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# FLIGHT MANUAL

# M – 24C ORION

# PILOT OPERATING HANDBOOK FOR THE MAGNI GYRO M24C

**Registration marks:** _____

**Constructors serial number:** _____

**Engine serial number:** _____

Aircraft Designed and constructed by: Magni Gyro Srl

# GENERAL

This Pilot Operating Handbook applies only to the aircraft detailled on page 0-4.
It is the responsability 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 apprpriate on the instruments and placards.

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

# RECORD OF AMENDMENTS

This page (0-6) and subsequent amendment page (0-6-1 etc), will be reissued as necessary with each amendment list. A copy of each Amendment List will be sent to the Registered Owner of each Aircraft.
It is the responsibility of the registered owner to insure that the amendments are incorporated in the Pilot Operating Handbook, that the superseded pages are removed and that the receipt form, enclosed with the Amendment List is signed and returned to Magni Gyro UK Ltd.

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# SECTION 1
# INTRODUCTION

## 1.1 OBJECT

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

# 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**

## 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** | Inicated 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 Metereological Conditions |
| | |
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| | |

# SECTION 2
# GENERAL DESCRIPTION AND INSTRUCTIONS FOR USE

## 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 tailplane 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.

## 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. 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 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. 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.

## 2.2 OVERALL DIMENSIONS (Figg. 1 / 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) ..... 2760 mm
Maximum height (with stick forward) ..... 2810 mm

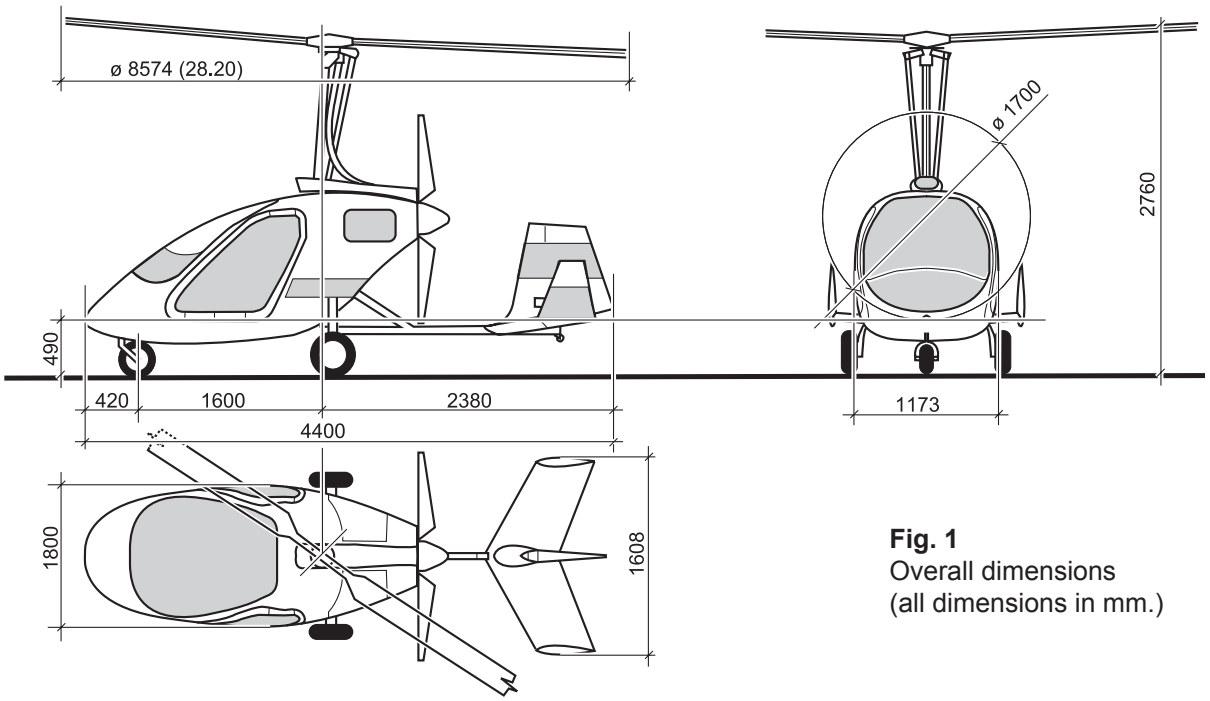



**Fig. 1**
Overall dimensions
(all dimensions in mm.)

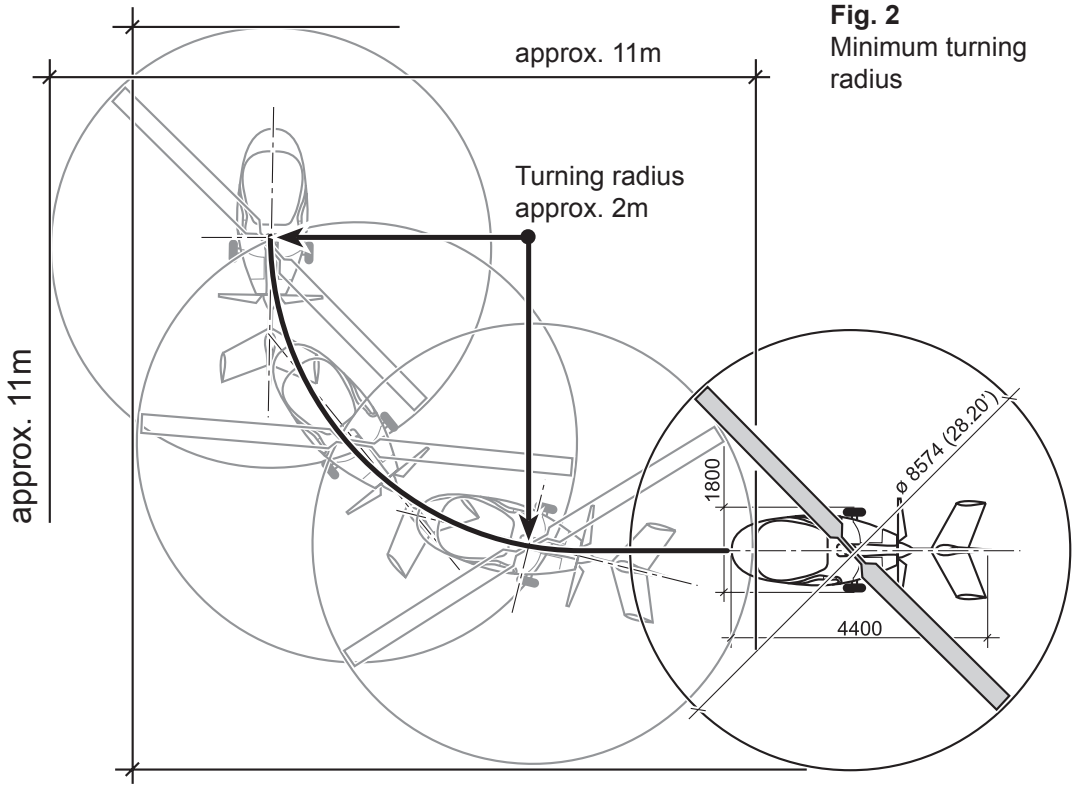



**Fig. 2**
Minimum turning
radius

## 2.3 TECHNICAL DATA

**Weights**
- Dry weight: .....290 kg
- Empty weight:.....297 kg
- MTOW:.....500 kg

**Performance**
- VNE - Never Exceed Speed..... 100 mph
- VNO - Normal Operating (Cruise) Speed..... 85 mph
- VY - Best Rate of Climb Speed..... 65 mph
- VAPP - Landing Approach Speed (Minimum Descent Speed)..... 65 mph
- 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

**Operating Temperatures °C**

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

**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 6P2Y
- Inflating pressure.....1.8 bar
- Main wheels .....6-004 6P2Y
- 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


**Fig. 1 - Manufacturer's identification placard**

## 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)

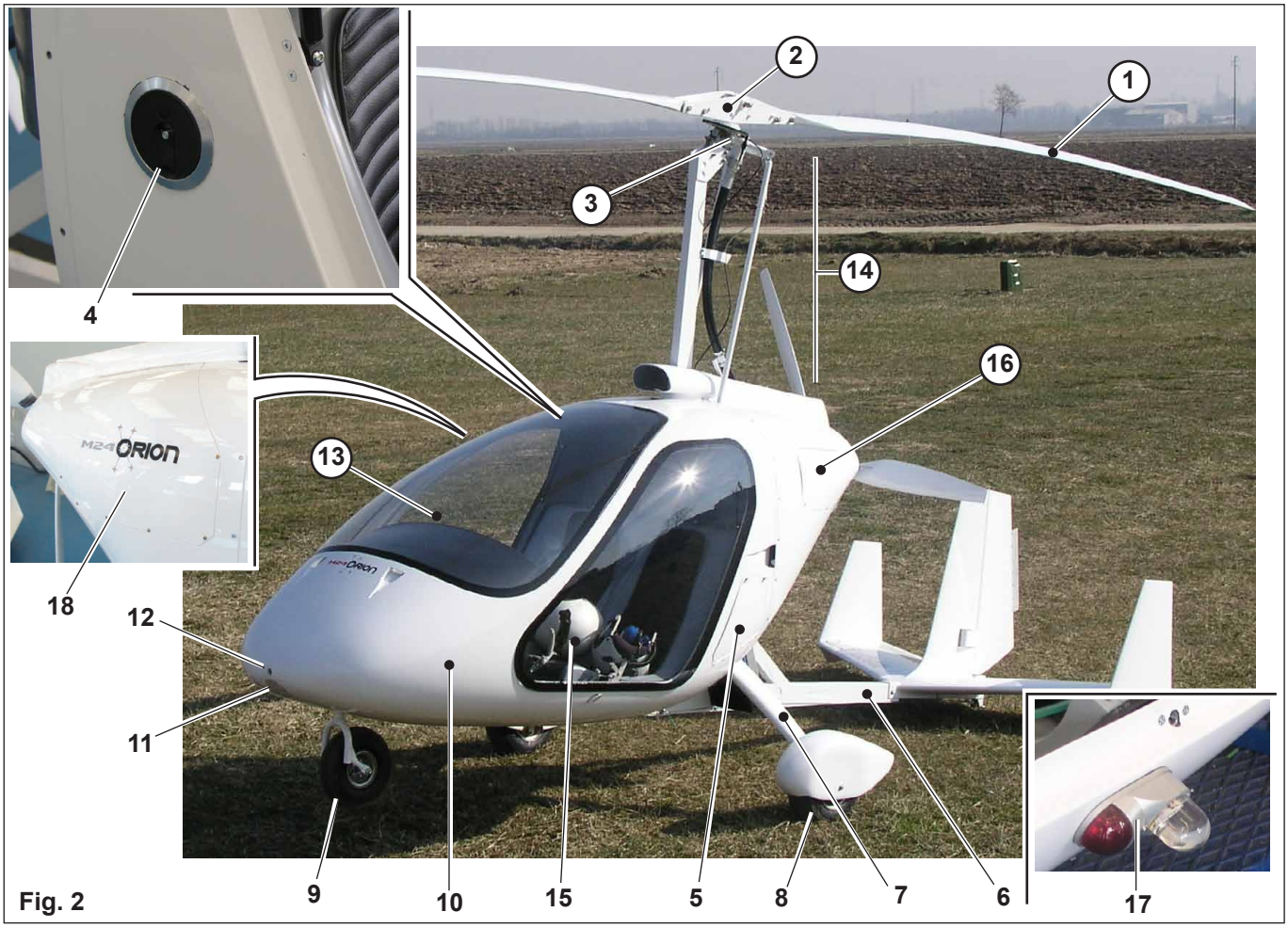



Fig. 2

**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

## Rear - external (Fig. 3)

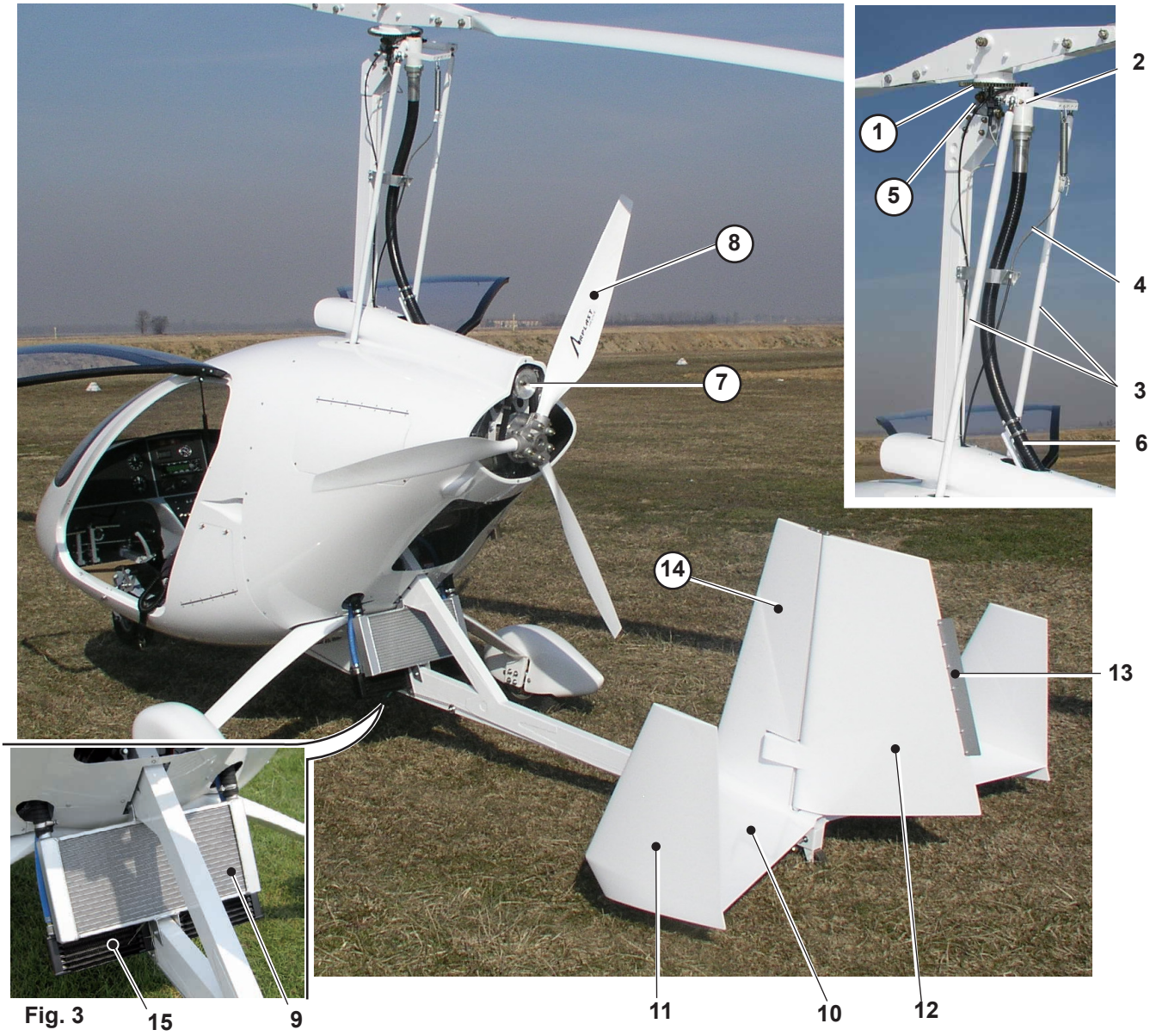



Fig. 3

**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-bladepusher propeller with ground adjustable pitch
**9** - Radiator
**10** - Horizontal stabilizer
**11** - Winglet
**12** - Rudder
**13** - Trim tab
**14** - Vertical Fin
**15** - Oil cooler

