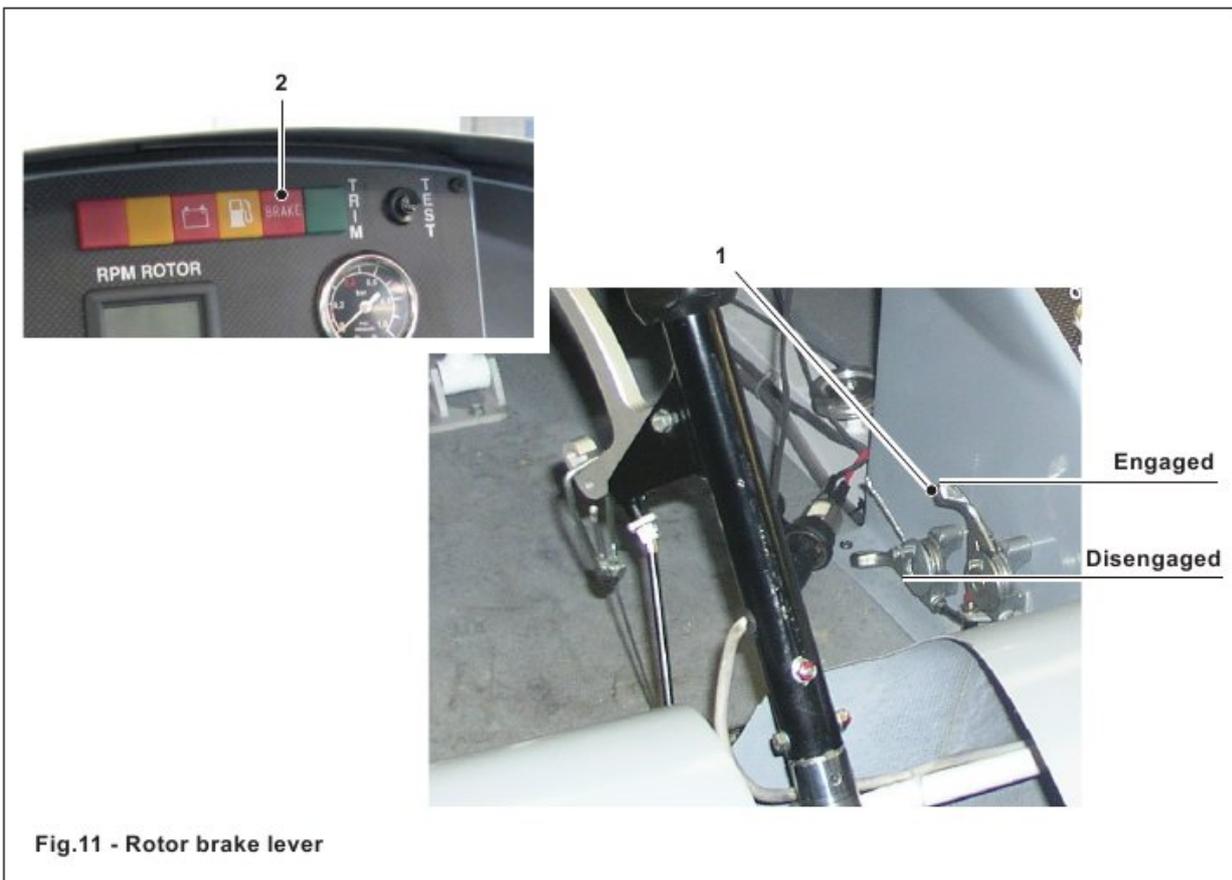
WARNING: 115% power can be used when necessary for takeoff operations, always taking care not to exceed the engine's maximum speed (5800 r.p.m.).

NOTE: The maximum continuous power is limited to 100% of the available power. The maximum available power (115%) can only be used for not more than 5 minutes. After 5 minutes, the red "DANGER" warning light is activated and the turbo's management system automatically reduces the delivered power until reaching maximum continuous power (100%).

2.6.e ROTOR BRAKE LEVER (Fig. 11)

This lever is used to stop the rotation of the rotor after landing and during all taxiing, holding-point and parking operations.

- To engage the brake pull up the lever (1) to vertical position; when the rotor brake is engaged the warning light (2) "BRAKE" comes on.

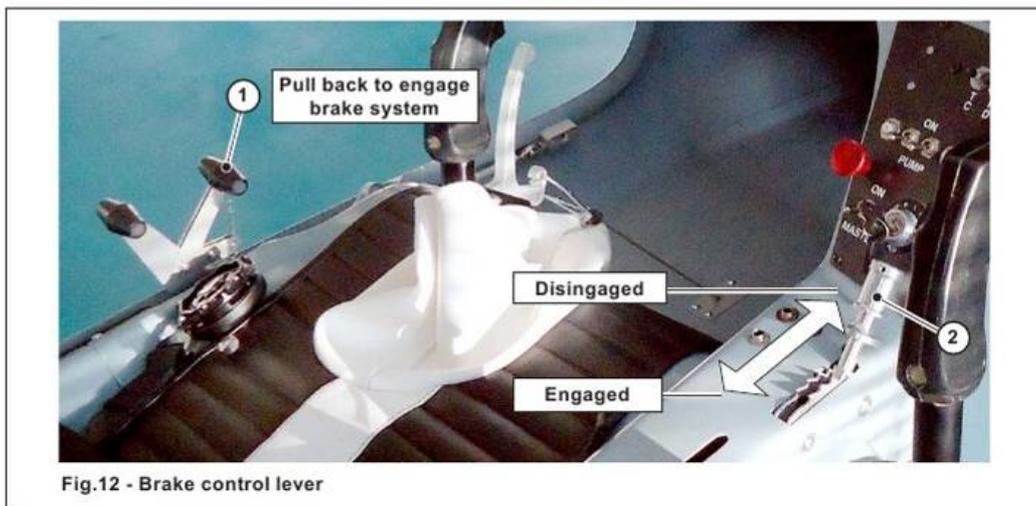


2.6.f BRAKE CONTROL LEVERS (Fig. 12)

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

Main brake lever (1) - To apply the brakes pull the lever (1) backwards. The braking action is proportional to the pull applied on the lever.

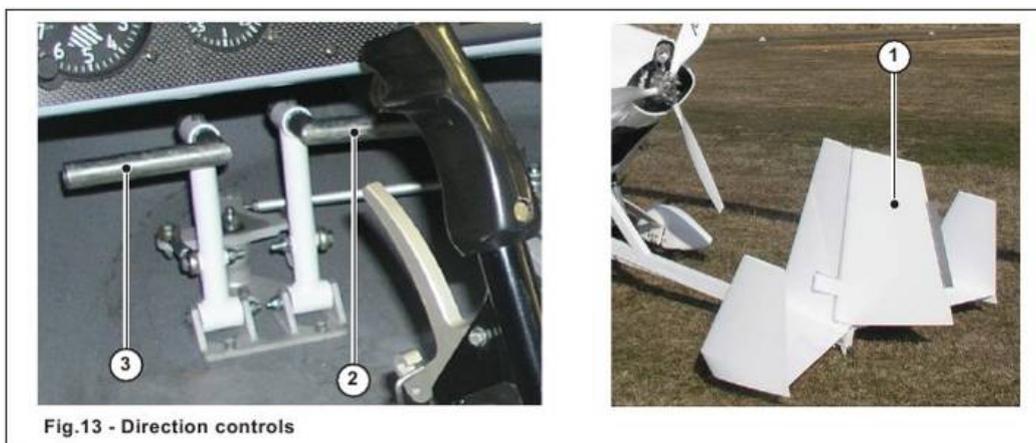
Parking brake lever (2) - To apply the brakes pull the lever backward. The braking action is proportional to the pull applied on the lever. To release the parking brake, lift up the top section of the lever and move the lever forward.



2.6.g DIRECTION CONTROLS (Fig. 13)

The control pedals operate the rudder (1) as well as the front wheel, thus allowing steering whilst taxiing

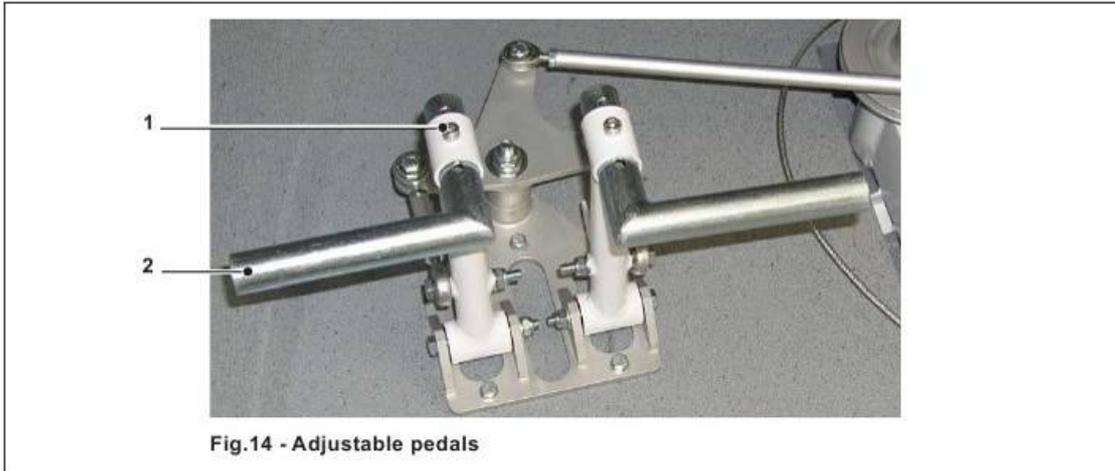
- Pressure on the right pedal (2) will cause right yaw/turn.
- Pressure on the left pedal (3) will cause left yaw/turn



2.6.g.a ADJUSTING PEDAL POSITION (Fig. 14)

It is possible to adjust pedal position to the height of the pilot. The procedure to follow for the adjustment is:

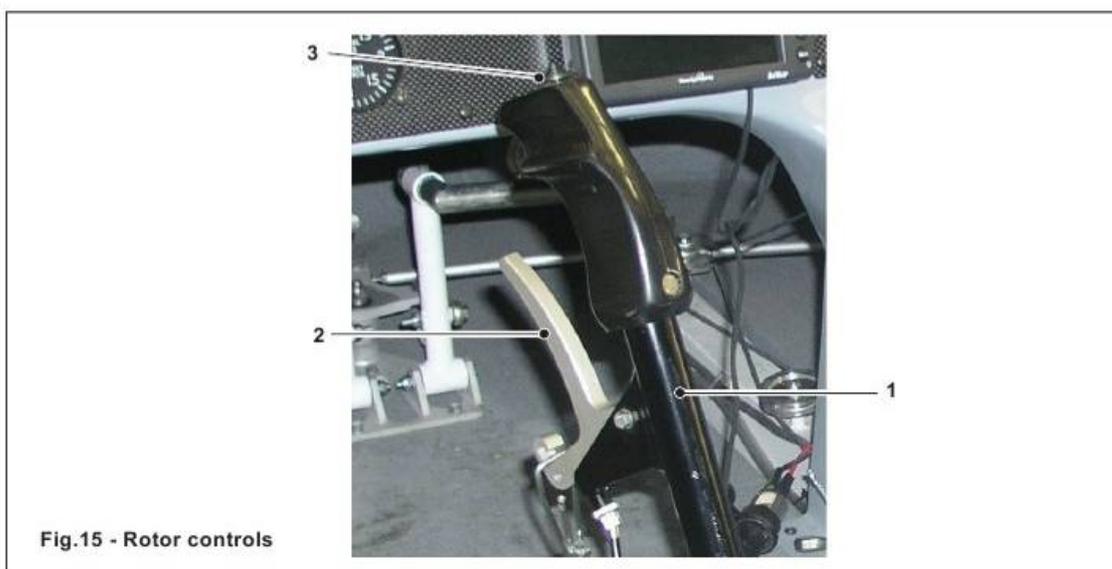
- Extract pin (1) and move the pedal (2) to the desired position corresponding to one of the positioning holes on the pedal.
- Re-insert pin (1) back into its position.



2.6.h ROTOR CONTROLS (Fig. 15)

The controls related to the rotor are placed on the control stick (1) and are:

- 2) Prerotation control lever
- 3) TRIM switch



2.6.h.a Control stick (Fig. 16)

The movements of the control stick (1) 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).

2.6.h.b Prerotation lever (Fig. 16)

This lever allows the engagement/activation of the prerotation. It is used during pre-take-off procedures. The degree of engagement of the prerotation is proportional to the degree of movement of the lever.

2.6.h.c Trim control switch (Fig. 16)

The trim switch is located on top of the control stick and allows in-flight adjustment of the aircraft's attitude allowing control over the aircraft's 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's trimmed speed must be made by means of brief movements of the trim switch

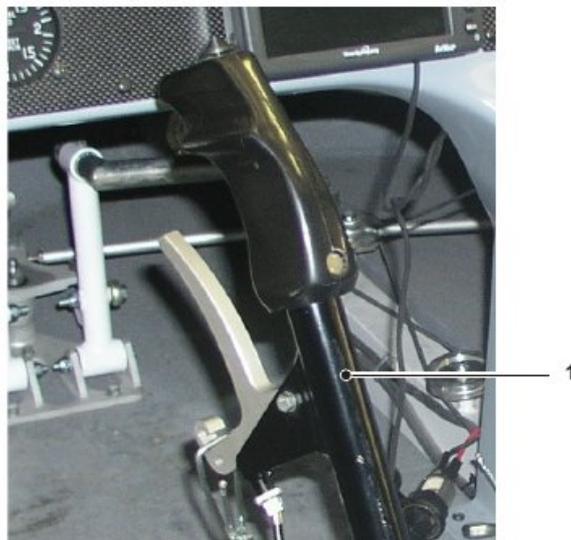


Fig.16

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2.6.i FUEL SHUT OFF VALVE CONTROL (Fig. 16b) (if installed)

The fuel shut off valve control (when installed) is located on the left side of the switch panel. This control is protected by a guard. In case of fire in engine compartment (fire detection lamp BLINKING) the fuel supply can be shut off:

- Push the guard to the side
- Pull out the fuel shut off control.



2.7. SAFETY BELTS (Fig. 17)

The safety belts (1) for both seats are 4-point "lap and shoulder belt" type with quick release metal buckle.





SECTION **3**

OPERATING LIMITS

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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 POWER LIMITATIONS

The Rotax 914 engine can provide maximum power of 115 hp for 5 minutes at a maximum engine speed of 5,800 rpm and 100 hp continuously at a maximum engine speed of 5,500 r.p.m.

The relation between r.p.m. and manifold pressure is described in the document “**Engine parameters**” in the **APPENDIX**.

3.4 ENGINE OVER-SPEED

The engine’s maximum speed is 5,800 r.p.m. In case of an over-speed:

From 5,800 up to 6,000 r.p.m. >>> Find the cause of the problem and correct it.

Over 6,000 r.p.m. >>> Inspect the engine in accordance with the manufacturer’s 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 115%.

