ORDINARY MAINTENANCE MANUAL MAGNI M16 (M16C) GYROPLANE

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MAGNI GYRO Srl.
Via Volpina, 23
I-21010 BESNATE (VA) - ITALY
WEB: www.magnigyro.it
ENQUIRIES info@magnigyro.it
Tel. +39 0331 274816
Fax +39 0331 274817

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APPROVED MAINTENANCE MANUAL FOR THE MAGNI M16 (M16C)

Registration Marks: _____

Constructors Serial Number: _____

Engine Serial Number: _____

Aircraft Designed and constructed by: Magni Gyro Srl

Maintenance Manual prepared and issued by: Magni Gyro Srl

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

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GENERAL

It is the responsibility of the maintenance engineer/pilot to be familiar with the content of this handbook, including any amendments.

Units of measure

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

Weight	Kilograms (kg)
Length (aircraft geometry)	Millimetres (mm)
Distance (aircraft performance)	Feet (ft) or Metres (m)
Altitude	Feet (ft)
Airspeed	Knots (Kn)
Moments	Kilogram metres (kgm)
Pressures	Bars (bar)
Temperatures	Degrees Celsius (°C)
Liquid Quantities	Litres (l)

RECORD OF AMENDMENTS

This page 6 and subsequent amendment pages (6/1 etc), will be reissued as necessary with each amendment list.

It is the responsibility of the owner to insure that the amendments are incorporated in the Maintenance Manual.

Amendment N° and date	Description of Amendment	Pages Affected

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ORDINARY MAINTENANCE MANUAL
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ISSUE 10 / 2012

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SECTION 1

1 INTRODUCTION

1.1 GENERAL INSTRUCTIONS

NOTE:
The instructions for the engine maintenance and servicing are not included in this manual. Please remember that maintenance and servicing of the engine must be accomplished, by suitably trained technicians, in accordance with the current issue of the Rotax Maintenance Manual; this is to ensure that the correct engine maintenance is undertaken and to satisfy safety requirements for this gyroplane.

The present Ordinary Maintenance Manual is intended to give to all operators the information and the procedures needed for the correct maintenance of the Magni Gyro M16 (M16C) "Tandem Trainer" gyroplane's systems, equipment, controls, cell and control surfaces. Please note that all described operations have to be carried out only by operators authorized by Magni Gyro.

If for whatever reason there is a doubt or lack of understanding, please contact the manufacturer.

A Spare Parts Manual is supplied as attachment to this Maintenance Manual to improve easiness of understanding of all the described procedures. The Spare Parts Manual is illustrated with drawings of all assemblies and systems and lists all codes and descriptions. For each described maintenance procedure, this manual lists all the required references (page or drawing number) so as to allow the best visualization of the parts and an easy understanding of the maintenance operation. For a better explanation of the more complex operations, pictures have been added to the description of the maintenance operations. Facsimile of inspection sheets are attached, too.

For a general description of the gyroplane and information on the operation and control of the gyroplane, reference should be made to Magni Gyro M16 (M16C) Pilot's Handbook.

1.1.1 WARNING SIGNS

All the safety rules indicated in this manual that imply danger are highlighted with the following symbols:

WARNING DANGER:
Warns of the presence of serious danger. If the necessary precautions are not taken, it is likely that the operator or a third party will risk serious accidents or death.

WARNING:
Warns that the vehicle's integrity is in danger. If the necessary precautions are not taken, it is likely that the vehicle be damaged, which in turn could cause an accident.

CAUTION:
Information on the operation in progress.

NOTE:
Draws the attention on important information that the personnel in charge must know and bear in mind for a correct operation of the vehicle.

1.2 APPLICABILITY

This manual is applicable to the Magni Gyro M16 (M16C) Tandem Trainer fitted with Rotax 914UL

1.3 OWNER/OPERATOR RESPONSIBILITIES

The owner and/or operator are responsible for the accomplishment of the maintenance prescribed in the schedule.

The maintenance must be carried out by qualified staff only. Each operation must be recorded in the aircraft logbook.

If the gyroplane does not fly for a total time of 100 hours within a period of 12 months, the 100-hours inspection should be performed as an annual inspection.

Engine maintenance and servicing should be carried out by appropriately trained and qualified staff. This manual does not include engine maintenance procedures. See the Rotax engine manual for more information and general maintenance and handling, or contact a Rotax authorized technician.

1.4 PERIODIC MAINTENANCE

Certain parts require scheduled maintenance regardless of flying hours. This maintenance must be performed in addition to the flight hour related maintenance.

1.5 CERTIFICATION OF MAINTENANCE

The gyroplane and engine logbooks should be present at all inspections. The number of flying hours, flights and modifications carried out since the last inspection should be correct and up to date. The engine logbook must show that the engine has been maintained in accordance with the manufacturer's instructions.

All periods in the schedule quoted in flying hours are to be calculated on the basis of the special reading of the Flydat instrument.

1.6 READING OF SERIAL AND PART NUMBERS OF COMPONENTS

For the correct understanding of the manual and to improve easiness of communication with the producer, it is essential to understand the meaning of the serial numbers (sn) of the gyroplane and part numbers (pn) of its components.

1.6.1 READING OF GYROPLANE sn (SERIAL NUMBER)

All Magni Gyro gyroplanes are classified with a serial number. This classification is helpful to define all the characteristics of a specific gyroplane, its assembly procedures, production date and, by consequence, the version. We can say that with a serial number it is possible to know "the history" of a gyroplane, that is its assembly, testing, user and modifications or updates. Furthermore, the serial number is the only reliable reference for the customer to ask for spare parts or information and be sure of a correct assistance from the manufacturer.

Maintenance staff can use the serial number to get primary information as to model, production year, progressive production number (and by consequence version) and initially fitted engine.

On Magni gyroplanes, a data plate pn 014 located on the longitudinal beam front of the front pilot seat, indicates the sn of the gyroplane. This data plate lists the following manufacturing data:

- Gyroplane model;
- Serial number;
- Engine initially fitted;
- Production date (month - year).

The following notes explain how to read a serial number:

Serial numbers are composed of 8 digits, the meaning of which is as follows:

XX - XX - XXX – X

XX the first two digits indicate the model of the gyroplane.

XX the second two digits indicate the year of production.

XXX the next three digits indicate the progressive production number.

X the last digit indicate the engine originally fitted, according to the following table:

- *0 Unassigned*
- *1 Rotax 528*
- *2 Rotax 912*
- *3 Rotax 912S*
- *4 Rotax 914*

Example of serial number reading sn 16032514

This serial number refers to an M16 (M16C) gyroplane, produced in 2003, progressive production number 251, initially powered with a Rotax 914 engine.

1.6.2 READING OF SPARE PARTS pn (PART NUMBER)

All the components of a Magni Gyro gyroplane are identified with a part number. Users and maintenance staff can use this part number as a reference when requiring information or spare parts. These pn are also used in the handbooks when describing procedures or controls. They are listed in the Spare Parts Catalogues supplied with each gyroplane.

The following notes explain how to read a part number: part numbers are composed of 7 digits, the meaning of which is as follows:

XXX-XX-XX

XXX the first 3 digits are the progressive number given by the company to the part.
This number is then combined with two other groups of numbers:

XX indicates the number of the page where the part is described in the Spare Parts Catalogue.

XX indicates the model of the gyroplane where the part is installed, and by consequence the Spare Parts Catalogue it refers to.

NOTE:
The same part number XXX may be associated with several page numbers or model identifiers, which is due to the repeated use of the same part in different groups and models. In this manual the parts are identified only through the first 3 digits of the pn, the other 4 digits are complementary.

Example of part number reading pn 267-09-16

This identifies part number 267, appearing in page 09 of the spare parts catalogue of the M16 (M16C) gyroplane model.

1.6.3 REQUEST FOR INTERVENTION TECHNICAL ASSISTANCE

NOTE:
All maintenance, repair, etc. must be carried out only by SPECIALISED PERSONNEL; otherwise, call our TECHNICAL ASSISTANCE DEPARTMENT.

Magni Gyro has set up for its customers the TECHNICAL ASSISTANCE DEPARTMENT so as to solve any problem connected to the machine's operation and maintenance.

EXCEPTION
Magni Gyro does not guarantee repair work and does not answer for the ensuing damages when the above-mentioned repairs have not been performed by its own personnel.

Assistance must be requested after an accurate analysis of the problems and of their causes.

The requests must always be in writing and the following information must be specified in the message:

- *Machine model;*
- *Serial number;*
- *Detailed description of the detected defects;*
- *Checks performed;*
- *Adjustments and regulations carried out and their effect;*

- *Any other information deemed useful.*

Address the requests to:
Magni Gyro *– I-21010 Besnate (VA) Italy, via Volpina, 23*
tel. *+33 0331 274816,* ***fax*** *+33 0331 274817*
web: *www.magnigyro.it,* ***e-mail:*** *info@magnigyro.it*

Serial number:
When asking for technical assistance or for spare parts, always quote the machine model, SERIAL NUMBER and year of production.

Note the rating from the machine's identification plate, which is fixed to the structure.

NOTE:
The machine's data plate is the only identification reference. It is therefore important to keep it in a good state. Do not modify it or remove any data. The Customer is responsible for any tampering.

1.7 GENERAL FASTENING REQUIREMENTS

Use only indicated products and strictly follow the requested methods:

1.7.1 MANUFACTURER'S REQUIREMENTS

1.	Metric Series, 8.8 type	-	fastening of fittings and components.
2.	PAN Series	-	fastening of torsion rods and blade flapping axis bolt.
3.	AN Series	-	fastening of control rods and rotor head assembly.
4.	NAS Series	-	fastening of rotor head joints.

Each fastening element must have specific anti-corrosion and resistance to oxidation characteristics.

1.7.2 FASTENING AND METHODS REQUIRED FOR ALL THREADED CONNECTIONS

1. Fiberlock nuts:

- *Never use them more than once;*
- *Do not use them if the tightening is not locked;*
- *After tightening there must be at least 1-1,5 thread clear of the nut.*

2. Lock washers (spring lock washers):

- *Always place between nut and plain washer, never directly on surfaces.*

3. Threadlocker (Loctite):

- *Light locking - purple Loctite 222;*
- *Medium locking - blue Loctite 243;*
- *Strong locking - Loctite 272.*

4. Castle nuts:

- *Always use together with safety pins or cotter pins.*

5. Plain washers:

- *Use on all painted surfaces.*

6. Large plain washers:

- *When possible use on all aluminium surfaces;*
- *Always use on surfaces of fibreglass reinforced plastic.*

7. Tightening method:

- *Tighten all the nuts by turning the nut, but never turn the bolt.*

1.7.3 GENERAL SPECIFICATIONS FOR TORSIONAL TIGHTENING

1. If there is no other specific indication, use the following strengths for all threaded fastening elements:

- *M4: 4-4,2 Nm*
- *M5: 5,5-6 Nm*
- *M6: 9,5-10 Nm*
- *M8: 23-26 Nm*
- *M10: 34-36,5 Nm*
- *AN4: 10-11 Nm*
- *AN5: 18-20 Nm*
- *AN8: 50-70 Nm*

2. Never use strong tightening strength on surfaces of fibreglass reinforced plastic.

1.7.4 LUBRICATION AND ANTI-CORROSIVE PRODUCTS SPECIFICATIONS

Rotor head control axis screws	-	Amber-coloured grease SHELL DARINA R2 or equivalent;
Flap bearings	-	Amber-coloured grease SHELL DARINA R2 or equivalent;
Rotor head notched gear	-	Water-repellent grease CASTROL GRAPHITE GREASE or equivalent;
Pre-rotation Bendix gear	-	Lithium graphite grease CASTROL MOLY GREASE or equivalent;
Pre-rotation flexible shaft	-	Lithium graphite grease CASTROL MOLY GREASE or equivalent;
Rudder pedals bolts bushes	-	Amber-coloured grease SHELL DARINA R2 or equivalent;
Outer surfaces of bearings	-	Water-repellent grease CASTROL GRAPHITE GREASE or equivalent;
Rear wheels pivot stem	-	Water-repellent grease CASTROL GRAPHITE GREASE or equivalent;
Inside of control cables sheaths	-	Spray grease CASTROL CHAIN LUBE RACING or equivalent;
Floating bush of rotor hub-bar	-	Spray grease CASTROL CHAIN LUBE RACING or equivalent;
Rudder upper bush	-	Lithium graphite grease CASTROL MOLY GREASE or equivalent;
Engine inner lubrication	-	In accordance with the latest issue of engine maintenance manual.

1.7.5 CARE AND CLEANING PRODUCTS SPECIFICATIONS

Surfaces of fibreglass reinforced plastic	
Rotor and propeller blades	- Avioclean P47 Special Propeller Cleaner
Transparent surfaces	- Avioclean S23 Canopy Scratch Remover
	- Avioclean C32 Aircraft Canopy Cleaner
Inner surfaces and padding	- Silicon-free instrument panel spray polisher
Instrument panel	- Silicon-free instrument panel spray polisher
Engine outer surfaces	- Anticorrosive ACF 50
Non-anodized aluminium surfaces	- Anticorrosive ACF 50
Control rod ends	- Anticorrosive ACF 50

WARNING:
To make all the maintenance operations easier, facsimiles of inspection sheets are enclosed with the present manual. They indicate the sequences of procedures to carry out, as well as their periodicity (hours, years).

1.8 SPECIFICATIONS

WEIGHT

Empty weight	285kg
Maximum take-off weight	500kg

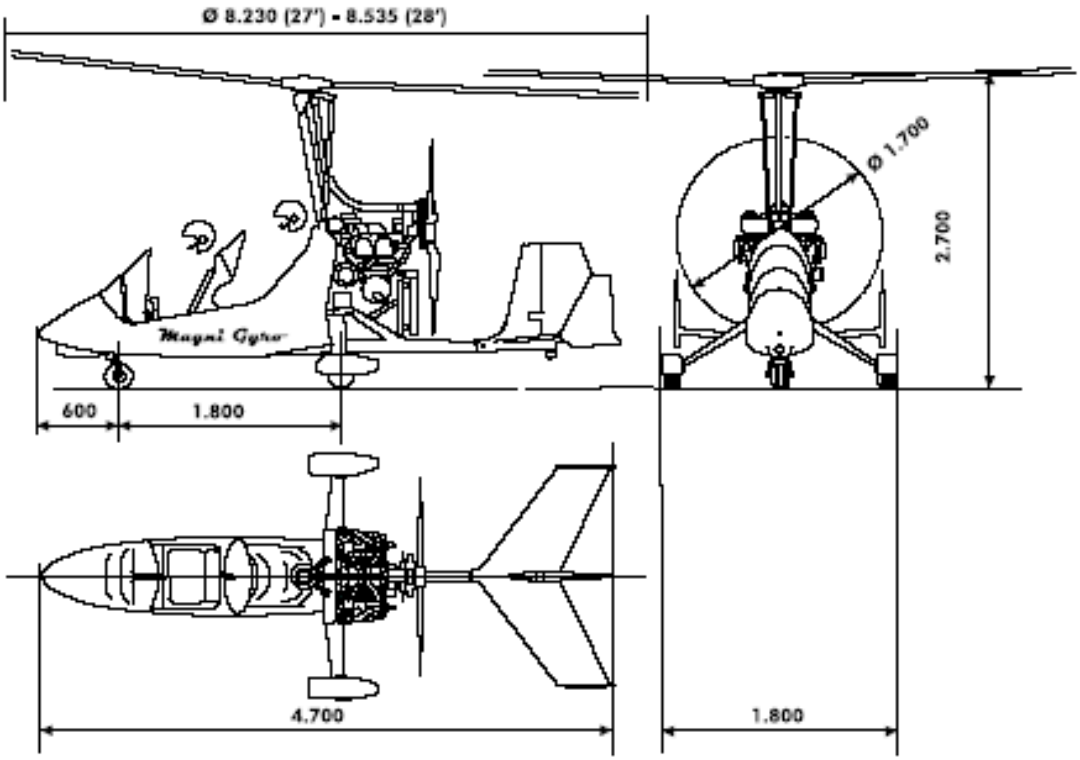
PERFORMANCE

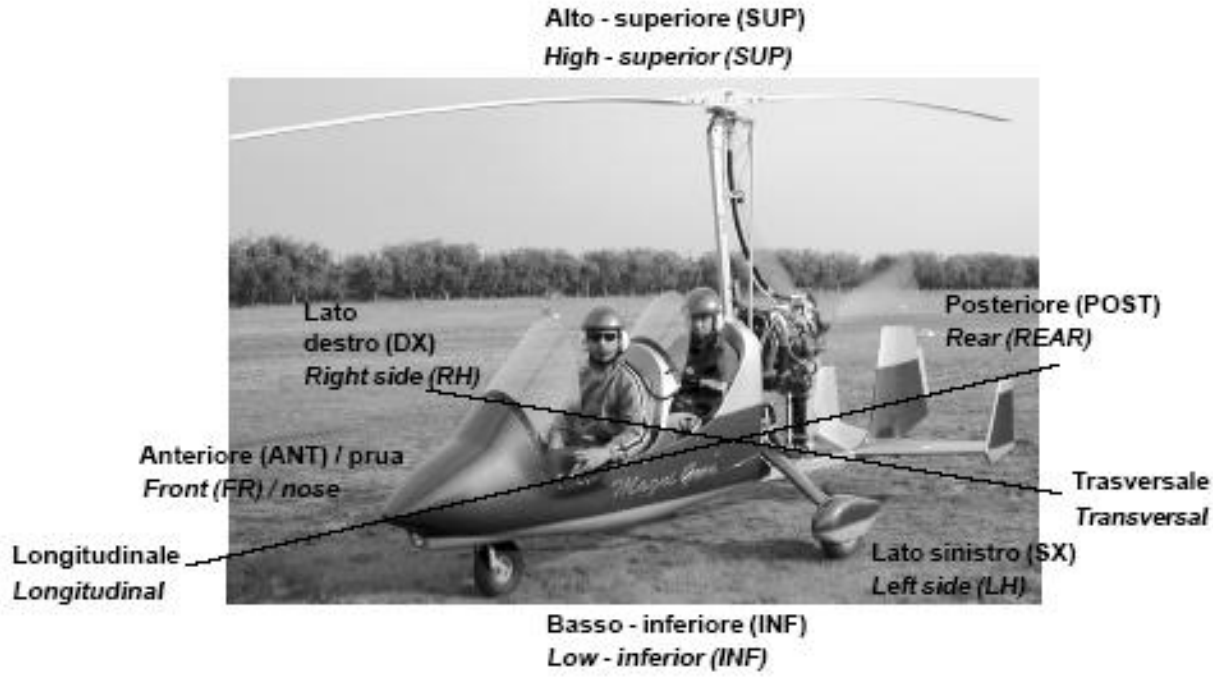
Vne	87Kn
Cruising speed	78Kn
Absolute ceiling	10000ft
Take-off distance to 50ft	820ft
Landing distance from 50ft	510ft
Rate of climb	625ft/min
Tank capacity	69lt

DIMENSIONS

Rotor Diameter	8535mm
Propeller Diameter	1700mm
Width	1800mm
Length	4700mm
Height	2700mm

Fig. 1.8/1 Dimensioni d'ingombro (quote in mm.)
Overall dimensions (all dimensions in mm.)




Alto - superiore (SUP)
High - superior (SUP)
Lato
destro (DX)
Right side (RH)
Posteriore (POST)
Rear (REAR)
Anteriore (ANT) / prua
Front (FR) / nose
Trasversale
Transversal
Longitudinale
Longitudinal
Lato sinistro (SX)
Left side (LH)
Basso - inferiore (INF)
Low - inferior (INF)

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SECTION 2

2 GENERAL DESCRIPTION OF GYROPLANE AND GENERAL MAINTENANCE REQUIREMENTS

2.1 MAIN STRUCTURE

The main structure of the gyroplane is constructed from TIG welded steel box section (4130 type). This structure forms the very base of the gyroplane; all the other systems are mounted on or to it.

The structure is a single piece unit with no user replaceable parts or components.

The structure is constructed to extremely exacting standards in our factory, on templates, with aerospace qualified welders and equipment. Owing to the flight loads placed on it and essential role it plays, Magni Gyro cannot allow or approve any privately made repair and/or modification to the structure.

WARNING DANGER:
The manufacturer must be contacted in all instances of the structure needing any repair or modification. Failure to do so could lead to a hazardous situation with potential for injury or even death, freeing Magni Gyro Srl of any responsibility.

2.2 ROTOR BLADES

The rotor blades are manufactured by Magni Gyro to a very high standard and have proven to give excellent flying characteristics.

Prior to shipping, the blades are matched and balanced; thus they must always remain paired.

Should one blade be damaged and require replacing, then it must be returned with the undamaged blade to Magni Gyro for repair (if repair is possible). Any non-approved repair of the blades is forbidden. In any case, either a set repaired by the manufacturer or a new set must be installed. Even a thin coat of paint can unbalance the blades and prove troublesome to correct.
The blades are made of composite material with a composite spar and an aluminium root. There are no user replaceable components on the blades and great skills in composite repair techniques are required (even to the manufacturer) to obtain a satisfactory repair.

Rotor blades must be returned to the factory for replacement after 2500 flying hours.

WARNING DANGER:
The manufacturer must be contacted in all instances of the rotor blades needing any repair or modification. Failure to do so could lead to a hazardous situation with potential for injury or even death, freeing Magni Gyro Srl of any responsibility.

2.3 FAIRING AND TAIL (CONTROL SURFACES)

The gyroplane tail is a one-piece fibre glass moulding. It may be repaired using standard composite repair techniques.

Any damage must be analyzed first and then repaired to keep the fairing complete. The surface finish must be restored to keep the design and maintain aerodynamic efficiency.

Should the customer wish to modify the fairing, please refer to Magni Gyro and ask for advice.