## Rear - outer sight (Fig. 3)

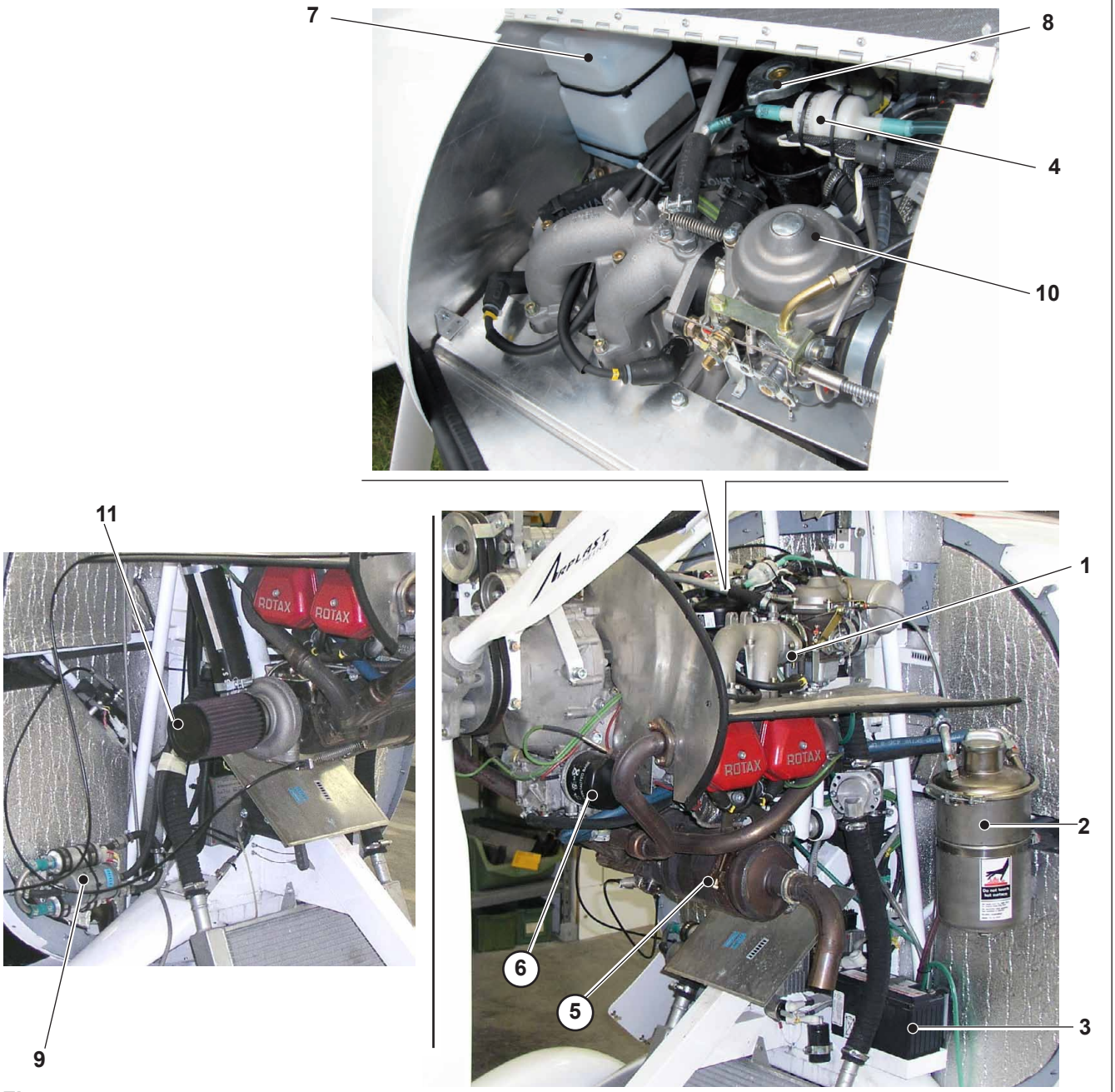



Fig. 4

**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

## 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

# 2.6 INSTRUMENTS AND CONTROLS

## 2.6.a Instruments (Fig.6)

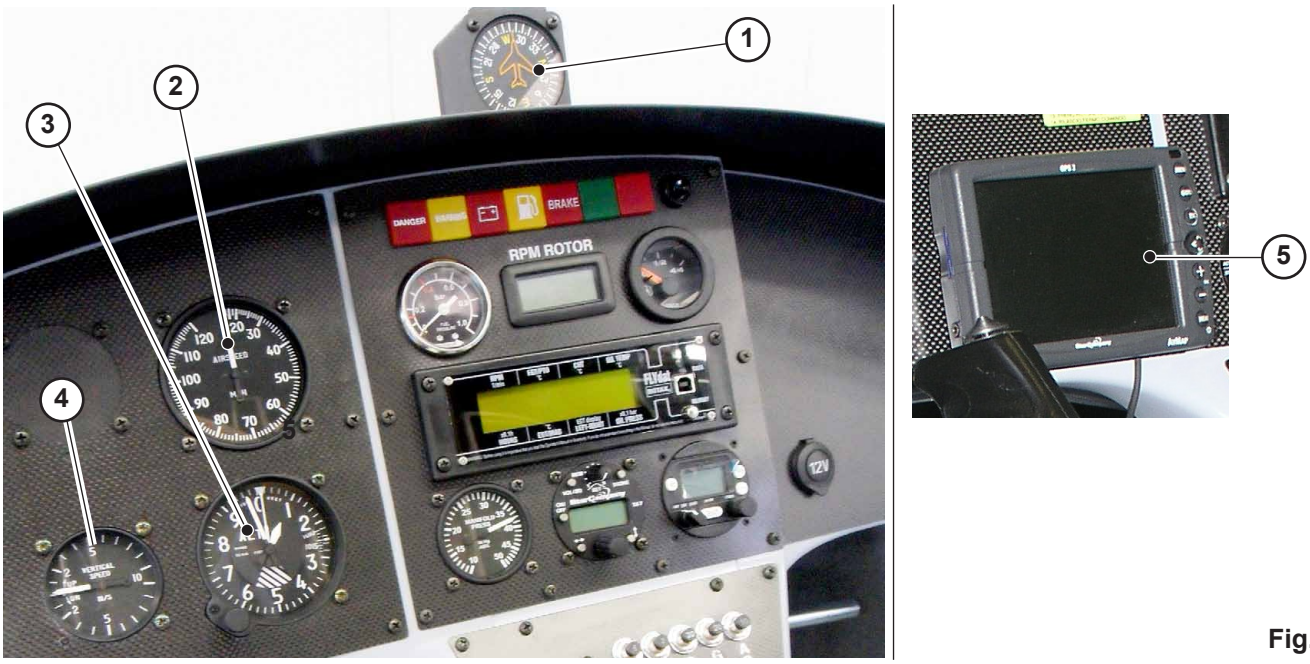



Fig. 6

**COMPASS (1)**

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

**AIR-SPEED INDICATOR (ASI) (2)**

The air-speed indicator has a range between 0 and 120 mph. 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.

## 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 - RESERVER, low fuel level

**5** - Red - BRAKE, rotor brake (on when angaged)
**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

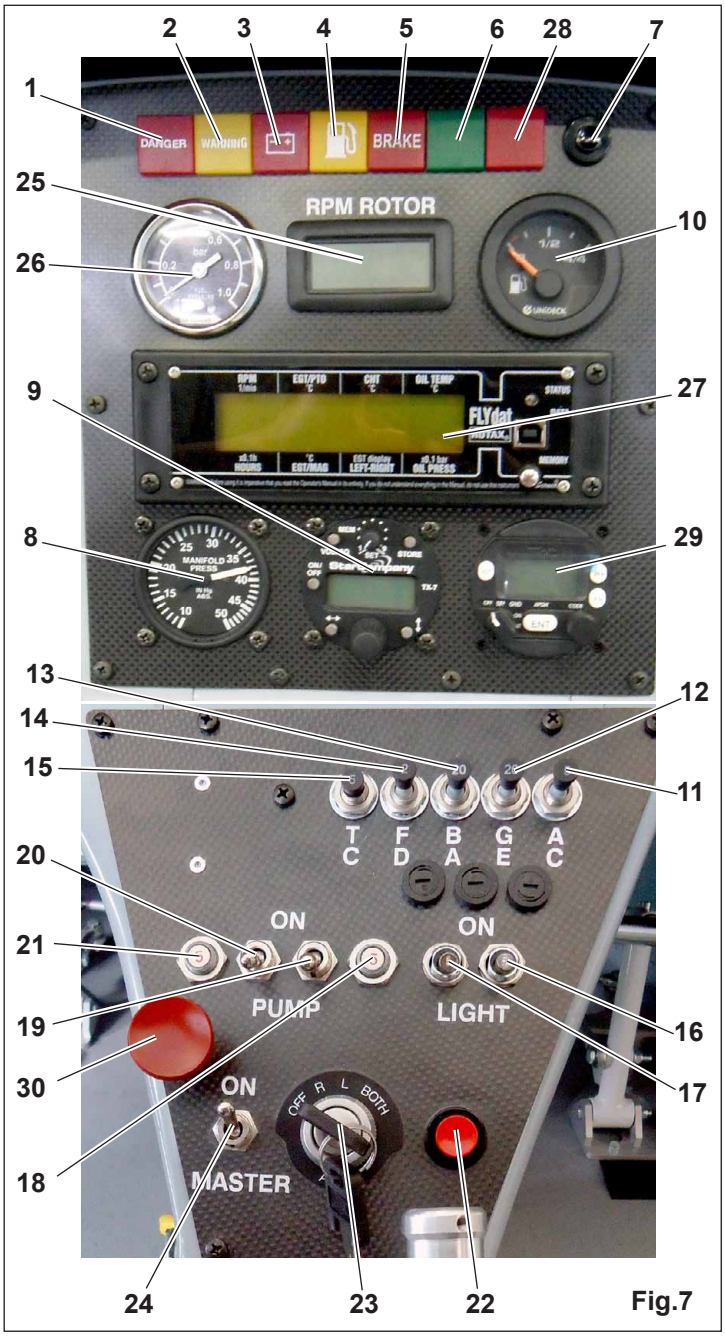



Fig.7

**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 39.9inch/Hg.
When applying 115% power a brief transient of 40inHg 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.**

**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 |
| ¾ | 30 litres |
| ½ | 20 litres |
| ¼ | 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 Unitt.

**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 .
To re-arm the breaker push in the button.

**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 .
To re-arm the breaker push in the button.

**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.

**28) RED light**
When illuminated 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.

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

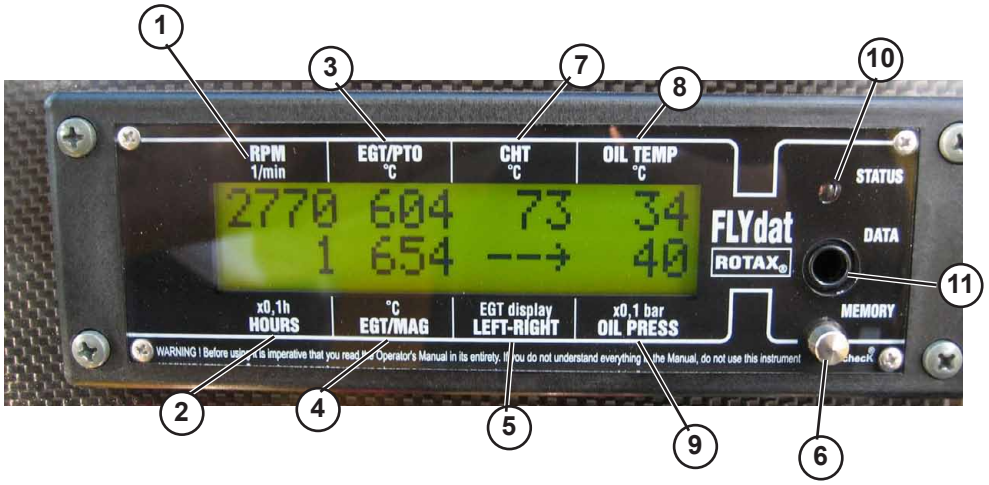



**Fig.8**

**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

For more information on the functions of this instrument, please see the FLYDAT OPERATOR'S MANUAL supplied with the gyroplane documentation.

### 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 carburettors' 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**