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**M24C_AUS
M24C FLIGHT MANUAL**

		min	normal	max
OIL	C°	50	90 -110	130
CHT	C°	50	90 - 110	135
EGT	C°		750 - 850	950
Oil Pressure (bar)		1.5	2.0 - 5.0	7.0
Max Engine Rpm (5 minutes)				5800
Max Continuous Engine rpm				5500
Max Manifold Pressure (5 minutes)				39.9 inHg
Max Continuous Manifold Pressure				35.4 inHg
Fuel Consumption/hour (cruise)				16-20 Litres
Fuel Consumption/hour (max power)				25 Litres
Fuel Pressure (bar)		0.25	0.50 - 0.70	0.80
Fuel Pressure (psi)		3.5	7.25 - 10.25	11.6

3.5 SPEED LIMITS

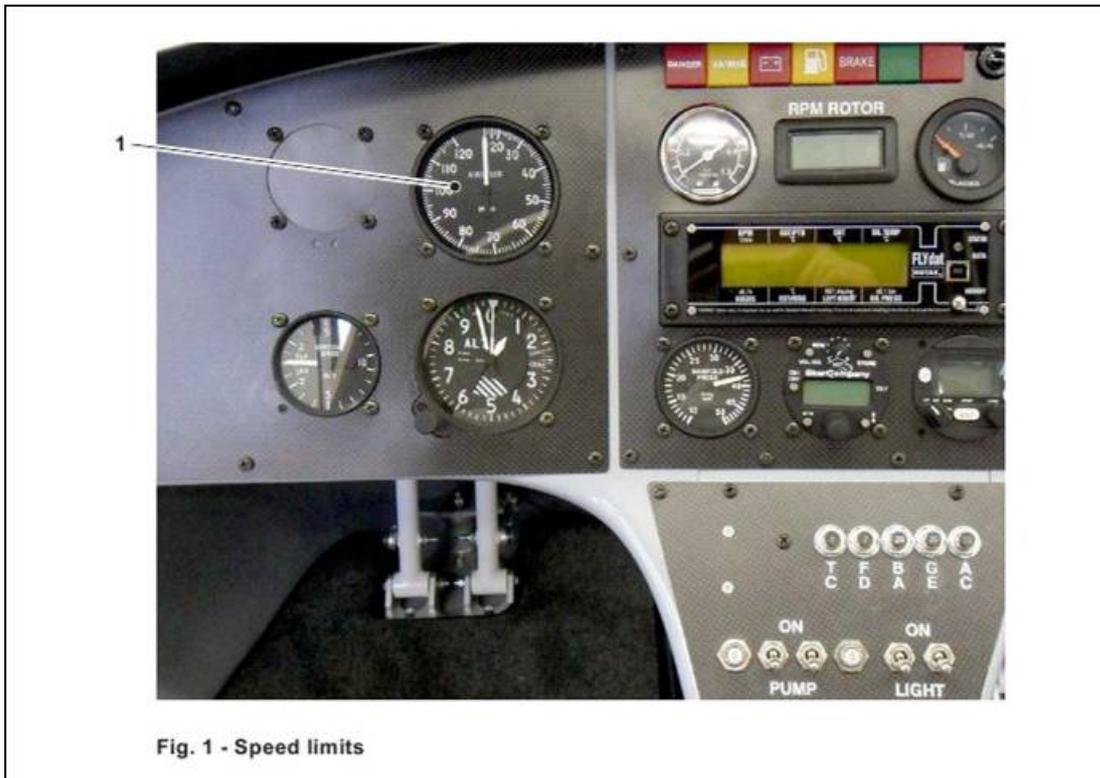
Never exceed speed (Vne) 105 mph [90 Kn]

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 (1).

Normal operating speed (Vno) 90 mph [78Kn]

This is the highest speed which may be maintained in turbulence and in any flight configuration without risk of damaging the gyroplane's structure (green range in the air-speed indicator (1)).

WARNING: Above 90mph [78Kn] movements in pitch must be limited to avoid overstressing the airframe. At speeds above 90mph [78Kn] 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.

Please see the APPENDIX for the flight manoeuvre limitations chart.

3.7 LOAD FACTOR LIMITATIONS

With a total aircraft weight of 500 kg, the maximum permissible acceleration load factor is equal to + 3 g. A higher load factor will permanently deform the gyroplane's 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's structure.

Flight configuration	load factor
500 kg	+ 3 g
400 kg	+ 4 g

3.8 FLIGHT ENVELOPE

Please see the APPENDIX for the flight envelope chart.

3.9 CENTRE OF GRAVITY LIMITATIONS

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

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

See Appendix 4 for centre of gravity limitation data



WARNING DANGER:

- Flight without an occupant of at least 60kg 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).

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3.10 LOAD LIMITATIONS

Maximum take-off weight..... 500 kg
Maximum landing weight..... 500 kg

3.11 BAGGAGE COMPARTMENT

The baggage compartment can hold a maximum of 10 kg.

3.12 EXTERNAL LOADS



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

3.13 TAKE OFF AND LANDING LIMITATIONS

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

3.14 ROTOR RPM MAX LIMIT

Max rotor rpm 550rpm

3.15 ELECTRICAL LOAD LIMITATIONS

The Rotax 914UL is fitted with an integrated AC generator with regulator that produces 12v DC at 20.8 amps. Therefore there is an excess of 7.88 amps available to power additional customer options

The electrical loads used by the standard installed equipment, plus the various customer options currently approved for installation onto the M24C are listed in the table below. It can be seen that if a customer wishes to install all the currently available electrical equipment modifications a situation of overloading the power system could occur. This will result in the battery warning light becoming illuminated.

Normal Procedures

If battery warning light becomes illuminated then non flight essential equipment must immediately be de-activated to reduce load on the alternator with the resulting effect of the warning light turning off

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LOW ENGINE RPM CONDITION

 **WARNING:** In a flight condition with low engine rpm the available electrical power from the engine is reduced such that the electrical warning light may become illuminated. In such an event non essential electrical equipment should be switched off until such time as the engine rpm is increased.

 **NOTE:** Prior to commencing the landing phase the strobe/position lights (if fitted) must be turned off before the landing light is turned on.

Emergency Procedures

If the warning light fails to turn off after load shedding activities are complete then this may indicate that failure of the generator may have occurred and standard emergency procedures, as defined in Section 5, must be adhered to.

	ITEM No.	EQUIPMENT	UNITS	TOTAL DEMAND PER UNIT (Amp)	TIME (min)	SIMULTANEOUS DEMAND (Amp)
BASIC AIRCRAFT ELECTRICAL ITEMS	1	FUEL PUMPS	2	8	CONT	8
	2	ENGINE INSTRUMENTS	1		CONT	
	3	WARNING LIGHTS	1		INT	
	4	T.C.U	1		CONT	
	5	LANDING LIGHT	1	2.92	INT	2.92
	6	TRIM	1	2.0	CONT	2.0
		GPS	1	1.5	CONT	1.5
		VHF Comm	1	1.8	INT	1.8
		TRANSPONDER	1	0.42	CONT	0.42
		POWER SOCKET	2	6.0	CONT	6.0
		POSITIONING/STROBE LIGHTS	3	1.4	CONT	4.2
				TOTAL		23.92*

**Note, total assumes that the landing light and positioning/strobe lights are not activated at the same time*



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SECTION

FLIGHT PROCEDURE

4

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4.1 GENERAL

This chapter 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	=	Chapter 3
Emergency procedures	=	Chapter 5
Flight in adverse conditions	=	Chapter 6

4.2 FLIGHT PLANNING

The reference data for flight planning are described in the APPENDIX.

4.3 TAKEOFF AND LANDING DATA

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

4.4 WEIGHT AND BALANCE

The limits of weight and balance are quoted in Section 3.
See the table in the “**CG Data**” **APPENDIX** for information on the cargo.

4.5 PILOT CHECKLIST

A concise pilot checklist is supplied as a separate document.

4.6 DAILY PRE-FLIGHT CHECKS



WARNING DANGER: 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 as per the following checklist.

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- 1 - INSTRUMENT PANEL
- 2 - CHECK PEDALS
- 3 - CHECK CONTROL STICK
- 4 - CHECK INSIDE OF COCKPIT
- 5 - CHECK THROTTLE LEVERS
- 6 - CHECK DOORS
- 7 - COCKPIT AND FUSELAGE, RIGHT HAND SIDE
- 8 - UNDERCARRIAGE, RIGHT HAND SIDE
- 9 - WHEEL AND WHEEL SPAT RIGHT HAND SIDE
- 10 - COOLANT LEVEL
- 11 - ENGINE OIL LEVEL
- 12 - ENGINE MOUNT, RIGHT HAND SIDE
- 13 - ENGINE, RIGHT HAND SIDE
- 14 - FREEDOM AND INTEGRITY OF CONTROL RODS
- 15 - TRIM SYSTEM
- 16 - CLOSING OF THE RIGHT HAND SIDE FAIRING
- 17 - ROTOR HEAD, RIGHT HAND SIDE
- 18 - RADIATORS
- 19 - PROPELLER
- 20 - PREROTATION SYSTEM
- 21 - TAILPLANE AND RUDDER
- 22 - ENGINE, LEFT HAND SIDE
- 23 - FUEL SYSTEM
- 24 - CLOSING OF THE LEFT HAND SIDE FAIRING
- 25 - UNDERCARRIAGE LEFT HAND SIDE
- 26 - WHEEL AND WHEEL SPAT LEFT HAND SIDE
- 27 - FUEL LEVEL
- 28 - ROTOR HEAD, LEFT HAND SIDE CONTROLS
- 29 - COCKPIT AND FUSELAGE, LEFT HAND SIDE
- 30 - NOSE WHEEL
- 31 - DYNAMIC HEAD
- 32 - ROTOR BLADES
- 33 - LIGHTING SYSTEM

 **WARNING:** INITIALLY THE DAILY/PRE-FLIGHT CHECKS MAY SEEM A LONG PROCEDURE, BUT WITH EXPERIENCE, THE PILOT WILL SOON BECOME FAMILIAR WITH ALL THE ASPECTS OF THE AIRCRAFT AND WHAT IS CORRECT OR NOT. THE CHECK IS ORGANIZED INTO A LOGICAL PATTERN THAT MAKES ONE COMPLETE CIRCUIT OF THE GYROPLANE AND BECOMES SECOND NATURE WITH PRACTICE. THIS PATTERN STARTS WITH THE INSPECTION OF THE INSTRUMENT PANEL AND CONTINUES CLOCKWISE AROUND THE GYROPLANE.

 **WARNING:** A well-executed daily/pre-flight check is one of the greatest contributing factors to good flight safety.

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4.6.1 INTERNAL CHECKS (Fig. 1)

1. INSTRUMENT PANEL

Check the Master switch (1) is in OFF-position and that all breakers (2) are switched OFF (pulled out). Examine instrument panel and instruments and ensure that all are in good working condition and that all nameplates, markings and placards are present and legible.

2. CHECK OF PEDALS

Check the condition and linkage of the rudder pedals (3). Ensure full and free movement over the entire range (nose wheel off ground).

Check the functioning of the pedals and their correct setting depending on pilot height.

Verify the integrity of the control rods.

Check the fastening of the pedal assemblies to the floor.

3. CHECK OF CONTROL STICKS

Verify full and free movement of the control sticks (4).

Verify that no damage has occurred to the control rods and verify the security of the rods.

Check the functioning of the prerotation lever (5) on the pilot control stick.

4. CHECK INSIDE OF COCKPIT

Ensure that no debris, equipment or cargo will cause any restriction to the controls.

Ensure that seats are secure and free from any damage.

Examine pilot and passenger restraint systems and make sure they are not damaged.

Pay particular attention to any cut, chafing, contamination, worn latch, loose or pulled stitching and any other factors you feel may cause you to doubt their durability and usability.



Fig. 1 - Inner checks

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5. CHECK OF THROTTLE LEVERS

Check that the full range of movement is available to the throttle levers (6), with no binding or restriction. Check the state of the brake lever (7). Make sure that the maximum braking power is available and that the lever returns to the “off” position when released.

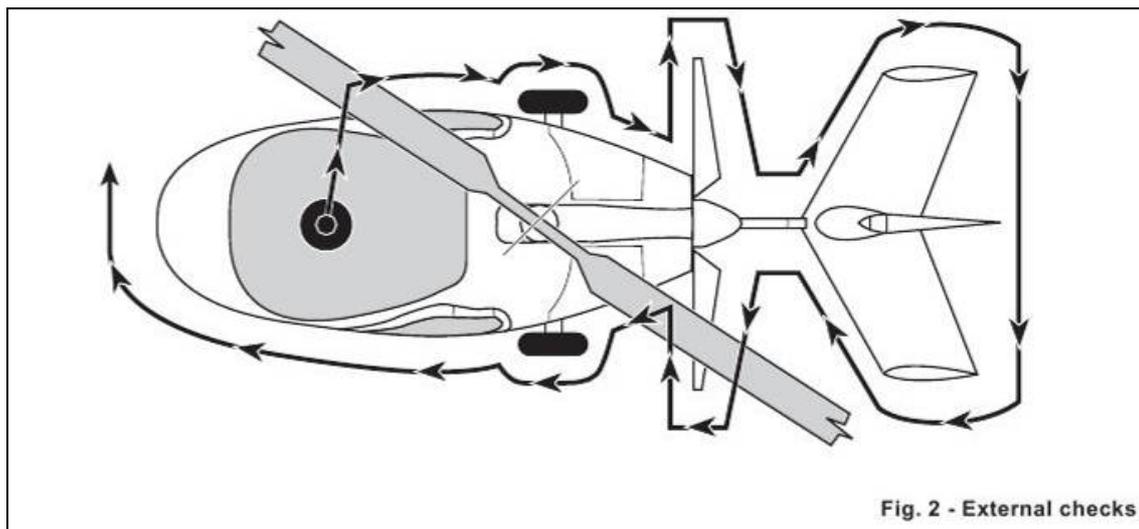
6. CHECK OF DOORS

Verify the correct attachment of the doors, the operational condition of the opening system stays and the locking system. Verify the integrity of the hinges, the integrity of the transparencies and the integrity of the binding of the transparencies to the frame of the door.



4.6.2 EXTERNAL CHECKS (Fig. 2)

The external check walk-round should be performed clockwise as shown in the picture (2).



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7. COCKPIT AND FUSELAGE, RIGHT HAND SIDE

Check the state of the external surface of the fuselage and remove any foreign object or dirt. Ensure it is clean.

Check that the windscreen is not damaged. Check the windscreen is clean and visibility is not impeded. Check the state and security of the fuel cap. Check correct fixing of all engine cowlings and check all screws are in place and tightened.

8. UNDERCARRIAGE, RIGHT HAND SIDE (Fig 3)

Check the state and safety of the leaf spring (1) and mounting bolts. Check there are no cracks, damages or impact marks.

9. WHEEL AND WHEEL PANT, RIGHT HAND SIDE (Fig. 3)

Check the state and security of the wheel attachment (2), hub, axle and wheel spat (3).

Check the whole tyre and make sure the inflation pressure is correct. Check the state, possible damage and rubbing marks.

Either roll the gyroplane forward or remove the wheel spat to check the whole tyre.

Ensure any dirt and debris have been removed from inside the wheel spat.

Examine as far as possible the state of the braking system.

Ensure the components of this system show no leaks or damage.

Check the brake lines and make sure there is no evidence of bending or chafing.



Fig. 3

4.6.3 ENGINE COMPARTMENT INSPECTION - RIGHT HAND SIDE (Fig. 4)

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

10. COOLANT LEVEL (Fig. 4)

Carefully open the expansion tank located on the top of engine (do not mistake it for the white overflow tank) and check the correct level of the coolant in the tank.

11. ENGINE OIL LEVEL (Fig. 4)

Check the engine oil level.

- Remove the cap (2).
- Pull out the dipstick (3) and check that the level of the oil is between the minimum and the maximum, if required top up with the oil of the type indicated in the "Refuelling" schematic given in the **APPENDIX**.