The fairing and tail assembly are manufactured from fibre glass and surface is finished with a gel coat.

A suitably qualified engineer or technician should assess any crack or de-bonding of the components. If the damage is non-structural, then repairs using standard composite repair techniques can be done.

In all instances, the surface finish must be restored to prevent the infiltration of moisture or contaminants and to guarantee aerodynamic performance. If the damage to the parts is deemed to be structural, then the components must be returned to the manufacturer for rework or replacement.

Unauthorized structural repair is not allowed.

Any worn or damaged part of the rudder system must be replaced with Magni Gyro original parts.

2.4 MAIN STRUCTURE AND FLYING CONTROLS

The main structure of the gyroplane is also the anchoring point and reaction base for the flying controls. Correct adjustment and functioning of the controls is essential for safe flight of the gyroplane. All the pivots and joints of the control system use a combination of bearings and "uniball" rod end bearings.

During inspection, any bearings or "uniball" rod end bearings found to be worn or corroded must be replaced. All components are available from Magni Gyro; this will ensure the use of correctly specified parts.

WARNING:
Some bearings available on the market may look the same as those removed from the gyroplane but, unless they are up to the designer's specifications, they must not be used to replace the original parts.

Adjustment of the controls, including setting of the retainers, may be required after replacement of these parts.

This procedure must be carried out by a Magni Gyro approved engineer or inspector to prevent any negative situation. It is strongly recommended to contact Magni Gyro prior to adjusting the flying controls.

After replacing "uniball" rod end bearings, check the inserted thread length and make sure it exceeds the minimum length, thus guaranteeing safety.

Lock nuts are to be secured and special marks applied.

2.4.1 ROLL AND PITCH CONTROL LINE

The gyroplane is controlled for roll and pitch through the control stick.

The stick (with its ergonomic handle) is pivoted to a fork by means of two bolts M5x32; the fork houses the bearings on which the displacements along the longitudinal axis of the torsion rods are articulated.

Tightening between control fork and torsion rods is guaranteed by PAN 32006 aeronautical grade bolts and nuts.

The movement of the control stick corresponds to the longitudinal translation of the upper torsion rod in relation to the lower torsion rod.

Two bearings, along which lateral movements are articulated, are fitted at the tips of the lower torsion rod. They are pivoted to the main structure by two adjusters (one fixed and one adjustable).

A PVC support is placed on the lower torsion rod, which is meant to prevent bending of the rod.

Similarly to the front control stick, the rear control stick too is fixed to the torsion rods via bearings and aeronautical grade bolts and nuts.

A 4130 steel TIG welded fork articulated to the torsion rods on bearings conveys the movements of the torsion rods to the control rods.

The vertical line conveys the movements from the lower fork to the rotor head. This vertical line is composed of two series of control rods made of 4130 steel, with TIG welded threaded ends.

Rod ends with threaded stem are fitted to the end rods. The control is then geared down through two pairs of aluminium transmissions, the movements of which always occur on bearings and aeronautical grade bolts and nuts.

The movement of the control rods allows to control the rotor head, when the roll movement happens along the bolt pn NAS 628-52 and the fork pn 051 that is bolted to the main structure with 4 bolts pn AN5-24 A and the pitch movement happens along the bolt pn NAS 628-30 and the fork pn 052.

All the bolts and nuts used in the control line are of aeronautical grade and all the movements occur on bearings, except the ones of the rotor head on the fork pn 052 and of the square pin pn 056 which are equipped with bushings to support the high loads involved.

Stoppers

Both stoppers (longitudinal and transversal) are fitted along the torsion rods.

2.4.2 SECONDARY CONTROLS

"Secondary controls" are all the controls of not primary importance that the pilot can use to allow safety and comfort of flight.

These types of controls are listed below:

3.9.1 - choke control line;
3.9.2 - rotor brake control line;
3.9.3 - brake system cables line;
3.9.4 - prerotation control line;
5.1 - trim control line;

The transmission of the movements and the pulls required to operate these services or specific systems occur through 1,5 mm diameter zinc plated steel cables (2 mm diameter for the trim line) that run in metallic sheathings, with a plastic film on the outside and Teflon covering on the inside.

This type of control line can suffer from oxidation of the inner part of the cables which, in case of high humidity, rain or careless washing, may occur in the lower part of the sheaths, thus causing considerable stiffening of the control levers.

WARNING:
If periodical maintenance of these cables is missing, the cables might break causing a complete ineffectiveness of the system. In the worst of cases, the broken and oxidized cable might be impossible to extract from the sheathing, and the replacement of both the cable and its sheathing become necessary. To avoid these problems, it is strongly recommended to respect the ordinary maintenance schedule indicated in the maintenance manuals.

2.4.3 RUDDER PEDALS SYSTEM

The control on the vertical axis is gained by the rudder pedals system used by the pilot to yaw the gyroplane during flight and to direct it in ground manoeuvring such as taxiing and parking.

The rudder pedals control line starts with pedals pn 071-072 and pn 080-081, which are connected one to the other through rigid rods and ball joint ends. The movement of the pedals occurs on bushes.
The front pedals pn 071-072 are furthermore connected one to the other by rigid rods and ball joint ends, through the control block pn 277, on which the stem of the fork pn 093 of the front wheel is fixed, and through the spacers pn 077.
When the pilot pushes one of the pedals, it makes the front wheel turn to the same side (right foot-right turn). The rotation of the fork pn 093 as to the main structure's tube occurs on 2 conical roller bearings; the lock nut KM4 screwed to the fork stem guarantees the tightening of the fork-bearings assembly.

The lock nut KM4 is furthermore locked by the transmission unit pn 227.
The cables of the rudder pedals line are fixed to the rear pedals through two turnbuckles.
The line cables operate three misaligned couples of pulleys pn 084, which lead to the pivot pn 086 of the rudder pn 091.
The movement of the pivot pn 086 occurs on two thrust bearings pn 6002 ZZ placed in the special housing in the main structure.

Thus, the pressure exerted on the pedals allows control of the rudder, fixed to the pivot pn 086, and to manage or correct the gyroplane's yaw while flying.

2.4.4 PRE-ROTATION SYSTEM

The function of the pre-rotation system is to provide to the rotor unit the initial acceleration necessary for take-off.

The pre-rotation control line stretches all along the gyroplane's structure, starting at the lever placed before the control stick and reaching the transmission unit through a sheathed steel cable. When the pilot operates the control lever, the two belts located close to the propeller are tensioned through the tightener, which is part of the transmission unit to which the control cable is connected.

Once the belts are tightened, the propeller's motion is geared down and transmitted through the transmission and through a flexible steel shaft to the Bendix gear. This gear, once started, engages the rotor head's notched gear to which the blades are anchored.

The tension exerted on the belts vanishes when the pre-rotation lever is released, thus stopping the transmission, flexible shaft and gear. This same gear moves back and disengages the crown, thus freeing the rotor so that it can rotate.

2.5 SUSPENSION, WHEELS AND BRAKES

The suspension of the gyroplane is realized through a leaf spring in composite material.

The manufacturer does not authorize any repair of this unit. Any crack or damage to the suspension has to be referred to Magni Gyro.

Minor surface abrasions and scratches can be repaired using standard composite repair techniques.

If any of the wheel or brake components are found to be damaged, then replacement with new or repaired parts is the only option.

Magni Gyro's policy is to recommend replacement of any worn or damaged parts rather than repair. In the long run the cost of a new wheel axle will probably be less than trying to repair a bent or damaged one and ensures greater flight safety.

If the front fork is found to be bent or distorted, then this unit is to be replaced. Unauthorized repair can lead to a unit that is much weaker as the original one and could fail in service ***(for inspection procedures see the specific paragraph).***

2.6 POWER PLANT

Any repair or overhaul of the engine must be carried out by personnel trained and qualified by the ROTAX Company, in strict accordance with the latest amendment state copy of the maintenance and operator's manuals applicable to the engine.

Details of any work carried out must be entered in the relevant engine logbook.

This logbook must be kept up to date and accurate and be available for presentation when work is carried out and at permit to fly renewal.

For more information, see the relevant section.

2.7 FUEL SYSTEM

The gyroplane's fuel system has been designed to meet the requirements of the British relevant requirement: BCAR Section T (CAP 643).

Any modification or substitution of non-original components may cause the system to no longer meet compliance standards and is strictly forbidden.

Whenever replacing a component, it is vitally important to replace it with an identical one.

A fuel flow availability check must be carried out after any work has been carried out on the fuel system.

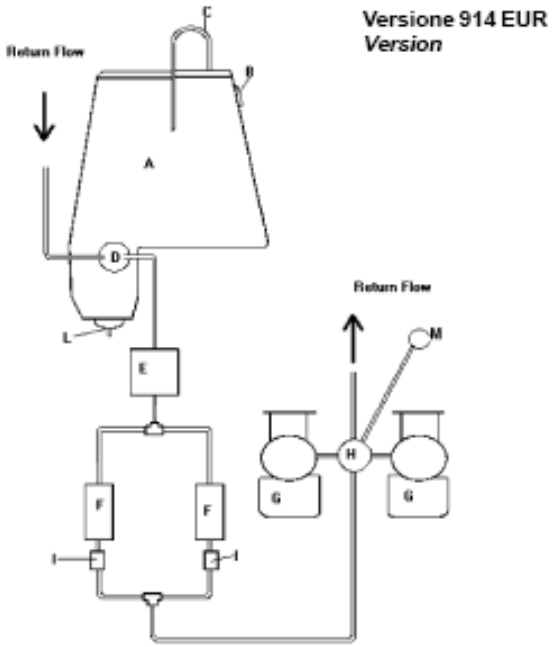
Each fuel pump and each filter must be capable of individually delivering at least 125% of the maximum fuel consumption of the engine.

Fuel consumption data is available in ROTAX operator's manual, according to the installed engine.

The fuel tank is manufactured in glass fibre composite materials. Before installation, it is subjected to a pressure test and to leak checks. Minor repairs may be carried out using standard composite repair techniques, but they must be tested to make sure it still satisfies the requirements.

If contamination of the fuel system is suspected, then the entire system must first be emptied and then filled with clean fuel. Furthermore, both filters must be replaced.

The schematic diagram of the fuel system is shown hereunder.



A) - FUEL TANK
B) - FUEL TANK FILLER CAP
C) - FUEL TANK VENT PIPE
D) - TANK OUTLET AND CONTENTS SENDER
E) - FUEL FILTER
F) - FUEL PUMP
G) - CARBURETTORS
H) - FUEL PRESSURE REGULATOR
I) - NON RETURN VALVES
L) - SAMPLE AND DRAIN POINT
M) - FUEL PRESSURE GAUGE
N) - AC MECHANICAL PUMP

2.8 COOLING SYSTEM

The cooling system may be described as follows:

1. The coolant flows from the expansion tank of the engine through a hose to the lower connection of the radiator where it gets cooled.
2. The radiator (size Normal 40 pn 419) is placed vertically, close to the propeller to increase its efficiency.
3. The cooled coolant flows from the radiator through a 180° elbow to the heat exchanger where it cools the oil.
4. The coolant is sucked by the engine pump from the heat exchanger and flows through a hose.

For the gyroplanes from serial number 16052934 to serial number 22063684, the temperature is kept within the green range thanks to a radiator choking system consisting of series of fins keyed to a special frame (see fig. 3.13/1). The movement of this frame follows the movement of the Bowden cable pn 403 controlled by the pilot from the cockpit.

For the gyroplanes serial number 16063694 onward, the temperature is kept within the green range thanks to a three-way thermostat fitted to the tubing between the expansion tank and the radiator. The control of the entire system is done visually as described below.

The control of the cooling system must follow the maintenance schedule as detailed in the Ordinary Maintenance diagram, or each time there are anomalies, overheating or loss of coolant.

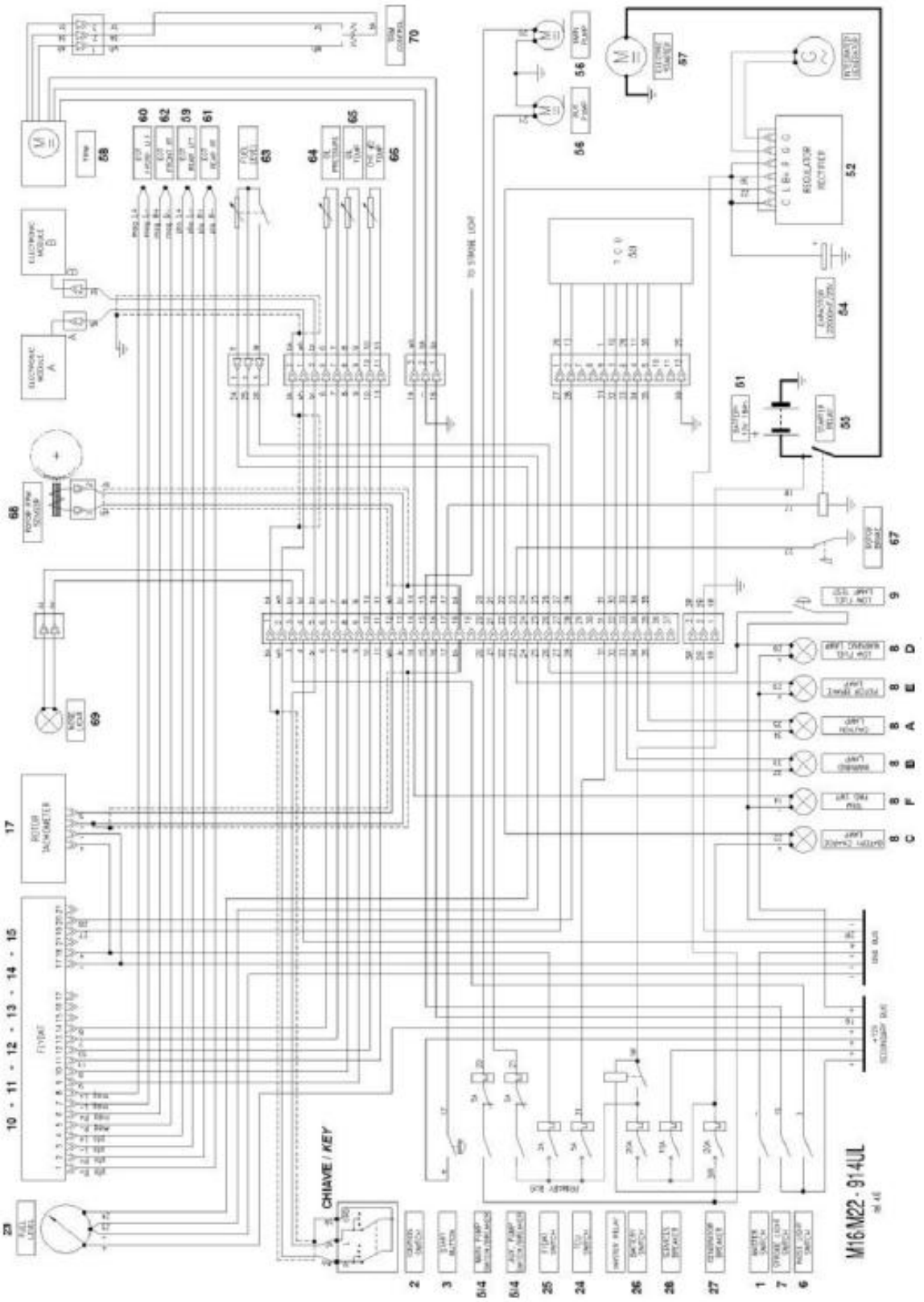
2.9 INSTRUMENTATION

All maintenance other than changing the battery must be carried out by an authorized workshop.

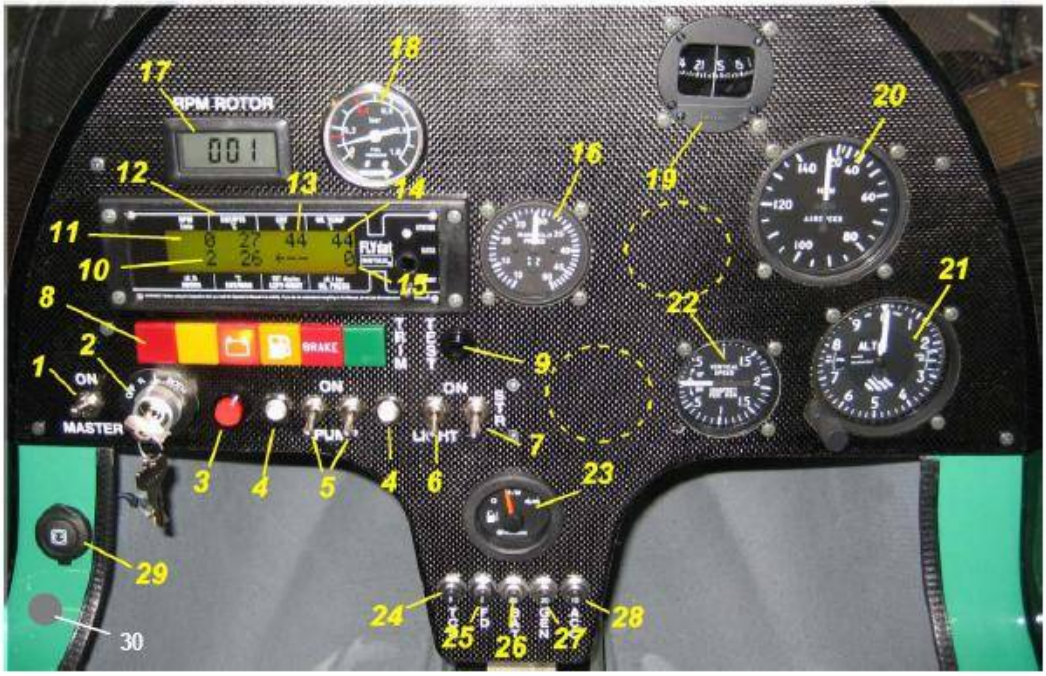
Any instrument that gives readings that are suspected to be wrong are to be replaced and a functional check of the system must be carried out.

Limit and range markings are to be clear and legible; they must be replaced when they no longer comply with a satisfactory standard.

Limits and ranges of each engine instrument can be found in the relevant sections of the ROTAX engine manual.


CHIAVE / KEY
M16M22-914UL

2.9.1 DESCRIPTION OF INSTRUMENT PANEL



1 - MASTER	Master switch
2 -	Ignition key
3 -	Start push button - choke
4 -	5A push button breaker for fuel pumps
5 -	Main and auxiliary pumps switches
6 -	Landing light switch
7 -	Stroboscopic lights switch
8 -	Warning lights line
8 a DANGER	Red - danger of overpressure
8 b WARNING	Yellow - Warning or Caution
8 c BATTERY	Generator not working
8 d RESERVE	Low fuel level
8 e BRAKE	Rotor brake (ON when engaged)
8 f TRIM	Green, trim in end position
9 - TEST	Fuel reserve warning light test push button
10 - 0,1 x hour	Hour meter
11 – Engine r.p.m.	Engine tachometer
12 - EGT	Exhaust gas temperature indicator
13 - CHT	Cylinder head temperature
14 - OIL TEMP	Oil temperature
15 - OIL PRESS	Oil pressure
16 - MAP	Manifold pressure indicator
17 – Rotor r.p.m.	Rotor tachometer
18 - FUEL Press.	Fuel pressure indicator
19 -	Compass
20 - ASI	Air-speed indicator
21 - ALT	Altimeter
22 - VSI	Vertical speed indicator
23 -	Fuel level gauge
24 - TCU	Circuit breaker 5A TCU
25 - FD	Circuit breaker 2A FLYDAT
26 - BATT	Circuit breaker 20A battery
27 - GEN	Circuit breaker 20A generator
28 - ACC	Circuit breaker 10A
29 -	Auxiliary feed outlet
30 -	N/A for Rotax 914

2.10 PROPELLER

The propeller fitted to the M16 (M16C) is an ARPLAST GL3 ECOProp manufactured by Hélice.

The propeller comprises composite blades of epoxy resin, reinforced with carbon and glass. The reinforcement extends the length of the blade and through aluminium collars at the blade foot. The hub, which takes three blades, is an aluminium casting, machined to accept the blades and fixing bolts.

The blades are protected from abrasion due to grass, gravel or rain by use of an adhesive strip applied to the leading edges

SECTION 3

3 ORDINARY MAINTENANCE PROCEDURES (Inspections – Checks – Adjustments – Replacements)

3.1 CHECK AND REPLACEMENT OF FLEXIBLE SHAFT

(See Fig 3.1/1-3.1/5)

The flexible power transmission unit (1) used during the pre-rotation phase needs periodical inspection and greasing so as to prevent system failures.

The life of this system is strongly connected to the type of use of the pre-rotation, to the average speed reached during pre-rotation and to the smoothness of its coupling.

WARNING:
To avoid unexpected failures, we suggest an inspection of the flexible shaft pn 118 every 100 flight hours for a standard use (pre-rotation speed between 200 and 220 r.p.m.) and every 50 hours for higher performance use (pre-rotation speed between 220 and 250 r.p.m.).

Please remember that the flexible shaft pn 118 is heavily greased before installation. Before starting the inspection procedure it is recommended to use latex gloves to avoid skin-grease direct contact. The following are maintenance procedures for the flexible shaft system.