**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.

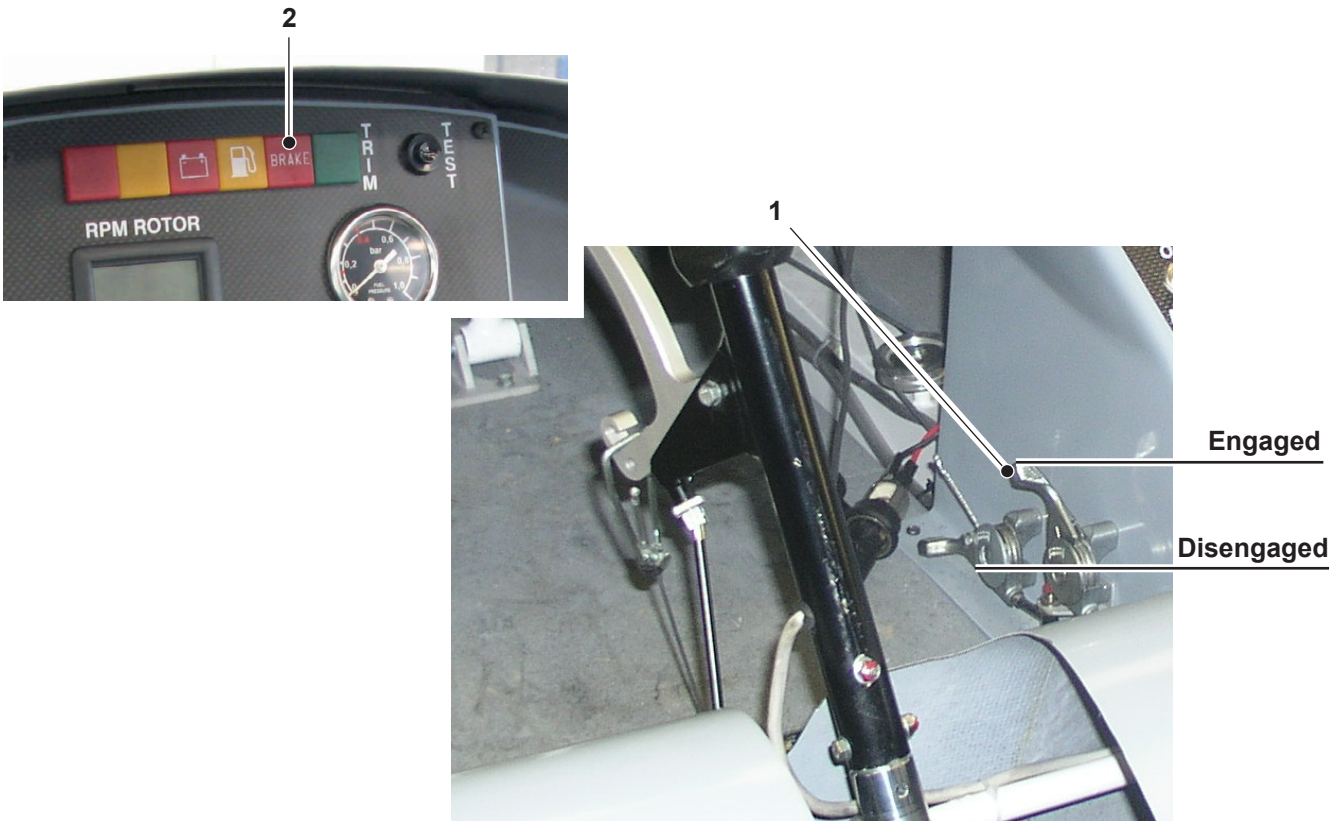



**Fig.11 - Rotor brake lever**

### 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.

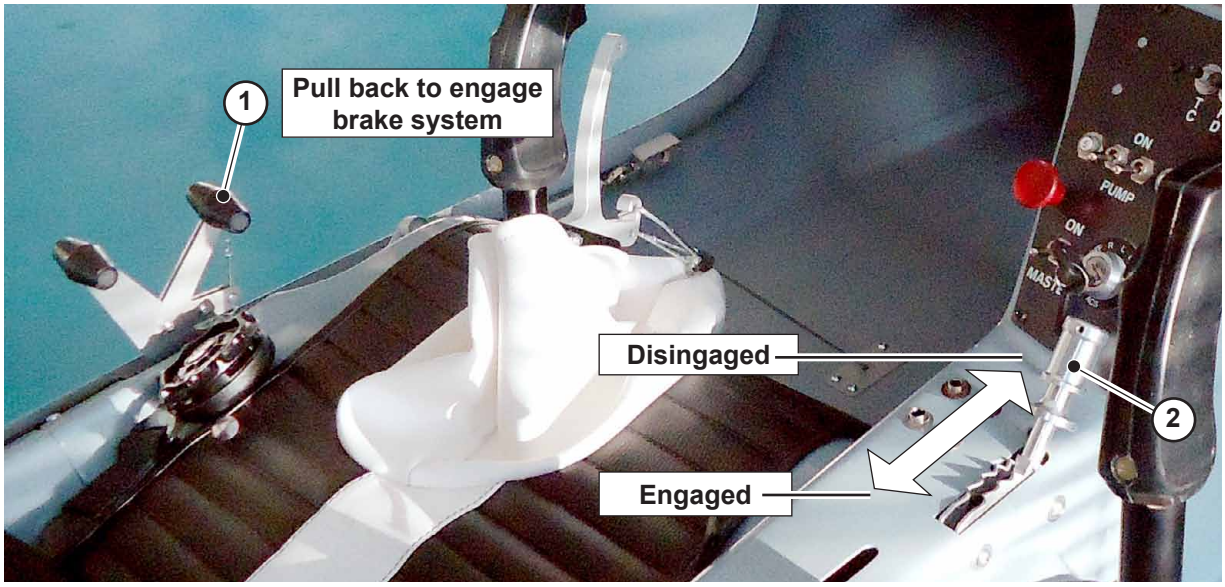
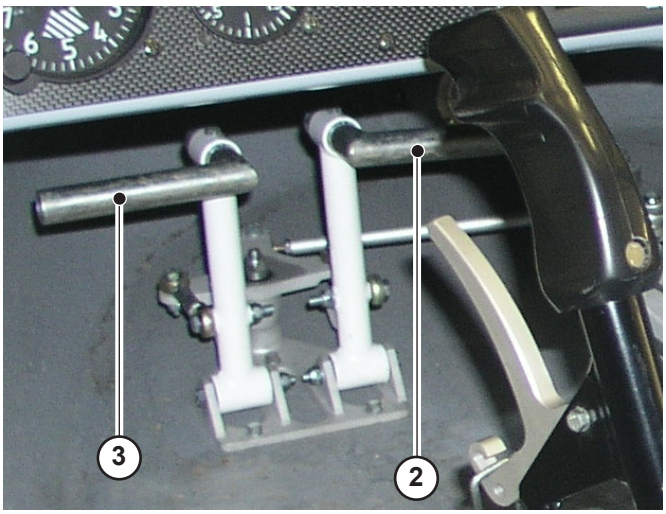



**Fig.12 - Brake control lever**

### 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



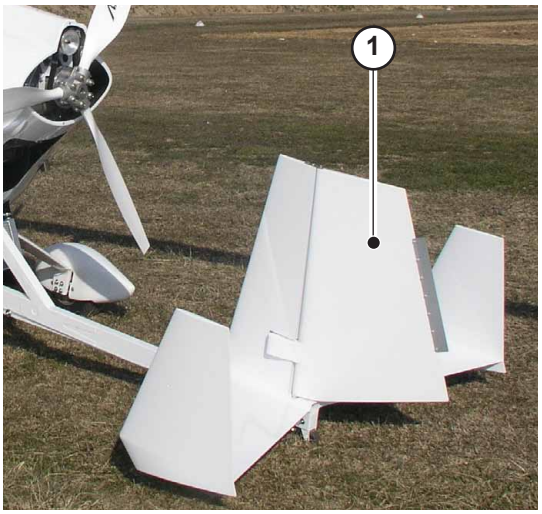




**Fig.13 - Direction controls**

### 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.

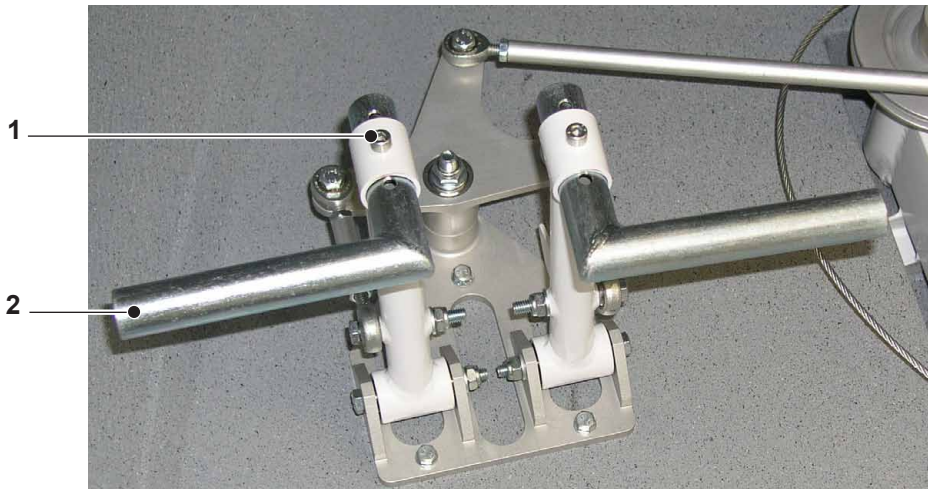



**Fig.14 - Adjustable pedals**

### 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

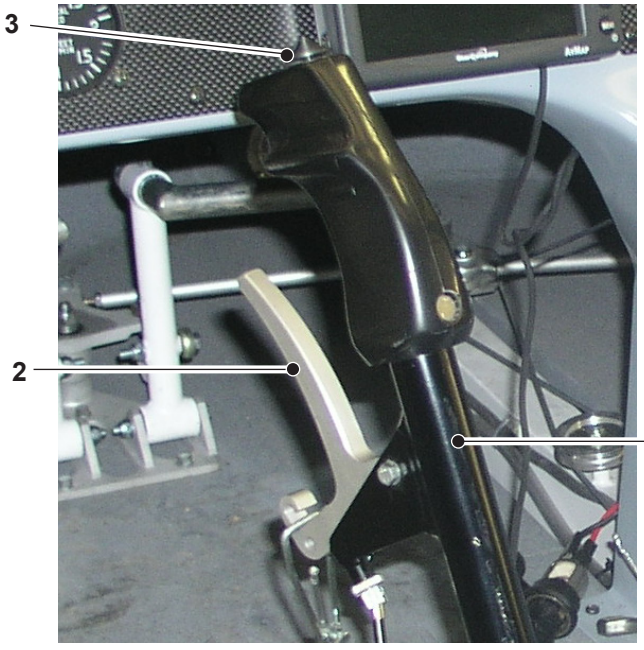



**Fig.15 - Rotor controls**

### 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 prerotator. It is used during pre-take-off procedures The degree of engagement of the prerotator 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**

### 2.6.i Fuel shut off valve control (Fig. 16b)

The fuel shut off valve control 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 ON) the fuel supply can be shut off: :

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

**Pull back to engage shut off valve**


**Fig.16b**

## 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.


**Fig.17 - Seat belts**

# SECTION 3
# OPERATING LIMITS

## 3.1 INTRODUCTION

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

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

## 3.2 MINIMUM CREW

All flights require a crew of at least one pilot.

**NOTE:**
**Smoking in the aircraft is prohibited.**

## 3.3 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 OVERSPEED

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

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%.**

| | | 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) 100 mph**

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) 85 mph**

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 85 mph movements in pitch must be limited to avoid overstressing the airframe. At speeds above 85mph only small, gentle pitch control movements should be used**


**Fig. 1 - Speed limits**

## 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 center 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).**

## 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 TAKEOFF 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

## 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 4
# FLIGHT PROCEDURE

## 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 PREFLIGHT CHECKS

### WARNING DANGER:

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

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/PREFLIGHT 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/preflight check is one of the greatest contributing factors to good flight safety.**

### 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 integritys 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 prerotator 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.

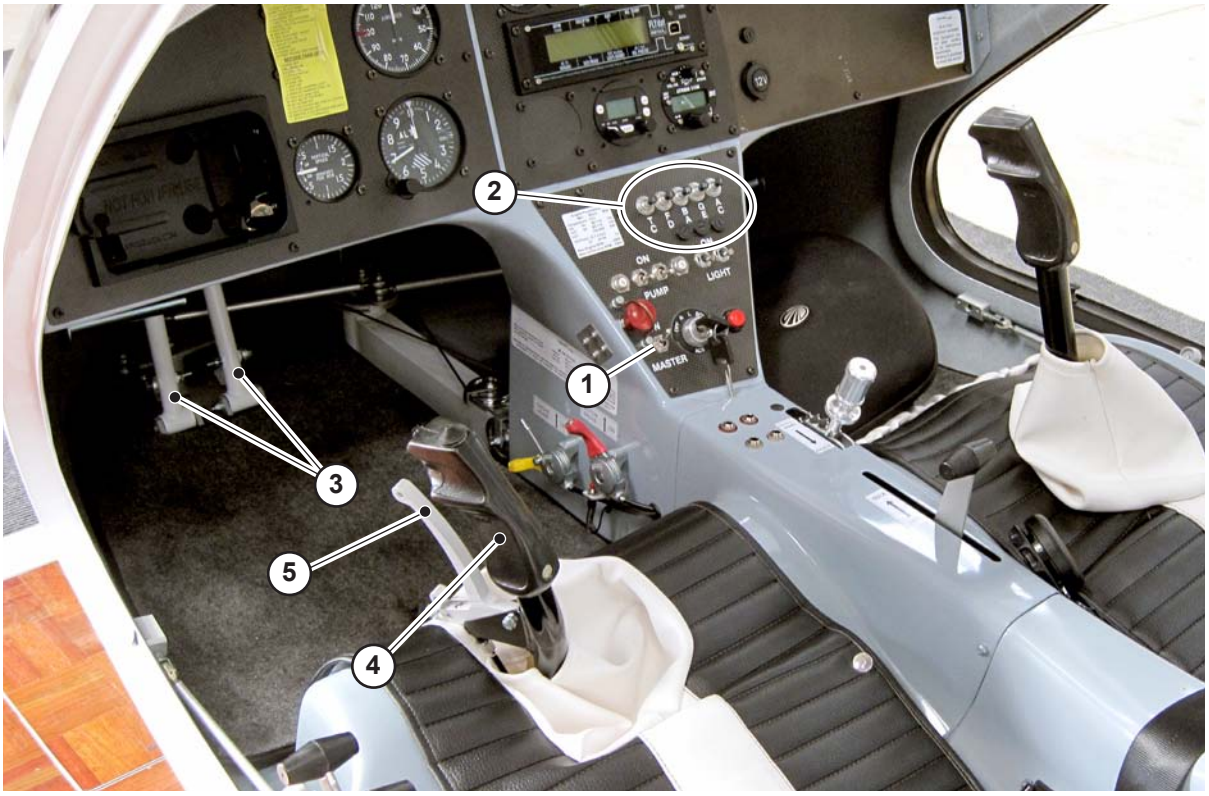


**Fig. 1 - Inner checks**

**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..


**Fig. 1 - Inner checks**

### 4.6.2 EXTERNAL CHECKS (Fig. 2)

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

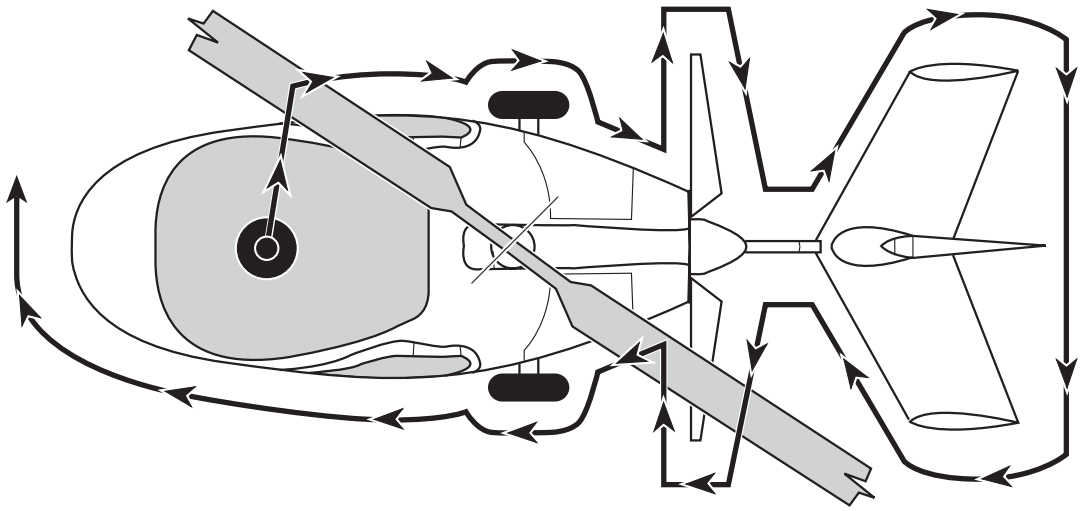

**Fig. 2 - External checks**

**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 windscreem in clean and visibilty 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**.

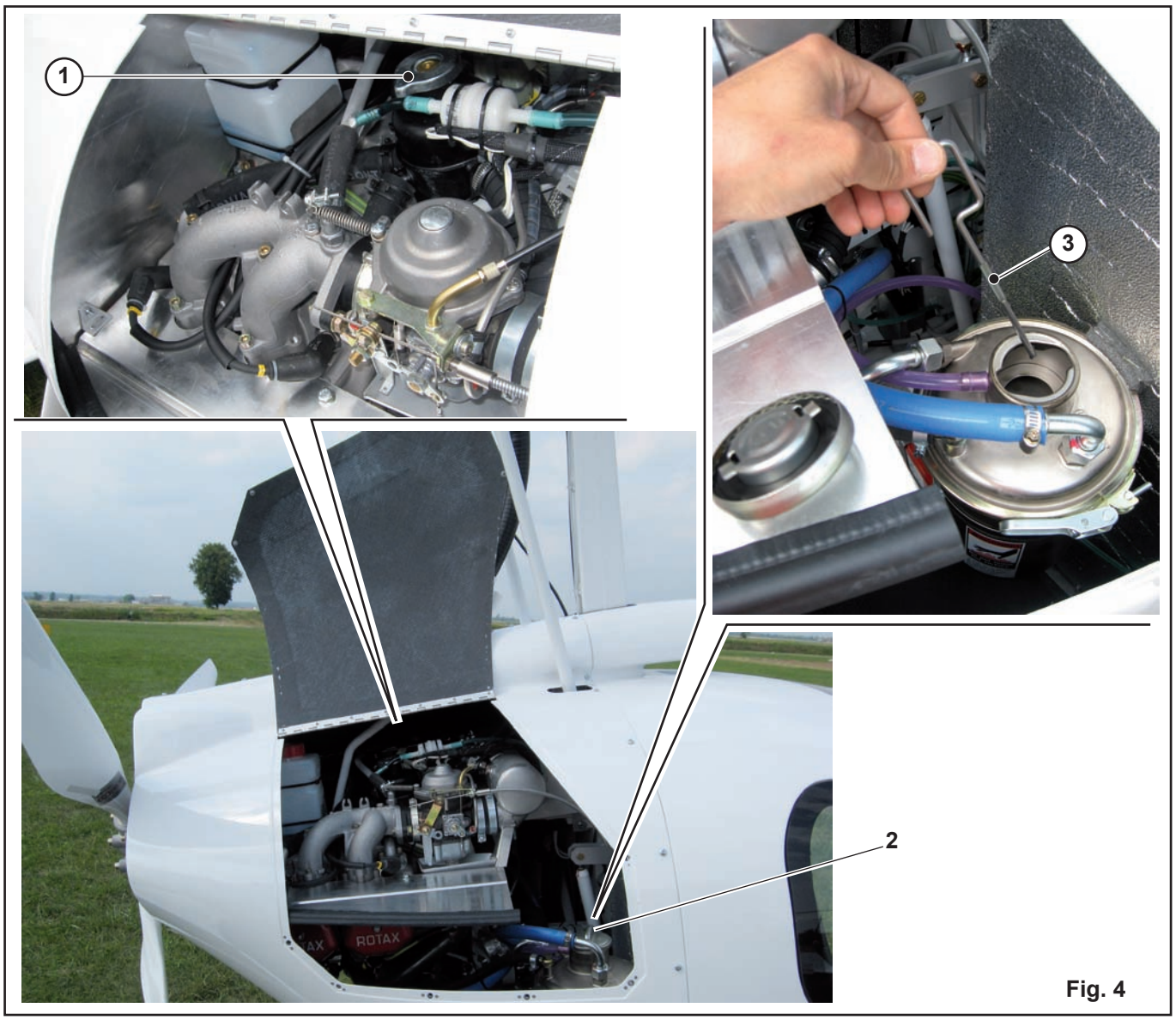


**Fig. 4**

**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:

- carburetors, 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.