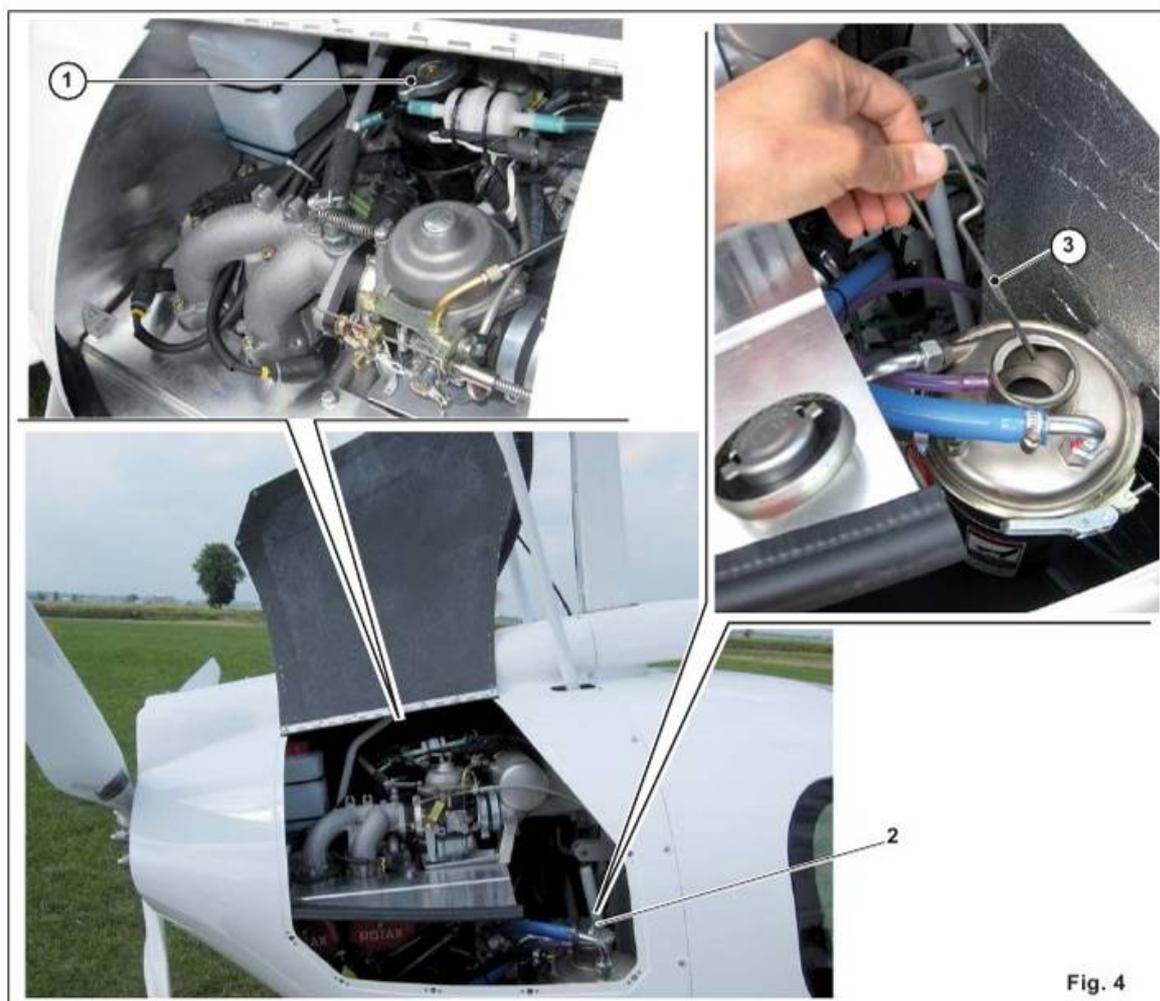


Fig. 4

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12. ENGINE MOUNT, RIGHT HAND SIDE (Fig. 5)

Inspect the welding points of the engine mount and check that there is no crack, damage or chafing. Check the integrity of the vibration dampers (1) and make sure the fixing bolts are tightened correctly.

13. ENGINE, RIGHT HAND SIDE (Fig. 5)

Check the security, corrosion, condition, leaks, damage and chafing of the following components:

- carburettors, linkages and cables
- airbox fixing (2)
- wirings and connections
- cooling system
- oil reservoir (4) and oil
- oil filter (5)
- spark plugs and their connection coverings
- engine probes, connectors and fasteners
- oil and coolant hoses and clamps
- TCU and its mount
- exhaust system, joints and mounts
- prerotation assembly, belts, cables and flexible shaft
- Check the state of the battery, and connecting wires, to look for signs of overheating, excessive venting, corrosion of terminals or leakage of acid.
- Check the voltage regulator and the starter contactor for signs of overheating, short circuits or corrosion

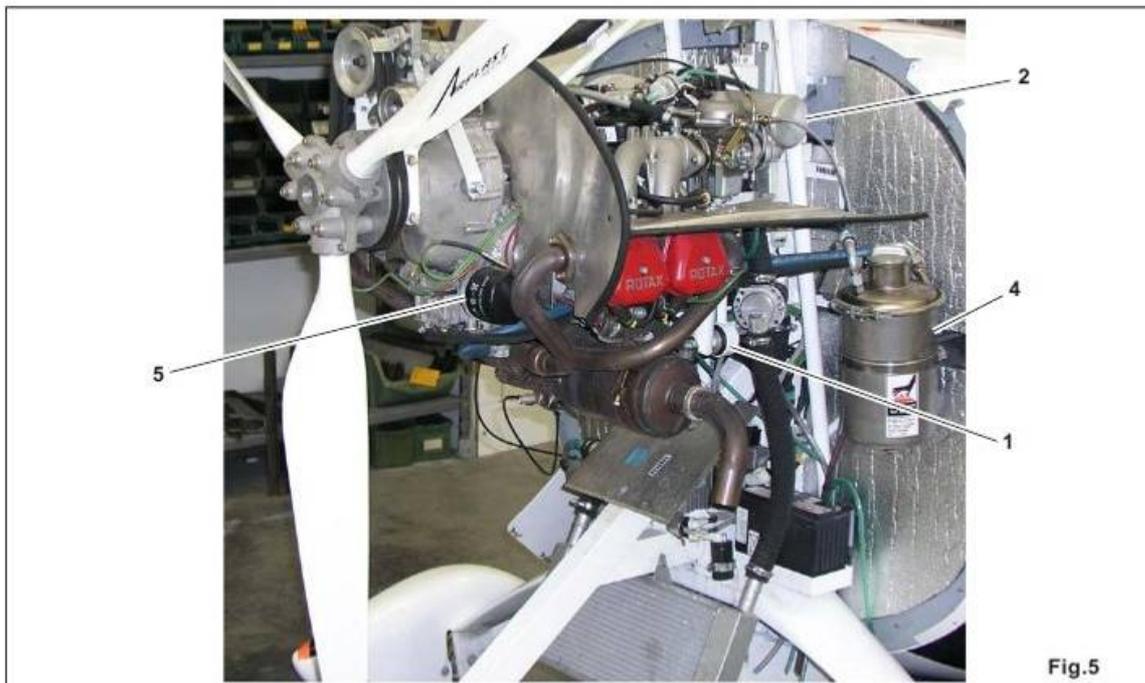


Fig.5

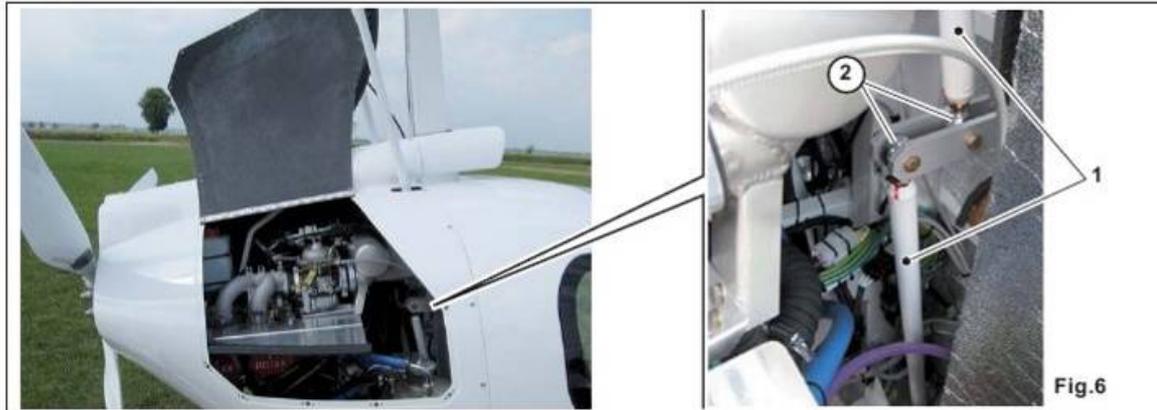
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14. FREEDOM AND INTEGRITY OF CONTROL RODS (Fig. 6)

Closely examine the condition and security of the safety points on the control rods (1), linkages, bearings and fibrelock nuts. There should be insignificant play in the “Uniball” rod end bearings (2) and no evidence of corrosion or damage.

The control rods (1) should be straight and undamaged.

The control rods (1) should be free to rotate slightly around their axis when gripped and given a light twist. Any undue force needed or inability to twist the bearing may indicate a problem of the bearing and should be further investigated



15. TRIM SYSTEM (Fig. 7)

Verify the correct fixing of the trim actuator (1) and the integrity of the control cable (2), springs (3) and electrical connections.

16. CLOSURE THE RIGHT HAND SIDE FAIRING (Fig. 7)

Close the right hand side fairing engaging the locks by mean of a screwdriver with 1/4 turn. Verify the correct closing and locking of the fairing and the integrity of the hinge



17. ROTOR HEAD, RIGHT HAND SIDE (Fig. 8)

Using a ladder if required, check that all the rotor (1) head nuts are secure and that all the safety locking systems are present and functional.

Examine as far as possible the rotor head and hubbar assemblies for cracks, damage, wear, corrosion and rubbing.

Check the state of the ring gear teeth and make sure they are not damaged. Make sure the flexible shaft (2) and the Bendix prerotation gear are adequately coated with grease.

Check the state of the ring gear (3).



18. RADIATORS (Fig. 9)

Inspect the radiant surfaces (4) and verify that there are no leaks of liquid, damage or chafing. Verify the integrity of the clamps and fixing points.

19. PROPELLER (Fig. 9)

Check the hub (2) bolts (1) of the propeller (3) support flange.

Check the whole surface of each blade for any signs of damage or debonding. Make sure the blades are clean.



20. PREROTATION SYSTEM (Fig. 10)

Check the correct positioning of the prerotation assembly and the tension of the belts (1).
 Check the functioning of the prerotation system and the freedom of movement (2) of the belt tensioning pulley lever (2) (3).
 Check the position of the pulley brake shoe and check the wear of the pulleys (5).

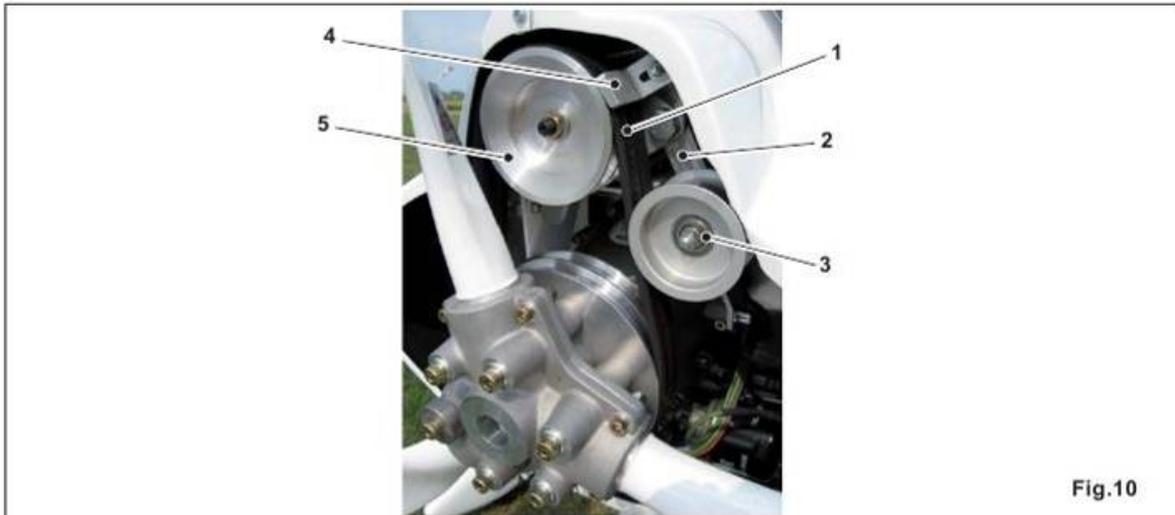


Fig.10

21. TAILPLANE (Fig. 11)

Check the lower and upper surfaces and make sure they are free of cracks or damage.
 Check the tailplane securing bolts.
 Check the security of the rudder (1) and make sure it is completely free to move. (Push down on the fin so that the nose wheel is clear of the ground, allowing free movement of the rudder).
 Check the condition and freedom of movement of the tail wheel (2).
 Check tension and integrity of the rudder cables and of the wire-locking of the turnbuckles.



Fig.11

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4.6.4 ENGINE COMPARTMENT INSPECTION - LEFT HAND SIDE (Fig. 12)

Inspection of the engine compartment must be performed after opening the cowl by releasing the fasteners.

22. ENGINE, LEFT HAND SIDE (Fig.12)

Proceed as for the right-hand side. Additionally:
Check the condition and security of the air filter.
Check the turbocharger unit and the waste gate.



Fig.12

23. FUEL SYSTEM (Fig. 13)

Examine the fuel pipes and connectors for serviceability and any sign of leakage. Check the security of the fuel pump assembly and fuel filter.

Draw a sample of fuel from the drain point (1) and check the sample for water or other contaminants.



Fig.13

24. CLOSING OF THE LEFT HAND SIDE FAIRING

Close the left hand side fairing engaging the locks by mean of a screwdriver with 1/4 turn. Verify the correct closing and locking of the fairing and the entireness of the hinge.

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25. UNDERCARRIAGE, LEFT HAND SIDE (Fig.14)

Check the condition and safety of the undercarriage bow (1) and mounting bolts.
Check there are no cracks, damage or impact marks.

26. WHEEL AND WHEEL PANT, LEFT HAND SIDE (Fig.14)

Check the state and security of the wheel (2), hub, axle and wheel spat (3).
Check the tyre and make sure the inflation pressure is correct (see relevant data paragraph).
Check for condition, damage and rubbing marks.

Either roll the gyroplane forward or remove the wheel spat to check the whole tyre.
Ensure any dirt and debris have been removed from inside the wheel spat.
Check the condition of the braking system.
Check the brake system components show no signs of leaks or damage.
Check the brake lines and make sure there is no evidence of kinking or chafing.



27. FUEL LEVEL (Fig. 15)

Open the lower left cowl (1) and check fuel level.

 **WARNING:** This operation must be done using the tank (2) transparency. Keep the gyroplane on all three wheels (nose down) so as to be able to correctly evaluate the quantity of fuel in the tank.



Fig.15

When refuelling it is imperative that the passenger door is fully open. In the event of a fuel spillage on the passenger door window, damage may occur to the transparency. Any fuel spillage on the cowling should be wiped off with a cloth.