3.1.1 REMOVAL OF FLEXIBLE SHAFT

(See Fig 3.1/1 - 3.1/5)

1. Before starting, verify that the ignition contact is in OFF position and that all the breakers are switched OFF;
2. Put the control stick (2) in forward limit stop position;
3. Loosen the clamps pn 4B-25-45 and release the flexible shaft from the support pn193.
4. Remove the clamping bolts M6x16 that fix the flexible sheathing pn 119 to the pre-rotation assembly pn 117; take care not to loose the spacer washers (3);
5. Extract the flexible sheathing pn 119 from the pre-rotation assembly; be very careful with this sheathing pn 118 as it could slide down and out of the sheathing, thus damaging or dirtying other components.
6. Vertically stretch the sheathing to help the controlled pull out of the flexible shaft pn 118; it is recommended to mark the upper and lower ends differently so as to avoid upside-down re-installation.
7. Lay the flexible shaft on a bench, or keep it in a vice (very gently tightened), so as to be able to proceed with the inspection and evaluation of the wear.

3.1.2 INSPECTION OF FLEXIBLE SHAFT pn 118

(See Fig. 3.1/1 - 3.1/5)

There are various factors in evaluating the wear of the flexible shaft pn 118:

1. Entireness of coils; damaged or broken coils of the flexible shaft interrupt its entireness, thus weakening it, too. The flexible shaft must be substituted if broken or damaged coils are found;
2. Torsional deformations are variations of the shaft's diameter. To feel them, simply pass two fingers along the shaft as shown in the picture. If these deformations happen, it is more likely that they will be located closest to the connections to the pre-rotation assembly pn 117 or to the Bendix gear unit pn GR03 where the torsional stress is higher. If the deformation is minimal (less than 3 mm on the nominal diameter of 20 mm), it is possible to re-install the flexible shaft. But a further inspection after the first 50 hours of use is strongly recommended. In case of stronger deformation, the shaft needs to be replaced;
3. Longitudinal deformation; the flexible shaft pn 118 should be immediately replaced if it shows permanent and discontinuous deformation along its length;
4. Coils sheen; if the coils appear to be very polished, this means that they have rubbed against the inner walls of the sheath pn 119 for a long time and that the friction caused during rotation has worn them out. This situation may be emphasized by an insufficient lubrication. If the flexible shaft pn 118 with polished coils has no deformation (similar to the ones described above), it is possible to re- install it after greasing it strongly first.

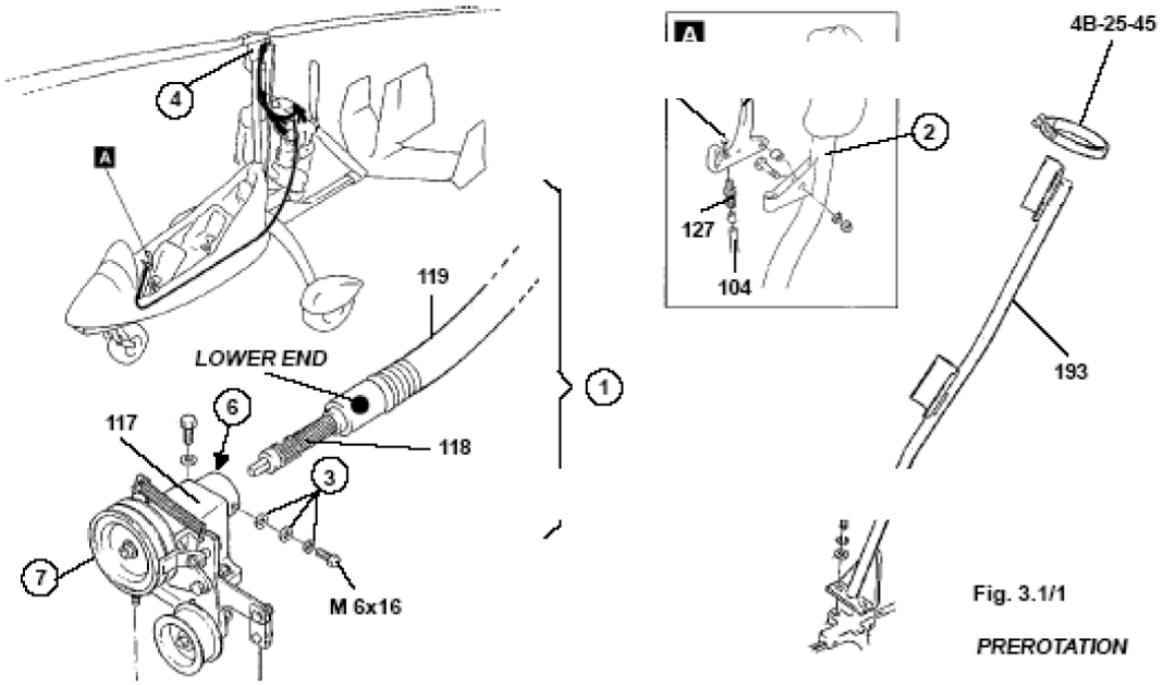
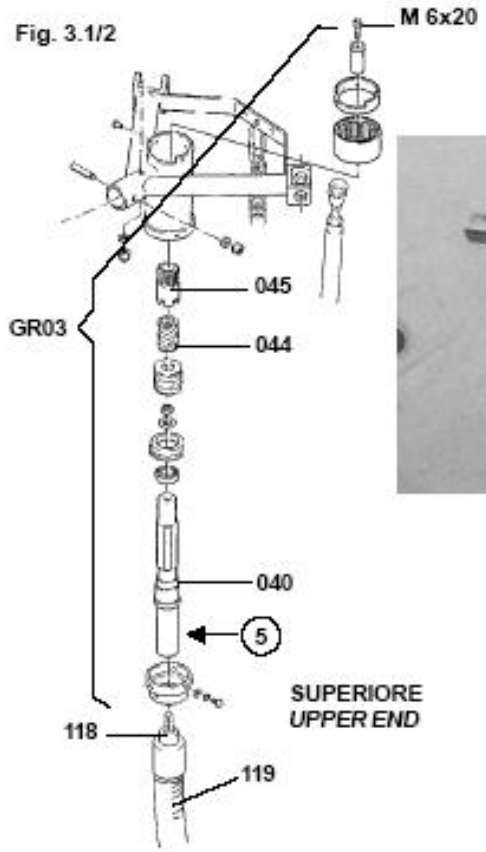


Fig. 3.1/1

PREROTATION

Fig. 3.1/2



Ispezione deformazioni torsionali del flessibile prerotazione

Inspection of torsional deformation of prerotation flexible shaft

Fig. 3.1/3

Scorrere lungo il flessibile per avvertire eventuali variazioni nel diametro

Pass two fingers along the flexible shaft to perceive any possible variation of diameter

3.1.3 GREASING OF FLEXIBLE SHAFT pn 118

(See Fig. 3.1/1 - 3.1/5)

1. Use latex gloves to avoid direct contact with the grease during this operation;
2. Block the flexible shaft pn 118 in a bench vice. Tighten it very gently and take care not to damage the coils;
3. Lay plenty of grease along the entire shaft. The quality of the grease must comply with the mentioned specifications;
4. Manually spread the grease evenly on the shaft's entire surface.

3.1.4 INSTALLATION OF FLEXIBLE SHAFT pn 118

(See Fig. 3.1/1 - 3.1/5)

1. Before starting, verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF.
2. Hang the sheath pn 119, which is still fixed to the rotor head (4), vertically.
3. Insert at least one third of the flexible shaft pn 118 in the sheath, starting from the bottom towards the top.
4. Collect the excess of grease that does not enter the sheath.
5. Extract the shaft pn 118 from the sheath and grease it again with the collected grease in excess.
6. Repeat the operations indicated in points 2., 3. and 4. three or four times, inserting the shaft pn 118 into the sheath pn 119 for a longer length each time so as to guarantee a correct greasing of the upper part of the flexible shaft pn 118, too.
7. When the flexible shaft pn 118 is completely inserted in the sheath pn 119, carry this sheath to the pre-rotator unit and insert the first part of the flexible shaft pn 118 into the square hole of the unit pn117.
8. Climb a ladder so as to reach the upper part of the Bendix gear unit pn GR03.
9. Using a key, rotate the socket head screw M6x20 clockwise so as to facilitate the insertion of the square ends of the shaft pn 118 in their respective seats (upper (5) and lower (6)).
10. If the rotation of the Bendix gear pn GR03 done with the 6 mm key corresponds to one rotation of the pulley (7) of the pre-rotation assembly, this means that the shaft pn 118 is correctly fitted in its seats (5 and 6).
11. Insert the sheath pn 119 in the pre-rotation assembly.
12. Fasten the sheath pn 119 to the pre-rotation assembly pn 117, tightening the M6x16 bolts and paying attention to the spacer washers (3).
13. Block the control stick (2) in all-forward position.
14. Position the sheath pn 119 on the support pn 193.
15. Fit and tighten the clamps pn 4B-25-45;
16. If the pre-rotation pulleys or V-belts are dirty with grease, carefully clean them with gasoline or solvent.

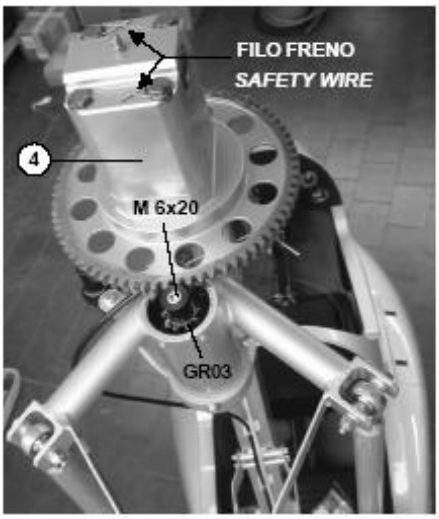
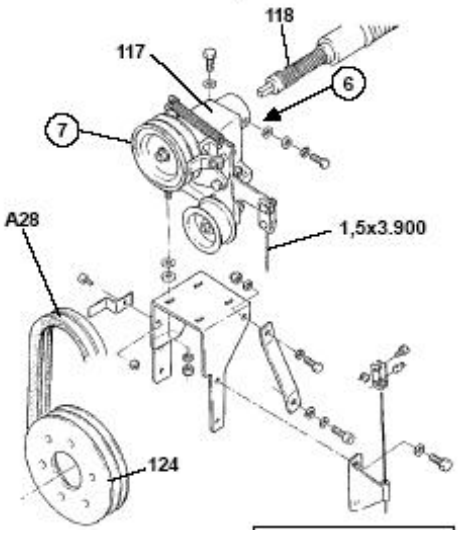


Fig. 3.1/4 Rotazione in senso orario per innesto flessibile
Clockwise rotation for flexible shaft coupling

Fig. 3.1/5 Installazione ingranaggio d'innesto (bendix)
Installation of Bendix gear



3.1.5 RECOMMENDED TYPE OF LUBRICANT

(See Fig. 3.1/3)

Flexible shaft pn 118 - BLACK LITHIUM BASED GRAPHITE GREASE

3.2 ADJUSTING OF PRE-ROTATION UNIT

(See Fig. 3.2/1 - 3.2/5)

To keep the efficiency of the pre-rotation and get safe and satisfactory take-off performances with predefined timing, it is strongly recommended to check and/or adjust the pre-rotation unit pn 117 according to the indications given below.

The reduction of performances is mainly due to the settling of the V-belts pn A28 caused by their wear and the progressive wear of the pulley pn 124. With time, belts tend to stretch, get longer and loose adherence on the pulleys pn 124, thus reducing the efficiency of the power transmission to the rotor. This is something that does not happen suddenly, but appears after many hours of use and does not endanger the gyroplane's efficiency, except at long-term.

Depending on the conditions of the V-belts, and on available tools and equipment, it is possible to correct this problem in various ways. When the operator feels a reduction of performances of the pre-rotator, he can act on the adjuster pn 127 of the pre-rotation cable sheath pn 104 (1,5 x 3.900).

Unscrewing the adjuster pn 127 allows the belt tightening lever pn 415 of the pre-rotator pn 117 to further stretch the belts pn 428, thus recovering part of their play and re-gaining the lost performance.

WARNING:
This is a temporary solution, the kind of action to be done at the airfield when other types of operation are not possible or when the problem is still small.

Fig. 3.2/1
Registro cavo comando prerotazione
Prerotation control cable adjuster

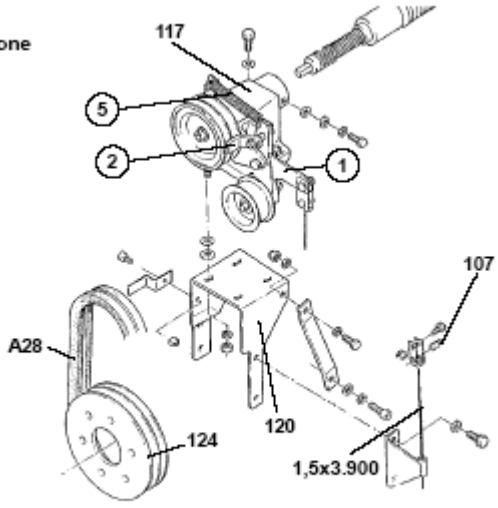


Fig. 3.2/2 Tensionatura cavo
Cable tightener

WARNING:
Please note that this type of intervention might not always be sufficient to solve the problem, especially after the first hours of flight due to the major settlings that happen during running in. In such a case, the operator may slightly stretch the pre-rotation cable, as described here below

3.2.1 CABLE STRETCHING PROCEDURE

(See Fig. 3.2/1 - 3.2/5)

1. Before starting this operation, verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF.
2. Completely screw the adjuster pn 127 of the sheath pn 104 of the pre-rotator cable pn 1,5 x 3.900.
3. Loosen the cable retainer pn 107 located close to the lever (1) of the belt tightener (5) of the pre-rotation assembly pn 117.
4. Pull the pre-rotation control cable pn 1,5 x 3.900 and tighten the cable retainer pn 107. This will modify the position of the belt tightener (5), further stretching the belts A28.
5. Verify that the brake shoe (2) of the belts A28 really touches the belts when the pre-rotation activating lever pn 415 is in rest position. If this is not the case, release the bolt M5x40, then re-position the shoe (3) as indicated in the figure and tighten the bolt M5x40 again.

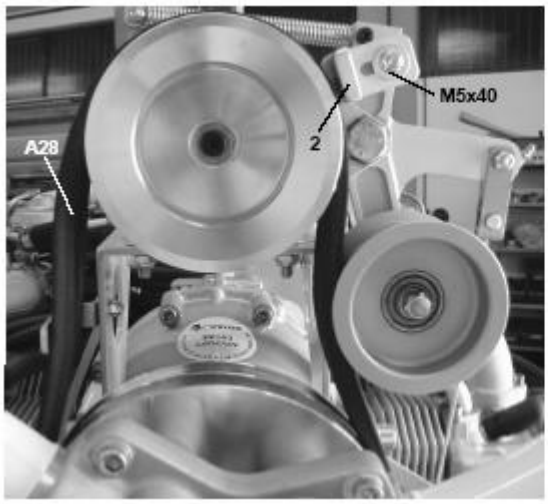


Fig 3.2/3
Shoe (2) not in contact with belts
(Wrong position)

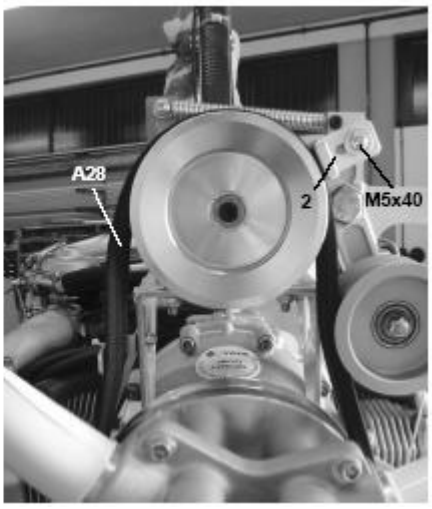


Fig 3.2/4
Shoe (2) in contact with the belts
(Correct position)

Shimming of the pre-rotation assembly pn 117 will be required if the above described procedure generates interference between the lever (1) of the belt tensioner and the support pn 120, or if the play between the belts A28 and pulley pn 124 is still too big to allow to reach the parameters indicated in the efficiency test diagram. The operator will have to shim the pre-rotation unit pn 117 so as to tighten the belts and remove the play.

3.2.2 SHIMMING PROCEDURE OF PRE-ROTATION ASSEMBLY

(See Fig. 3.2/1 - 3.2/5)

NOTE:
As regards shimming, it is strongly recommended to follow the instructions given below or to have the operation done by qualified operators so as to avoid mistakes or malfunction that can jeopardize flight safety.

1. Before starting this operation, verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Completely screw in the adjuster pn 127 of the pre-rotation cable sheath 1,5 x 3.900;
3. To have a better and easier access to the pre-rotation assembly pn 117, unscrew the clamping bolts pn 284 and remove the propeller unit pn 125;
4. Remove the pulley pn 124 from the flange of the propeller as well as the belts pn A28;
5. Slacken and remove the 4 nuts M6 that fix the pre-rotation assembly pn 117 to the support pn 120;
6. Lift the pre-rotation assembly to have access to the space washers 6x18;
7. Add a washer to each locking bolt M6x30;

NOTE:
Make sure the washers are all of the same thickness.

8. Reposition the pre-rotation assembly pn 117 on the support pn 120 and insert the locking bolts M6x30;
9. Tighten the nuts M6 to the bolts so as to reduce the movement of the pre-rotation assembly on the support pn 120;
10. Reposition the pulley pn 124 on the flange of the propeller; verify that it rests on the entire surface of the flange;
11. Use a ruler (1) to check the alignment between the pulley pn 124 and the pulley of the pre-rotation assembly pn 117;
12. Tighten the locking bolts M6x30 completely, checking that the fibrelock nuts pn M6 are placed correctly. If this condition is not achieved, replace the nuts M6 with thinner nuts or with longer bolts M6x30;
13. Reposition the belts pn A28;
14. Verify that the brake shoe (2) of the belts pn A28 really touches the belts. If this is not the case, set it correctly (see paragraph 3.2.1, point 5);
15. Verify that there is a play (even a small one) between the belts pn A28 and the pulleys pn 124;
16. Reposition the propeller and tighten the locking bolts.

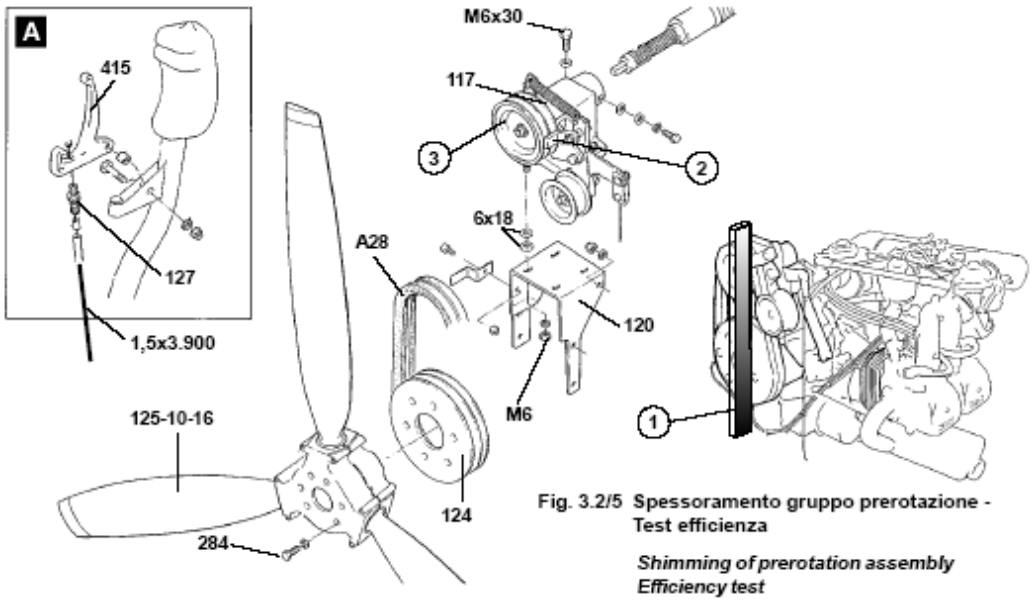


Fig. 3.2/5 Spessoramento gruppo prerotazione - Test efficienza

Shimming of prerotation assembly Efficiency test

3.2.3 EFFICIENCY TEST:

(See Fig. 3.2/1 - 3.2/5)

WARNING DANGER:
An operational test of the system is strongly recommended before starting to fly. Excessive shimming (between the pre-rotation assembly pn 117 and the support pn 120) could prevent the disengagement of the power transmission when the pre-rotation control lever pn 415 is released, thus generating hazardous consequences! Two people are needed to execute this test: a qualified gyroplane pilot that knows the pre-rotation procedures and an outside observer that will always keep outside the rotor range area!

WARNING DANGER:

1. Before starting the engine make sure that there are no obstacles, people or objects within the rotor range area as too much shimming may result in an immediate rotation of the rotor upon engine start up!

2. Start the engine, following the standard start procedure;
3. Warm up the engine taking it to minimum operational temperature;
4. Set engine to 1800 r.p.m. rotation speed;
5. Gently engage the pre-rotation. Keep in mind that the coupling will happen in advance;
6. Keep the engine setting to 1800 r.p.m. and gently push the pre-rotation control lever pn 415 until it reaches the end of its run. Verify the number of the rotor revolutions achievable with this engine speed. In optimum conditions, it should easily exceed 160 rotor r.p.m.;
7. When the number of rotor revolutions stops increasing, gently increase the engine revolutions till 200 rotor r.p.m. are reached (approx 2.200-2.400 engine r.p.m.);
8. Release the pre-rotation control lever pn 415;

9. The outside observer will now have to verify that the belts pn A28 remain still on the pulleys pn 124 (3) and are not dragged by these pulleys. If this condition is satisfied, go to the next step. Otherwise proceed to point 11;

10. Increase the engine r.p.m. to a value between 3500 and 4000. The outside observer will have to verify that the belts remain still on the pulleys and are not dragged by them. If this condition is satisfied, go to point 12. Otherwise proceed to point 11;

11. Wait till the rotor r.p.m. is less than 50 and repeat points 4, 5, 6, 7, 8 and 9;

12. It is possible to go for a flight test if the pre-rotation parameters are similar to the indications of the following diagram.