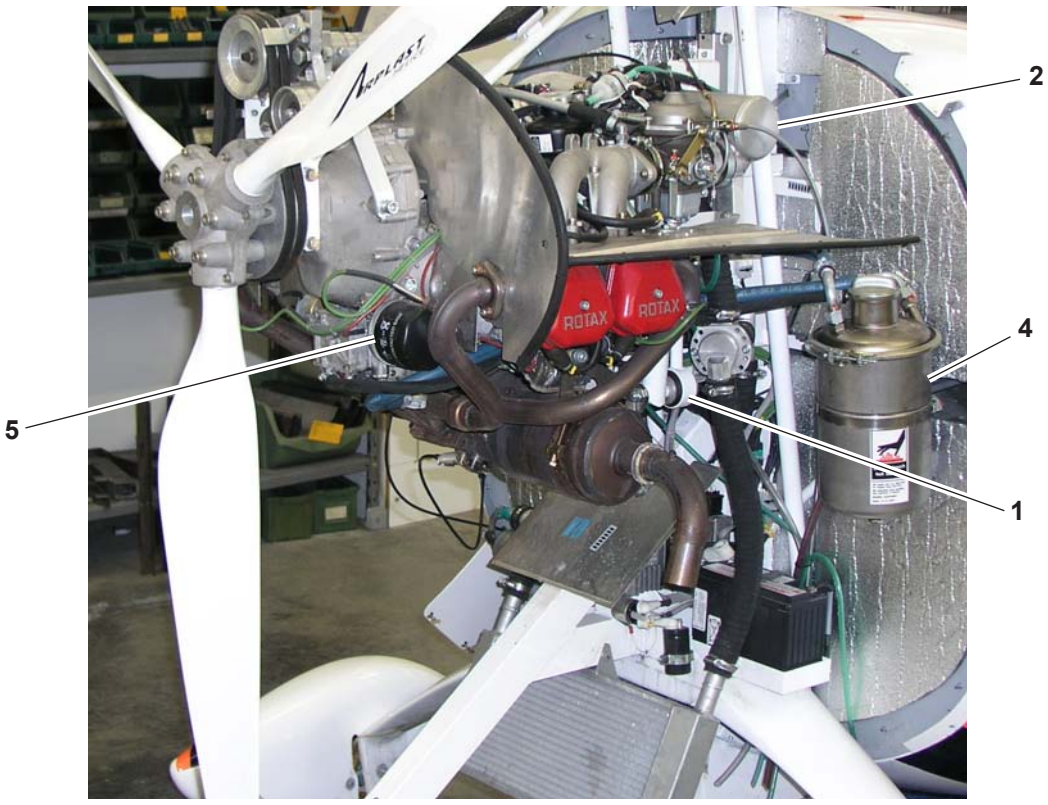


Fig.5

**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 fiberlock 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

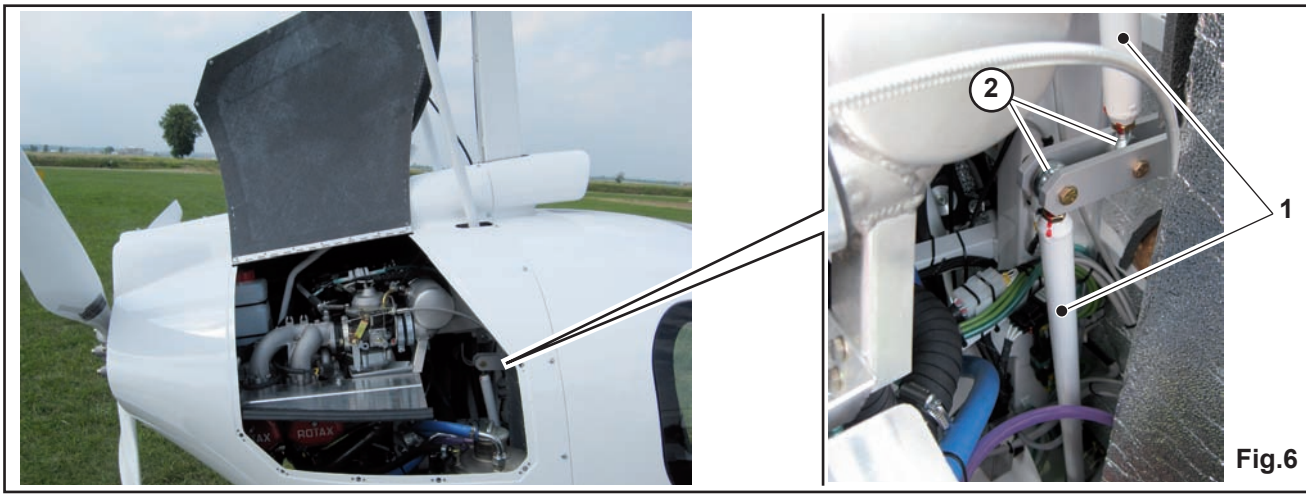


Fig.6

**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

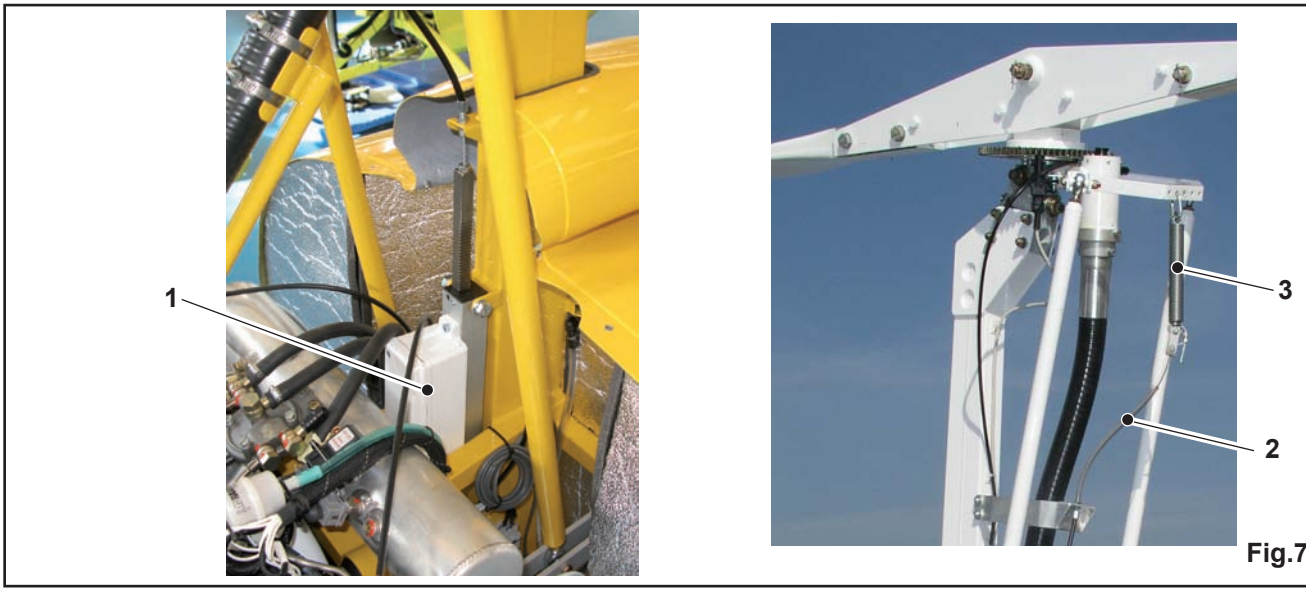


Fig.7

**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)


Fig. 8

**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.

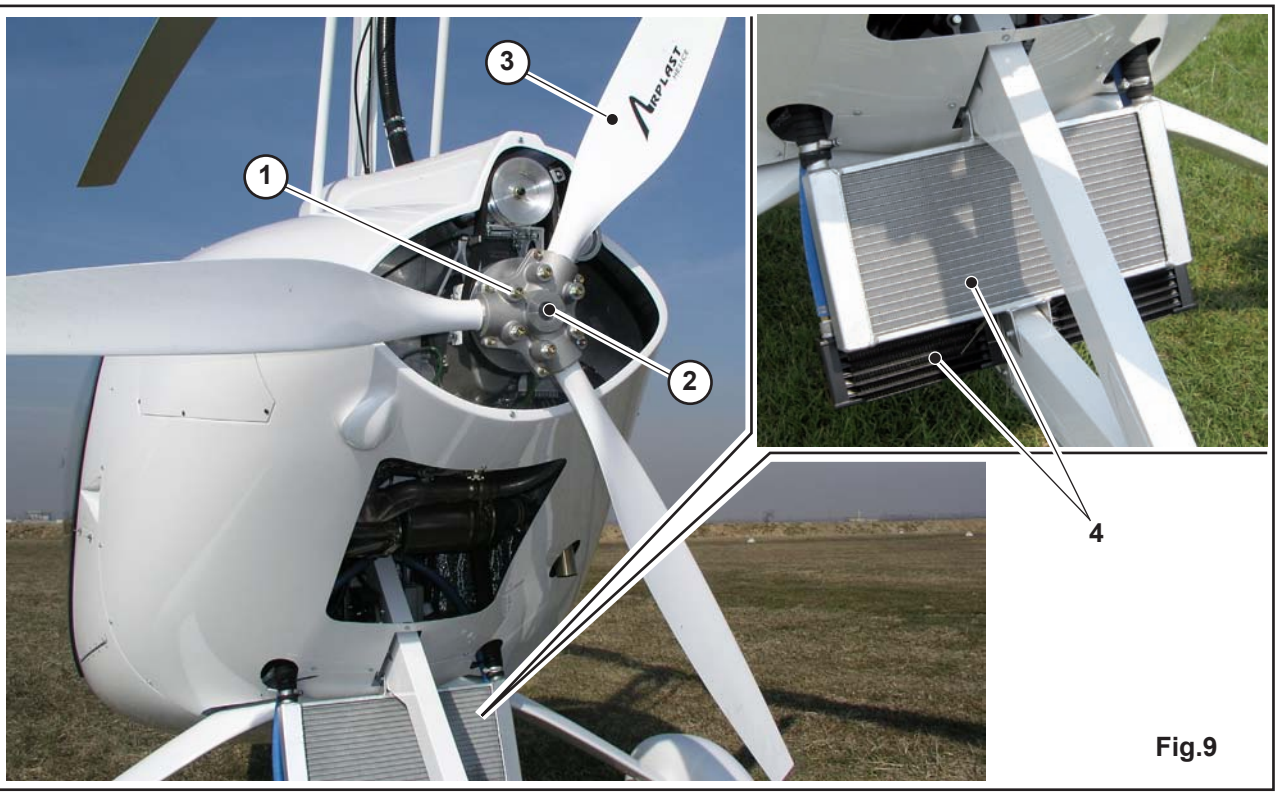


Fig.9

**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).

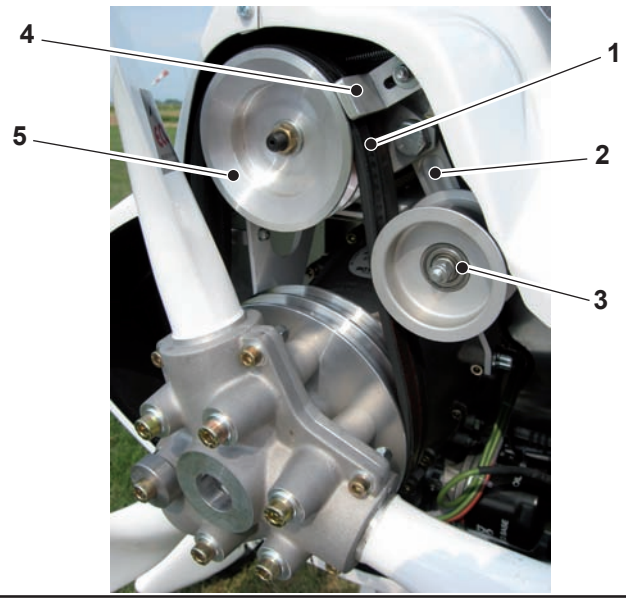


**Fig.10**

**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.

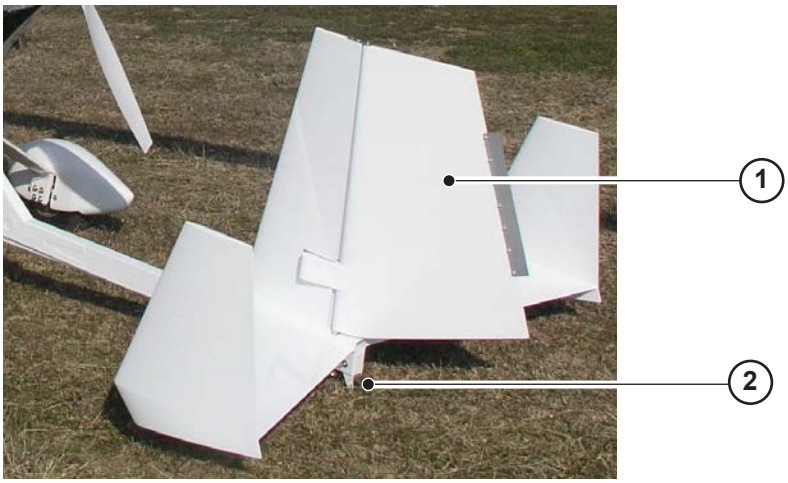


**Fig.11**

### 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.

**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.


**Fig. 14**

**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**

**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

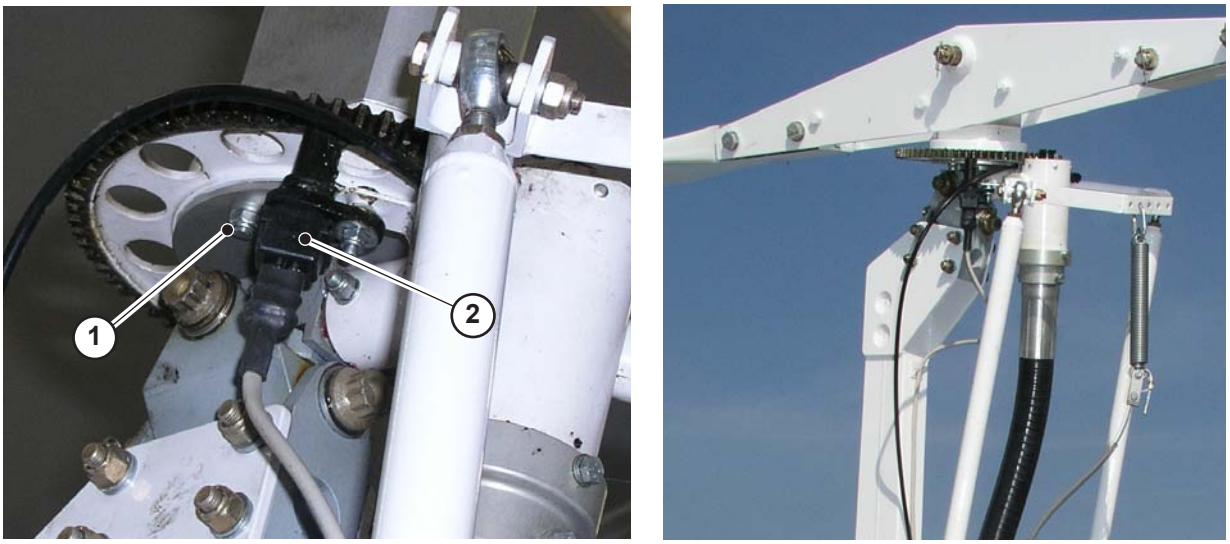


Fig.16

**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


Fig.17

**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**

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## 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 |

### 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.

>>>>>


Fig.19

3 - CONTROL STICK - in forward position with retainer applied
4 - BREAKERS - switched ON
5 - THROTTLE LEVER - in “minimum” position (idle)

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

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

**Fig.20**

**WARNING DANGER:**
**Shout “CLEAR PROP”.**

12 - STARTING - push start botton

**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 al least 1 minute before pressing again.**

13 - 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.