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28. ROTOR HEAD AND CONTROL RODS, LEFT HAND SIDE (Fig. 16)

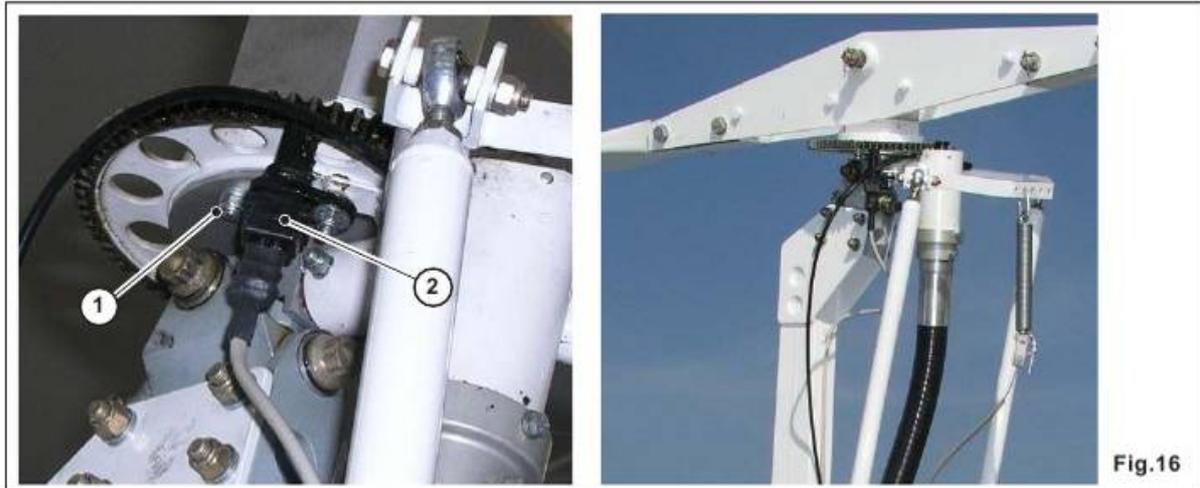
Proceed as per the right side. Additionally:

Check the rotor brake (1) and cables for condition and freedom of movement.

Check the condition and security of the rotor tachometer pick-up (2).

29. COCKPIT AND FUSELAGE, LEFT HAND SIDE

Proceed as per the right side.



30. NOSE WHEEL (Fig. 17)

Check the condition of the nose wheel (1) and that the tyre is correctly inflated.

Check that the full range of movement is available to the wheel and that it operates in the correct sense with the rudder.

Check the fork (2) for any sign of damage or distortion. Check that the wheel is free to spin, without play in the bearings. Make sure the axle nut is secure.



31. DYNAMIC INTAKE (Fig. 18)

Make sure there are no obstructions, dirt or other debris inside the dynamic intake (2).

32. ROTOR BLADES (Fig. 18)

Make sure the rotor blades are free from any damage or defect. Ensure the rotor blades are clean.

33. LIGHTING SYSTEM (Fig. 18)

Check the function of the lighting systems (3).



Fig.18



4.7 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 r.p.m. 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.**

4.7.1 ENGINE OPERATION LIMITS

		min	normal	max
OIL	C°	50	90 -110	130
CHT	C°	50	90 - 110	135
EGT	C°		750 - 850	950
Oil Pressure (bar)		1.5	2.0 - 5.0	7.0
Max Engine Rpm (5 minutes)				5800
Max Continuous Engine rpm				5500
Max Manifold Pressure (5 minutes)				39.9 inHg
Max Continuous Manifold Pressure				35.4 inHg
Fuel Consumption/hour (cruise)				16-20 Litres
Fuel Consumption/hour (max power)				25 Litres
Fuel Pressure (bar)		0.25	0.50 - 0.70	0.80
Fuel Pressure (psi)		3.5	7.25 - 10.25	11.6

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4.7.2 ENGINE STARTING (Fig. 19/20)



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 (1) , releasing the door locks using the lever (2).
- 2 - Sit inside the gyroplane (3), fasten seat belts (4) and helmet.

>>>>



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- 3 - CONTROL STICK - in forward position with retainer applied
- 4 - BREAKERS - switched ON
- 5 - WHEEL BRAKE – ON and LOCKED

- 6 - THROTTLE LEVER - in “minimum” position (idle)

- 7 - CHOKE - ON, lever in raised position (only if engine is cold)
- 8 - MASTER - switch ON
- 9 - KEYS - in BOTH position (3 clicks)

- 10 - AUX. PUMP TEST - ON / check “fuel press” >0,25 bar / OFF.
- 11 - MAIN PUMP - ON / check “fuel press” indication >0,25 bar.
- 12 - PROPELLER - clear

Fig.20





WARNING DANGER: Shout "CLEAR PROP".

13 - STARTING - push start button



WARNING: Should starting be 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 - check the pressure on the FLYDAT instrument (14) and make sure the pressure rises to within the specified operating range (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 (6) - Set to reach a speed of 1.800 ÷ 2.000 r.p.m.

16 - AUXILIARY PUMP - ON. Check pressure parameters fuel pressure >0,25 bar.

4.7.3 STARTING FAILED

Should starting fail, repeat the procedure from point 5 onward, moving the throttle lever slightly forward.

IF THE EXTERNAL TEMPERATURES ARE LOW: CHOKE - ON / lift the choke lever (7).

Repeat the complete starting procedure.

CHOKE - OFF / lower the choke lever (7) within one minute after the engine has started.

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4.8 TAXIING TO THE HOLDING POINT



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/or objects, especially when 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/or 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 gyro. Additionally, the rotor brake should always be engaged when the gyroplane is not moving.



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

4.8.1 EQUIPMENT CHECK

RADIO - On if required
INTERCOM - On if required
NAVIGATION SYSTEMS - On if required
HOUR COUNTER, CLOCK - Check
RADIO CALL - As required

4.8.2 CHECK PRIOR TO TAXIING

MOVEMENT AREA - Clear
ROTOR BRAKE - ON, brake lever raised, brake warning light on
ROTOR - Check for obstacles, rotor aligned along longitudinal axis
BRAKES - Check effectiveness
FLIGHT INSTRUMENTS - Check

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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 r.p.m.

4.8.3 CLOSING THE DOORS (Fig. 21)

- Grab the frame of the door (1) and lower it;
- close the door (1) pulling the knob (2);
- engage the pins of the locking system lowering the lock lever (3).

Visually check that both pins (front and rear) have engaged securely.



NOTE: In high ambient temperatures it is possible to taxi with the doors open. In this case slow taxiing is recommended to avoid stress on the door attachment points.



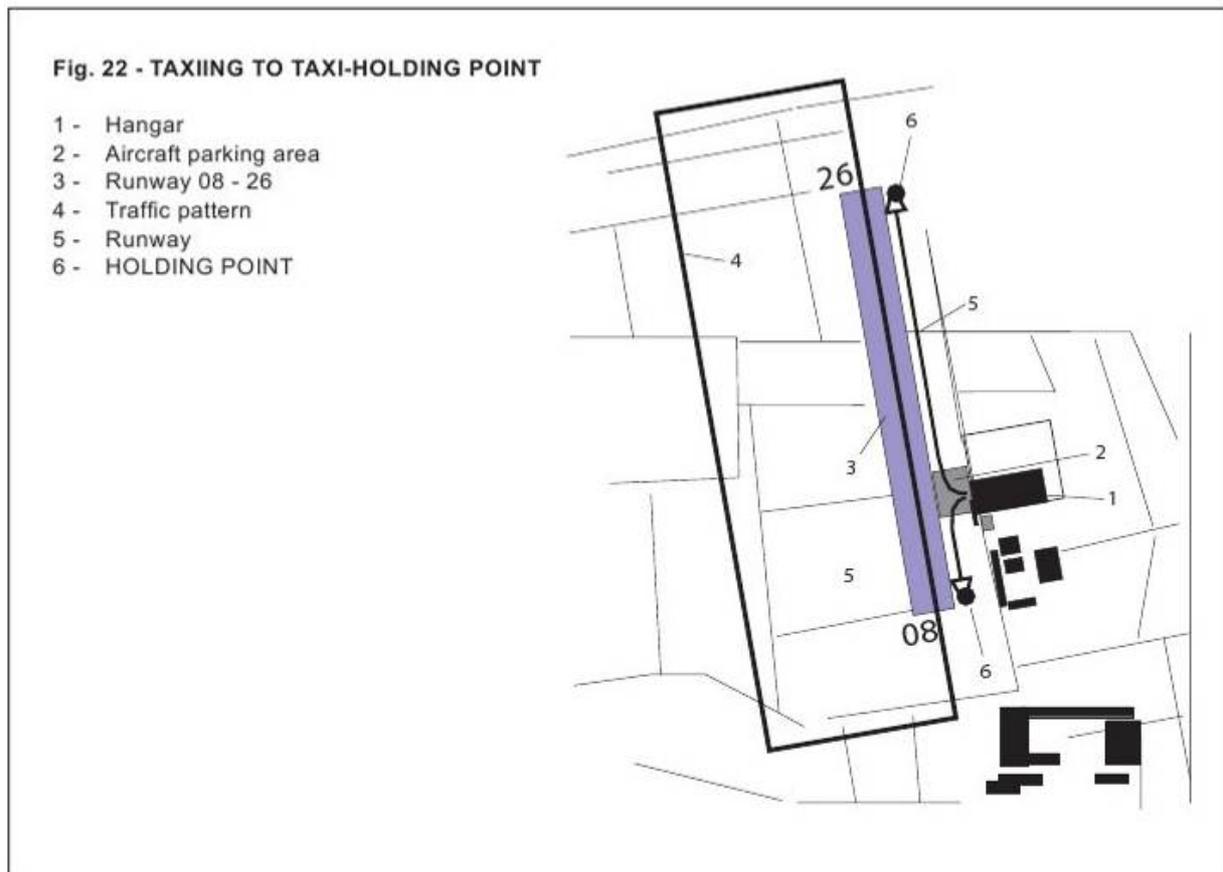
NOTE: For information regarding the minimum steering radius please refer to chapter 2.



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4.8.4 TAXIING TO HOLDING POINT (Fig. 22)

Purpose	Move the gyroplane from the parking area to the holding point.
Preparation	Control stick fully forward. Start engine. Visually check for obstructions.
Execution	Identify runway to use. Gently vary the throttle to start taxiing to holding point. Steer with the rudder pedals Control taxiing with throttle lever and brakes Always stop the gyroplane before crossing the runway and make sure there is no traffic before crossing Stop the gyroplane at the holding point



4.9 PRE-TAKEOFF CHECKS (Fig. 23)



NOTE: Before entering the runway and while at the holding point, execute the pre-takeoff checks as diligently as possible.

- 1 - CHOKE - OFF lever (1) lowered
- 2 - IGNITION TEST - set engine at 2.500 - 3.000 r.p.m. - Use key (2) to select the ignition. Verify that r.p.m. drop is within 300 r.p.m. and that it does not exceed 150 r.p.m. between one ignition and the next one.
- 3 - Key (2) - in BOTH positions
- 4 - Switch (3) lights - ON
- 5 - FUEL RESERVE - press test push button (4) and check functionality of the warning light (5).
- 6 - MINIMUM TEMPERATURES - reaching minimum parameters (50° OIL and CHT)
- 7 - ENGINE INSTRUMENTS - check within limits
- 8 - TRIM FULLY FORWARD - move trim switch forward, check that green warning light (7) is ON
- 9 - FLIGHT INSTRUMENTS - check (set altimeter (8))
- 10 - DOORS CORRECTLY CLOSED - Lock lever lowered and doors engaged



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's and passengers doors should be pushed from inside the cabin to ensure both forward and aft catches are secure. Should the door come open in flight it is unlikely to become detached or adversely affect the aircraft's handling. However should a door open in flight it is recommended that the airspeed be limited to around 50-60 MPH [43-52 Kn] and the aircraft landed in an unhurried and controlled fashion as soon as is possible.

- 11 - ROTOR BRAKE - OFF, lever (9) lowered, BRAKE OFF warning light (10)
- 12 - CONTROL LOCK- release and check freedom of control
- 13 - CONTROL STICK - keep at front limit stop
- 14 - AIRPORT TRAFFIC CHECK

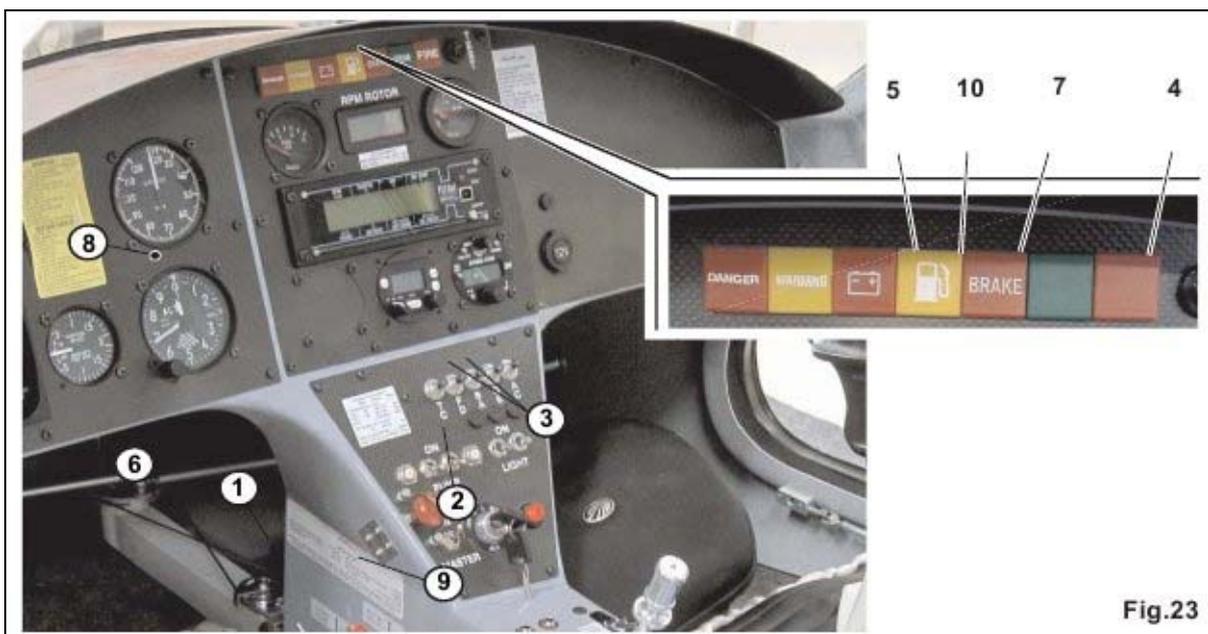


Fig.23

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4.10 ROTOR PREROTATION (Fig. 24)

 **CAUTION:** Keep the control stick fully forward until reaching 130 r.p.m. rotor speed.

- 1 - ALIGNMENT - runway alignment
- 2 - ENGINE SPEED - set at 1.800 r.p.m.

 **CAUTION:** A lower or higher engine speed may worsen the prerotation procedure performances.

- 3 - PREROTATION ENGAGING - gently operate the prerotation lever (1).
Keep engine speed at 1.800 r.p.m.

 **CAUTION:** The prerotation must be engaged in a gentle manner, without sudden movements of the lever (1), so as not to stress the system and avoid stopping the engine.

At 130 r.p.m. ROTOR

- 4 - CONTROL STICK - Place the control stick (2) in takeoff position (rear limit stop).
- 5 - PREROTATION 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 prerotation 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 to 200 rpm, proceed as for take off. This should be practiced with an instructor before proceeding in these conditions

AT LIMIT STOP OF PREROTATION LEVER

- 6 - ENGINE r.p.m. - Gently increase the engine speed until reaching 200 r.p.m. of the rotor. (standard prerotation).

 **WARNING DANGER:** The minimum rotor prerotation speed is 150 r.p.m. It is strictly forbidden to proceed with takeoff operations if the rotor r.p.m. is lower than the minimum value.

 **NOTE:** Under identical conditions, the length of the takeoff run depends on the rotor r.p.m. reached during prerotation.
The maximum speed of the prerotation system is 280 r.p.m.
The life of the prerotation system and its inspection frequency depend on the average rotor r.p.m. applied during the prerotation operation.