3.2.4 PRE ROTATION PARAMETERS SUMMARY TABLE

Engine RPM	Rotor RPM
1800	>160
2200 - 2400	200

Reaching the parameters indicated in the above table guarantees the efficiency of the pre-rotation system.

3.3 REPLACEMENT OF PULLEYS AND BELTS

(See Fig. 3.3/1)

The belts pn A28 and the pulleys pn 124 are subject to a continuous wear in all the operations, except during pre-rotation.
The pulley pn 124 and propeller are fixed with six bolts pn 284 to the engine flange; thus its rotation is identical to the number of revolutions of the engine.

Furthermore, the belts pn A28 are braked whenever they are not tightened through the pre-rotation system. So, interference and a continuous slipping are created between the belts and pulleys, which modify the profile of the pulleys' grooves.

The wear of the pulleys causes a reduction of the performances of the pre-rotation system, which can be overcome by following the procedures described in section 3.2.

Because the adjustments described above will no longer be sufficient to bring the system back to full efficiency, replacement of belts and pulleys is recommended every 500 hours as indicated in the "Ordinary Maintenance Schedule".

WARNING:
Always use belts and pulleys supplied by Magni Gyro itself, as these parts are run-in by the Manufacturer so as to guarantee a soft and progressive coupling, even during the first pre- rotations.
Take care to note the position of the belts on the pulley when they are supplied by the Manufacturer or Area Retailer and do not invert them (as each pair of pulleys is run-in on its own pulley, each belt impresses its own groove on that pulley).

3.3.1 REPLACEMENT PROCEDURE

1. Before starting this operation, verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Release the 6 bolts pn 284 that fix the propeller pn 125 to the flange of the engine and remove the propeller;
3. Remove the pulley pn 124 by withdrawing it from the bushes of the engine flange;
4. Remove the belts pn A28 from the pulley of the pre-rotation assembly pn 117;
5. If there are more than 2 space washers 6x18 (used to shim the pre-rotation assembly pn 117) under each bolt (M6x30), these need to be removed so as to allow enough slack between the belts and pulleys and avoid unwanted coupling; otherwise proceed as described in points 10-13 and following ones;
6. Loosen the 4 bolts M6x30 that fix the pre-rotation assembly pn 117 to the support pn 120;
7. Lift the pre-rotation assembly pn 117 and remove the spacer washers 6x18 in excess;
8. Reposition the pre-rotation assembly pn 117 on the support pn 120 and insert the locking bolts M6x30;
9. Tighten the nuts M6 to the bolts so as to friction the movements of the pre-rotation assembly on the support.

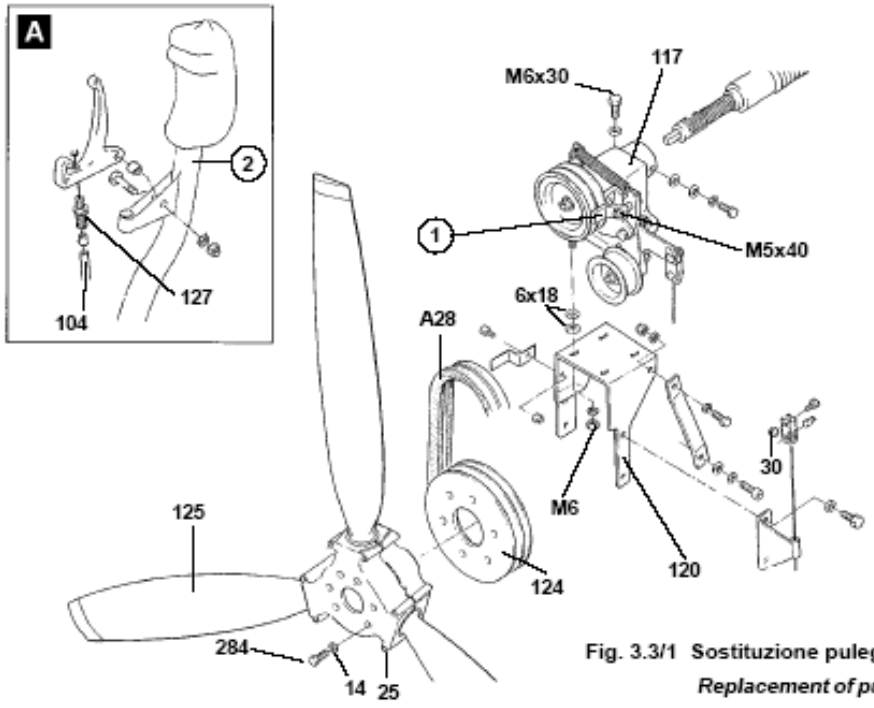


Fig. 3.3/1 Sostituzione puleggie e cinghie
Replacement of pulleys and belts

10. Position the new pulley pn 124 on the flange of the propeller and verify that it rests on the entire surface of the flange;
11. Using a ruler (see fig. 3.2.5, point 1), verify the alignment between the pulley pn 124 and the pulley of the pre-rotation assembly pn 117;
12. Tighten the locking bolts M6x30 completely and make sure that the fibrelock nuts M6 work correctly. It is recommended to change the nuts M6 so as to guarantee a correct braking effect.
13. Fit the new belts pn A28. Thereby take care not to invert them, as each belt is run in on its pulley so that it impresses its own groove in the pulley;
14. Completely screw in the adjuster pn 127 of the pre-rotation cable's sheath pn 104;
15. Reposition the brake shoe (1) of the belts pn A28 by slackening the bolt M5x40 and placing it on the mid point of the slot;

16. Verify that the brake shoe (1) really touches the belt pn A28. If this is not the case, set it correctly;
17. Verify that there is a play between belts and pulleys, even if it is a small one;
18. Reposition the propeller pn 125 and tighten the locking bolts pn 284;
19. At the end of this operation (see section 3.2.3.), proceed with an efficiency test.

3.4 ROTOR HEAD INSPECTION

(See Fig. 3.4/1)

The rotor head is of essential importance for the gyroplane. A correct and careful maintenance can avoid troubles and problems that can interfere with flight operations and by consequence reduce safety.

WARNING:
Due to the peculiarity of the rotor head assembly, its maintenance must be done only by authorised personnel, with the following exceptions: visual checks, standard greasing, frictioning of the controls and rotor installation.

3.4.1 VISUAL CHECKS

(See Fig. 3.4/1)

WARNING:
Visual checks have to be done according to the checklist, either before every flight or before scheduled maintenance. There are many aspects that the performer must pay attention to, so as to be able to understand the general condition of the rotor head assembly, the type of operation required and the conditions of operation.

The following factors must be taken into account when evaluating the state of the rotor head assembly:

a) General condition of the paint of the notched gear pn 061.
b) Absence of abrasions and/or parts where paint has been removed.
c) Oxidation of bolts and nuts.
d) Lubrication of the notched gear pn 061.
e) Presence of safety pins pn AN 416-1.
f) Correct locking (1) of the bolts AN5-40 A for fastening the aluminium rotor head pn 066 with wire and tightening marks (see also fig. 3.1.3).
g) Freedom of movement of the rotor brake lever pn 201.
h) State of the teeter bearings pn NKXR 15 Z (only if rotor is not installed).

Presence of anomalies:

a) Burning or blackening of the paint of the notched gear are due to using the system with rotor brake pn 201 engaged during flight, where the friction caused by the braking action of the brake linings pn 208 generates the overheating of the notched gear pn 061 which then burns the paint.
b) Abrasions and/or parts where paint has been removed can reveal rubbing or wear, as well as anomalous deformations. It is essential to recognize and understand the reason that has generated this state before flying again.
c) The oxidation of bolts and nuts can reveal the operative conditions of the gyroplane (high humidity level or use in salty environment).
d) A correct lubrication of the notched gear pn 061 teeth avoids oxidation and reduces wear.

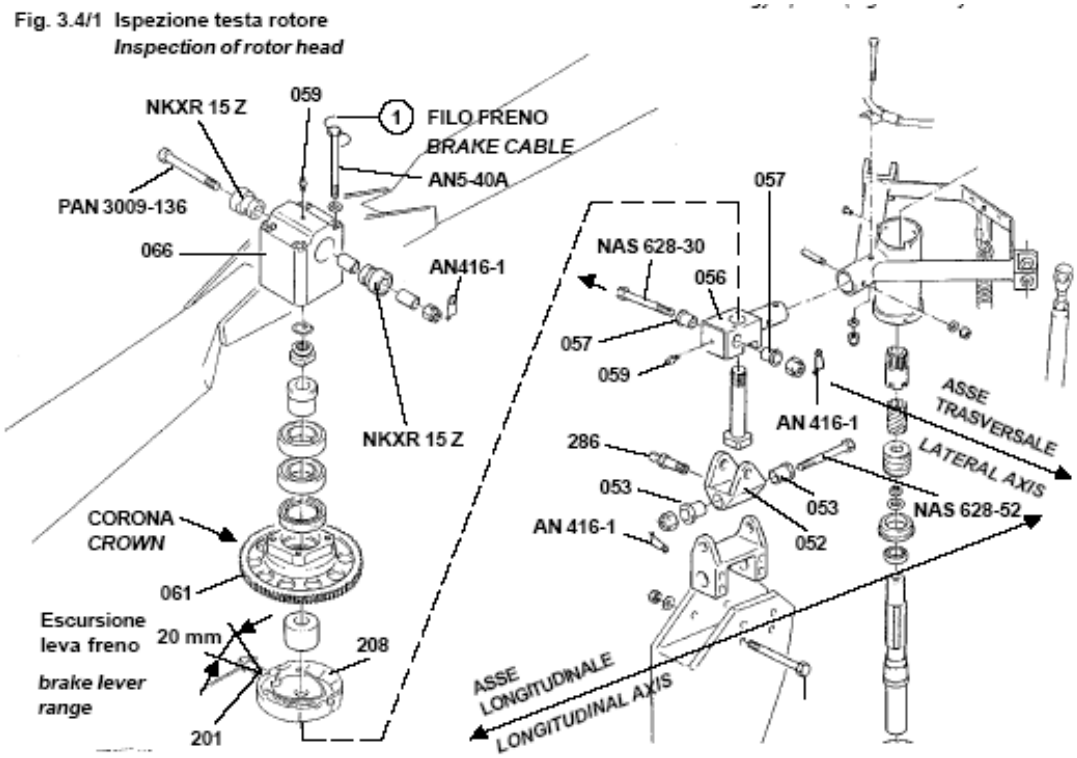
e) All the components which need to always be kept tight (longitudinal bolts pn NAS 628-52 and traverse bolts pn NAS 628-30 and PAN 3009-136, on which the rotor head movements are articulated) must absolutely be equipped with safety pins pn AN 416-1.

f) The bolts AN5x40 must be locked and the tightening markings must be present. This should allow to check that there has been neither tampering nor unauthorized intervention.

g) The freedom of movement of the lever pn 201 shows the correct functioning of the rotor brake system. If the movement is too wide, the wear of the brake linings is excessive.

h) The visual inspection of the teeter bearings pn NKXR 15Z is recommended if the rotor is not installed. In particular, make sure there are no radial cracks on the external lock nuts. Such cracks indicate that the driving torque of the bolt pn PAN 3009-136 that fixes the rotor to the aluminium head pn 066 is too high.

Fig. 3.4/1 Ispezione testa rotore
Inspection of rotor head



3.4.2 LUBRICATING OPERATIONS

(See Fig. 3.4/1)

The rotor head needs to be greased regularly, as per maintenance schedule diagram, to avoid an abnormal wear of the teeter bearings pn NKXR 15Z, bolts pn NAS 628-52 and pn NAS 628-30, bushes pn 057 and pn 053 on which the control movements are articulated and of the notched gear pn 061.

There are three lubrication points (pn 059 (short) and pn 286 (long)) on the rotor head.

During lubrication, the movement of the controls, or of the teeter axle, allows the head to be greased more easily.

First clean the notched gear pn 061, then lubricate it with humidity-proof grease and apply a protective film on the teeth.

If the forks pn 051 and pn 052, on the square block pn 056, are burnished (black colour), the same type of lubrication must also be done on these items.

3.4.3 SUGGESTED TYPES OF LUBRICANT

Bearings and NAS bolts	AMBER-COLOURED GREASE SHELL DARINA R2
Notched gear and forks	BLUE WATER-REPELLENT GREASE

3.5 ROTOR HEAD OVERHAUL

(See Fig. 3.5/1 - 3.5/2)

WARNING:
The overhaul of the rotor head can only be done by the Manufacturer or at Facilities authorized by the Manufacturer.

This overhaul includes specific checks of the wear of all the head components and the replacement of worn parts. For any overhaul, the complete rotor head assembly (without alterations or tampering), the teeter bolt PAN 3009-136 and the longitudinal bolt NAS 628-52 (see fig. 3-4/1) must be sent (with previous agreement as to time and conditions) to Magni Gyro or to an Authorized Facility.

3.5.1 INSTRUCTIONS FOR DISASSEMBLY OF ROTOR HEAD

(See Fig. 3.5/1-3.5/2)

WARNING:
The following instructions describe how to remove the rotor head from the gyroplane.
The operator must follow carefully the operations and procedures described and, in case of any doubt or problem, contact the Manufacturer. Magni Gyro will not be responsible for damages or breakages due to the misinterpretation or to the wrong application of the given instructions.

3.5.2 ROTOR DISASSEMBLY

(See Fig. 3.5/1 - 3.5/2)

The rotor unit must be removed from the rotor head before being able to remove the rotor head:

1. Before starting verify that engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Remove the safety pin pn AN 416-1;
3. Unscrew and remove the nut pn 12 PCR 106 from the central bolt pn PAN 3009-136 of the flapping axle;
4. Lift the rotor (with a hoist (1) or crane) so as to unload the central bolt;
5. Extract the bolt pn PAN 3009-136 by hand or with the help of a rubber hammer;
6. Remove the rotor, lifting it from the rotor head and put it on a flat surface; take care to protect the blade's trailing edge.

Fig. 3.5/1 Smontaggio rotore e testa
Disassembly of rotor and head

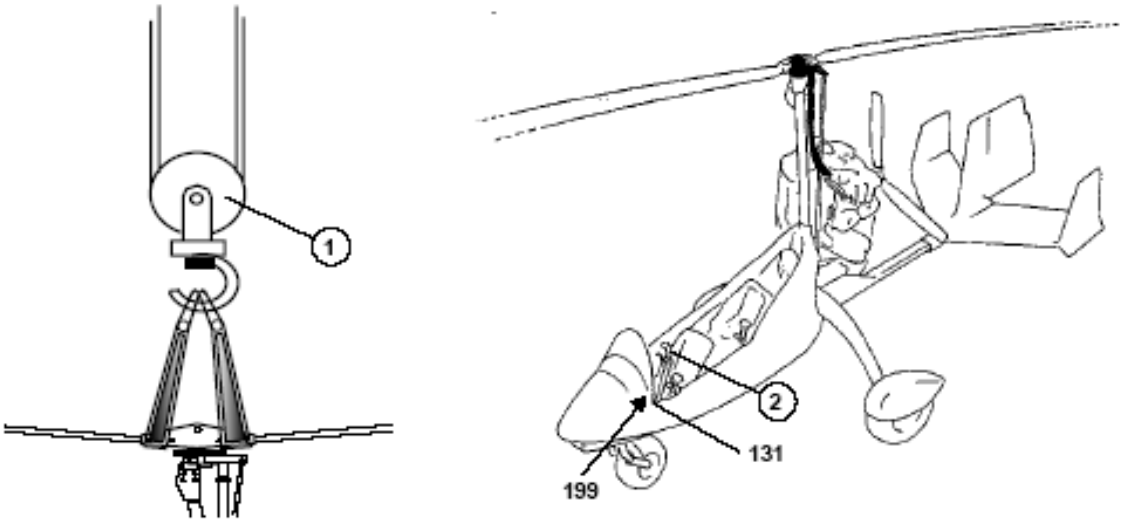
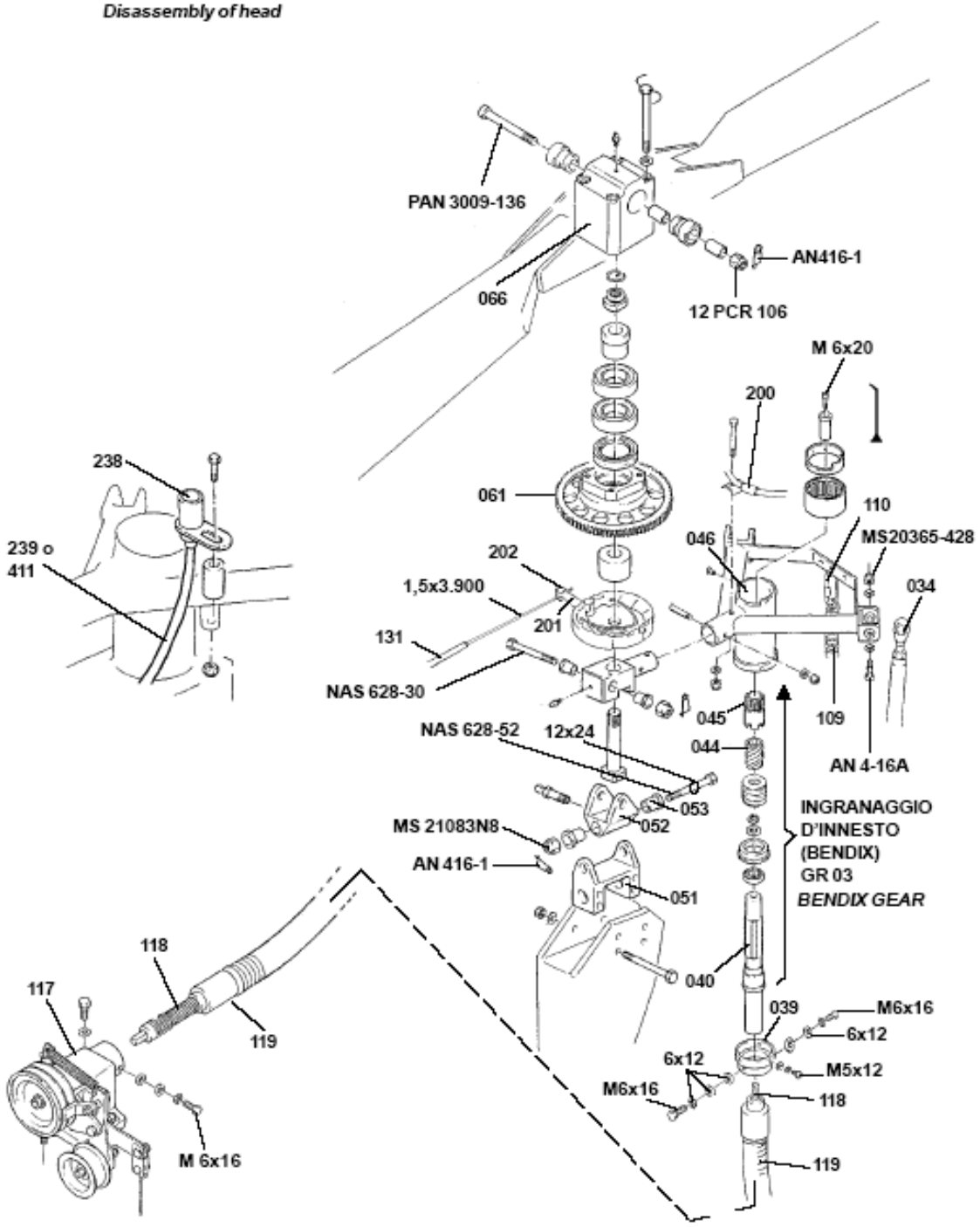


Fig. 3.5/2 Smontaggio testa
Disassembly of head



3.5.3 ROTOR HEAD DISASSEMBLY

(See Fig. 3.5/1 - 3.5/2)

WARNING DANGER:
Carefully follow the instructions. Magni Gyro is not responsible for damages caused by changes and/or modifications that are either unforeseen or done with non-original parts.