14 - THROTTLE LEVER (7) - Set to reach a speed of 1.800 ÷ 2.000 r.p.m.

15 - 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 (8).**

Repeat the complete starting procedure.

**CHOKE - OFF** / lower the choke lever (8) within one minute after the engine has started.

## 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

**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 enaged 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.**

Fig.21

### 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.

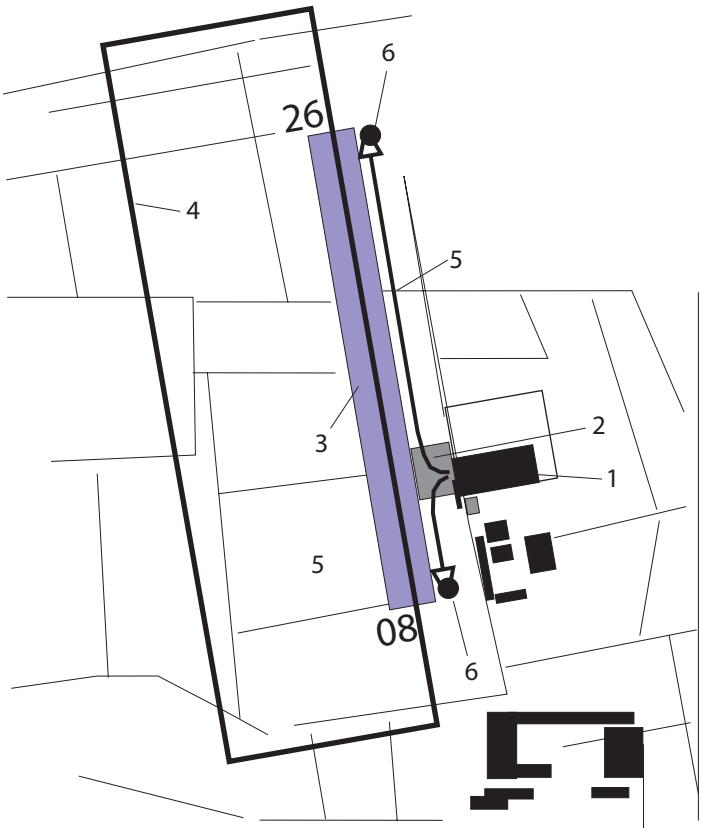
Execution
**Identify** runway to use.
**Gently** vary the throttle to start taxiing to holding point.
**Steer** with the rudder pedals

**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.

**Fig. 22 - TAXIING TO TAXI-HOLDING POINT**

1 - Hangar
2 - Aircraft parking area
3 - Runway 08 - 26
4 - Traffic pattern
5 - Runway
6 - 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 position
4 - Switch (3) lights - ON
5 - FUEL RESERVE - press test push button (4) and check functionality of reserve 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

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

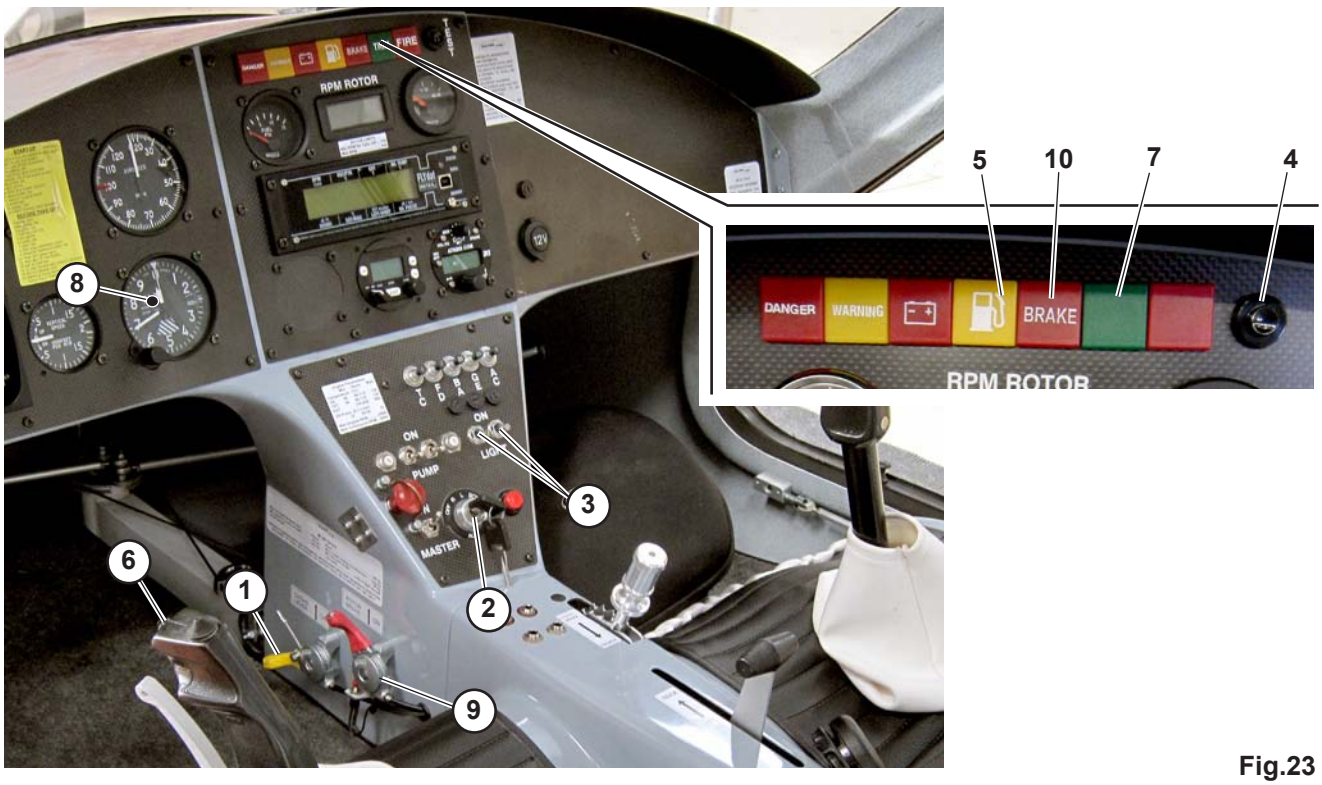



Fig.23

## 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 prerotator 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.

**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.**

**WARNING DANGER:**
**If 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.24**

## 4.11 TAKEOFF (Figs. 25/26/27/28)

**With takeoff the gyroplane becomes airborne.**

**NOTE:**
**DEFINITIONS:**
**PATTERN: is composed of four legs connected by 90° turns**
**TAKEOFF LEG: climb**
**CROSSWIND LEG: climbing until reaching the circuit level**
**DOWNWIND LEG AND BASE: in level flight**
**FINAL: alignment for landing**

**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

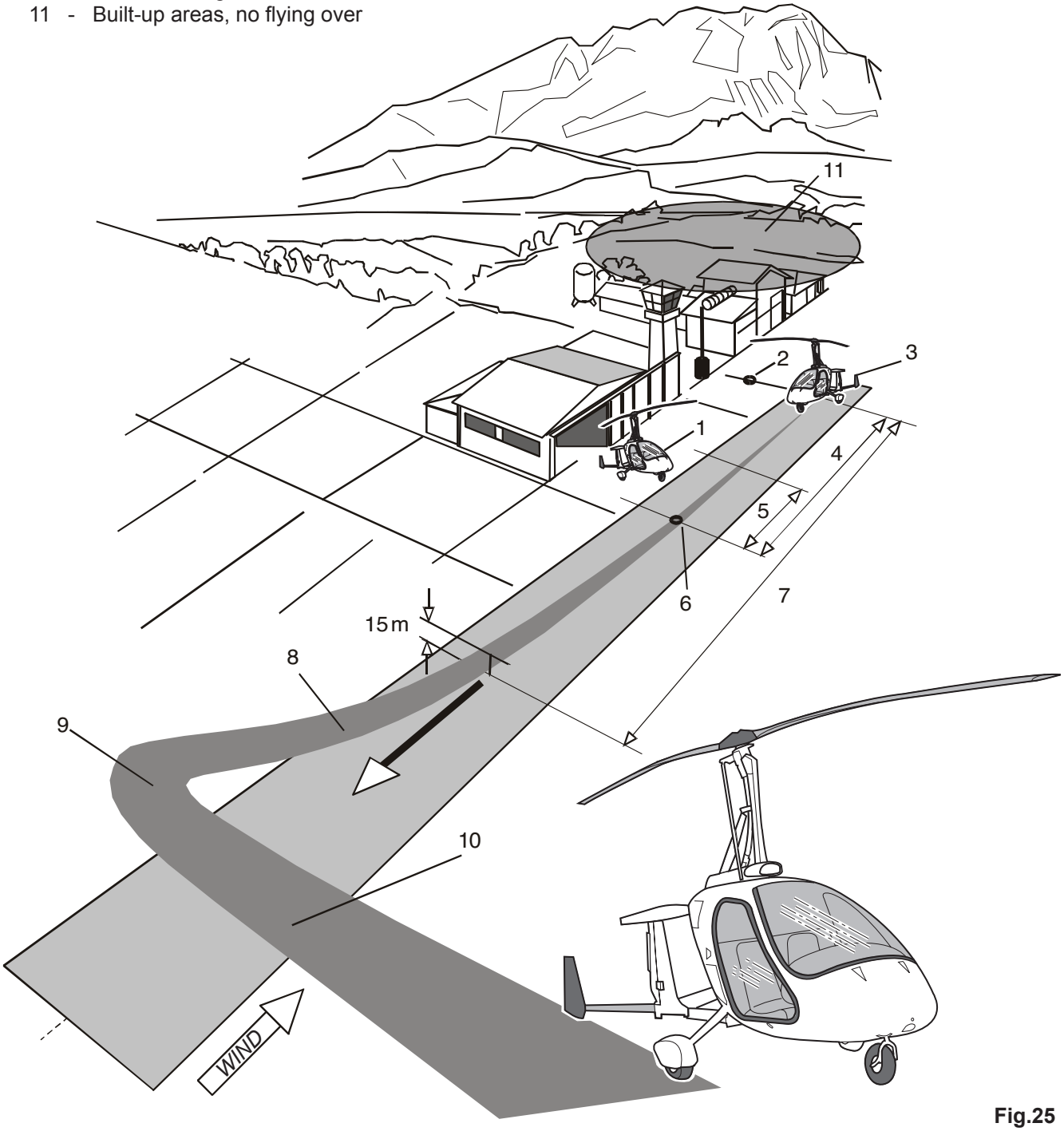



Fig.25

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.

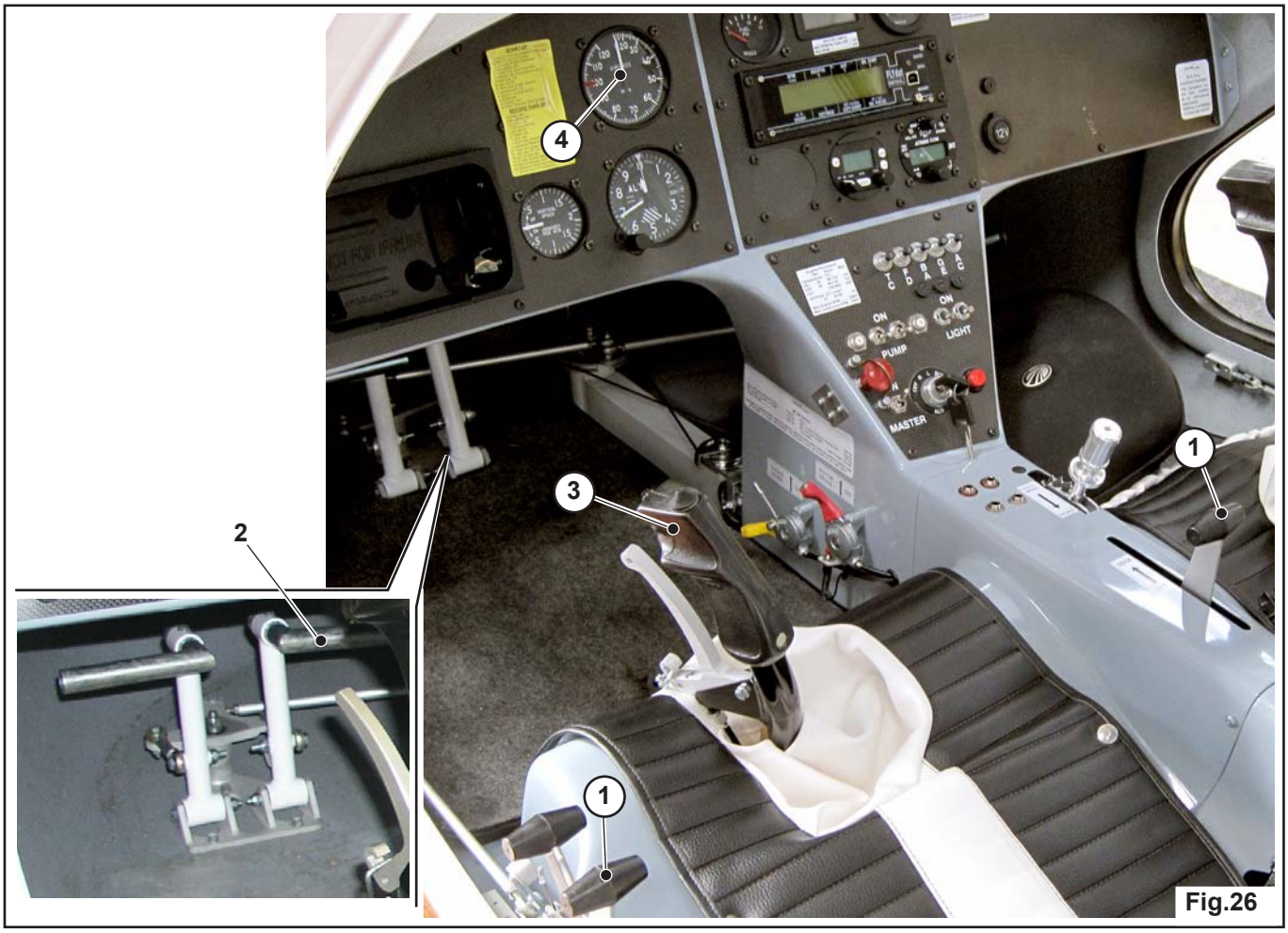


Fig.26

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) touch the ground.**

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 (Best rate of climb speed).