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WARNING DANGER: it is not possible to reach the minimum rotor r.p.m. during prerotation, stop the operation and return to the parking area.

7 - BRAKES - release (3).

8 - RELEASE PREROTATION LEVER - once the rotor turns at 200 r.p.m., quickly release the prerotation lever (1).



WARNING DANGER: It is strictly forbidden to operate the prerotation lever (1) other than during the prerotation procedure.



Fig. 25 TAKEOFF PHASES

- 1 - Engine starting
- 2 - Preflight checks holding point
- 3 - Rotor prerotation (increase speed until reaching 200 r.p.m.)
- 4 - Takeoff run
- 5 - Balancing leg
- 6 - Takeoff
- 7 - Takeoff distance above obstacle, 15 m
- 8 - Climb to altitude
- 9 - Turn in crosswind
- 10 - Crosswind leg
- 11 - Built-up areas, no flying over

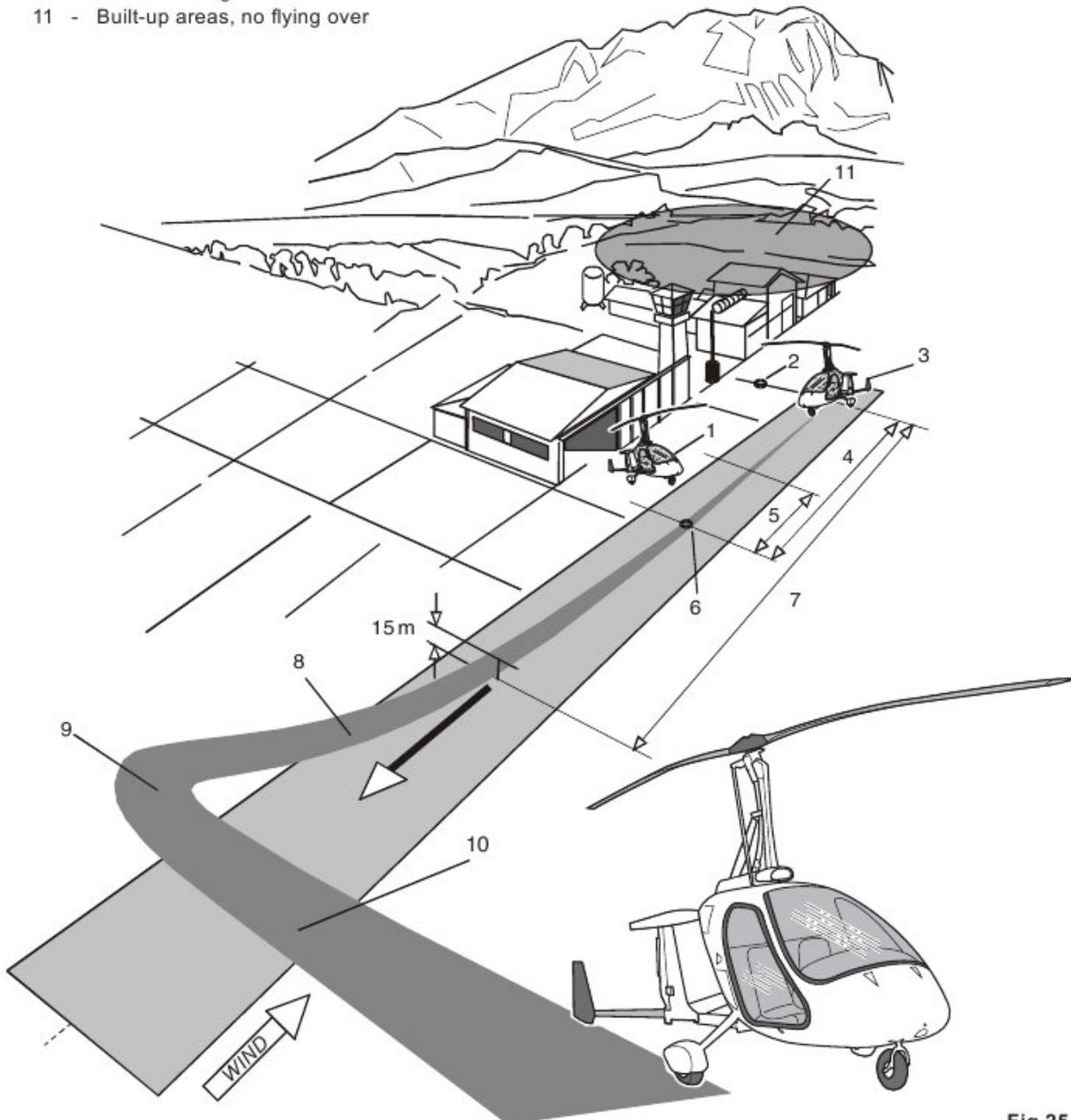


Fig.25

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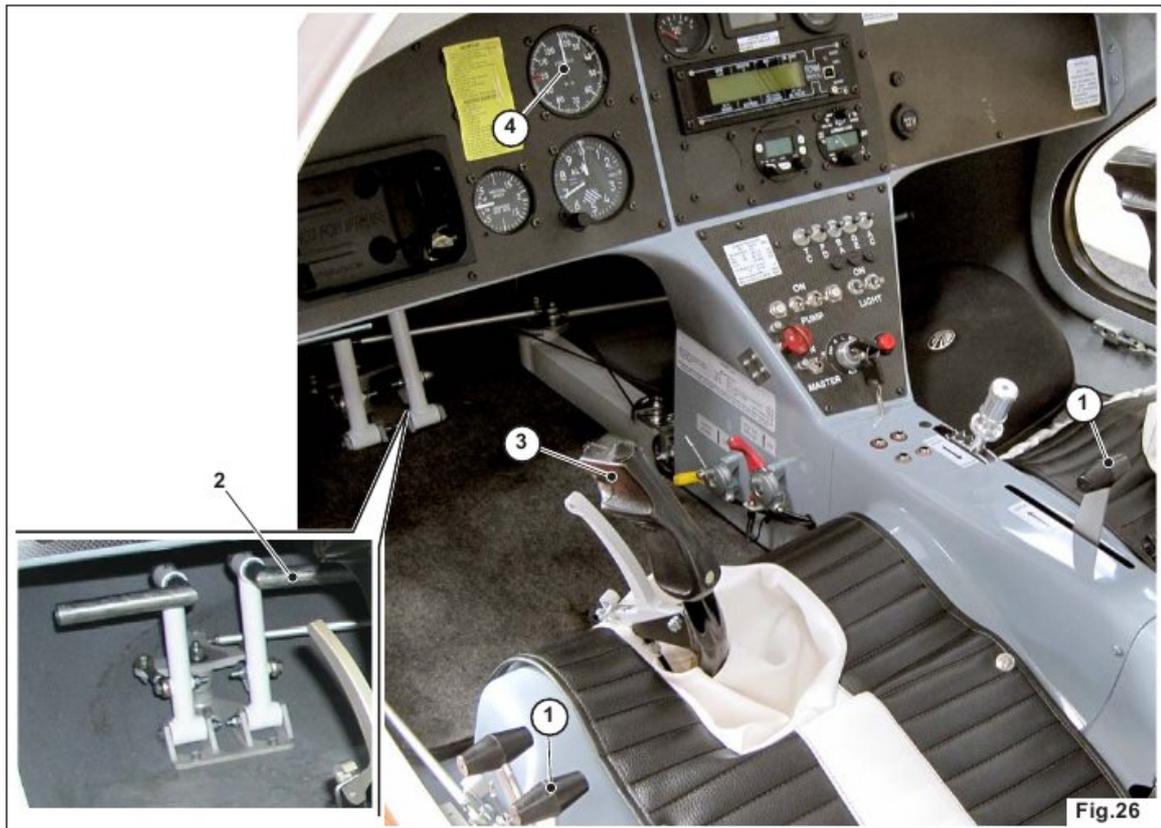
1 - THROTTLE LEVER (1) - Increase the throttle in a progressive and uniform manner.

 **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 r.p.m. is achieved during prerotation, acceleration must be gradual.
Engine rpm must be increased very carefully.

2 - ALIGNMENT - use the rudder pedals (2) (right pedal) to keep the alignment on the runway.



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- 3 - CONTROL STICK (3) - in takeoff position (rear limit stop).
Once the nose wheel has lifted, move the control stick forward and balance the gyroplane on the main wheels.

WARNING: During the balancing phase, the attitude must be so that neither the nose wheel (pitch down) nor the rear wheel (pitch up) touches the ground. Practicing of “balancing” or taxiing on tarmac runways for more than 30 minutes continuous, without flight, may cause the brakes and the wheels to overheat. This is normal; restrict these exercises to periods of less than 30 minutes continuous.

- 4 - TAKEOFF:
A) correct the roll induced by the engine torque (stick (3) to the left);
B) reach and maintain attitude so as to obtain 65 mph [55 Kn] (Best rate of climb speed).

NOTE: See the APPENDIX for more information on takeoff.

- 5 - CLIMB: speed for best rate of climb 65 mph [55 Kn]
6 - THROTTLE - CHECK: (lever (1) completely open 115% (5.500 r.p.m. at 115%))
7 - SPEED - 65 mph [55 Kn] (See air-speed (4))

NOTE: See the APPENDIX for more information on speed and rates of climb.

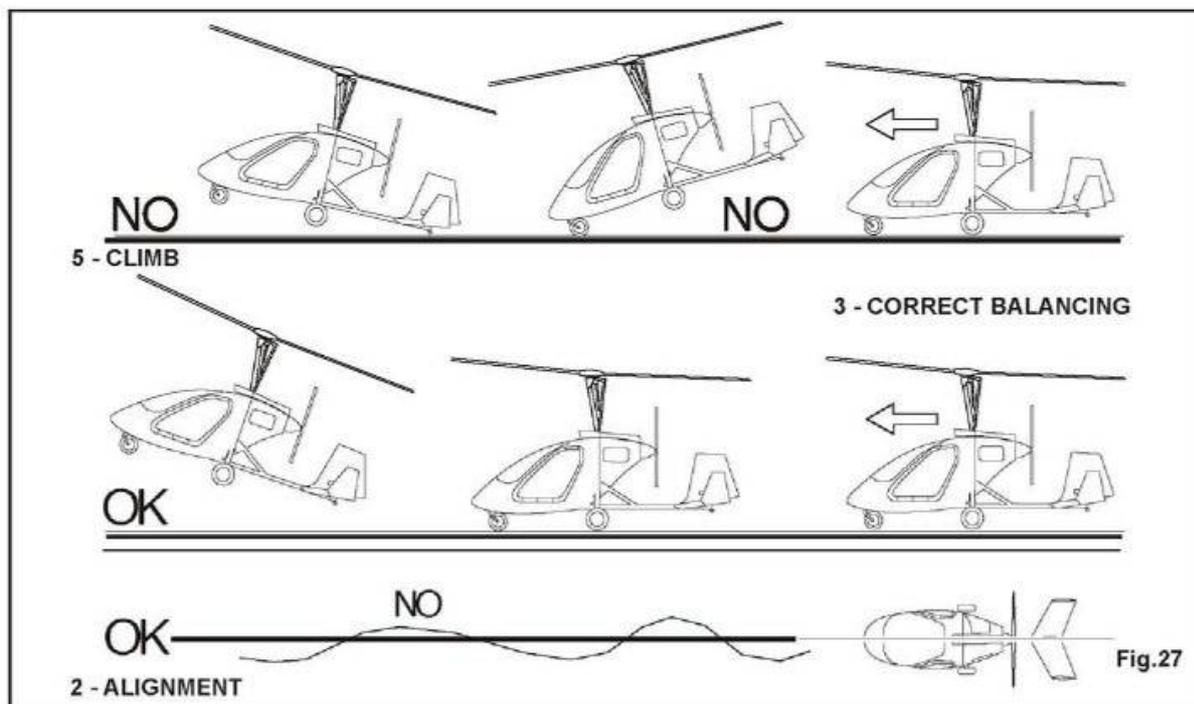




Fig.28

8 - TRIMMING - start trimming the aircraft for the desired airspeed.



NOTE: TRIMMING AFTER TAKEOFF

Maintain the required attitude in the climb by maintaining rearward pressure on the stick (3).

Operate the trim switch (5) 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 (green light (6)), 15 to 20 seconds of action are necessary before the trim control becomes effective.

Once you feel that the load on the control stick (3) has been reduced as required, reduce the rearward pressure on the control stick and maintain a constant speed.



NOTE:

TRIM SWITCH BACKWARD (5) = nose up trim = reduced speed
TRIM SWITCH CONTROL (5) = 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.

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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.

- 9 - OPERATIONS upon reaching a safe altitude (300-500 ft).
- A) brakes - momentarily apply them to stop the rotation of the wheels.
 - B) power reduction - if there are no obstacles, reduce the power
- 10 - LEVELLING - reduce the engine power as necessary for level flight 50 ft before reaching the desired altitude; lower the nose to maintain airspeed.
- 11 - CRUISING - Set the engine power necessary to maintain the desired height and speed. Adjust the attitude with small corrections of the trim so as to maintain the desired speed. Check all the flight parameters and take care not to exceed the specified values.

4.11.1 TAKEOFF WITH CROSS WIND

During takeoffs with cross wind, pay attention to maintaining alignment with the runway. The takeoff 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 cross wind, 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's strength and speed and should be appropriate to keep the gyroplane aligned with the runway axis.



WARNING DANGER: Before taking-off with strong cross wind, it is necessary to evaluate its intensity and to operate only if it is possible to respect the limits of that intensity.

Maximum cross-wind component for take-off is 25 knots.

Inexperienced pilots should consider their own skill level and not attempt to take-off in cross wind conditions which exceed their own capability.

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4.12 FLIGHT MANOEUVRES

4.12.1 CLIMB



NOTE:

Best rate of climb speed

65 mph [55 Kn]

Best angle of climb speed

55 mph [48 Kn]

Purpose	Gain of altitude
Preparation	Level attitude Speed - keep the predetermined speed Predetermined altitude Select reference point
Execution	Increase power (mm. 5.000 rpm.) Maintain speed 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.