1. Before starting this operation, verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. To facilitate the disassembly of the rotor head, put the control stick (2) in all-forward position;
3. Unscrew and remove the two bolts M6x16 that fix the sheath pn 119 of the flexible shaft to the pre-rotator pn 117 (use a 10 mm wrench);
4. 4Extract the sheath pn 119 and the flexible shaft pn 118 from the endings on the rotor head pn 039 and pn 040;
5. Loosen the rotor brake cable pn 1,5x3900 from the cable retainer pn 202 of the brake lever pn 201 (use a 10 mm wrench);
6. Extract the cable pn 1,5x3900 of the rotor brake from the sheath retainer pn 200 of the rotor head;
7. Mark the fastening position of the trim spring pn 109;
8. Loosen and remove the spring catch pn 110 that fixes the spring pn 109 of the trim (use a 7 mm wrench);
9. Disconnect the connector of the sensor pn 238 from the cable-wiring pn 239;
10. Unscrew and remove the nuts pn MS 20365-428 of the bolts pn AN4x16A that lock the rod ends pn 034 of the control rods to the rotor head;
11. Remove the bolts AN14x6A of the rod ends pn 034. Take care not to scratch or damage the paint of the rods, especially when these get disconnected from the rotor head;
12. Remove the safety pin pn AN 416-1 from the longitudinal bolt pn NAS 628-52;
13. Unscrew and remove the nut pn MS 21083 N8 of the longitudinal bolt pn NAS 628-52 of the head;
14. Holding the rotor head by the fork pn 046 to which the trim spring pn 109 is fixed, extract the bolt NAS 628-52;
15. Remove the rotor head from the fork pn 051;

3.5.4 ROTOR HEAD INSTALLATION

(See Fig. 3.5/1 - 3.5/2)

1. Before starting this operation, verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. To facilitate the assembly of the rotor head, put the control stick in all-forward position;
3. Before installing the rotor head, abundantly grease the bushes pn 053 in which the longitudinal bolt NAS 628-52 will be inserted;
4. Put the rotor head in correct position by inserting the upper fork pn 052 into the lower fork pn 051;
5. Insert the washer pn 12x24 into the bolt NAS 628-52. Pay attention to put the bevelled part against the bolt head;
6. Respecting the direction of insertion along the longitudinal axis, i.e. from rear to front, insert the bolt pn NAS 628-52 into the fork pn 051;
7. Take the grease in excess that came out while the NAS 628-52 bolt was inserted and spread it on the notched gear teeth;
8. Tighten the nut pn MS 21083 N8 on the bolt NAS 628-52;
9. Reposition the control rod ends in the apposite head forks and insert the bolts AN4-16A with their washers;
10. Tighten the bolts AN4-16A with the nuts pn MS20365-428, which in any case should be replaced;
11. Connect the wiring cable pn 239 with the detector pn 238;
12. Insert the spring catch pn 110 in the apposite hole along the fork pn 046 of the rotor head;
13. Tighten the spring catch pn 110;

14. Make sure the rotor brake lever pn 199 is in OFF position (low);
15. Make sure that the sheath pn 131 of the rotor brake cable is positioned correctly in the seat of the rotor brake lever pn 199;
16. Insert the rotor brake cable pn 1,5x3.900 along the sheath retainer pn 200;
17. Insert the rotor brake cable pn 1,5x3.900 in the clamp pn 202 of the brake lever pn 201;
18. Tighten the clamp pn 202;

WARNING:
The lever pn 201 must not travel more than 20 mm.

19. Insert the flexible cable pn 118 and the sheath pn 119 into the rotor head couplings pn 039 and pn 040;
20. Screw the two bolts pn M6x16 that fix the sheath pn 119 to the connection pn 039. Thereby respect the position of the four split washers 6x12 and two plane washers 6x12;
21. Operate the bolt pn M6x20 placed on top of the coupling gear GR03 and turn this gear clockwise, so as to insert the flexible cable pn 119 more easily in its seats;
22. Following the instructions of paragraph 3.7 CONTROLS FRICTIONING, either tighten or release the bolts pn NAS 628 52 and NAS 628 30 to check that the frictioning of the controls is correct;
23. Place the safety pin pn AN416-1 on the bolt NAS 628 52.

3.6 INSPECTION OF BENDIX GEAR

(See Fig. 3.6/1 - 3-6/3)

The Bendix coupling gear GR03 together with the notched gear pn 061 are the last link of the pre-rotation chain.

The Bendix gear has its seat in the fork's tube pn 046, where it can slide and engage the notched gear pn 061 to transmit the movement of the flexible shaft.

A failure of the Bendix unit GR03 can cause a bad or no functioning at all of the pre-rotation system. In this case, the operator can apply to the nearest maintenance centre or otherwise execute the following inspections, while strictly following the described procedure.

3.6.1 REMOVAL OF BENDIX GEAR

(See Fig. 3.6/1 - 3-6/3)

1. Make sure that the master switch is in OFF position and that all the breakers are switched OFF;
2. Remove the two bolts M6x16 that fix the flexible shaft's sheath pn 119 to the containment cup pn 039;
3. Keeping the control stick (2) in forward position, extract the sheath pn 119 and with it the flexible shaft pn 118 from its square section ending on the splined shaft pn 040;
4. Still keeping the control stick (2) in forward position, remove the three bolts M5x12 that fix the cup pn 039 to the fork pn 046;
5. Gently beat the Bendix coupling gear pn 045 with a rubber hammer, extract the assembly GR03; (Bendix) from the lower part of the tube of the fork pn 046;

3.6.2 INSPECTION OF BENDIX GEAR

(See Fig. 3.6/1 - 3-6/3)

1. Manually check the correct sliding of the gear pn 045 along the shaft pn 040. The gear must slide along the shaft while rotating, without hindrance;
2. Remove the excess of grease from the Bendix gear pn 045 and, clean it with gasoline or diluents;
3. Extract the coupling gear pn 045 from the worm screw pn 044;

4. Visually inspect the entireness of the thread of the screw pn 044;
5. Visually inspect the entireness of the base of the inner thread of the coupling gear pn 045.
6. If there are radial cracks at the base of the gear pn 045 or damages to the sliding screw of the gear pn 044, contact Magni Gyro or the Area retailer for the replacement of the part(s).
7. If there are no visible damages, put a little of grease on the gears and re-install the Bendix unit GR03.

3.6.3 INSTALLATION OF BENDIX GEAR

(See Fig. 3.6/1 - 3-6/3)

1. Insert the complete Bendix gear in the tube of the fork pn 046. Fit the fastening seats together with the tube's threaded holes;
2. When placing the cup pn 039, take care to correctly align the holes as to the tube of the fork pn 046 with the sheath (pn 119) fastening holes, which must be in line with the longitudinal axis of the gyroplane;
3. Tighten the three bolts M5x12 that fix the cup pn 039;
4. Insert the sheath pn 119 in the cup;
5. Use an Allen wrench M6 (1) to turn the Bendix unit GR03 clockwise, thus facilitating the insertion of the flexible shaft pn 118;
6. Once the insertion is done, place the sheath pn 119 against the cup pn 039 and fasten it by tightening the bolts M6x16.

WARNING:
If there are no damages to the Bendix coupling gear unit, cleaning it may solve some of the operation problems. The grease may reduce the sliding of the gear on the shaft because of its aging and of its emulsifying with water and thus hinder the coupling of the pre-rotation. This kind of problem can be avoided by cleaning the parts on a periodical base and especially after permanence in very humid situations or rain.

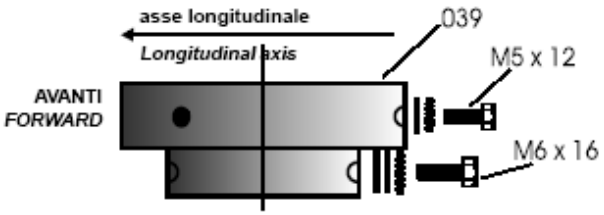


Fig. 3.6/1 Fissaggio bicchierino inferiore
Fastening the lower cup

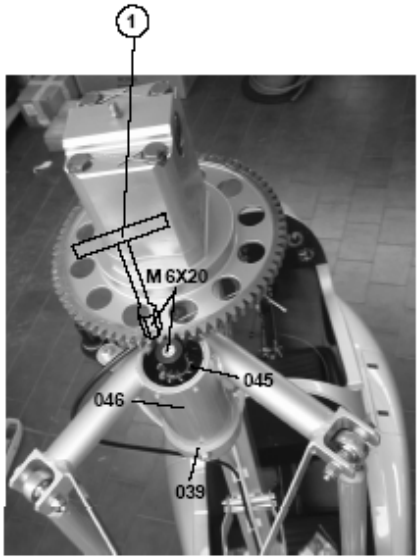


Fig. 3.6/2 Regolazione innesto
Adjustment of coupling

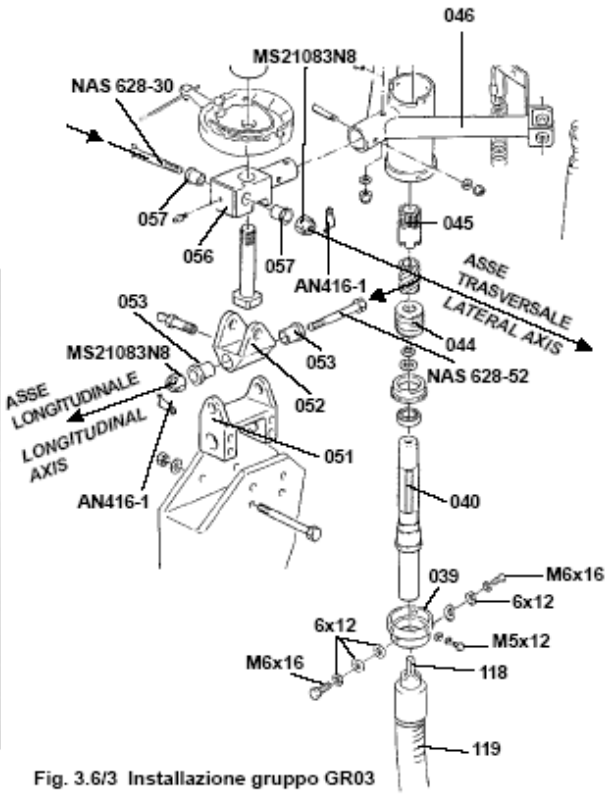


Fig. 3.6/3 Installazione gruppo GR03
Installation of unit GR03

3.7 FRICTIONING OF ROLL AND PITCH CONTROLS

(See Fig. 3.6/1 - 3-6/3)

Controls need to be frictioned each time there is an increase of vibrations - with divergence features - on these controls, associated with a special slackness of the movements.

This is due to the wear of the bushes pn 057 and pn 053, of the square pn 056, of the fork pn 052, of the safety pin pn AN 416-1 and of the nuts pn MS 21083 N8.

The consequent play along the bolts NAS (pn NAS 628-52 and pn NAS 628-30) results in vibrations of the controls.

3.7.1 FRICTIONING PROCEDURE

(See Fig. 3.6/1 - 3-6/3)

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;

2. The rotor being installed, move the control stick (2,fig. 3.3/1) along the longitudinal axis (pitch up and down) to try out the force needed to move it;

3. With a 9/16' ring wrench and a 3/4' wrench (or n°19) slightly tighten the bolt pn NAS 628-30;
4. Try again the control along the longitudinal axis (pitch up and down);
5. Go on repeating steps 3 and 4 till a good compromise between reduction of forks' play and easiness of flight control is reached.

The same operation has then to be done for the control along the transversal axis, with tightening of the bolt pn NAS 628-52. The picture 3.6/3 shows the axes on which the rotor head movements are articulated.

3.8 MAINTENANCE AND CHECKS OF CONTROL LINE

(See Fig. 3.8/1 - 3.8/2)

Due to its strong building and to the high reliability of the materials used, the control line does not need short term maintenance, just pre-flight checks.

NOTE:
All the bolts of the control line (1) are marked after having been tightened at the factory, so as to highlight incidental and unwished movements of the bolt-nut coupling.

3.8.1 REPLACEMENT OF CONTROL RODS BALL JOINT ENDS

(See fig. 3.8/1 - 3.8/2)

WARNING DANGER:
Replacing the ball joint ends is a very delicate operation which has to be carried out only by Magni Gyro authorized operators. This replacement must be done complying with the maintenance schedule diagram.

WARNING:
Each rod must be disassembled and reassembled one by one, according to the following order:

Lower right rod pn 032	***INF - RH***
Lower left rod pn 032	***INF - LH***
Upper right rod pn 038	***SUP - RH***
Upper left rod pn 038	***SUP - LH***

Whenever replacing ball joint ends, strictly follow the procedure described below, which refers to the lower left rod. Repeat the same procedure for the other rods.

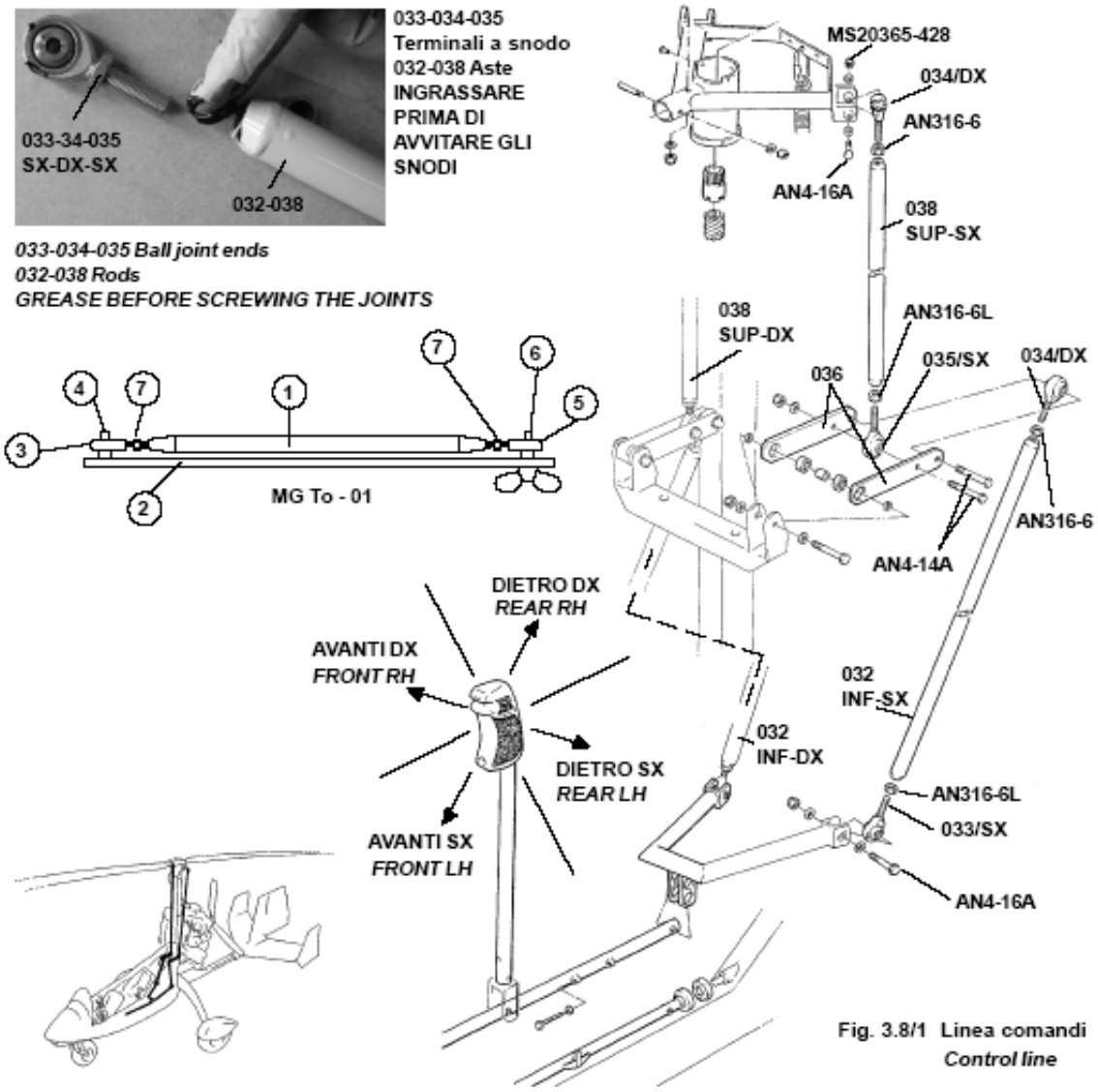


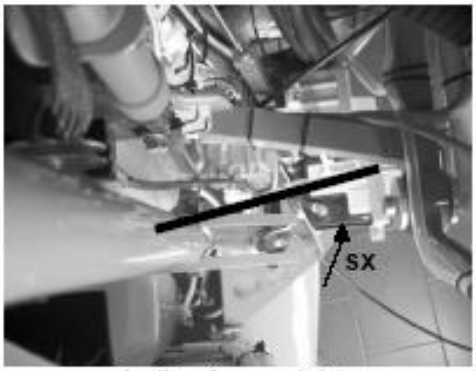
Fig. 3.8/1 Linea comandi
Control line

1. Before starting verify that the engine's ignition key, and push-button, are in OFF position and that all the breakers are switched OFF;
2. Loosen the check nuts pn AN316-6 and pn AN16-6L of the ball joint ends pn 033 and pn 034 of the lower left rod pn 032, taking care not to rotate it as this will vary the rod length;
3. Loosen the bolts that fasten the rod;
4. Remove the fastening screws pn AN4-14A and AN4-16A and the rod pn 032, taking care not to rotate the rod nor the ball joint ends pn 033 and pn 034 so as not to vary the rod length;
5. Using the MG TO-001 tool, measure the length of the rod pn 032;
6. Tighten the measuring stop (6) of the MG TO-001 (2) tool and remove the rod pn 032 from the rod;
7. Remove the ball joint ends pn 033 and pn 034 from the rod pn 032;
8. Slightly grease the threaded end of the rod pn 032;
9. Check that the check nuts pn AN316-6 and pn AN316-6L of the ball joint ends are completely screwed in;

10. Completely screw in the ball joint ends to the rod pn 032 (as a rule, right thread rod ends pn 034 have to be fitted on top, while left thread ones pn 035 have to be fitted at the bottom. Wide-tilting ball joint ends HXAB-4T pn 033, have to be assembled to the lower rods);
11. Put the rod (1) on the tool MG To-001 (2), inserting one of the joints (3) to the fixed pin (4) of the tool;
12. Blocking the rotation of the joint by hand, lengthen the rod (1) until it is possible to insert the second joint (5) in the free pin (6) of the tool;
13. To avoid further rotation of the joints and consequently avoid a modification of the rod length, tighten the check nuts (7) by hand;
14. Remove the rod (1) from the tool (2);
15. Fasten the rod to the control line, keeping the right joint pn 034 in upper position, with the bolts pn AN4-16A and pn AN4-14A;
16. Replace the nuts MS 20365-428 for the bolts pn AN4-16A and AN4-14A and tighten them;
17. Tighten the check nuts pn AN316-6 and pn AN316-6L of the control rod pn 032;
18. After the check nuts pn AN316-6 and pn AN316-6L have been tightened, make sure the rod can rotate freely in the forks and that these can reach the inner face of the transmissions (see fig. 3.8/2);
19. With the control stick in "end-of-range" positions (RH forward - LH forward - RH backward - LH backward), check that the rods still have the possibility (even a limited one) to angle as regards the bolts pn AN4-16 and pn AN4-14A, so as to guarantee the travel!

WARNING DANGER:
It is strictly forbidden to fly if step 19 has not been satisfied. Flying under such conditions could cause unplanned loads on the ball joint ends which could lead to disastrous consequences!

Inclinazione a destra
Inclination to the right



Inclinazione a sinistra
Inclination to the left

Fig. 3.8/2
Completa escursione dei terminali aste
Complete travel of rod ends

3.9 SECONDARY CONTROLS

3.9.1 CHOKE CONTROL LINE

(See Fig. 3.9/1)

The choke's control line starts from the lever pn 128, placed at the left side of the main structure's longitudinal spar (1), close to the floor.

A cable 1,5x2500 mm is fastened to the control lever by means of a cable retainer pn 107 which is inserted in its sheath pn 131, which in turn is fastened to the left side of the main structure (1) and reaches the splitter pn 132 located close to the engine mount.

After the splitter pn 132, the movement is transmitted through two cables 1,2x1000 mm fastened to the throttles of the two cable retainers pn 133 - to the choke's throttles (2) located on the carburettors.

Oxidation of the cables in the choke line could be the cause of nasty consequences, as the throttles (2) placed on the carburettors could not return to closing position when the pilot lowers the choke.

This results in excessive fouling of the spark plugs and, in the long term, in a possible contamination of the oils.

WARNING:
Due to the above mentioned remarks, a careful check of the correct sliding of the cables inside the sheaths pn 131 and the consequent correct closing of the choke throttle valves (2) are strongly recommended.

3.9.1.1 REPLACEMENT OF CHOKE CABLES

(See Fig. 3.9/1)

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Put the choke lever pn 128 in OFF position;
3. Cut the cable 1,2x1.000 and remove the cable terminal protection pn 103 located close to the lever of the carburettor (2);
4. Loosen and free the cable 1,5x2500 from the cable retainer pn 107 that fastens it to the choke lever pn 128;
5. Cut the cable 1,5x2.500 between the sheath pn 131 and the deformation (3) caused by the tightening action of the retainer pn 107. This deformation could cause some problem when doing step 9;
6. Loosen the cable retainers pn 133 and free the cables 1,2x1000 from the carburettors' throttles;
7. Cut the cables 1,2x1000 between the sheath pn 131/A and the deformation (4) caused by the tightening action of the retainer. This deformation could cause some problem when doing step 9;
8. Open the splitter pn 132 and withdraw the lower cap (132/A);
9. Extract the kern (132/B) of the splitter and the three cables (one low and two upper cables).
10. Visually check the cable. If there is no oxidation, the gyroplane has been used in optimal conditions, with low humidity, it has been cleaned accurately, did not fly in the rain and was not parked in a makeshift hangar;

WARNING DANGER:
11. Before starting to clean the internal part of the sheath, direct the upper end of the sheath pn 131 downward, far away from people and heat sources;

12. Starting from the sheath end (5) in the cockpit, spray some releasing agent inside the sheath;
13. Always from the sheath end (5) in the cockpit, now spray some spray grease in the sheath;
14. Insert the new cable 1,5x2.500 of the choke, following the sequence: splitter lower cap (132/A), sheath

end pn 103, sheath pn 131, sheath end pn 103, control lever pn 128;

15. Insert the new cables 1,2x1.000 following the sequence: splitter pn 132, sheath end pn 103, carburettors 90° adjuster (6), and carburettor throttles (2);
16. Anchor the cables to the kern (132/B) of the splitter, taking care not to cross the cables routed to the carburettors;
17. Close the splitter pn 132 by pressing the lower cap (132/A) against the body of the splitter;
18. Tension the two cables 1,2x1000 to the carburettors, so as to pull the kern (132/B) inside the splitter pn 132 in high position;
19. Tighten the cables 1,2x1000 to the carburettors' throttles, using the cable retainers pn133;
20. Cut away the cable in excess, leaving at least 10 mm more than needed;
21. Put the choke control lever pn 128 in OFF position;
22. Insert the cable in the retainer pn 107;
23. Tighten the retainer pn 107 by blocking the cable 1,5x2500;
24. Cut away the cable in excess, leaving at least 30 mm more than needed;
25. Position the cable terminals on all the cables and clamp them with cutting nippers;
26. Operate the control lever pn 128 to check the correct functioning of the system. Make sure that the throttles (2) on the carburettors reach the end positions during their travel.