**NOTE:**
**See the APPENDIX for more information on takeoff.**

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

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

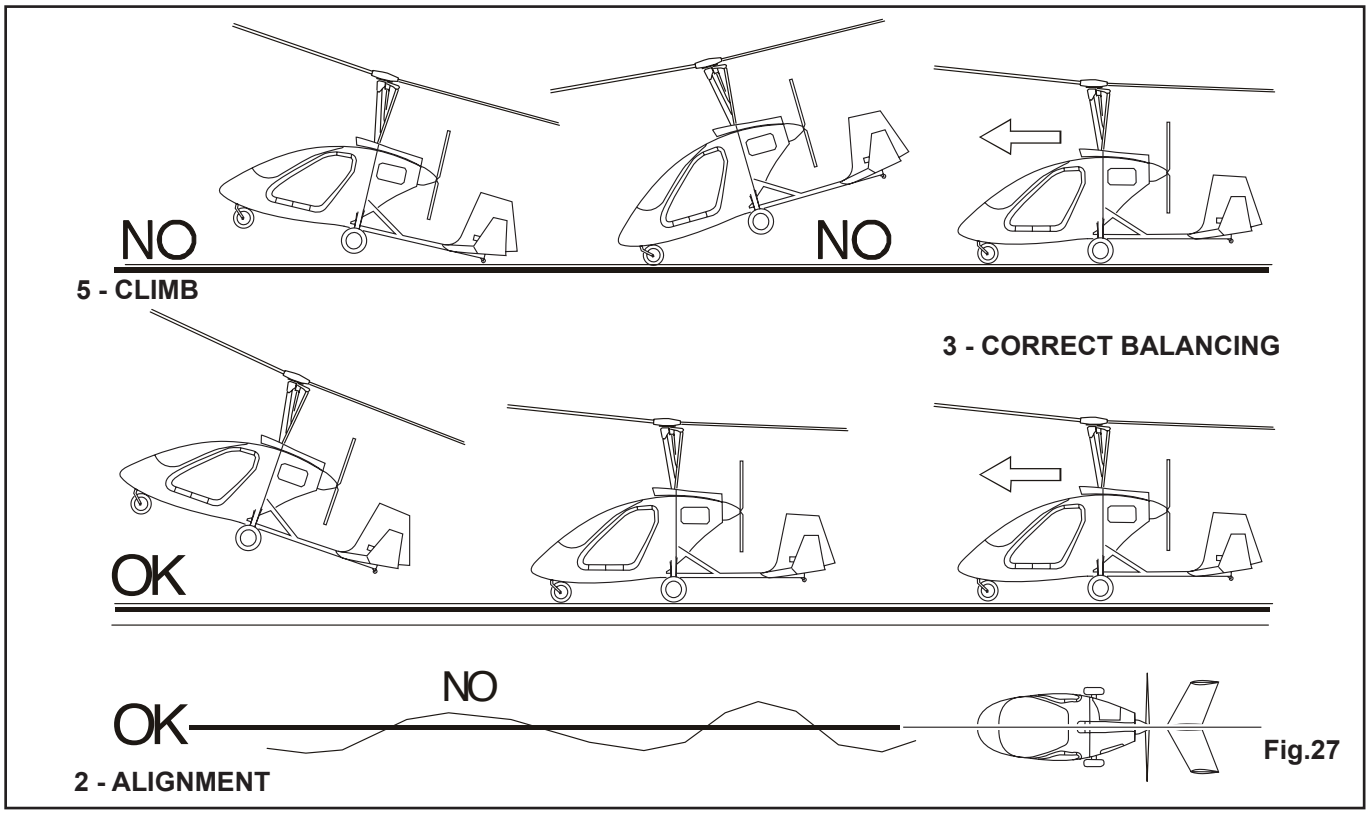



Fig.27

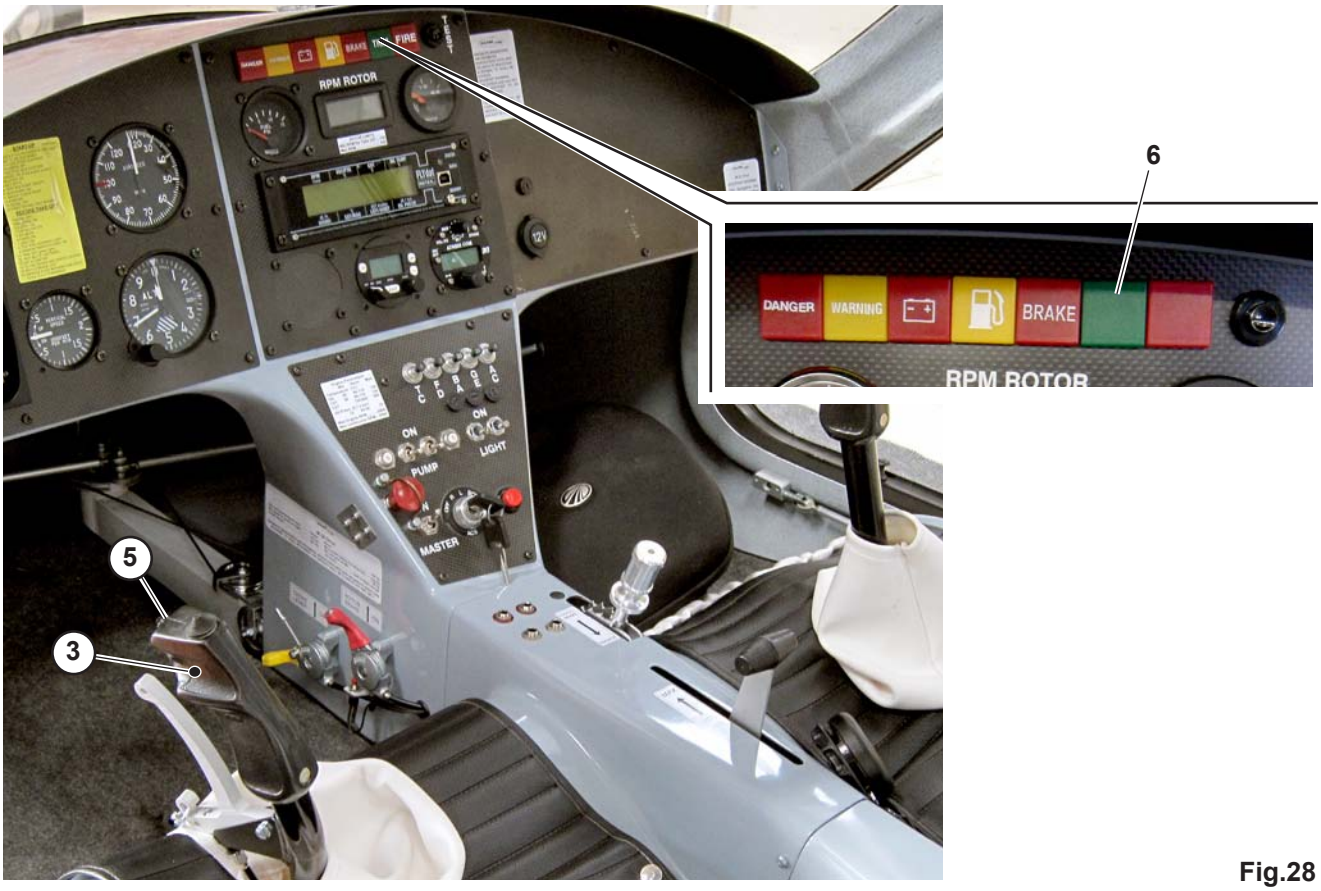



Fig.28

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 he 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)), several 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 presuure on the control stick and maintain a constant speed.

**NOTE:**
**TRIM SWITCH BACKWARD (5)**
= nose up trim = reduced speed
**TRIM SWITCHCONTROL (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.

**NOTE:**
**Trimming may start during the climb after the takeoff. Trimming must be stopped and corrected after the leveling 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 form 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 - LEVELING - 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 com- pared 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.**

## 4.12 FLIGHT MANEUVERS

### 4.12.1 CLIMB

**NOTE:**

| | |
|---|---|
| **Best rate of climb speed** | **65 mph** |
| **Best angle of climb speed** | **55 mph** |

Purpose — **Gain** of altitude

Preparation
Level **attitude**
**Speed** - keep the predetermined speed
Predetermined **altitude**
**Select** reference point

Execution
**Increase** power (min. 5.000 r.p.m.)
**Maintain** speed
Attitude **control**
**Maintain** reference point

**NOTE:**
**Leveling 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**

Purpose **Loss** of altitude

Preparation Level **attitude**
**Speed** - keep the predetermined speed

Predetermined **altitude**
**Select** reference point

Execution **Decrease** power
**Maintain** speed
Attitude **control**
**Maintain** reference point

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

### 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

### 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 (eg. from 65 to 80 mph)

Preparation
Level **flight**
Constant **speed**
Constant **altitude**
**Select** front reference point

Execution
**Increase** power
**Vary** attitude as necessary
**Maintain** alignment to reference point
**Reach** preset speed
**Use** trim

# 4.13 UNUSUAL MANOEU- VRES

## 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

Preparation — Constant **heading**
Head-**wind**
**Level flight** 400 ft - 65 mph

Execution — **Reduce** engine power
**Maintain** attitude

**Upon reaching 40 mph:**
**Increase** power to maintain altitude

**To regain speed:**
**Change** attitude to increase speed
**Reduce** power upon reaching 65 mph

## 4.13.2 VERTICAL DESCENT

To descend vertically at zero forward speed, follow the- se 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 reduce the power to level flight values
c. keep aligned with a reference on the horizon

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

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

### 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 MANOEUVERS

**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.**

**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

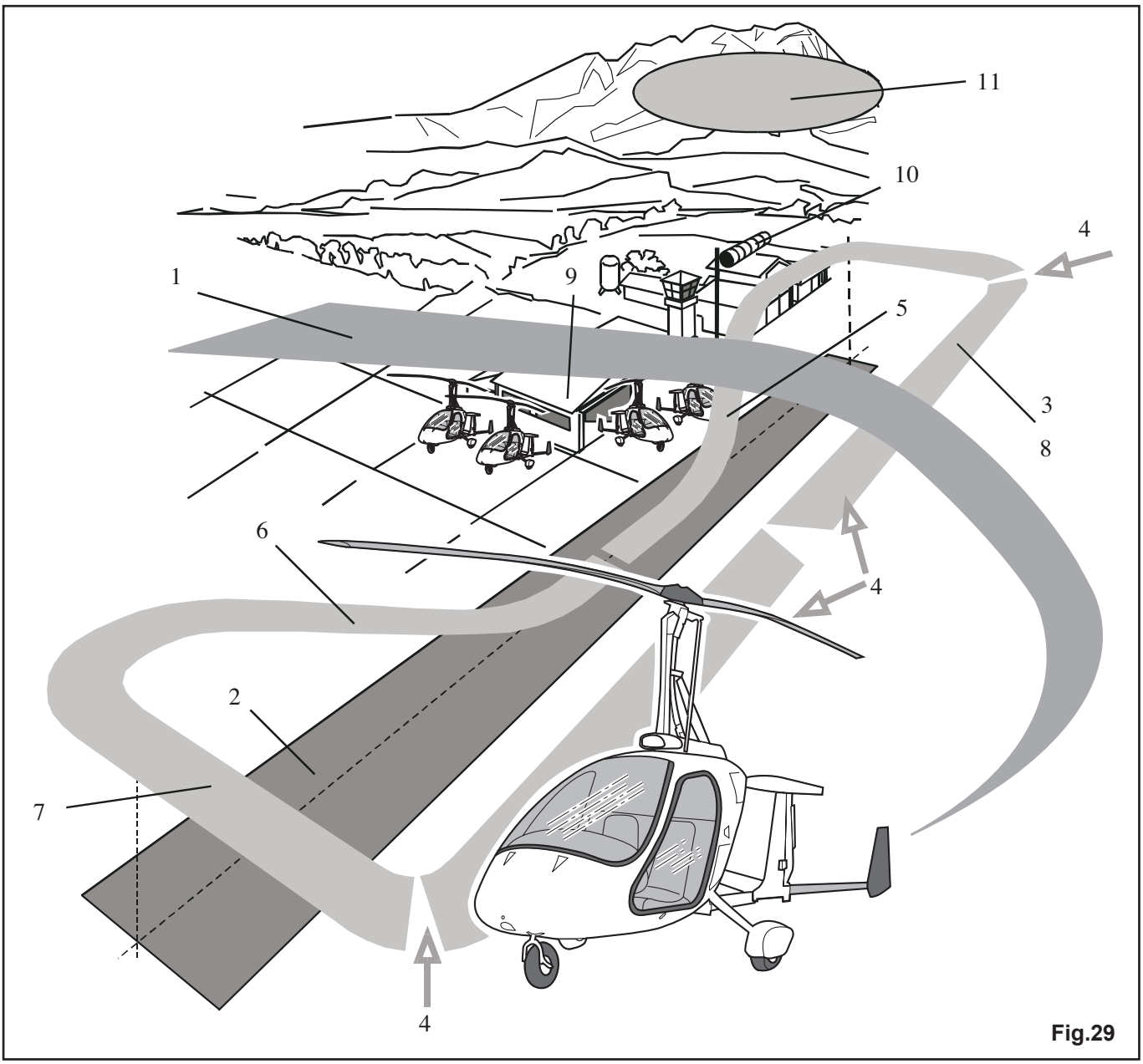



**Fig.29**

### 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
- 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)
- 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.).**