4.12.2 DESCENT



NOTE:

Max. efficiency speed

65 mph [55 Kn]

Purpose	Loss of altitude
Preparation	Levelled attitude Speed - keep the predetermined speed Predetermined altitude Select reference point
Execution	Decrease power Maintain speed Attitude control Maintain reference point



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

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4.12.3 LEVEL FLIGHT

Purpose	Flight at constant speed and altitude
Preparation	Constant heading Select reference point
Execution	Set speed and power to maintain requested parameters Attitude control Possible trim adjustment

4.12.4 LEVEL TURNS (bank angle less than 15°)

Purpose	Variation of heading at constant altitude
Preparation	Level flight Preset speed Preset altitude Clear airspace
Execution	Select reference point Commence turn with control stick Reach and maintain required bank angle Manage attitude and speed Upon reaching reference point: Acting on the control stick, bring back the gyroplane in straight flight

4.12.5 LEVEL TURNS (bank angle greater than 15°)

Purpose	Variation of heading at constant altitude
Preparation	Level flight Preset speed Preset altitude Clear airspace
Execution	Select reference point Increase power as necessary Commence turn with control stick Reach and maintain required bank angle Use pedal to assist turn Manage attitude and speed Upon reaching reference point: Centralize rudder pedals Reduce power Using on the control stick, return the gyroplane to straight flight

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4.12.6 TURNING WHILST CLIMBING (AND DESCENDING)

Purpose	Turn while gaining (or losing) altitude
Preparation	Preset speed Level attitude Constant heading
Execution	Clear airspace Select reference point Increase (or reduce) power Commence turn with control stick (bank angle not more than 15°) Control attitude to maintain constant speed Upon reaching reference point: Reduce (increase) power 50 ft in advance Recover to straight and level flight attitude

4.12.7 SPEED CHANGE

Purpose	Change speed without variation of altitude and heading (e.g. from 65 to 80 mph [55 to 70 Kn])
Preparation	Level flight Constant speed Constant attitude Select front reference point
Execution	Increase power Vary attitude as necessary Maintain alignment to reference point Reach preset speed Use trim

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4.13 UNUSUAL MANOEUVRES

4.13.1 SLOW FLIGHT AND FLIGHT BEHIND THE POWER CURVE

Purpose **Reduce** speed until reaching flight behind the power curve conditions
65 mph -> 40 mph [55 Kn -> 35 Kn]

Preparation Constant **heading**
Head-**wind**
Level flight 400 ft -65 mph [55Kn]

Execution **Reduce** engine power
Maintain attitude

Upon reaching 40 mph [35 Kn]:
Increase power to maintain altitude

To regain speed:
Change attitude to increase speed
Reduce power upon reaching 65 mph [55 Kn]

4.13.2 VERTICAL DESCENT

To descend vertically at zero forward speed, follow these indications:

1. Preparation:

- a. head-wind
- b. safe height

2. Throttle lever:

Partial reduction compared to level flight values

3 Attitude management:

- a. pull the: nose up gently
- b. reduce forward speed

4. Directional control:

Keep aligned with a reference on the horizon

5. Reaching zero speed:

Do not increase the nose-up attitude

6. Recovery:

- a. move the control stick forward
- b. gradually increase the power to: level flight values
- c. keep aligned with a reference on the horizon

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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.

4.13.3 LARGE POWER CHANGES



WARNING: In manoeuvres involving sharp increase in power settings from low power to high power (turbo setting) the M24C may exhibit a tendency to roll right as a reaction to the engine torque. We recommend that pilots increase power from low power to 100% before then increasing to 115% to avoid undue roll to the right. It is also recommended that the simultaneous application of control stick to the right whilst applying sharp power increases is avoided.

4.14 LANDING MANOEUVRES



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.

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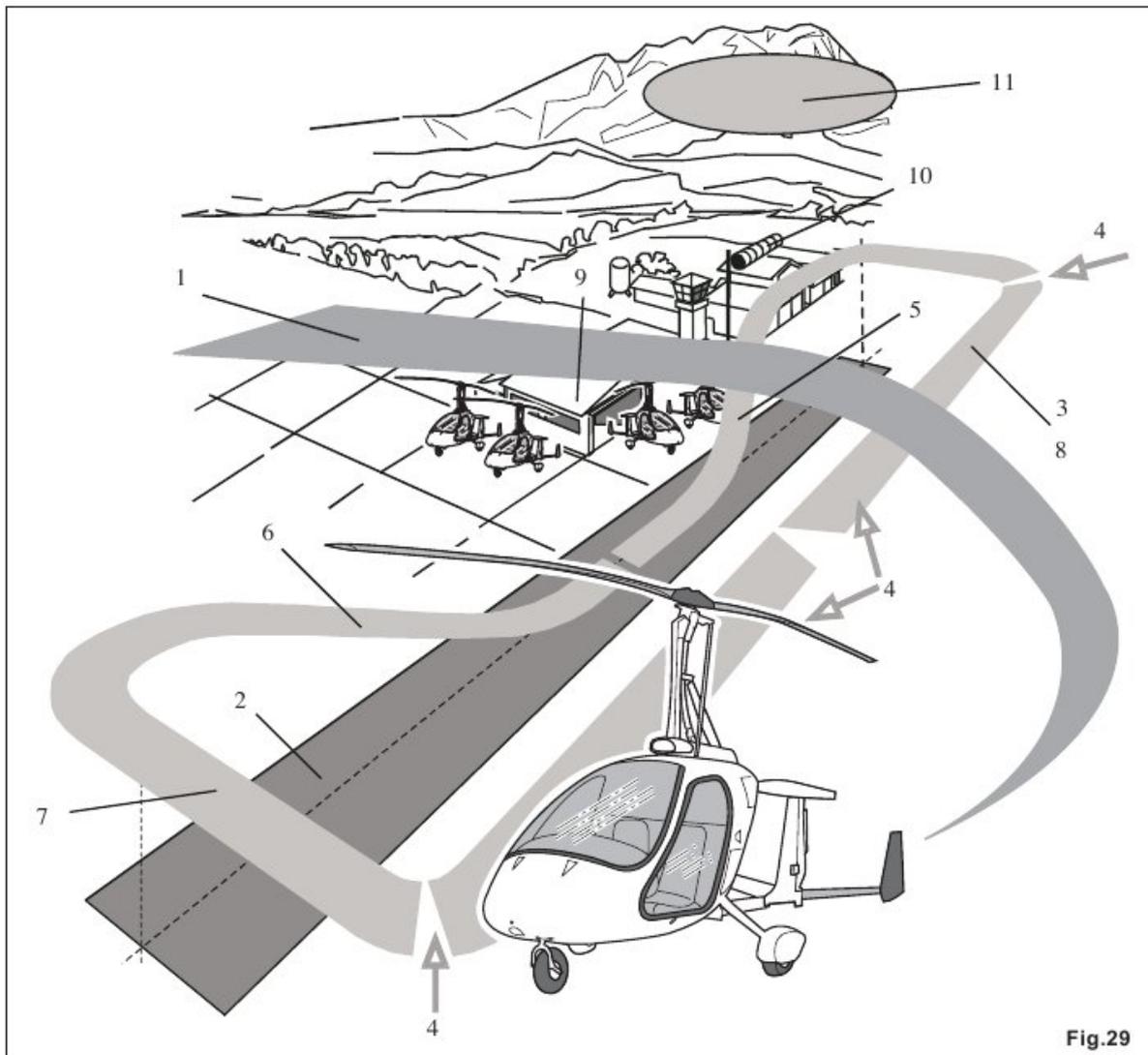
Fig. 29 BEFORE LANDING

A) - FLY OVERHEAD AND CHECK THAT THE RUNWAY IS CLEAR

- 1 - Fly at altitude (600 - 1.000 ft QFE)

B) - LANDING AND TAKEOFF PATTERN

- 2 - Runway
- 3 - Pattern
- 4 - Pattern entries; use according to wind direction
- 5 - Final landing
- 6 - Takeoff leg
- 7 - Crosswind leg
- 8 - Windward side
- 9 - Hangar
- 10 - Wind-sock oriented according to wind
- 11 - Built-up area, no flying over



4.14.1 BEFORE LANDING (Fig. 29)

RUNWAY IN USE

Before entering the circuit

- a. Contact airport facilities via radio (if necessary)
- b. Check the whereabouts of other traffic
- c. Cross the runway at altitude and check the wind direction and strength
- d. Identify the runway to use

Entering the circuit

- a. Check the traffic pattern
- b. Correct attitude and power to reach 65 mph [55 Kn]
- c. First identify the runway in use, then - if possible - enter downwind at 45°, at preset speed and altitude

Downwind

- a. Enter according to the parameters indicated for the pattern concerned
- b. Check the engine parameters and make sure they are within normal operating limits

Base leg

- a. Maintain the specified altitude and speed
- b. Check the traffic on final and on the runway

On final

- a. Align with runway
- b. Reduce the power to idle
- c. Keep the best glide speed (65 mph [55 Kn])
- d. 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.).

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Fig. 30 APPROACH AND LANDING

- 1 - Wind-sock
- 2 - Pattern crosswind leg
- 3 - Downwind, check landing parameters
- 4 - Base, check traffic in final
- 5 - Final, alignment and descent (65 mph [55Kn], throttle lever idling, IDLE)
- 6 - First flare
- 7 - Flare in ground effect
- 8 - Contact with ground (control stick backward)
- 9 - Runway
- 10 - Hangar
- 11 - Built-up areas, no flying over

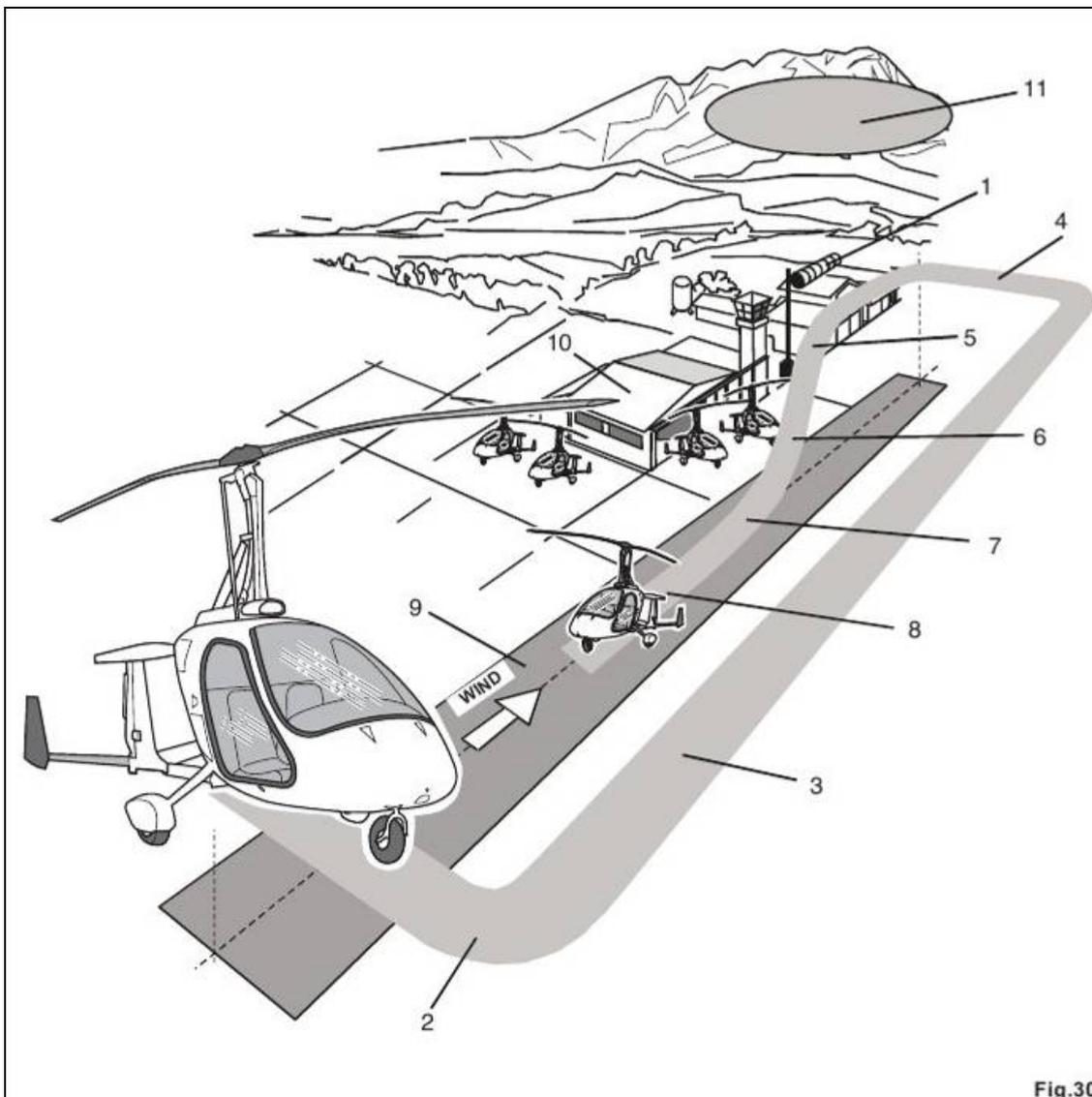


Fig.30



4.14.2 LANDING (Fig. 30)

Power - idle
Speed - 65 mph [55Kn]

Maintain alignment with runway with pedals and control stick.

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

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

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

To stop the gyroplane **upon contact with the ground**, progressively move the control stick to rear limit stop.

Use the rudder pedals to control the gyroplane's direction.

4.14.3 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 cross-wind component for landing is 25 kts. 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.

4.14.4 GO AROUND



NOTE: If pilot decides to abandon the landing and go around he should proceed as follows:

Throttle - throttle lever fully forward.

Pedal - use right pedal to maintain alignment with the runway.

Simultaneously ease the nose up.

Speed - reach and maintain 65 mph [55 Kn] while climbing.

Clear the runway axis and keep to the "dead" side.

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4.14.5 AFTER LANDING

Gyroplane stopped - control stick to front limit stop position.

Using the rudder pedals, **vacate the runway** by moving the gyroplane towards the exit.

Stop the gyroplane with the brakes.

TRIM - fully forward (switch forward) - green light QN.

Control lock - connect the control lock. KEEP HOLD OF STICK IN FULLY FORWARD POSITION

Rotor at 100 r.p.m. - engage rotor brake, brake warning light ON.



WARNING DANGER: In the presence of obstacles or people, or if the available space is not adequate, operate the rotor brake before the rotor reaches 100 r.p.m. This will reduce the rotor's stopping time as much as possible and maximise safety.



WARNING:
Move towards parking area.
First stop the rotor. Drive slowly towards the appropriate parking area just when the rotor is stopped.

4.14.6 ENGINE STOP (Fig. 31)



NOTE:
To stop the engine, the actions on the instrument panel must be done from right to left.

With gyroplane braked and in parking position.

- 1 - **ROTOR BRAKE** - ON lever (1) up and BRAKE warning light (2) ON
- 2 - **RADIO** and navigation instruments - OFF
- 3 - **STROBE and LIGHTS** - Switches (3) OFF
- 4 - **FUEL PUMPS** - Switches (4) OFF
- 5 - **KEY** (5)-OFF
- 6 - **MASTER (6) AVIONICS** - OFF

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4.14.7 OPENING THE DOORS

Lift the locking lever (7) 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.

4.14.8 BEFORE LEAVING THE GYROPLANE

Post-flight inspection - check for damages, impacts from foreign bodies, leaks or loss of fluids



Fig.31

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4.15 ORDINARY MAINTENANCE

Correct maintenance of the gyroplane avoids problems and issues that can compromise the safety of flight operations.

Complying with the maintenance schedule '045-00-24C_A' is strongly recommended.

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SECTION

EMERGENCY PROCEDURES

5

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5.1 GENERAL

This section contains the procedures to follow 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.

5.2 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.

5.3 GROUND EMERGENCY PROCEDURES

FIRE DURING STARTING:

In the event of a fire in the engine compartment the fire detection light (red "FIRE" indicator) will illuminate in a constant blinking manner.

Proceed as follows

SHUT OFF VALVE (if installed) — ON (Pull backwards)

FUEL PUMPS - OFF

THROTTLE LEVER - OPEN

KEY - upon stopping the engine - OFF

MASTER - OFF

ABANDON THE GYROPLANE

CALL EMERGENCY SERVICES

5.4 EMERGENCY PROCEDURES DURING TAKE-OFF

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's training to land safely or continue with the takeoff.

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5.5 FIRE IN FLIGHT

IF ENGINE FIRE:

In the event of a fire in the engine compartment the fire detection light (red "FIRE" indicator) will illuminate in a constant blinking manner.

Proceed as follows:

SHUT OFF VALVE (if installed) - ON (Move guard to one side and pull out fuel shut off control)

FUEL PUMPS - OFF

THROTTLE LEVER - OPEN

KEY - upon stopping the engine - OFF

MASTER – OFF

MAINTAIN ATTITUDE TO ENSURE ADEQUATE MANOEUVRE SPEED
PROCEED IN LINE WITH PROCEDURES OUTLINED FOR AN EMERGENCY LANDING

AFTER EMERGENCY LANDING:

ROTOR BRAKE - ON

ABANDON THE GYROPLANE

CALL EMERGENCY SERVICES

IF 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 above.