3.9.2 REPLACEMENT OF ROTOR BRAKE CABLE

(See Fig. 3.9/2)

1. Before starting, verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Put the rotor brake lever pn 199 in OFF position;
3. Cut the cable 1,5x3.900 and remove the cable terminal protection pn 103 located close to the rotor brake lever pn 201 on the rotor head;
4. Using a 10 mm wrench, loosen and free the cable from the retainer pn 202 that fastens it to the rotor brake lever pn 201;
5. Cut the cable between the sheath and the deformation (3) caused by the tightening action of the retainer pn 202. This deformation could cause some problem when doing step 8;
6. Put the rotor brake lever pn 199 in ON position;
7. Free the cable kern (7) from the rotor brake control lever pn 199;
8. Completely extract the cable 1,5x3.900;
9. Visually check the cable. If there is no oxidation, the gyroplane has been used in optimal conditions, with low humidity, it has been cleaned accurately, did not fly in the rain and was not parked in a makeshift hangar;
10. Before starting to clean the inner part of the sheath, direct the upper end of the sheath pn 131 downward, far away from people and heat sources;

NOTE:
This operation may be somewhat difficult.

11. Starting from the sheath end (5) in the cockpit, spray some releasing agent inside the sheath;
12. Always from the sheath end in the cockpit, spray some spray grease inside the sheath;
13. Insert the new rotor brake cable from the end inside the cockpit and check the correct position of the sheath ends pn 103;
14. Hook the cable to the rotor brake lever pn 199;
15. Put the rotor brake lever pn 199 in OFF position;
16. Put the upper end of the sheath in its seat again, with its sheath end pn 103;
17. Insert the cable in the retainer pn 202;
18. Tighten the retainer pn 202 and fasten the cable;

NOTE:
The movement of the rotor brake control lever must not be greater than 20 mm.

19. Cut away the excess of cable 1,5x3.900, leaving at least 30 mm more than needed;
20. Position the cable terminal protection pn 103 and tighten it with cutting nippers.

Fig. 3.9/1 Arricchitore
Choke assembly

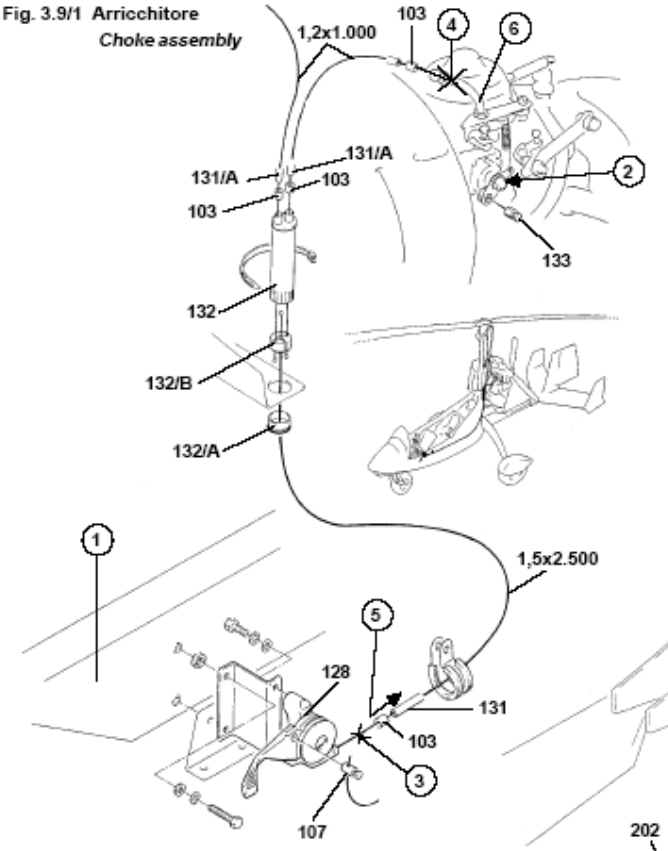
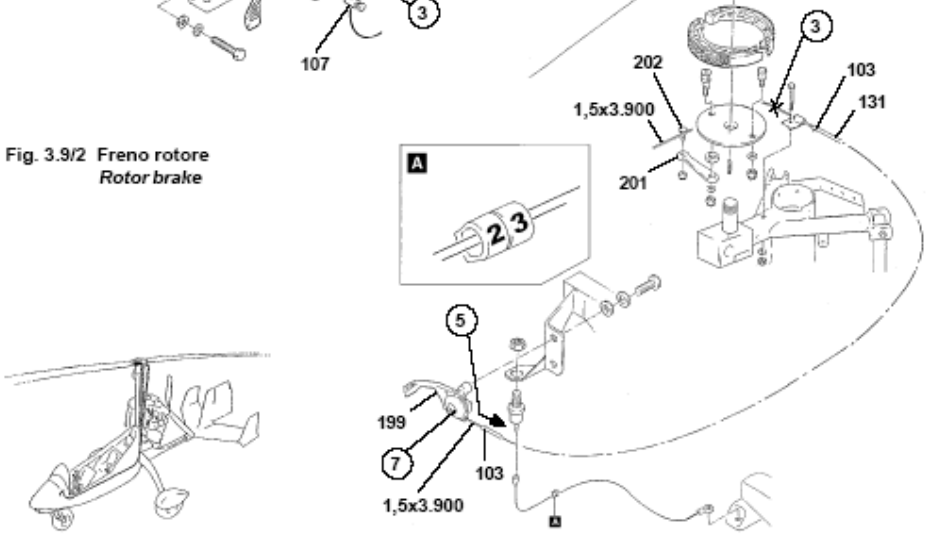


Fig. 3.9/2 Freno rotore
Rotor brake



3.9.3 BRAKE SYSTEM CABLE LINE

(See Fig. 3.9/3)

WARNING:

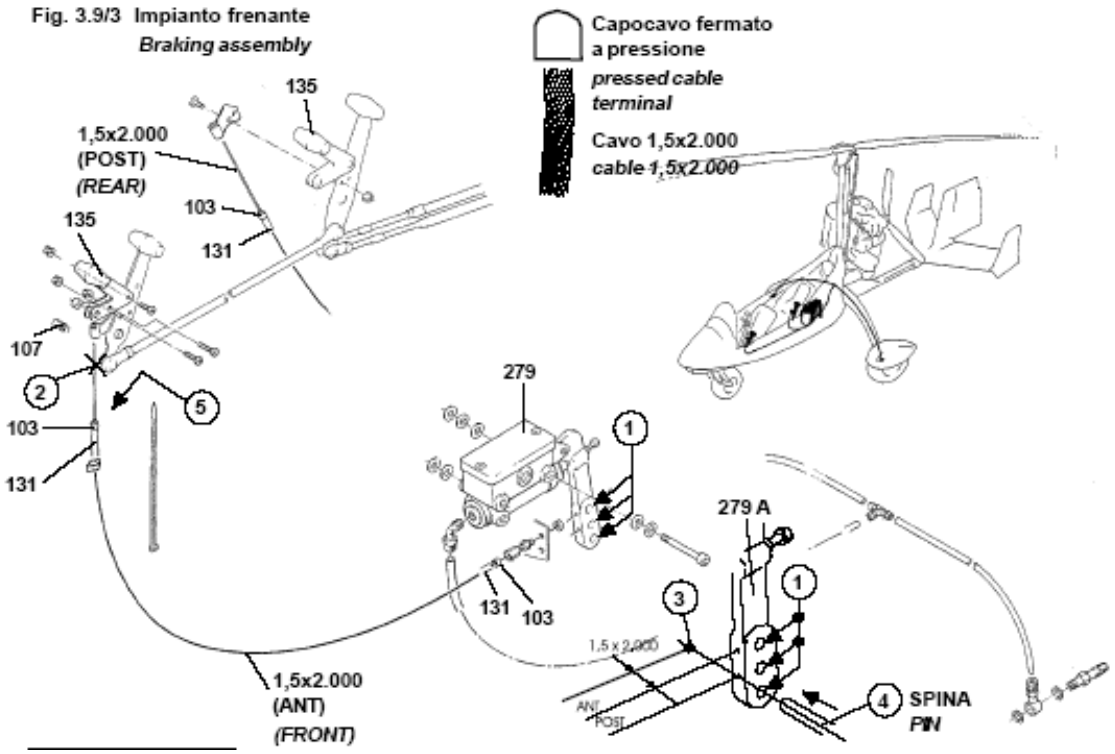
Position of the cables: The brake system of the M16 (M16C) model is doubled to satisfy the needs of double control piloting and thus allow training requirements. There are three (1) different positions for anchoring the cables on the brake pump pn 279. Usually these cables are placed in such a way as to guarantee the most efficient braking to the skipper. It is important to carefully respect the position of the cables so as not to alter the braking efficiency.

3.9.3.1 REPLACEMENT OF BRAKING SYSTEM CABLES

(See Fig. 3.9/3)

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Cut the cable 1,5x2.000 and remove the cable terminal cap located close to the brake lever pn 135;
3. Use a 7 mm wrench to loosen the cable retainer pn 107 that fastens the cable 1,5x2.000 to the brake lever pn 135;
4. Cut the cable below the deformation (2) caused by the tightening action of the retainer pn 107. This deformation could make it difficult to remove the cable from the sheath pn 131;
5. Extract the cable kern (3) from the lever pn 279/A of the brake pump pn 279. Therefore use a pin (4) to apply lateral pressure;
6. Extract the cable from the sheath pn 131 and from the lever of the pump pn 279;

Fig. 3.9/3 Impianto frenante
Braking assembly



7. Visually check the cable. If there is no oxidation, the gyroplane has been used in optimal conditions, with low humidity, it has been cleaned accurately, did not fly in the rain and was not parked in a makeshift hangar;

8. Before starting to clean the internal part of the sheath, direct the upper end of the sheath pn 131 downward, far away from people and heat sources;

NOTE:
This operation may be somewhat difficult.

9. Starting from the sheath end in the cockpit, spray some releasing agent inside the sheath (5);
10. Always from the sheath end in the cockpit (5), spray some spray grease inside the sheath;
11. Insert the new brake cable in the lever of the pump pn 279/A and then in the sheath pn 131. Check the correct position of the sheath ends pn 103;
12. Slightly pull the cable, thereby taking care of getting rid of possible plays of the brake lever pn 135. Then fasten the cable to the lever, with the retainer pn 107;
13. Cut the cable in excess, leaving at least 30 mm more than needed;
14. Position the sheath ends pn 103 on all the cable ends and clamp them with the help of cutting nippers;
15. Operate the control lever pn 135 to check the correct functioning of the system.

3.9.4 REPLACEMENT OF PRE-ROTATION CABLE

(See Fig. 3.9/4)

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Cut the cable 1,5x3900 and remove the cable terminal protection pn 103 located close to the belt tightening lever pn 415 of the pre-rotation assembly pn 117;
3. Use a 7 mm wrench to loosen the cable retainer pn 107 that fastens the cable to the fork pn 108;
4. Cut the cable between the sheath and the deformation (1) caused by the tightening action of the retainer pn 107. This deformation could cause some problem when doing step 8;
5. Put the pre-rotation control lever pn 415 in ON position so as to make it easier to extract the cable1,5x3900;
6. Completely extract the cable (3);
7. Visually check the cable. If there is no oxidation, the gyroplane has been used in optimal conditions, with low humidity, it has been cleaned accurately, did not fly in the rain and was not parked in a makeshift hangar;
8. Before starting to clean the internal part of the sheath, direct the upper end of the sheath pn 104 downward, far away from people and heat sources;

NOTE:
This operation may be somewhat difficult.

9. Starting from the sheath end (2) in the cockpit, spray some releasing agent inside the sheath;
10. Always from the sheath end in the cockpit (2), spray some grease inside the sheath;
11. Insert the new pre-rotation control cable in the lever pn 415 and then along the adjusters pn 127 and in the sheath pn 104. Make sure that the position of the cable terminal protections pn 103 is correct;
12. Fully screw the adjuster pn 127 in its housing;
13. Put the pre-rotation control lever pn 415 in OFF position;
14. Place the upper end of the sheath pn 104 back to its seat (support pn 122), together with its cable terminal protection pn 103;
15. Insert the cable in the retainer pn 107 located in the fork pn 108;
16. Tighten the retainer pn 107 and fasten the cable;

WARNING:
When tightening the cable retainer pn 107, verify that the brake shoe (4) of the belts (5) really touches the belts (ref. paragraph 3.2 "Pre-rotation assembly adjustment").

17. Cut the cable in excess, leaving at least 30 mm more than needed;
18. Position the cable terminal protection pn 103 and tighten it with cutting nippers.

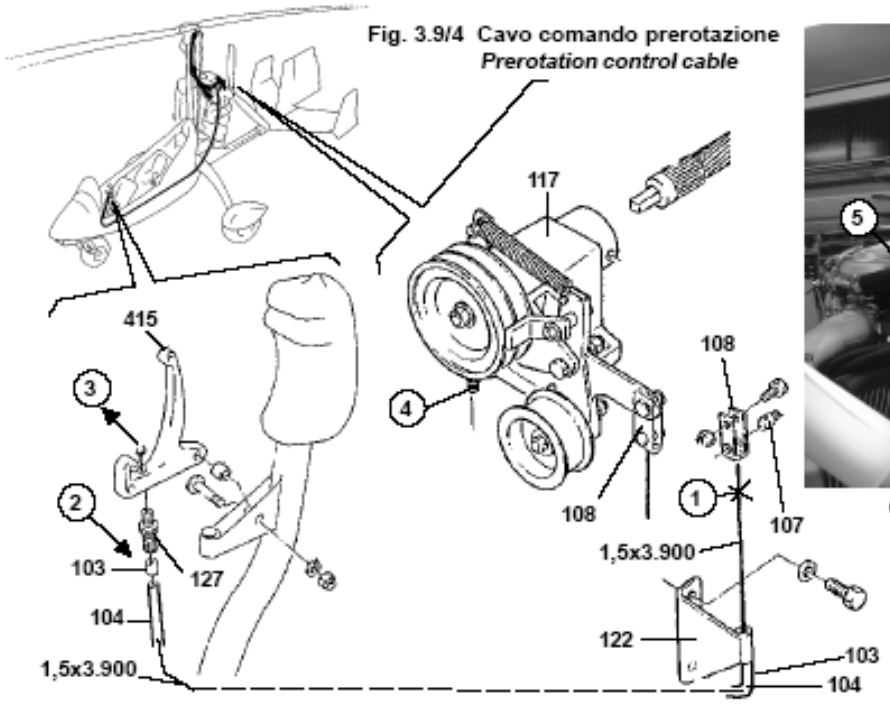
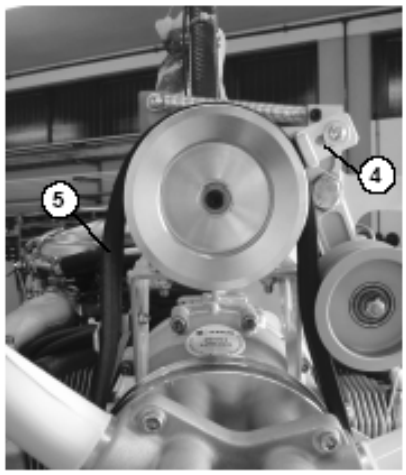


Fig. 3.9/4 Cavo comando prerotazione
Prerotation control cable



Corretto serraggio del pattino
Correct tightening of the shoe

3.10 RUDDER PEDALS LINE

(See Fig. 3.10/1 - 3.10/2)

3.10.1 GENERAL INSTRUCTIONS

3.10.1.1 ENTIRENESS OF CABLES

The breaking of the cables (Ø 3 mm x 49 wires) does certainly not happen suddenly and unexpectedly. It will only happen in the long term, if the correct maintenance of the gyroplane and of the system are neglected. The lack of maintenance can generate an unexpected rubbing of the cable or excessive corrosion. Precautionary checks easily allow avoiding such problems.

3.10.1.2 RUBBING

Repeated rubbing of the cables over a long period is the only cause of wear.

This wear can only occur where the cables pn 3x49 are close to the 6 pulleys pn084 and to the rudder pivot pn 086.

Excessive wear of the cable causes its flattening and the consequent reduction of its diameter or the breaking of some wires of this same cable.

This may occur near the pulleys, where the cable is continuously in contact with the pulley and there is a movement between both parts. Anyway, the interaction between cable and pulley is absolutely normal and does not compromise the entireness of the cable. But the wear can become important if the pulley does not turn freely because of excessive tightening or oxidation of the inner bearing pn 626-ZZ. In such a case, the friction between pulley and cable will not be rolling anymore; instead there will be rubbing which will damage the cable.

Similar problems may arise if the position of the cable guiding fork pn 083 is not correct, i.e. if it looses its vertical position, thus interfering with the cable. The unavoidable rubbing could damage the cable in this case, too (see detail "A").

3.10.1.3 OXIDATION

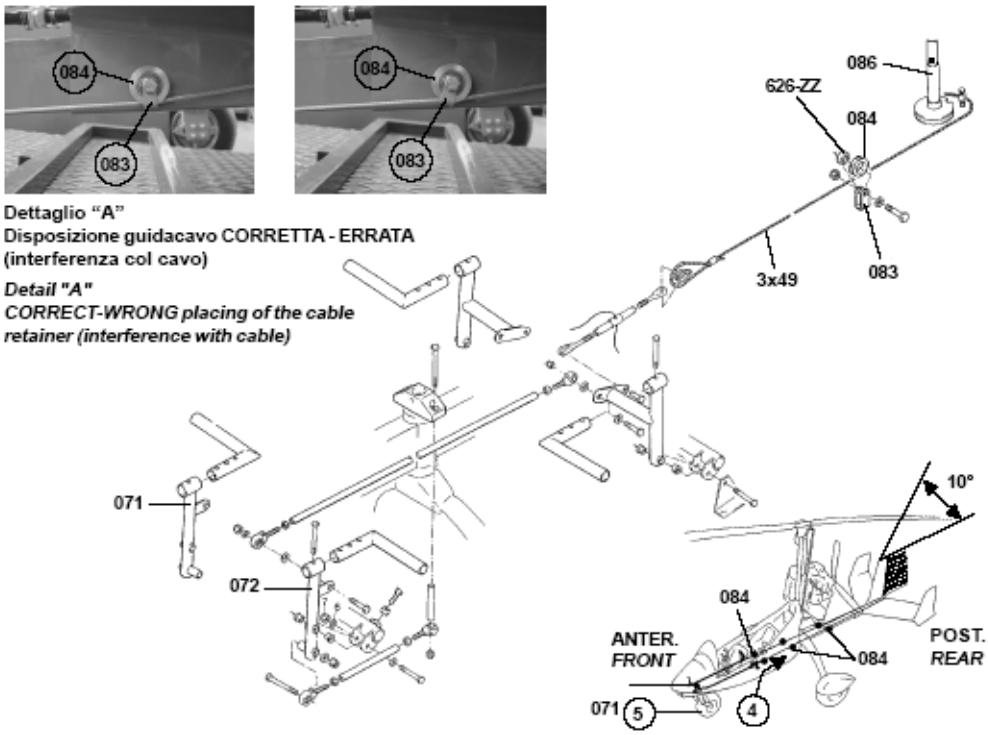
In the long term and if operated in very humid conditions, the steel cable pn 3x49 may be subject to oxidation, causing some wires to break.

3.10.2 CABLES INSPECTION PROCEDURE

(See Fig. 3.10/1 - 3.10/2)

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Check the cable guiding forks pn 083, making sure they are vertical and that there are no interferences with the cables (see detail "A");
3. Initially, proceed with a visual check of the cable pn 3x49. Make sure it is not damaged;
4. To do a more accurate check, pass two fingers all along the cable with a slight pressure;

Fig. 3.10/1 Linea pedaliera
Rudder pedals line



WARNING:

5. Broken or damaged superficial wires are easy to find, as the fingertips are stung by the damaged wires and can not slide freely;

6. Then check the freedom of movement of the pulleys pn 084;

7. If the pulleys are not free to turn, use some release agent WD40 to clean them, facilitate their movement and reduce the oxidation. If the result of steps 3 - 4 - 7 is not satisfying, it is possible to replace the cable or blocked pulley pn 084.

3.10.3 CHECK OF CABLE TENSION

(See Fig. 3.10/1 - 3.10/2 and Table. 3.10.4.4)

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;

2. Using the adequate tool (To-006), check the tension of the cable at approximately the midpoint between the rudder pivot pn 086 and the rear pulley pn 084 of the rudder pedals line;

3. If the measured tension is lower than the limit values indicated in the table, remove the safety wiring on both screw couplings pn MS 21251-B3S;

4. Screw in both screw couplings one complete turn;

5. Grab the pedal (pn 071 or pn 072) and move it several times along the entire range of the movement, so as to distribute the tension evenly on all the cable;

6. Using the tool To-006, check the tension of the cable again, as per step 2;

7. If the tension is satisfying as per the given indications, repeat this braking operation with the other two screw couplings, while tying the wire (1). Otherwise repeat the procedure from step 4 onward.