**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, 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

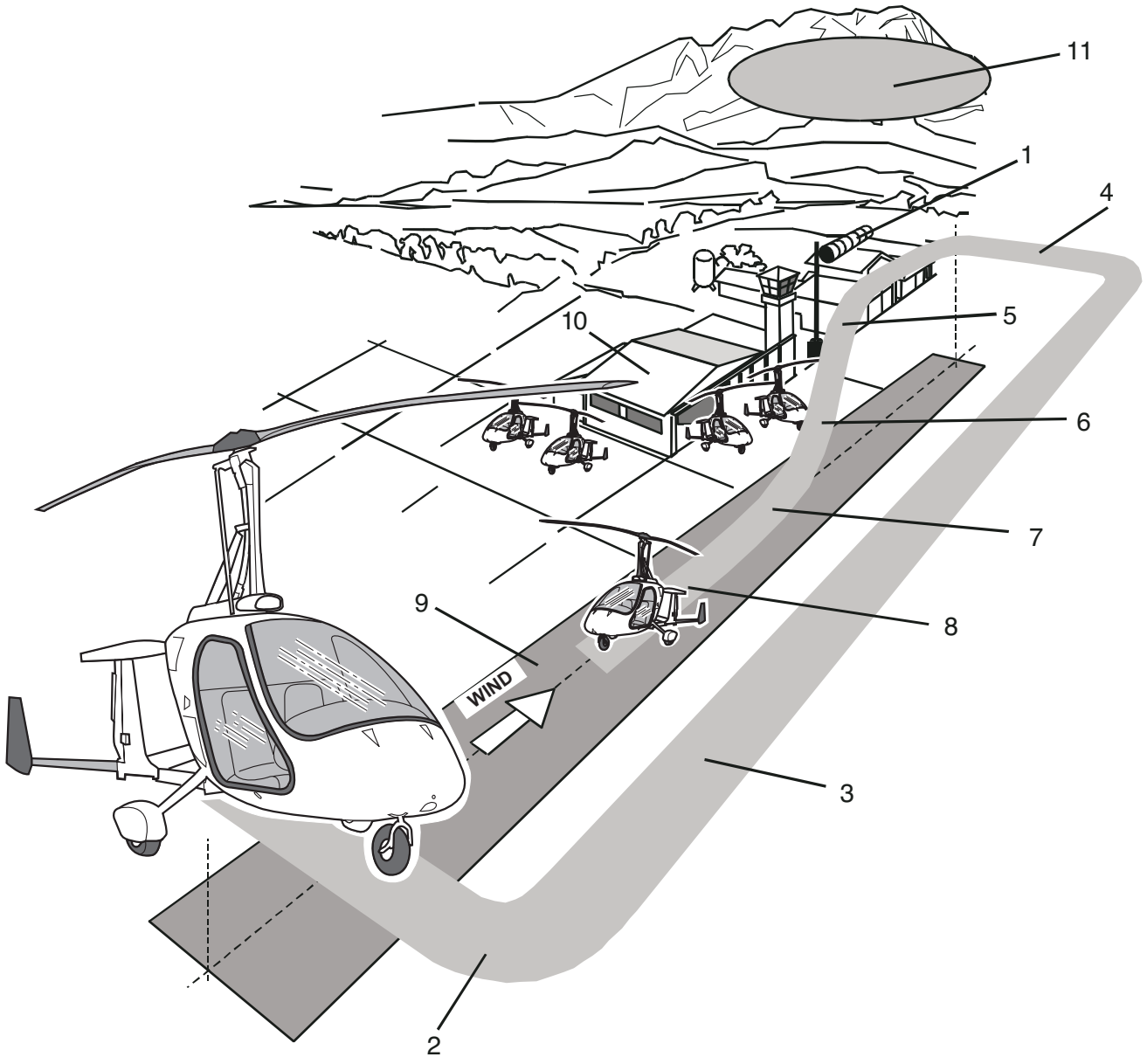



**Fig.30**

### 4.14.2 LANDING (Fig. 30)

**Power** - idle
**Speed** - 65 mph

**Maintain alignment** with runway with pedals and control stick.

**At 2-3 meters 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.**

### 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 while climbing.
**Clear** the runway axis and keep to the "dead" side.

### 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 ON.
**Control lock** -connect the control lock.
**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. When the rotor is stopped then drive slowly towards the appropriate parking area.**

### 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** - **KEYS** (5) - OFF
**6** - **MASTER (6) AVIONICS** - OFF

### 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.

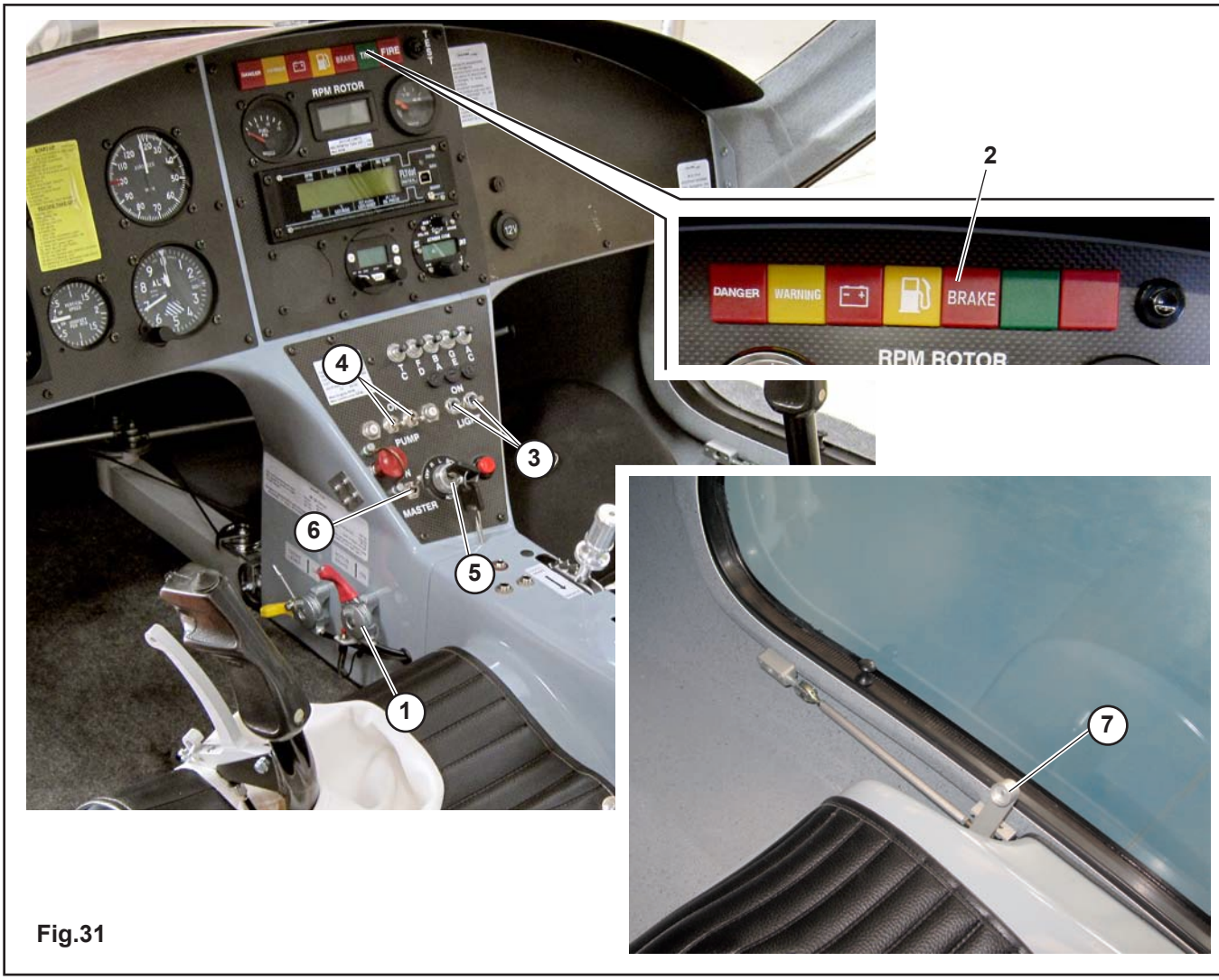



**Fig.31**

## 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' is strongly recommended**

# SECTION 5
# EMERGENCY PROCEDURES

## 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, unfavorable 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 become illuminated.
Proceed as follows
SHUT OFF VALVE – 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 become illuminated.
Proceed as follows:
SHUT OFF VALVE – 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 MANOUEVRE 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, in to wind and/or up any slope.

**In flight**
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

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 must be turned completely 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 the 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

## 5.9 ENGINE FAILURE

**EXAMPLE OF TEACHING PROCEDURE FOR ENGINE FAILURE**

Preparation
**Altitude** 400 ft
**Speed** 65 mph
**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
**Locate** landing area
Wind **evaluation**

**Master** and fuel pumps OFF
**(VERBAL INDICATION OF EXECUTION)**

**Land** within preset constraints

## 5.10 WARNING 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 praticable.
  Contact an authorized service centre to address the problem.

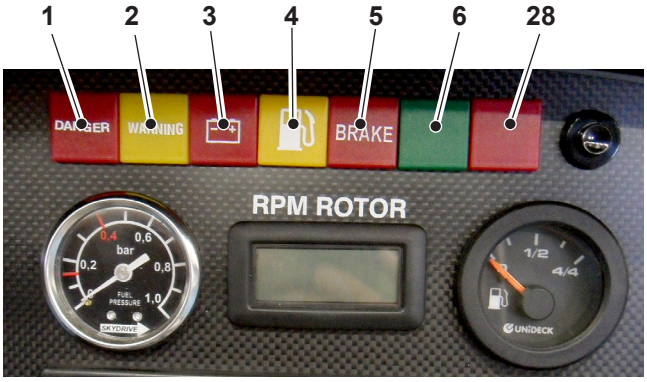
- **ORANGE LIGHT - WARNING**
  One of the sensors turbocharger system sensors is indicating a problem or has failed.
  Land as soon as possible and proceed to the nearest authorized service centre to address the problem.

- **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 taxing 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




| 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 taxing 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. |

>>>>

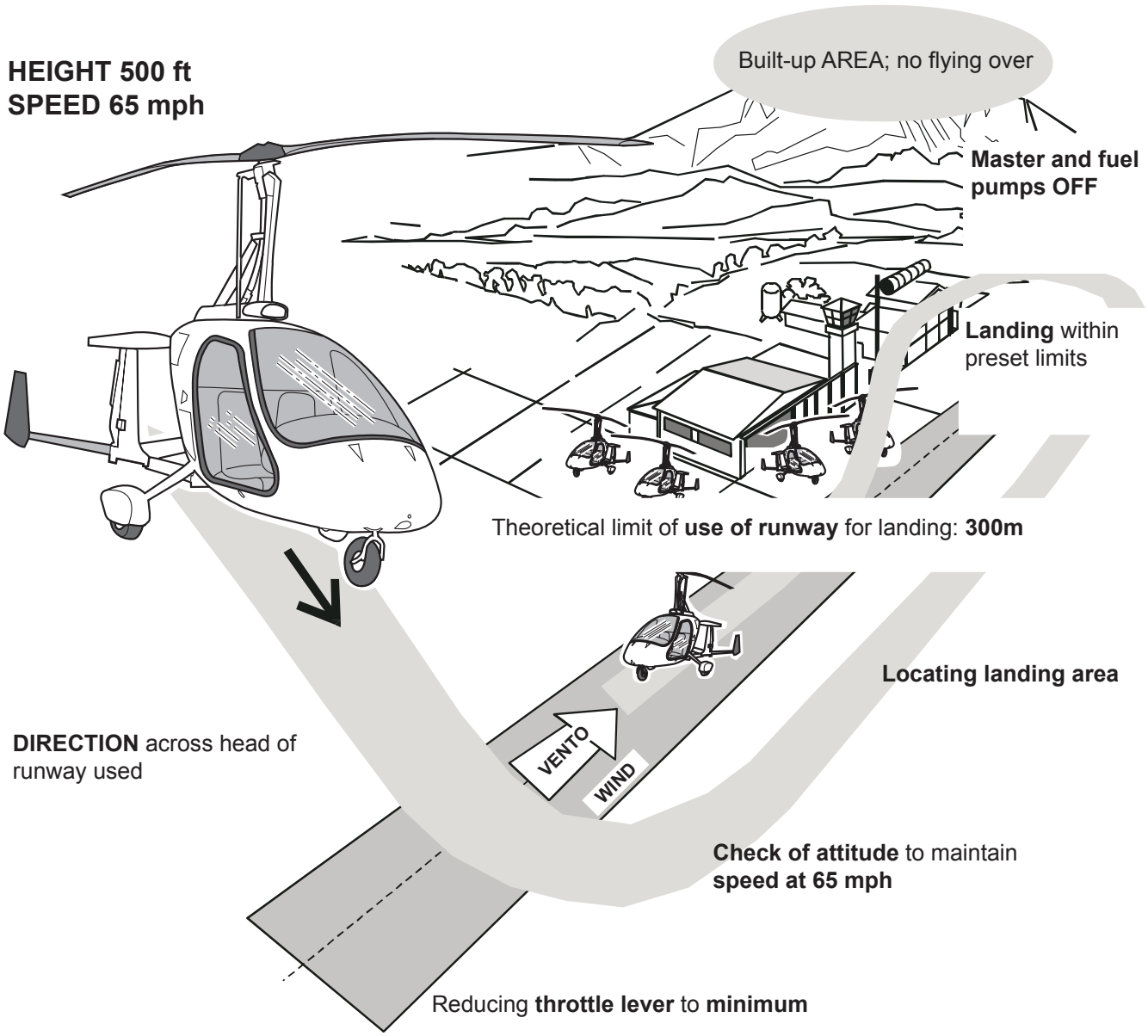
**⚠ WARNING DANGER:**

**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.**

**FIG. 1 TRAINING IN THE EVENT OF ENGINE *FAILURE***



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# SECTION 6
# FLIGHT IN ADVERSE CONDITIONS

## 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 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.**

**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 stoppaging 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.

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

# 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.**

# SECTION 7
## APPENDIX

# 7.1 APPENDIX 1 - REFUELLING DATA

## 7.1.1 FUELS

The following fuels can be used:

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

1) min. ROZ 95
2) min. AKI 91

AVGAS 100LL places greater stress on the valve seats due to its high lead content and forms increased depo- sits in the combustion chamber and lead sediments in the oil system. AVGAS should only be used in case of problems with vapor lock or when other types of gaso- line are unavailable.

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

## 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.

- 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 dury 4-stroke motor cycle oils meet all the requirements. These oils are normally not mineral oils but semi or fully synthetic oils.

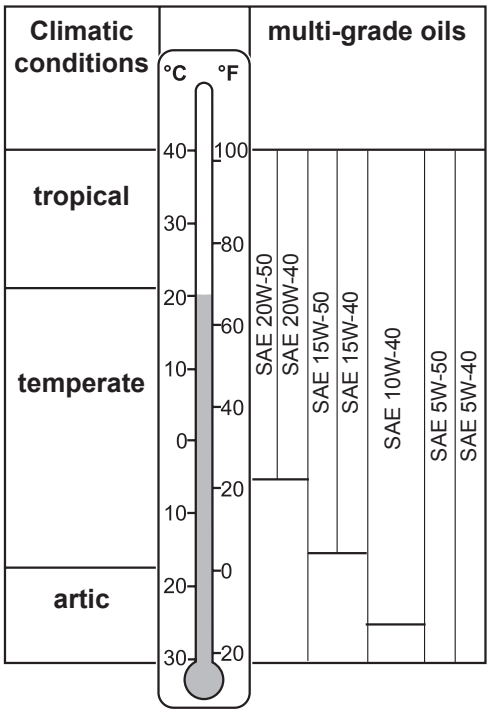
- Oils primarity for Diesel engines are generally unsuitable due to **insufficient high temperature properties and additives which cause clutch slipping.**

**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.

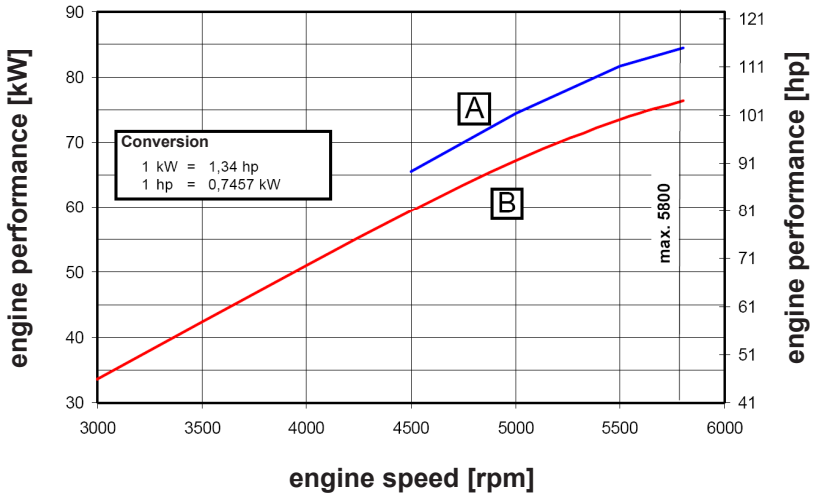


## 7.2 APPENDIX 2 - ORDINARY MAINTENANCE SCHEDULE

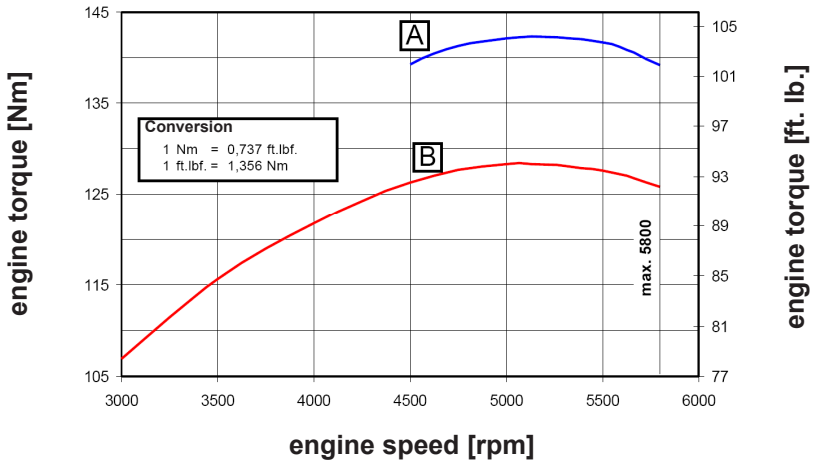
See maintenance schedule document
045-00-24C