5.6 ENGINE FAILURE

In case of failure of the engine the following actions are recommended:

Taxing, prior to take-off

Maintain directional control, brake and stop where safe.

Immediately after take-off

Land immediately ahead

- a) If higher than 300ft - consider wind speed and direction. Select a forced landing site, into wind and/or up any slope.

Inflight

If at reasonable altitude

- a) Check magneto switch is set to "both"
- b) Check fuel pumps are on
- c) Check fuel gauge to confirm sufficient fuel
- d) Check choke is off
- e) Attempt engine re-start

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If engine fails to re-start

- f) Turn off engine magneto switches
- g) Flick Master switch to "OFF"
- h) Check Harnesses are tight
- i) Consider wind speed and direction.
- j) Select a forced landing site, in to wind and/or up any slope

5.7 ENGINE START IN FLIGHT

ENGINE START IN FLIGHT:

The engine should not be deliberately stopped in flight except as part of forced landing training under the supervision of a competent instructor

Where practical, to limit engine damage, leave the engine to idle at 3000 rpm for about 30 sec to cool before turning it off.

The engine can be restarted in flight using the usual starting procedure.



NOTE:

To restart the engine the key does not have to be turned to off, and then back, to start.

5.8 ABANDONING THE AIRCRAFT

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

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

If abandoning the aircraft with either the propeller and/or the rotors 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

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5.9 ENGINE FAILURE

EXAMPLE OF TEACHING PROCEDURE FOR ENGINE FAILURE

Preparation	Altitude 400 ft Speed 65 mph [55 Kn] 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 speed of 65 mph [55 Kn] Locate landing area Wind evaluation Master and fuel pumps - OFF (VERBAL INDICATION OF EXECUTION) Land within preset constraints

5.10 LIGHTS

- **BATTERY LIGHT**
Turn off all optional and non-essential equipment
(strobe lights, landing light, radio, GPS)
Land as soon as possible applying the emergency landing procedure.
- **RED LIGHT - DANGER**
Turbocharger pressure parameter exceeded. Land as soon as practicable.
Contact an authorized service centre to address the problem.
- **ORANGE LIGHT - WARNING**
One of the turbocharger system sensors is indicating a problem or has failed.
Land as soon as possible and proceed to the nearest authorized service centre to address the problem.
- **LOW FUEL LIGHT**
The fuel level is low.
Land within 5 minutes to avoid engine shut down due to lack of fuel.
- **BRAKE LIGHT**
The rotor brake lever is "on" and consequently the rotor brake is engaged.
Keep the rotor brake engaged during the taxiing and parking operations.
Disengage the rotor brake before entering the runway and preparing to fly.
- **GREEN LIGHT - TRIM**
Trim disengaged. Trim in fully nose-down position.
- **RED LIGHT – FIRE**
Fire detected in engine bay.
Follow emergency procedures defined in the event of a fire detection warning.

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ID	LIGHT TYPE	WARNING when the light is "on"	DESCRIPTION	ACTION TO BE TAKEN
1	RED	DANGER	Turbocharger supply	Reduce power to ensure engine is within normal operating limits. Land as soon as practicable. Contact an authorized service centre to eliminate the problem.
2	ORANGE	WARNING	One of the sensors gives a wrong reading or is not functioning	Land as soon as possible and proceed to the nearest authorized service centre to solve the problem
3	BATTERY	Generator overload or failed	The battery charging system is not functioning	If "on" during the normal motor functioning then non flight essential equipment must immediately be de-activated to reduce load on the alternator with the resulting effect of the warning light turning off. If the warning light fails to turn off after load shedding activities are complete then this may indicate that failure of the generator may have occurred, land as soon as possible and stop flying. Get in touch with an authorized service centre to eliminate the problem
4	LOW FUEL	Low Fuel Level	The fuel level is low	Land in 5 minutes to avoid the shut down of the engine because of lack of fuel
5	BRAKE	Rotor Brake Engaged	The lever of the brake rotor is in "on" position and consequently the rotor parking brake is engaged	Keep the rotor brake engaged during the taxiing and parking operations. Disengage the rotor brake before driving the strip and the beginning of the operations
6	GREEN TRIM	Trim Disengaged	Trim nose down end stroke	
28	RED	DANGER	Fire in engine Bay	Follow Emergency procedures for fire in engine bay.

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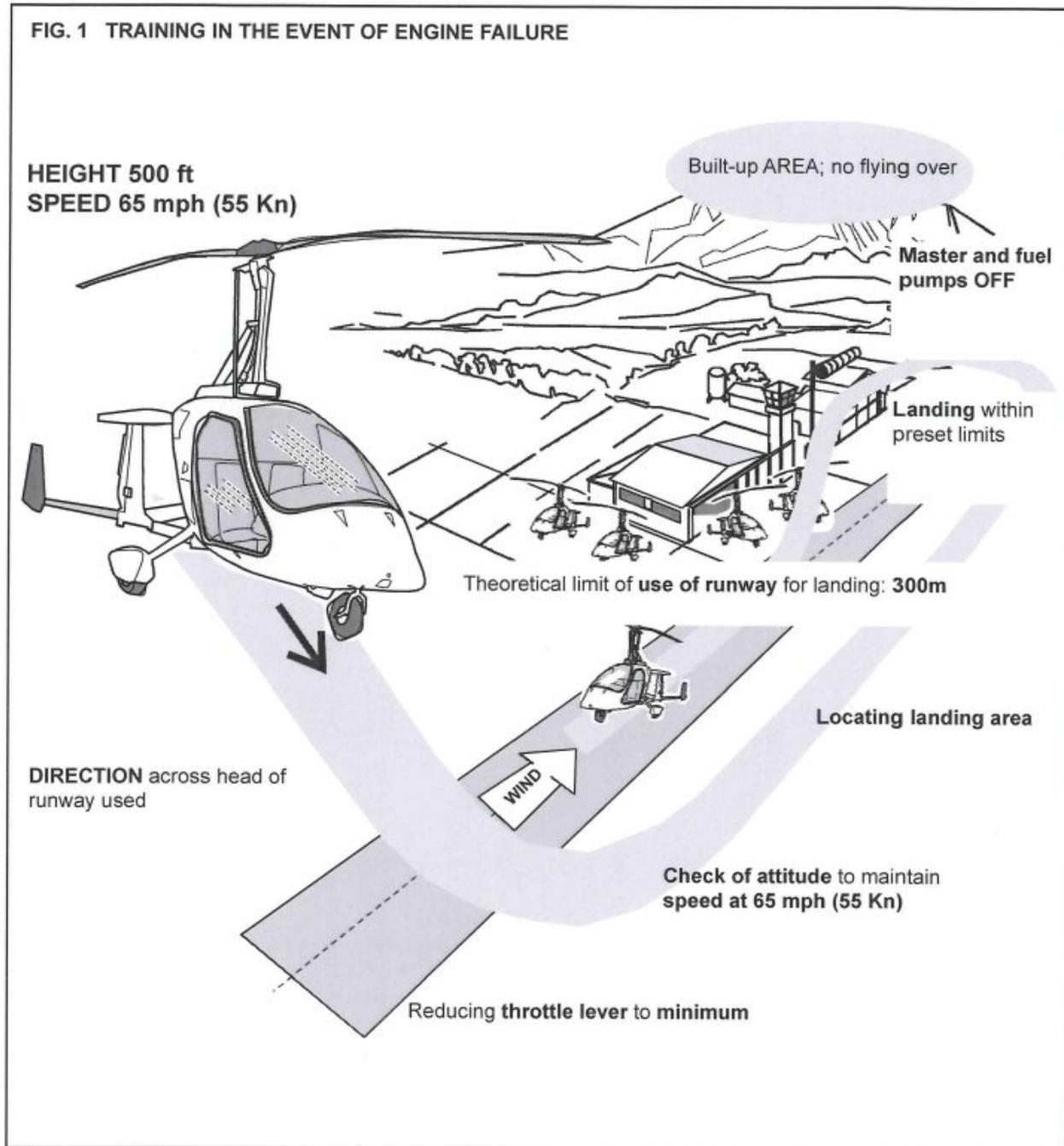
WARNING DANGER: A continuously illuminated red danger light indicates that the maximum admissible boost pressure has been exceeded. Engine speed and boost pressure should be reduced manually to be within normal operating limits. Flying should be ended as soon as possible as boost pressure control will either be limited or non-existent.

A blinking red danger light indicates that the maximum 'take-off' time limitation has been exceeded. Engine speed and boost pressure should be reduced to at least maximum continuous limits.

A blinking orange light indicates a failure of a sensor, sensor wiring, TCU or leakage in the airbox. Engine speed and boost pressure should be reduced manually to be within normal operating limits. Flying should be ended as soon as possible as boost pressure control will either be limited or non-existent.

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FIG. 1 TRAINING IN THE EVENT OF ENGINE FAILURE





SECTION

FLIGHT IN ADVERSE CONDITIONS

6

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6.1 INTRODUCTION

The procedures to follow when flying in adverse weather conditions are described in this chapter.

6.2 TURBULENCE OR STORMS



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

Should a storm occur 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 to maintain the best gust penetration speed

6.3 SNOW, ICE, RAIN

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



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's leading edges

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WARNING DANGER: Takeoff 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.

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

- a. increased stopping distance
- b. reduced directional control

6.3.1 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.

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6.4 LOW AND HIGH TEMPERATURES

6.4.1 PROCEDURES UNDER LOW TEMPERATURE CONDITIONS

Starting the engine may be difficult in low temperatures.

Using the choke is always recommended.

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

6.4.2 PROCEDURES UNDER HIGH TEMPERATURE CONDITIONS

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

The following advice should however be followed:

- a. Do not stop for too long during taxiing or at the holding point.
- b. When using maximum power for long periods of time, check the indicated temperatures of the heads and oil and make sure they do not exceed the maximum allowed values.
- c. 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.

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SECTION 7

APPENDIX

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7.1 APPENDIX 1 - REFUELLING DATA

7.1.1 FUELS

The following fuels can be used:

		<i>Usage / Description</i>
		914 UL
MOGAS		
<i>European standard</i>		<i>EN 228 Super ¹⁾</i>
		<i>EN 228 Super plus ¹⁾</i>
<i>Canadian standard</i>		<i>CAN/CG SB-3.5 Quality 3 ²⁾</i>
<i>US standard</i>		<i>ASTM D4814</i>
		AVGAS
<i>US standard</i>		<i>AVGAS 100 LL</i>
		<i>(ASTM D910)</i>

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 AVGAS100LL should be used.

7.1.2 BRAKE OILS

The type of oil used in this system is either DOT 3 or DOT 4.

7.1.3 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 the high stresses in the reduction gears, oils with gear additives such as high performance motorcycle oils are required.

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- 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 motor cycle oils meet all the requirements. These oils are normally not mineral oils but semi or fully synthetic oils.
- Oils primarily 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 (0.13 liq pt/h)

Oil viscosity:

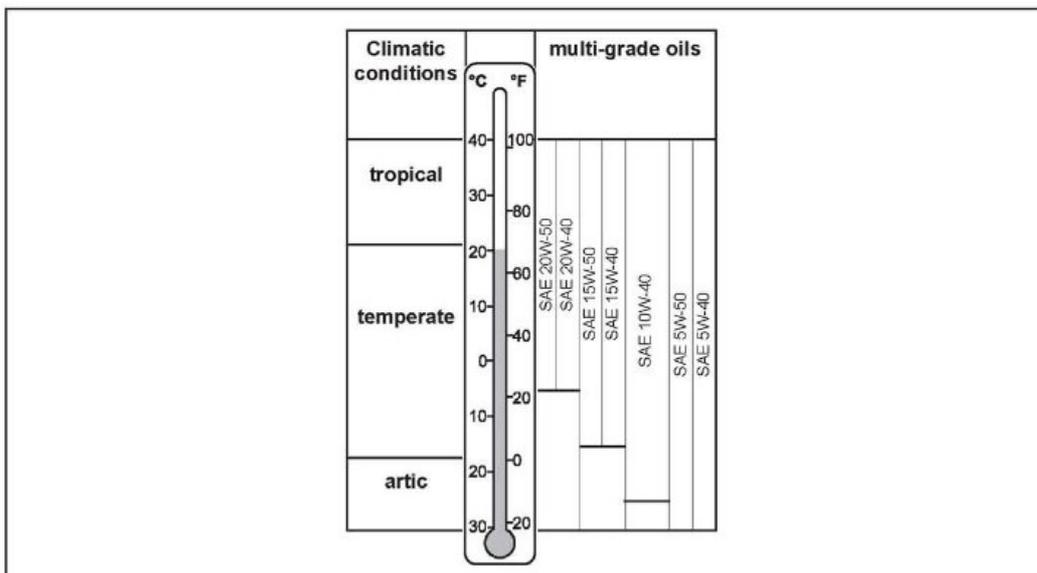
Use of multi-grade oils is recommended.



NOTE: Multigrade 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 for change of oil viscosity during short term fluctuations of ambient temperatures.





7.2 APPENDIX 2 – ORDINARY MAINTENANCE SCHEDULE

See maintenance schedule document 045-00-24C_A.

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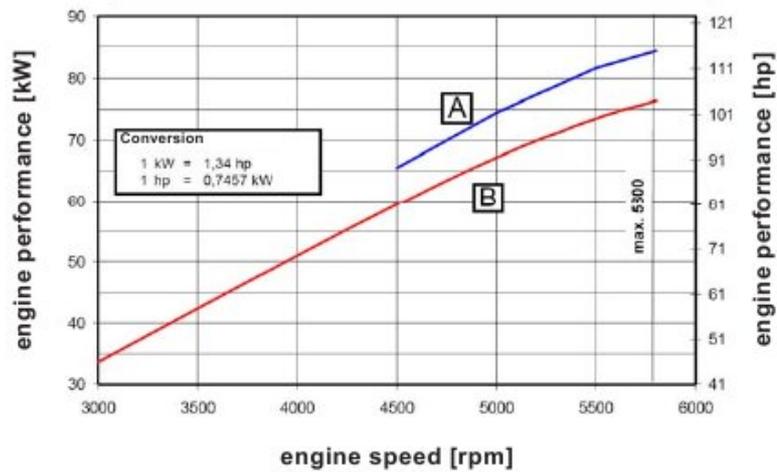


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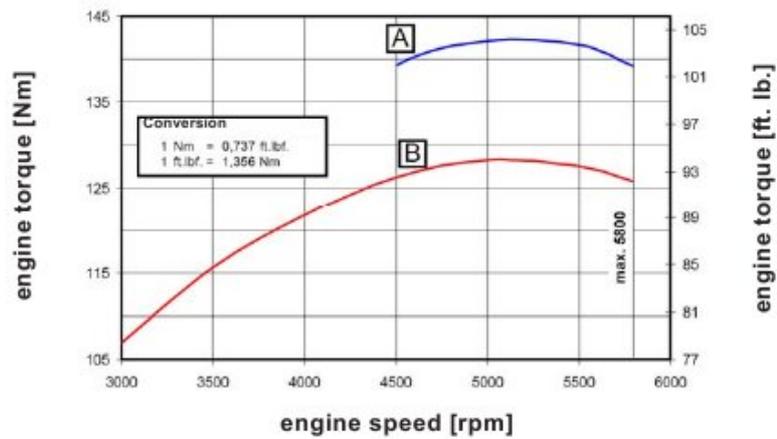
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7.3 APPENDIX 3 - ENGINE PARAMETERS