3.10.4 REPLACEMENT OF RUDDER PEDALS CABLE

(See Fig. 3.10/1 - 3.10/2)

3.10.4.1 REMOVAL OF DAMAGED CABLE

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Remove the safety wiring from the screw couplings pn MS21251-B3S;
3. Loosen the screw coupling so as to free the cable ends;
4. Cut the cable (2) close to the thimbles pn 082 so as to free the cable eye end pn MS21255-3LS;
5. Extract the damaged cable from the rear of the gyroplane;
6. Free the cable from the rudder pivot pn 086 and retrieve the cable retainer pn 085;

3.10.4.2 PREPARATION OF NEW CABLE

(See Fig. 3.10/1 - 3.10/2)

1. Verify that the cable 3x49 is at least 8 meters long;
2. Put the thermo-retractable sheath (3) on one end of the cable pn 3x49;
3. Put the cable retainer pn 269 (Nicopress) on the same cable end (see Detail "B");
4. Run the cable around the thimble pn 082 fixed to the cable eye end MS21255-3LS;
5. Leave at least 10 centimetres of cable more than needed and tighten the cable retainer pn 269 close to the thimble. Take care not to leave the cable slack (see Detail "C");
6. Put the thermo-retractable protection sheath on the crimped cable retainer pn 269 and "shrink" it with a heat gun.

3.10.4.3 INSTALLATION OF CABLE

(See Fig. 3.10/1 - 3.10/3)

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Insert the free end of the cable 3x49 from inside the cockpit through the front pulley pn 084 and then through the other pulleys; thereby take care to follow the correct path (4) of the control pedals;

WARNING:
Insert the cable between the pulley pn 084 and the cable retainer pn 083. Take care to avoid any anomalous rubbing of the cable along the rudder pedals line (see Detail "A").

3. Screw in the cable eye end pn MS21255-3LS with the cable to the turnbuckle pn MS21251-B3S. Take care to screw the other end pn MS21252-3RS symmetrically;
4. Using a pin pn MS 20392-2C11, fasten the end pn MS21252-3RS to the pedal pn 080;
5. When the cable comes out of the rear pulley pn 084, insert it through the retainer pn 085 and anchor it to the rudder pivot pn 086;
6. Insert the cable in the other pulleys until reaching the front pedal pn 080;
7. Manually pull the cable's free end so as to give it a slight tension and check its correct positioning along the line;
8. Insert the heat shrink tubing in the cable's free end;
9. Insert the Nicopress fitting pn 269 in the cable's free end;
10. Insert the cable in the thimble pn 082 of the eyelet end pn MS21255-3LS of the turnbuckle;
11. Using a pin pn MS 20392-2C11, connect the end pn MS 21252-3RS to the pedal pn 081;

Fig. 3.10/2 Cavo comando pedaliera
Pedals control cable

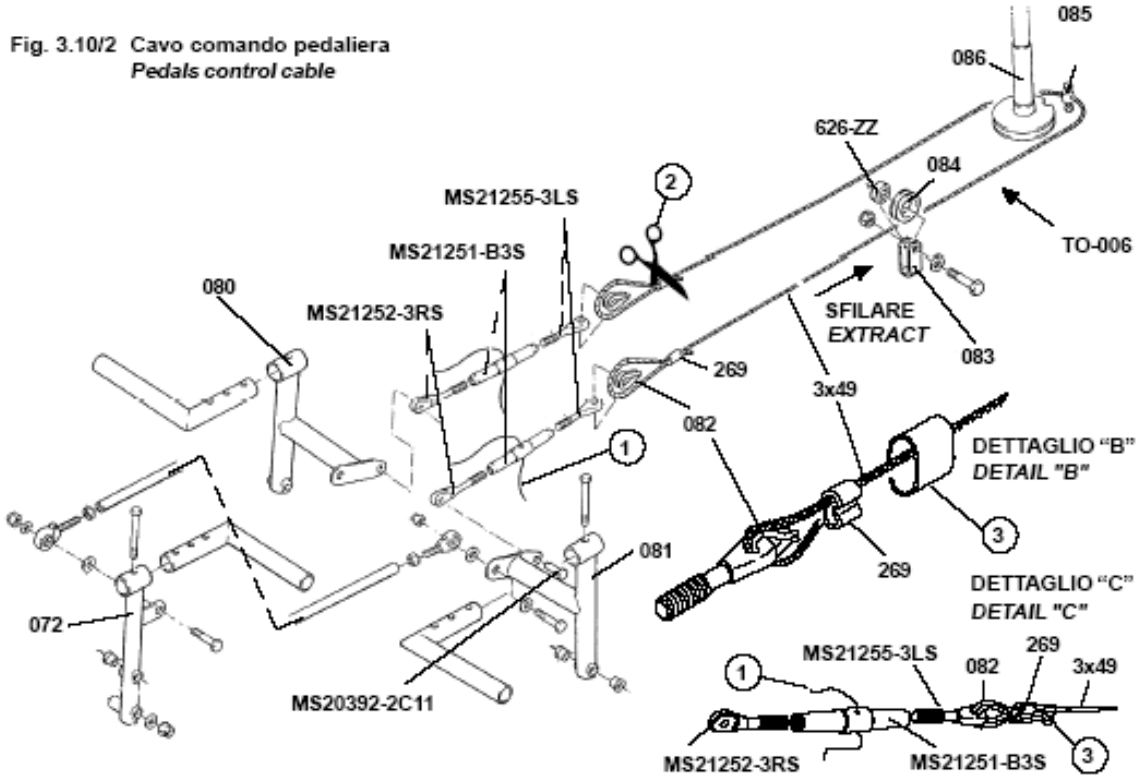
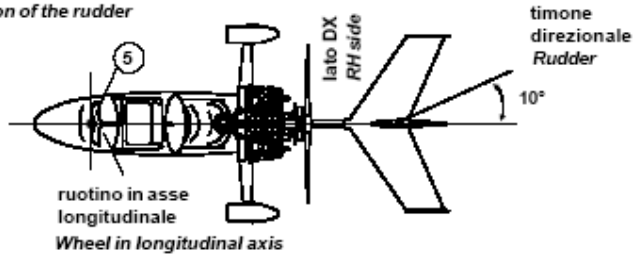


Fig. 3.10/3 Posizione a terra del timone direzionale
Ground position of the rudder



12. Tighten the Nicopress fitting pn 269 close to the thimble. Do not let the cable slack and correctly evaluate the total length of the cable;
13. Screw both end pn MS 21255-3LS and pn MS 21252- 3RS symmetrically to the turnbuckle MS 21251-B3S, thus tightening the cable;
14. Grab the pedals pn 072 and pn 071 move it several times along the entire range of the movement, so as to distribute the tension evenly on all the cable;
15. Using the tool To-006, check the tension of the cable according to the indications of paragraph "Check of cable tension";
16. Lock the turnbuckles with the special safety wire (1);
17. Shift the rudder at an angle of approx. 10° to the right, while keeping the nose wheel (5) lined up with the longitudinal axis of the gyroplane;
18. Tighten the cable retainer pn 085 so as to block the rudder.

3.10.4.4 CABLE TENSION TABLE

Cable specifications - galvanized steel 3,2 mm x 49 wires

Cable tension allowance	from	180 N (40 lbs)
	to	270 N (60 lbs)

3.10.5 INSPECTION OF RUDDER PEDALS RODS

(See Fig. 3.10/5)

The inspection of the pedal rods pn 076 and pn 078 is limited to checking the freedom of movement of the joints (1) when they are at the end of their travel, the absence of abrasion or unexpected bending, as well as the correct tightening of the locking bolts (M5x42, M6x55, M6x25, M6x80) on the pedals.

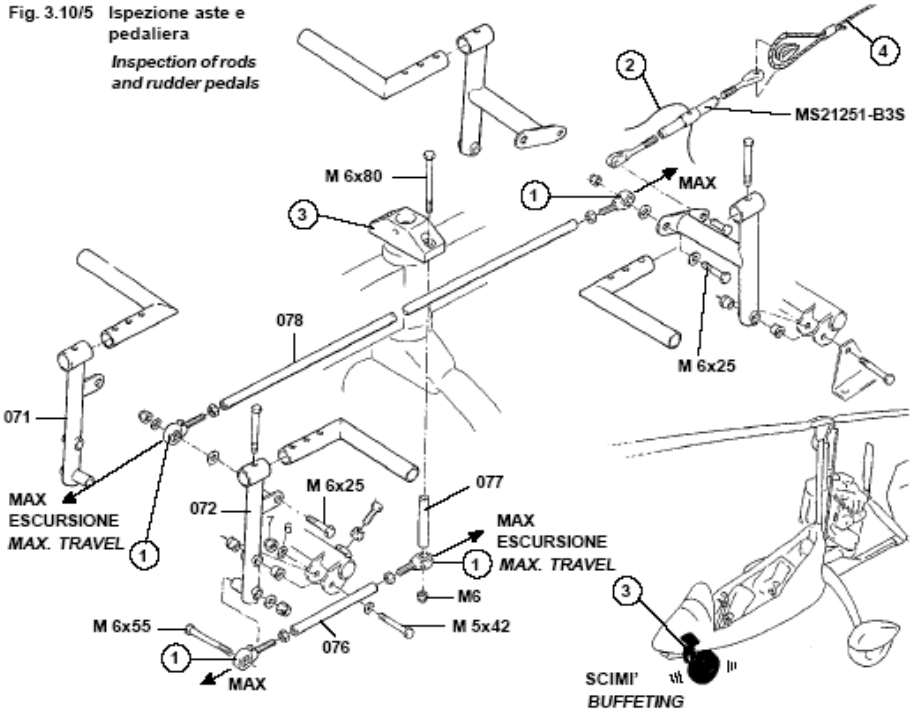
Incorrect tightening may generate play and vibrations on the pedals pn 071 and pn 072 and consequently on the nose wheel (3) (buffeting).

3.10.6 INSPECTION OF PEDALS

(See Fig. 3.10/5)

1. Check the correct movement of the pedals pn 071 and 072 until they reach the stoppers;
2. Verify that the pedals have no lateral play;
3. If there is some lateral play, tighten the locking bolts pn M5x42 on which the movements of the pedals are articulated;
4. Verify that the safety wiring (2) is still there and check the correct positioning of the turnbuckles pn MS21251-B3S on the rear pedals.

Fig. 3.10/5 Ispezione aste e pedaliera
Inspection of rods and rudder pedals



3.11 INSPECTION AND REPLACEMENT OF FRONT SUSPENSION

(See Fig. 3.11/1 - 3.11/3)

3.11.1 ENTIRENESS OF TIRE

The tire must satisfy several basic requirements to avoid inopportune punctures or lowering of the pressure:

- The wear of the tread (1) must not be excessive.
- The tire must not show abnormal abrasions (2).
- The tire (3) must not show radial cracks, which are symptoms of ageing.

It is possible to visually check all these requirements. The correct inflation pressure (4) helps in reducing the wear of the tire. Therefore we strongly recommend checking it carefully and regularly, at least at the beginning of each new season.

The correct inflating pressure for the nose tire is 1,6 - 1,8 bar.

Please remember that taxiing on hard surfaces or asphalt increases the wear of tires. Under such conditions, we recommend to check the tire and its pressure more often.

3.11.2 FIXING OF NOSE WHEEL AND FORK

(See Fig. 3.11/3)

The nose wheel (5) and fork (6) are assembled through the connection of the bolt pn M12x160 and the fork pn 093 (for gyroplanes with serial number till 16053404) (or pn 426) and the spacer pn 094 (or pn 427) and the wheel (5). Tightening and blocking the wheel is done with a fibrelock nut M12.

The tightening action of the bolt M12x160 must be adequate, so as to avoid compression of the bearings 6201-LU of the wheel hub and allow complete freedom of wheel rotation. At the same time, the wheel must not have any lateral play on the fork, which could cause vibrations to the entire system.

3.11.3 ENTIRENESS OF FORK

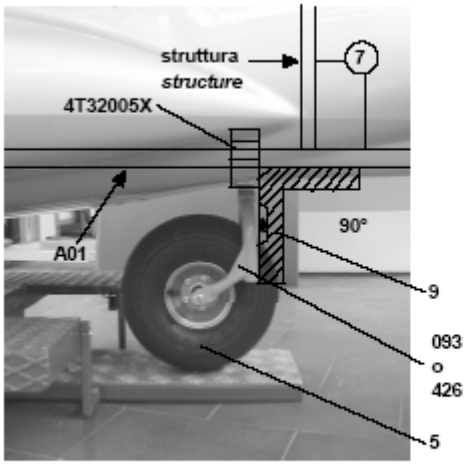
The fatigue of the front fork pn 093 (or pn 426) can generate its deformation. Deformation is a symptom of hard landing or of take-off and landing on very rough surfaces. Periodically check the fork so as to prevent excessive deformation or failure of the fork stem.

3.11.4 CHECK PROCEDURE

(See Fig. 3.11/3 - 3.11/2)

The fork check parameter consists in having a 90° angle between the main structure's spar (7), which supports the bearings 4T 32005X that allow the fork's movement, and the plane created by the fork.

Fig. 3.11/1 Angolo di 90° tra forcella ruotino e struttura
90° angle between wheel fork and structure



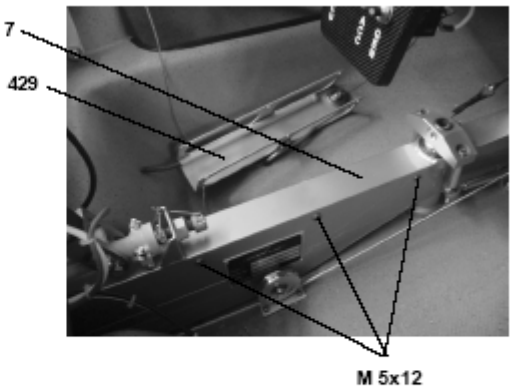
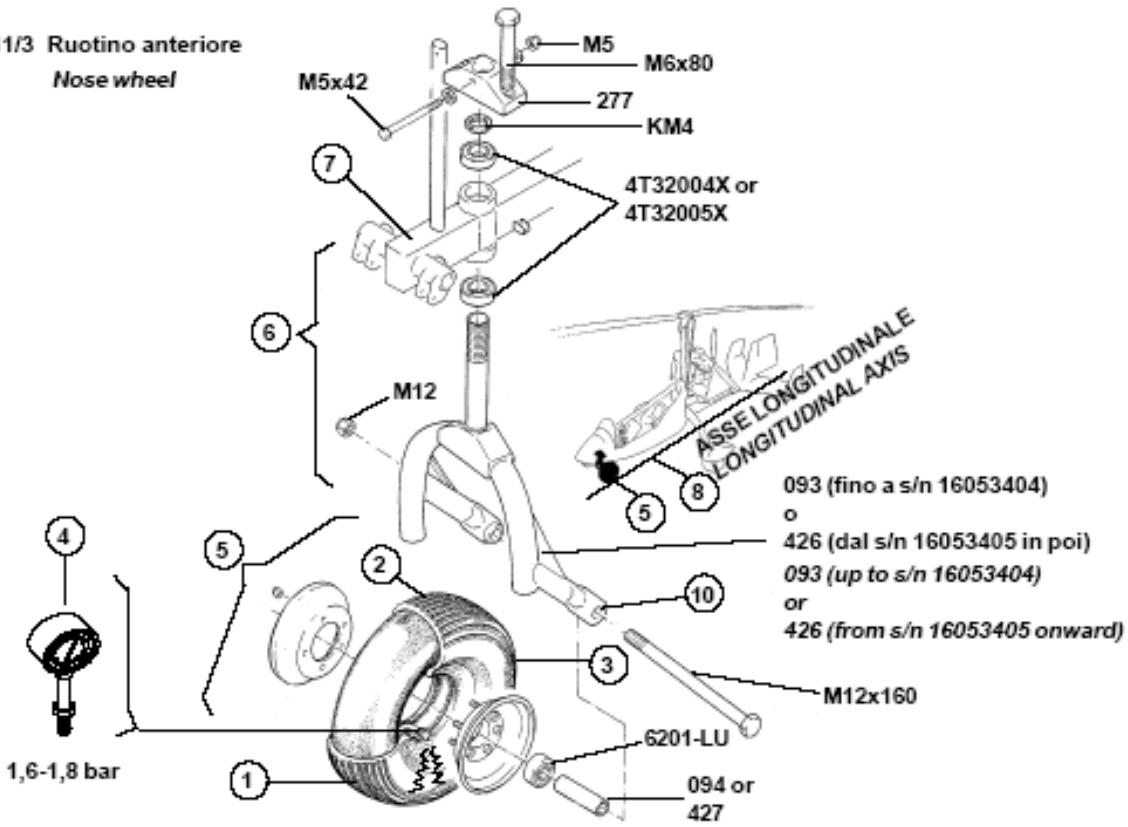


Fig. 3.11/2 Poggiapiedi anteriore
Front footboard

TOLLERANZE AMMESSE		*ACCEPTABLE TOLERANCES*	
Struttura posizione A01 – forcella	90°	*Structure position A01 - fork*	*90°*
Tolleranze anteriori	+10°	*Front tolerances*	*+10°*
Tolleranze posteriori	-10°	*Rear tolerances*	*-10°*

Fig. 3.11/3 Ruotino anteriore
Nose wheel



1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Put the pedals (pn 071 and 072, in fig. 3.10/5) in central position. Visually check that the nose wheel (5) is aligned with the longitudinal axis of the gyroplane (8, fig. 3.11/3);

3. Unscrew the 6 screws M5x12 that fasten the front footboard pn 429;
4. Remove the front footboard pn 429;
5. With a dial gauge (9) check the existing angle between the keel spar in A01 position (see fig. 3.11/1) and one of the vertical arms of the fork;
6. Reposition the footboard pn 429 and fasten it to its seat with the screws M5x12;
7. If the control parameters are not within the allowed tolerances, the fork pn 426 must be replaced.

3.11.5 REPLACEMENT OF FORK pn 426

(See Fig. 3.11/3)

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Remove the safety wire (2) from one of the turnbuckles pn MS 21251-B3S of the rudder pedals cable (4) (see fig. 3.10/5);
3. Completely slacken the turnbuckle pn MS 21251-B3S so as to avoid any tension from the cable (4) on the pedals pn 071;
4. Using two 10 mm wrenches, loosen and remove the two vertical bolts M6x80 that fix the control block pn 277 of the rudder pedals;
5. Using two 8 mm wrenches, loosen and remove the screws M5x42 that fix the control block pn 277 to the stem of the fork pn 093 (or pn 426);
6. Unscrew the control block pn 277 from the stem;
7. Lean the gyroplane with its nose up, so as to be able to work comfortably on the front fork. Make sure its equilibrium is stable. Support the gyroplane so it cannot drop back on the nose. As the wheel has been removed for replacement, in case the nose would fall, it would crash on the ground, thus damaging the lower part of the fuselage;
8. Unscrew and extract the screw M12x160 that fix the front wheel to the fork, then remove the wheel;
9. Supporting the fork pn 093 or 426, loosen and remove the lock nut pn KM4;
10. Extract the fork from the bottom and remove the conical bearings as described below;
11. Extract the bearing 4T 32004 X (for all the versions up to serial number 16053404), from the stem of the fork pn 093; or remove the bearing 4T 32005 X (from gyroplane serial number 16053404 (included) onward) from the stem of the fork pn 426;

WARNING:
If the deformation of the stem is too important and it is impossible to extract the indicated bearings, or if this operation could damage them, these bearings must be replaced.

12. Clean both bearings with solvent and remove residual grease, dust, sand or soil;
13. Grease the bearings again (recommended grease: SHELL DARINA R2 or equivalent). Carefully press the grease between the rollers.

3.11.6 PREPARATION OF SPARE FORK

The spare fork (6) will be supplied with pre-drilled holes (Ø5.0 mm) in the stem and with its own calibrated lock nut pn KM4. Before installing it, it is suggested to screw the lock nut KM4 on the stem, so as to check the entireness of the thread M20x1. Last, previous to the installation, remove the paint from the bush (10) where the axle M12x160 of the wheel is housed, so as to make its access easier during assembly.

3.11.7 INSTALLATION OF FORK pn 426

(See Fig. 3.11/3 and 3.10/5)

1. Insert the lower bearing pn 4T 32004 X (for all the gyroplane versions up to serial number 16053404) on the stem of the fork pn 093; or insert the bearing 4T 32005 X (from serial number 16053404 (included) onward) on the stem of the fork pn 426;
2. Insert the stem (6) in its seat, inserting the upper bearing (same as the lower bearing) on the stem;
3. Screw and tighten the lock nut pn KM4;
4. Screw the control block pn 277 till the 5mm diameter fixing holes are lined up;
5. Insert and tighten the bolt M5x42 that fixes the block pn 277 to the stem (replacement of the fibrelock nut M5 is recommended);
6. Tighten the lock nut pn KM4 against the aluminium control block pn 277 (unscrewing the lock nut from the stem). This serves to avoid possible plays of the control block pn 277 on the stem;
7. Insert the spacer pn 077, the end (1) and tighten the bolts M6x80 that fixes the rods pn 076 of the pedals (replacement of the fibrelock nuts M6 is recommended);
8. Install the nose wheel (5) through the following connection: fork - spacer pn 094 (or pn 427) - wheel - spacer - fork (6);
9. Tighten the pivot of the wheel as explained in the paragraph "assembly of nose-wheel and fork" (3.11.2);
10. Insert and tighten the cables through the turnbuckle (see paragraph 3.10.4.3, "Installation of the cable");
11. Put safety wiring (2) on the turnbuckle (See Fig.3.10/5).

3.12 CHECK OF TIRES

(See Fig. 3/12)

WARNING:
The M16 (M16C) gyroplane tires are made of 6-ply tread with air tube. The nominal dimensions of the tires are listed in the table at the end of the paragraph. Tires need to be checked at the beginning of each season, to check the wear and above all the correct inflating pressure. Please remember that an incorrect inflating pressure will compromise the road holding and direction keeping of the gyroplane during taxiing and its overall trim. Furthermore, an unusual wear of the tire will also increase the risk of punctures.