# 7.3 APPENDIX 3 - ENGINE PARAMETERS

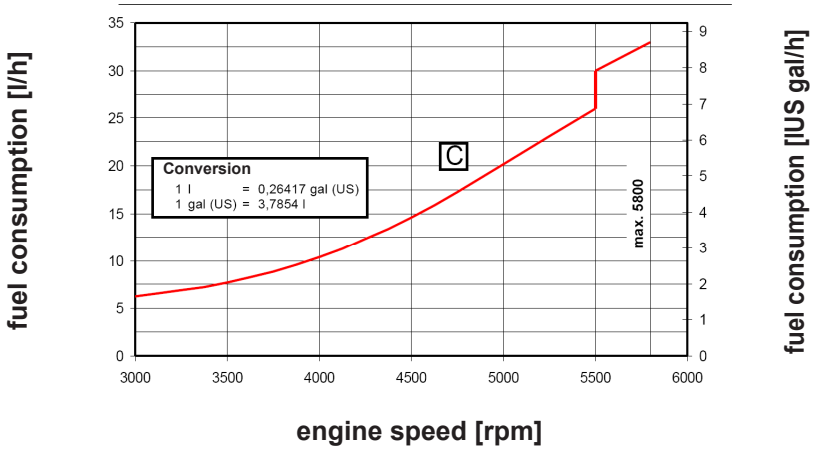
## 7.3.1 ENGINE PERFORMANCE



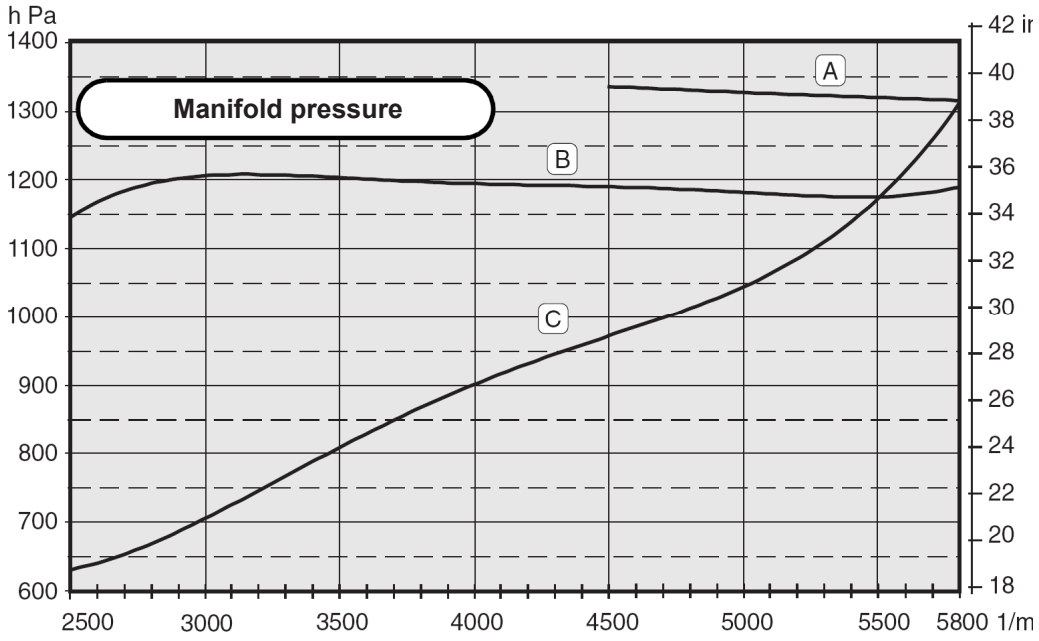

## 7.3.2 ENGINE TORQUE




## 7.3.3 FUEL CONSUMPTION




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




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

**A:** Take-Off Performance - **B:** Continuous Throttle Performance - **C:** Propeller Power Requirement

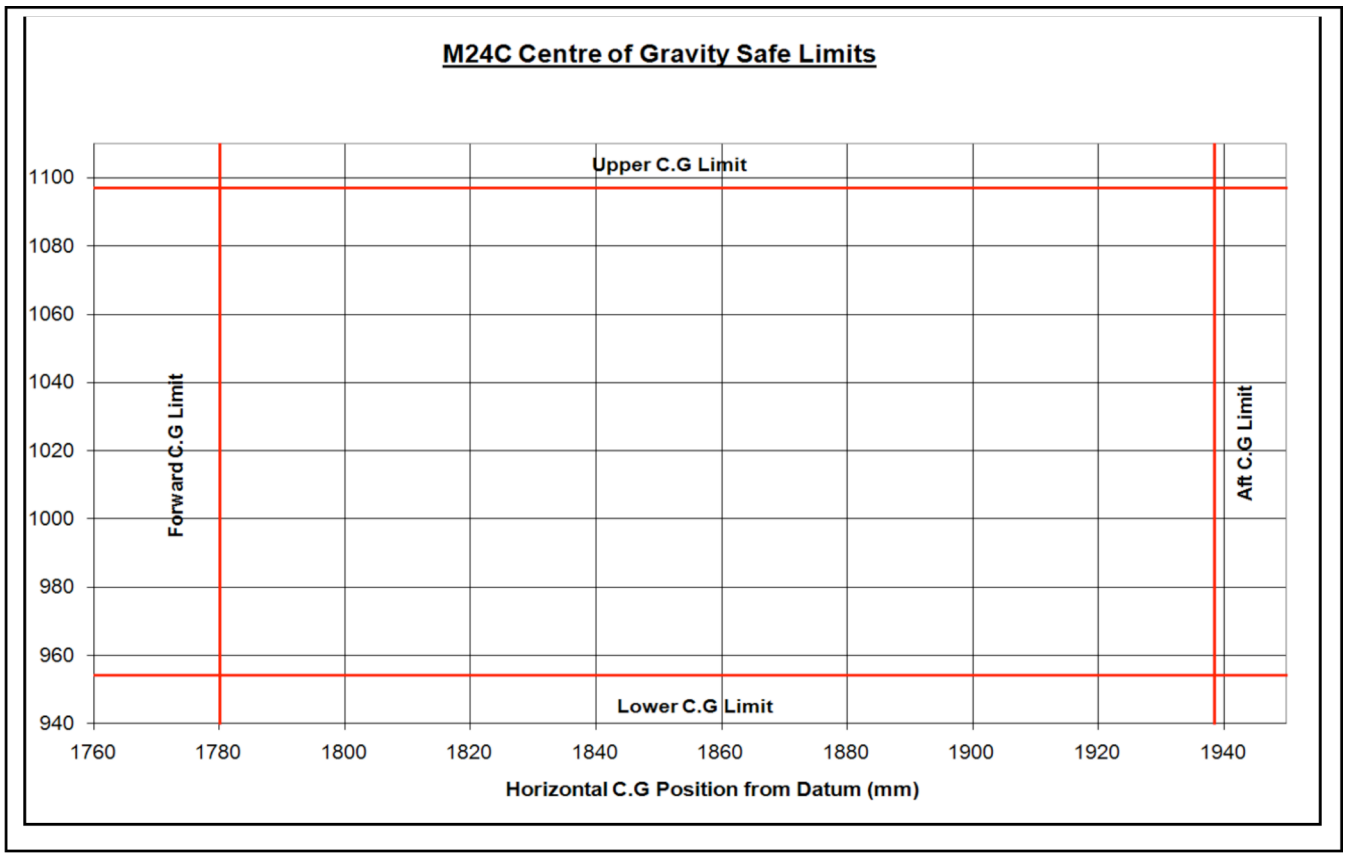
# 7.4 APPENDIX 4 - CG DATA

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 | | Position from Datum: | 3995 | mm | |
| Moment Arm: | 0 | kgmm | Moment Arm: | 0 | kgmm | | Moment Arm: | 0 | kgmm | |
| | | | Empty Weight | | | | | kg | | |
| Empty CG Position (Horizontal) $CG = \frac{\sum Moment\ Arm}{\sum Empty\ Weight}$ | | | | | | | Empty CG Position (Horizontal) | | | |
| **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) | | | $DG = \frac{\left(\frac{l'_{ac}W'_{ac}}{W} + \frac{rh}{l_{ac}}\right)\left(l'_{ac} + \frac{rh}{l_{ac}}\right) - (l_{ac}X_c)}{h}$ | | | | 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 | kgmm | |
| | Vertical | 710 mm | Moment Arm (Full Fuel): | | | | | 44020 | kgmm | |
| Pilot Seat | | | | | | | | | | |
| Position from Datum | Horizontal | 1312 mm | Moment Arm with 60kg pilot: | | | | | 81344 | kgmm | |
| | Vertical | 590 mm | Moment Arm with 60kg pilot: | | | | | 36580 | kgmm | |
| Position from Datum | Horizontal | 1312 mm | Moment Arm with 120kg pilot: | | | | | 81344 | kgmm | |
| | Vertical | 590 mm | Moment Arm with 120kg pilot: | | | | | 36580 | kgmm | |
| Co-pilot Seat | | | | | | | | | | |
| Position from Datum | Horizontal | 1410 mm | Moment Arm with 60kg co-pilot: | | | | | 87420 | kgmm | |
| | Vertical | 625 mm | Moment Arm with 60kg co-pilot: | | | | | 38750 | kgmm | |
| Position from Datum | Horizontal | 1410 mm | Moment Arm with 120kg co-pilot: | | | | | 87420 | kgmm | |
| | Vertical | 625 mm | Moment Arm with 120kg co-pilot: | | | | | 38750 | kgmm | |
| 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 | THEORETICAL C.G.POSITION | | NOTES |
|---|---|---|---|---|
| | kg | X (mm)<br>(Aft of Nose) | Z (mm)<br>(Above Ground) | |
| EMPTY | 297 | 2054.5 | 1191 | Zero fuel. Maximum Oil, coolant, hydraulic fluid |
| MTOW<br>&<br>LOWEST CG<br>&<br>MOST FWD CG | 500 | 1780 | 954 | Pilot 120kg; Co-pilot 55kg 9kg baggage plus 19kg fuel |
| MOST AFT<br>&<br>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
- $V_{NE}$ Never Exceed Speed ..... 100 mph
- $V_{MIN}$ Minimum Level Flight Speed ..... 30 mph
- $V_{APP}$ Landing Approach Speed (Minimum Descent Speed) ..... 65 mph
- $V_{MC}$ POWER OFF – Minimum Control Speed (Power Off) ..... 20 mph
- $V_{MC}$ POWER ON – Minimum Control Speed (Power On) ..... 20 mph
- $V_{NO}$ Normal Operating (Cruise) Speed ..... 85 mph

**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

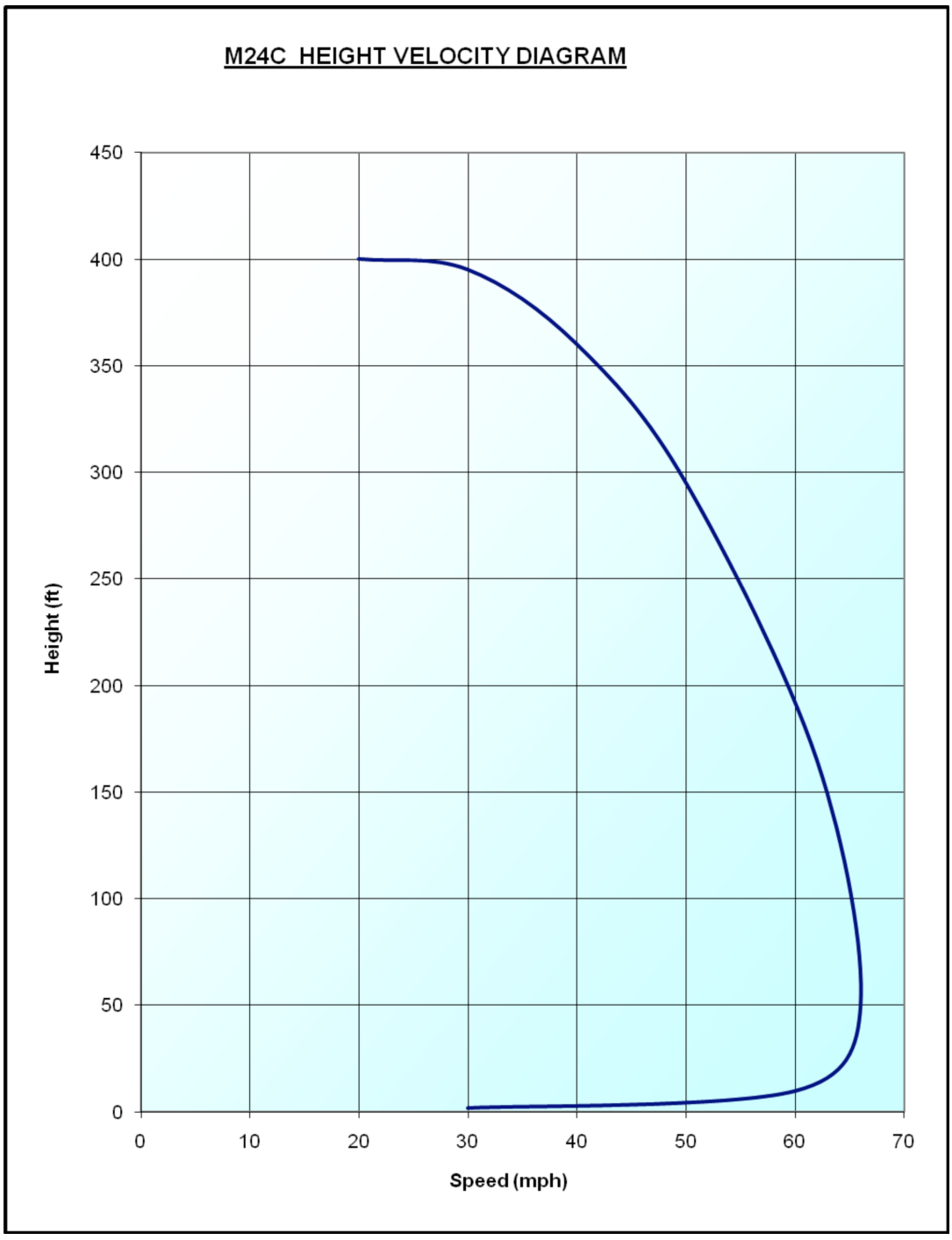
**Cross wind**

- 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

## 7.6 APPENDIX 6 - HEIGHT VELOCITY DIA- GRAM



## 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.