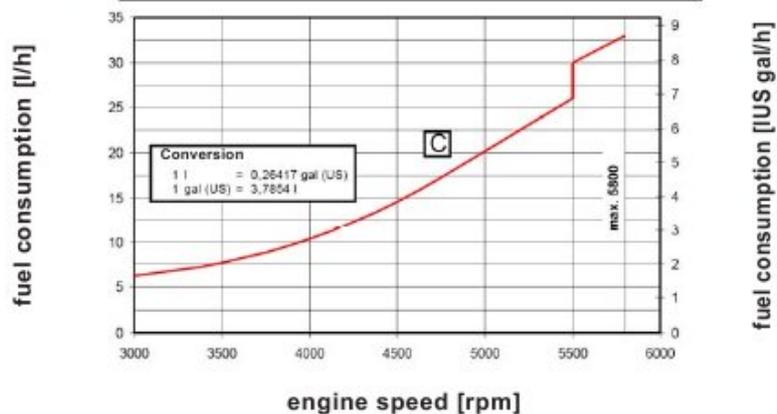
7.3.1 ENGINE PERFORMANCE



7.3.2 ENGINE TORQUE

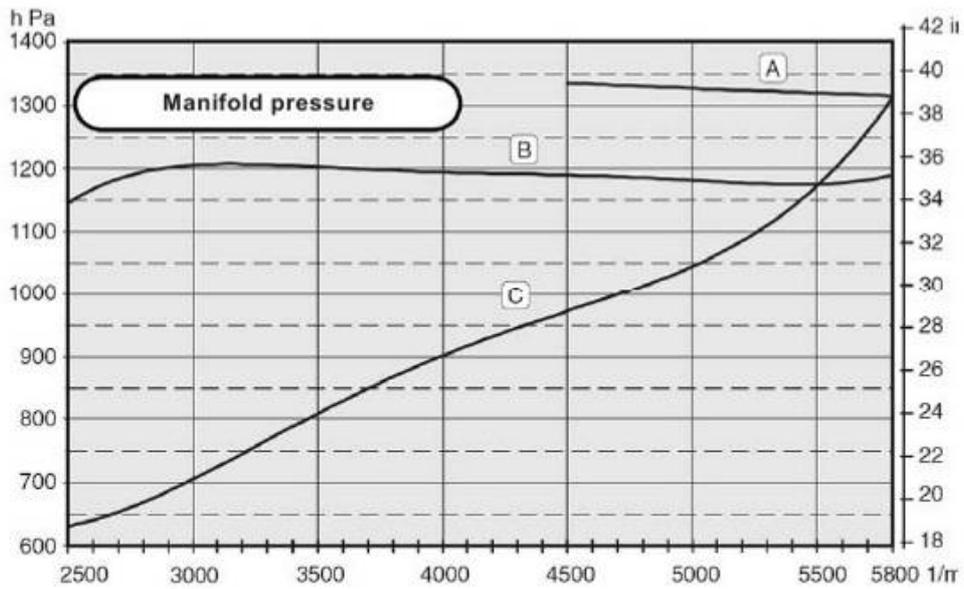


7.3.3 FUEL CONSUMPTION



A: take off - B: max continue - C: propeller curve

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A: take off - B: max continue - C: propeller curve
A: Take-Off Performance - B: Continuous Throttle Performance - C: Propeller Power Requirement



M24C_AUS
M24C FLIGHT MANUAL

7.4 APPENDIX 4 - CG DATA

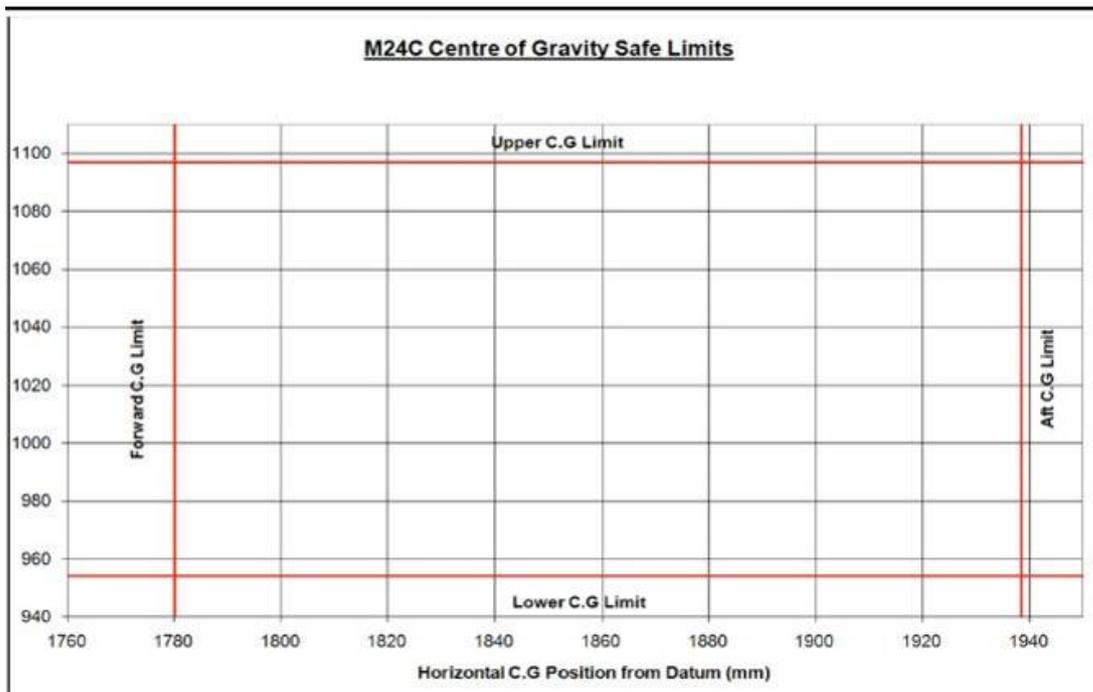
An example of weighing report is shown below.

Aircraft Type	M24C	Aircraft Registration		Date	
		Tail Wheel Base		1970 mm	
MTOW	Normal:	500 kg		The Horizontal C.G. datum is defined as: Nose of Aircraft	
				The Vertical C.G. datum is defined as: Ground Level	
Level Aircraft Weighing Results					
Empty Weight at Starboard Main Wheel		Empty Weight at Port Main Wheel		Empty Weight at Tail Wheel	
Position from Datum:	2020	mm	Position from Datum:	2020	mm
Moment Arm:	0	kgmm	Moment Arm:	0	kgmm
Empty Weight				kg	
Empty CG Position (Horizontal)		/		Empty CG Position (Horizontal)	
$CG = \frac{\sum Moments}{\sum Empty Weight}$					
Inclined Aircraft Weighing Results					
Inclined Angle		degrees	Tail Wheel Height		mm
Empty Weight at Starboard Main Wheel		Empty Weight at Port Main Wheel		Empty Weight at Tail Wheel	
Empty CG Position (Vertical)		$DG = \frac{\left(\frac{I_{star} W_{star}}{W} + \frac{r h}{I_{star}} \right) \left(I_{star} + \frac{r h}{I_{star}} \right) - (I_{star} X_c)}{h}$		Empty CG Position (Vertical)	
Fuel Tank Capacity		82		litres	
Weight of Full Fuel		62		kg	
Position from Datum	Horizontal	1712	mm	Moment Arm (Full Fuel):	106144
	Vertical	710	mm	Moment Arm (Full Fuel):	44020
Pilot Seat					
Position from Datum	Horizontal	1312	mm	Moment Arm with 60kg pilot:	81344
	Vertical	590	mm	Moment Arm with 60kg pilot:	36580
Position from Datum	Horizontal	1312	mm	Moment Arm with 120kg pilot:	81344
	Vertical	590	mm	Moment Arm with 120kg pilot:	36580
Co-pilot Seat					
Position from Datum	Horizontal	1410	mm	Moment Arm with 60kg co-pilot:	87420
	Vertical	625	mm	Moment Arm with 60kg co-pilot:	38750
Position from Datum	Horizontal	1410	mm	Moment Arm with 120kg co-pilot:	87420
	Vertical	625	mm	Moment Arm with 120kg co-pilot:	38750
Max Weight (Max Pilot 1, Min Pilot 2 & 19kg Fuel)				kg	
Max Weight (Max Pilot only & Full Fuel)				kg	
CG Position (each combination)		Max Possible Fuel		Zero Fuel	
		Horizontal	Vertical	Horizontal	Vertical
Pilot 55kg / Co-pilot Zero / Full Fuel		mm	mm	mm	mm
Pilot 120kg / Co-pilot Zero / Full Fuel		mm	mm	mm	mm
Pilot 120kg / Co-pilot 55kg / 28kg Fuel		mm	mm	mm	mm
Pilot 55kg / Co-pilot 120kg / 28kg Fuel		mm	mm	mm	mm
This aircraft is/is not within the weight and CG requirements					
Signed:			Inspector No:		
Date:					



CONDITION	MASS kg	THEORETICAL C.G.POSITION		NOTES
		X (mm) (Aft of Nose)	Z (mm) (Above Ground)	
EMPTY	297	2054.5	1191	Zero fuel. Maximum Oil, coolant, hydraulic fluid
MTOW & LOWEST CG & MOST FWD CG	500	1780	954	Pilot 120kg; Co-pilot 55kg 9kg baggage plus 19kg fuel
MOST AFT & HIGHEST CG	348.3	1939	1097	Pilot 55kg plus zero fuel

Centre of Gravity Safe Limits



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

Max permissible fuel loading is 500kg – aircraft empty weight – occupant weights.

Example Fuel Calculation:

500kg – 297kg (aircraft empty weight) – 85kg (pilot) – 90kg (co-pilot) = 28kg fuel

Fuel volume therefore = 28/0.72 = 38.9 litres



7.5 APPENDIX 5 – PERFORMANCE DATA

Speeds

- V_Y	Best Rate of Climb Speed	65 mph (55 Kn)
- V_{NE}	Never Exceed Speed	105 mph (90 Kn)
- V_{MIN}	Minimum Level Flight Speed	30 mph (25 Kn)
- V_{APP}	Landing Approach Speed (Minimum Descent Speed)	65 mph (55 Kn)
- V_{MC}	POWER OFF – Minimum Control Speed (Power Off)	20 mph (17.5 Kn)
- V_{MC}	POWER ON – Minimum Control Speed (Power On)	20 mph (17.5 Kn)
- V_{NO}	Normal Operating (Cruise) Speed.....	90 mph (78 Kn)

Distances

-	Take-off distance:	430 ft
-	Take-off distance to 50ft.	1250 ft
-	Landing roll:.....	from 0 to 100 ft
-	Landing distance from 50ft.....	430 ft

Climb and Glide

-	Rate of climb at MAUW, max power ISA conditions:.....	625 ft/min
-	Glide rate at MAUW	1250 ft/min
-	Glide rate at Min Weight.....	1000 ft/min

Cross wind

-	Maximum demonstrated Cross Wind Component for Take-Off.....	25 kts
-	Maximum demonstrated Cross Wind Component for Landing	25 kts

Service Ceiling

-	Maximum service ceiling:	10000 ft
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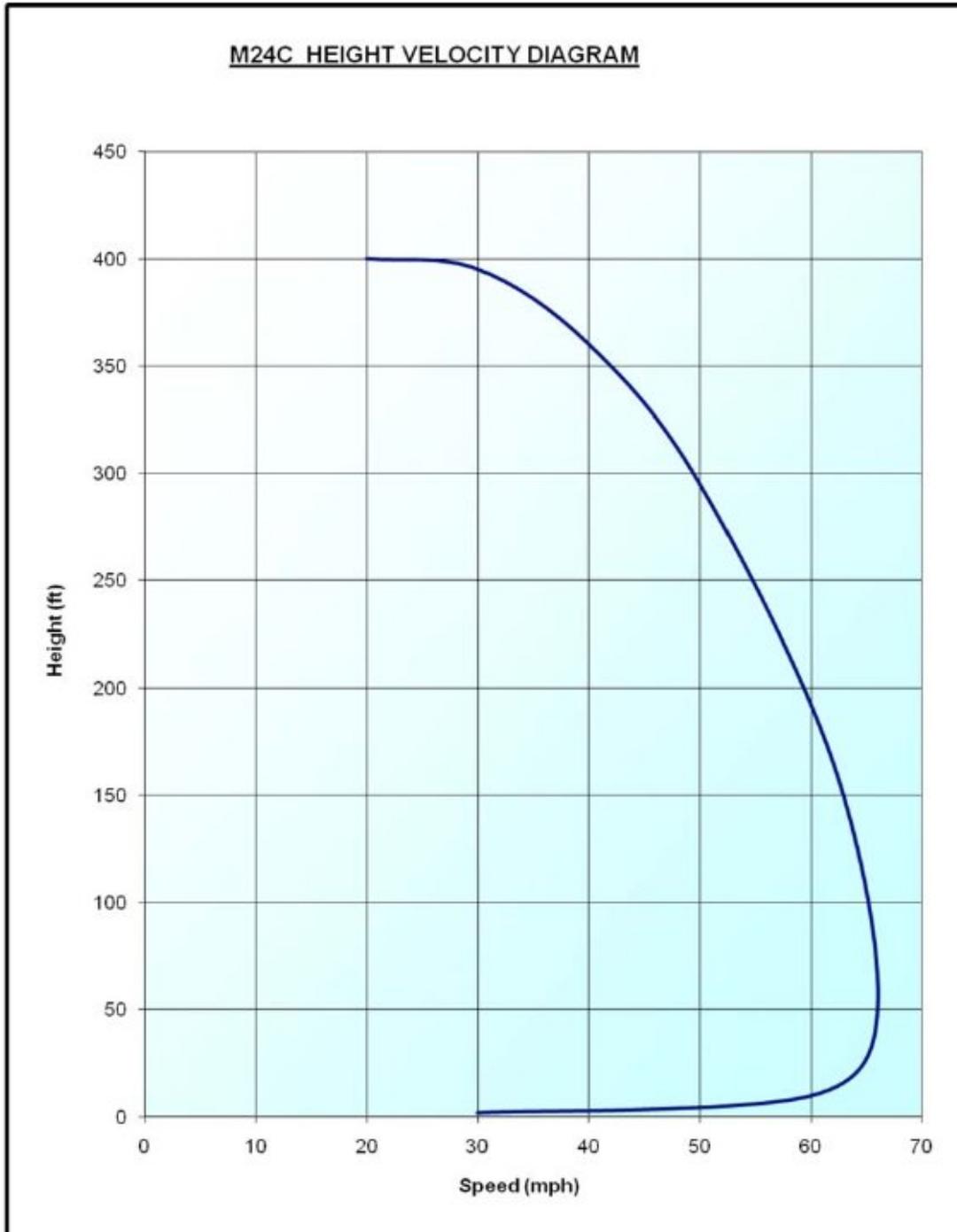


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7.6 APPENDIX 6 - HEIGHT VELOCITY DIAGRAM





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7.7 APPENDIX 7 - MANOEUVRE LIMITATIONS

The aircraft shall be flown by day in visual meteorological conditions (VMC) only.

Flight in icing conditions is prohibited.

Flight in strong gusty winds or wind velocities of more than 40 kts is prohibited.

Intentional spinning is prohibited.

Aerobatic manoeuvres are prohibited.

Manoeuvres involving a deliberate reduction in normal 'g' shall be avoided.

Maximum bank angle 60 degrees from vertical.

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MAGNI GYRO s.r.l.

via Volpina, snc - I-21010 BESNATE (VA) - ITALY

tel. +39 0331 274816 fax +39 0331 274817

RICHIESTE / ENQUIRIES: info@magnigyro.it WEB: www.magnigyro.it

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