3.12.1 FRONT WHEEL CONTROL PROCEDURE

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Lean the gyroplane on the tail, so that the nose is up and the access to the front tire is easier;
3. Verify the wear of the tread and check that there are no radial cracks on the rubber;
4. Remove the inflating valve cap;
5. Measure the tire pressure (4, fig. 3.11/3) and correct it according to the inflation pressure table (see paragraph 3.11.1);
6. Close the valve with its cap.

3.12.2 MAIN WHEELS CONTROL PROCEDURES

(See Fig. 3.12/1)

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Unscrew and remove the wheel pants pn 167 outer fixing bolt M8x50. Be careful not to loose the spacers pn 168 and the washers (1);
3. Unscrew and remove the wheel pants pn 167 inner fixing bolt M5x16. Be careful not to loose the washers;

NOTE:
Gyroplanes prior to serial number 22063434 have a washer 10x20 between the wheel pant support pn 162 and the wheel pant pn 167. This shim washer is placed on the head of the threaded insert to guarantee enough contact surface. This washer does not exist on the following serial numbers.

4. Remove the wheel pants pn 167 by pulling them gently upward;
5. Verify the wear of the tread (3) and check that there are no radial cracks on the rubber (4);
6. Remove the inflating valve cap (5);
7. Measure the tire pressure (2) and correct it according to the inflating pressure diagram given below;
8. Close the valve with its cap (5),
9. Only for gyroplanes prior to serial number 22063434: place the shim washers 10x20 on the head of the M5 threaded insert, which protrudes from the support pn 162. This washer 10x20 does not exist on higher serial numbers;
10. Insert the wheel pant pn 167 on its fixing seat;
11. Tighten the wheel pant pn 167 inner fixing bolts M5x16; thereby follow the sequence: bolt (M5x16) - lock washer (5) - washer (5x20) - wheel pant pn 167;
12. Position and tighten the outer fixing bolt M8x50, following the sequence: bolt (M8x50) - lock washer (8) - washer (8x16) - wheel pant (pn 167) - washer (8x16) - spacer pn 168.

3.12.3 TYRES INFLATING PRESSURE

	PLY NUMBER		DIMENSIONS	PRESSURE (bar)
FRONT TYRE	6	Trelleborg	4.00-4	1.6 – 1.8
MAIN TYRES	6	Trelleborg	4.00-6	2.0 – 2.2

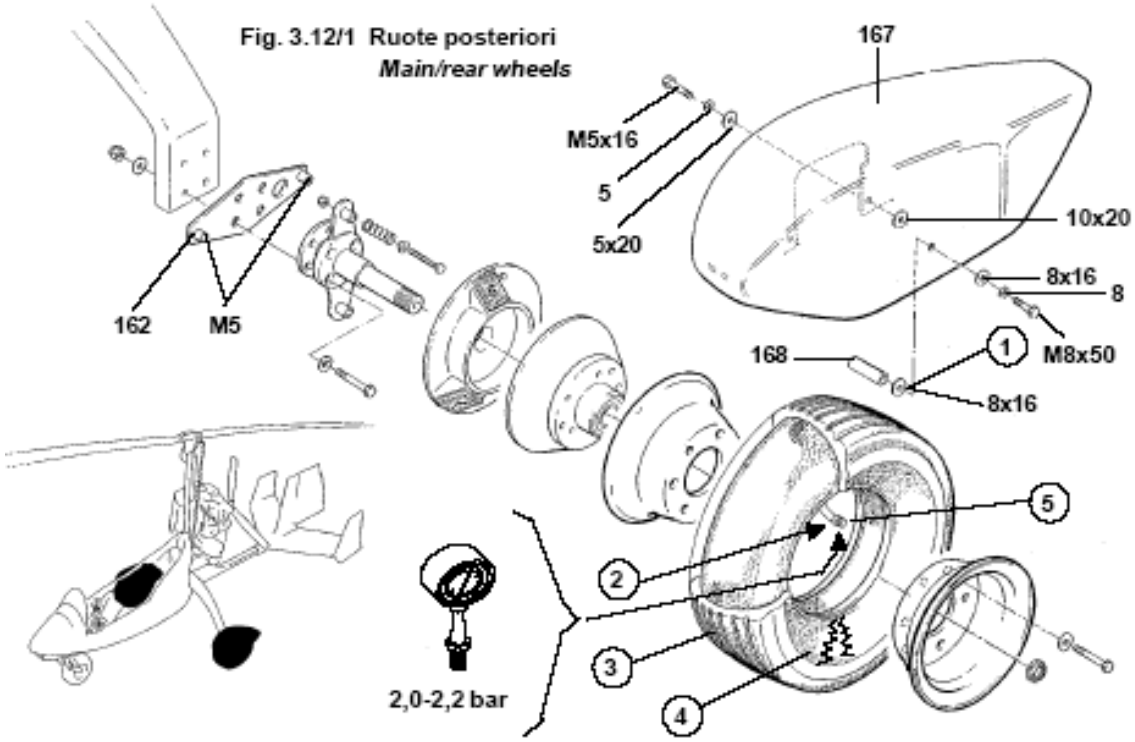


Fig. 3.12/1 Ruote posteriori
Main/rear wheels

3.13 CHECK OF COOLING SYSTEM

(See Fig. 3.13/0)

3.13.1 CHECK PROCEDURE OF COOLING SYSTEM

(See Fig. 3.13/1 - 3.13/3)

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Verify that there are no leaks of coolant on the radiant surface (1). These are easy to detect because of the blue-white stains left by the dried-up coolant and of damages to the radiator interspaces;
3. Check the entireness of the hoses pn 1240, pn 870, pn 300, pn 240 and pn 540. Make sure there are no abrasions or contact points with damaging rubbing;
4. Make sure the level of the coolant is correct, as per parameters of paragraph 3.13.7 "Coolant level";
5. Verify the correct tightening of all the clamps pn 384 of the system;
6. Only for gyroplanes with sn 16052934 to sn 22063684 included: verify the easy sliding of the radiator choking system Bowden control cable pn 403 and check that there is no friction nor hardening of the movement.

If one or several of the verifications give(s) negative results, proceed with the following procedures to correct the problem:

3.13.2 INSPECTION OF THERMAL EXPANSION VALVE

(See Fig. 3.13/0 and 3.13/1)

Starting from sn 22063684 (included), all the Magni gyroplanes have been equipped with a three-way thermal expansion valve placed along the coolant system upstream the radiator.

This valve allows to automatically keep the temperature within the normal operation range (green). Inspecting the thermal expansion valve (02, fig. 3.13/0) consists in the following operations:

WARNING:
This intervention must to be carried out just with cold engine.

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Loosen the clamp pn284 that fixes the hose pn870 to the lower connection of the radiator;
3. Have a tray ready to collect the coolant;
4. Gently remove the hose pn 870 from the radiator connection and direct the liquid into the tray (5);
5. Remove the cap of the engine's expansion tank (1, Fig. 3.15/1) to allow the complete discharge of the coolant from the cooling system;
6. Remove the two locking bolts M6x16 of the thermal expansion valve's cover;
7. Gently open the valve's cover. Thereby pay attention to the discharge of the coolant still present in the system;
8. Extract the thermal expansion valve;
9. Visually inspect the valve, remove any deposit and clean it accurately until its original conditions are restored;
10. Place the thermal expansion valve in its container. Take care to place the vent on top;
11. Close the valve's radiator. Make sure the seals are placed correctly;
12. Tighten the bolts M6x16 with the proper lock washer;
13. Put the hose pn 870 on the radiator's lower connection;
14. Tighten the clamp pn 384;
15. Fill the cooling system from the engine's expansion tank.

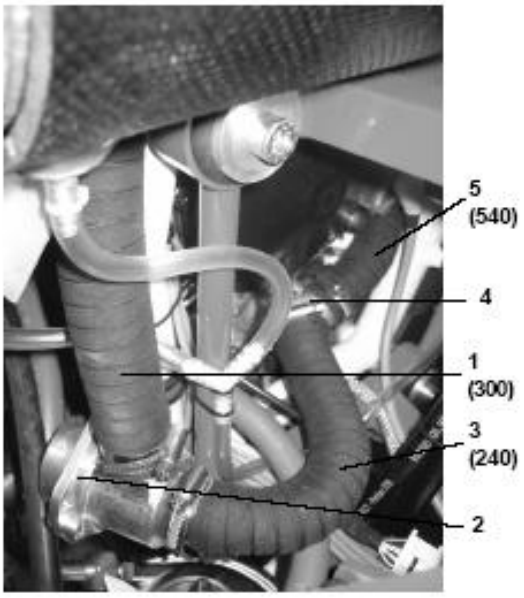
WARNING DANGER:
The thermal expansion valve remains closed at ambient temperature, thus hindering the flow of coolant into the radiators. Therefore it is necessary - before starting to fly - that the heads (CHT) reach a temperature of at least 75° C.

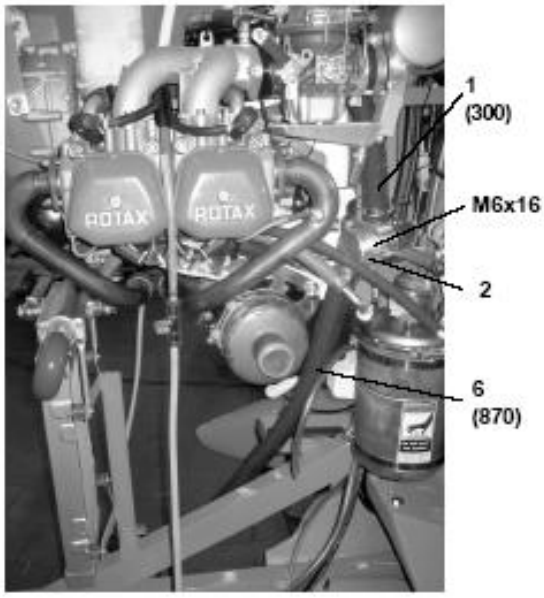
To do this, start the engine. But first, make sure the gyroplane is located outside with plenty of space around, without any hindrance or people. Also make sure the gyroplane is braked well on the ground.

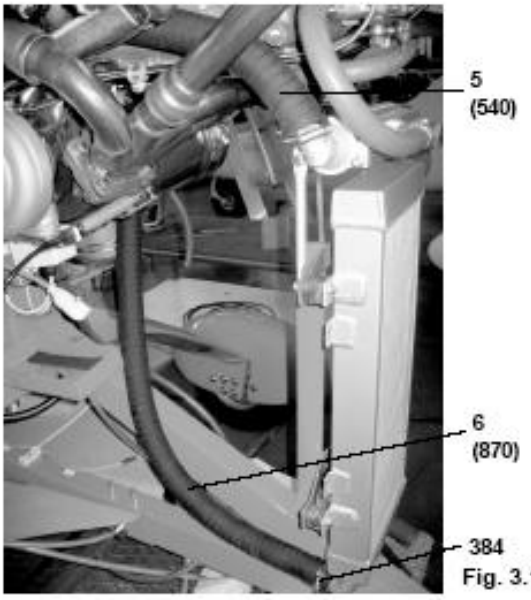
Only qualified personnel seated in the gyroplane is allowed to start and preheat the engine.

Once the temperature necessary for operating the valve (75° C) is reached, stop the engine, let the liquid cool down and fill up with liquid through the expansion tank.

Repeat this operation until the cooling system is completely filled.







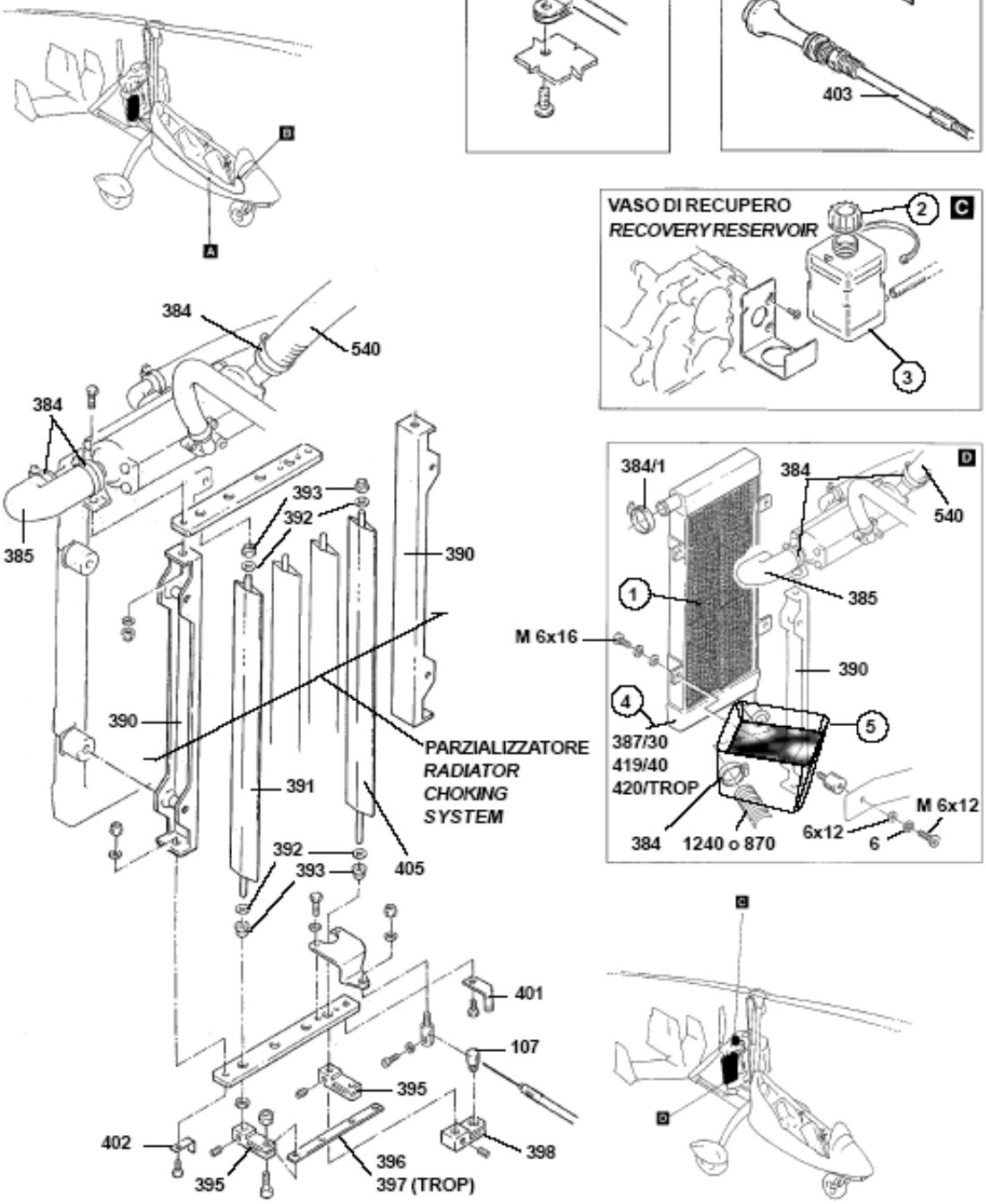
1 - Tubo vaso espansione-valvola L. 300 mm
2 - Valvola termostatica
3 - Tubo valvola-raccordo pompa L. 240 mm
4 - Raccordo pompa
5 - Tubo raccordo pompa-scambiatore calore L. 540 mm
6 - Tubo valvola-radiatore L. 870 mm

1 - Expansion tank hose - Valve L. 300 mm
2 - Thermal expansion valve
3 - Valve - pump connection hose L. 240 mm
4 - Pump connection
5 - Pump - heat exchanger connection hose L. 540 mm
6 - Valve - radiator hose L. 870 mm

Fig. 3.13/0 Ispezione valvola termostatica
Inspection of thermal expansion valve

Fig. 3.13/1 Impianto liquido raffreddamento
Cooling system

Parzializzatore
Radiator choking system



3.13.3 STAINS OR DAMAGE TO RADIATING SURFACE

Loss of coolant liquid can cause engine temperature rising and lead to damages to the engine; in some cases it can also lead to emergency landing.

WARNING DANGER:
In case of slight dripping (indicated by small stains, no continuous dripping and no damaged radiant surface) and only in case of extreme need, the gyroplane might fly again. But, in such a case, some special "Radiator Stop Leak" solution must be used, mixed with the coolant liquid.

This is only a temporary solution allowing the gyroplane to fly to a service centre. During such a flight, it is necessary to check the leak(s) and levels every 30 minutes of flight.

WARNING DANGER:
In case of large leaks and evident dripping, or if the liquid damages the radiant surface, the radiator must be replaced as soon as possible.

3.13.4 REPLACEMENT OF RADIATOR

(See Fig. 3.13/1 - 3.13/3)

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Loosen the clamp pn 384 that attaches the hose pn 1240 to the lower connection of the radiator;
3. Have a tray (5) ready to collect the coolant;
4. Gently remove the hose pn 1240 from the radiator connection and direct the liquid into the tray;
5. To allow the complete discharge of the coolant from the cooling system, remove the cap (2) of the engine's recovery reservoir (3);
6. Loosen the clamp pn 384/1 connecting the elbow pn 385 to the upper connection of the radiator;
7. Remove the elbow pn 385 from the radiator;
8. Unscrew the 4 locking bolts M6x12 of the radiator as well as the lock washers (6) and washers 6x12;
9. Remove the locking bolts M6x16 and then the radiator (4) from the frame of the radiator choking system pn 390;
10. Fit the new radiator and fix it with the bolts M6x16 (replacement of the lock washers (6) is recommended at each removal);
11. Insert the elbow pn 385 on the special radiator connection and tighten the clamp pn 384;
12. Put the hose pn 1240 on the special radiator connection and tighten the clamp pn 384;
13. Fill the system from the engine's expansion tank, following the level indications given in paragraph 3.13.7;
14. Close the cap (2) of the engine's expansion tank (3).

3.13.5 ENTIRENESS OF COOLING SYSTEM HOSES

WARNING:
The flexible hoses pn 1240 and pn 540 have an inner steel spiral to prevent flattening of the inner diameter on bends. If some part of the hoses rubs against some metal or sharp edge, producing tearing or abrasion of the outer surface of the hose, this hose must be replaced. Furthermore, the rubbing and contact must be reduced.

3.13.6 REPLACEMENT OF COOLING SYSTEM HOSES

(See Fig. 3.13/1 - 3.13/3)

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Loosen the clamp pn 384 that attaches the hose pn 1240 to the lower connection of the radiator;
3. Have a tray (5) ready to collect the coolant;
4. Gently remove the hose pn 1240 from the connection and direct the liquid into the tray;
5. To allow the complete discharge of the coolant from the cooling system, remove the cap (2) of the engine's expansion tank (3, fig. 3.15/1);
6. Loosen the clamps that fix the damaged hose to the connections;
7. Remove the damaged hose from the connections;
8. Carefully check the worn part of the hose and find out the point of contact where it has been damaged.
9. If possible, avoid further rubbing with the hose, either using some rubber spacer, anti-rubbing sheath or removing the sharp contact edges;
10. Replace the hose, taking care to restore the original layout of the cooling system;
11. Fasten the clamps pn 384 of the hoses to attach them to their connections;
12. Fill the system from the engine's expansion tank, as per level instruction of paragraph 3.13.7 "Coolant level";
13. Close the cap of the expansion tank.

3.13.7 COOLANT LEVEL

Magni Gyro uses the following coolant:
SHELL ANTIFREEZE -26° +122°
Dilution rate 40%

WARNING DANGER:
The coolant level must be checked before each flight. If the engine is hot, be cautious when removing the cap of the expansion tank.

WARNING DANGER:
When the engine is hot, the coolant may be pressurized and careless opening of the cap may generate spurting and spreading of hot liquid.

When the engine is cold, the correct level of the coolant is reached when the ROTAX engine's expansion tank is full and the level inside the recovery reservoir (3) is at its minimum.

If this is not the case, fill up with coolant.

WARNING:
Whenever coolant is replaced during maintenance to the cooling system, always check the levels after the first start-up.

3.13.8 REPLACEMENT OF CLAMPS pn 384

(See Fig. 3.13/1 and 3.13/2)

The clamps pn 384 that fix the hoses to the cooling system need to be replaced whenever they show some kind of oxidation, when they are broken or when they no longer tighten correctly.
The tightening action of the clamps should be checked frequently, as rubber hoses may get deformed with time, thus altering the tightening action and seal.

3.13.8.1 CHECK PROCEDURE

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Inspect all the clamps pn 384 and make sure they are tight;
3. If the clamps do not keep their tightening action (i.e. the screw turns without effort) or if evident oxidation is found, replace them immediately.

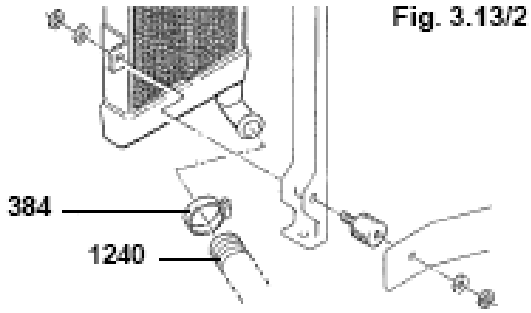


Fig. 3.13/2

3.14 REPLACEMENT OF FUEL FILTER

(See fig. 3.14/1)

CAUTION:
It is strongly recommended to respect the maintenance schedule and replace the fuel filter as per Magni Gyro diagram dates (see Ordinary Maintenance Diagram). Furthermore, the replacement of the fuel filter is recommended whenever you think you have used fuel that is contaminated or has not been filtered correctly.

The fuel pressure indicator (1) gives hints about how clean the fuel filter pn 274 is.

If these values are lower than usual, replacement of the filter pn 274 is advisable.

The following steps indicate the correct procedure for replacing the fuel filter pn 274.

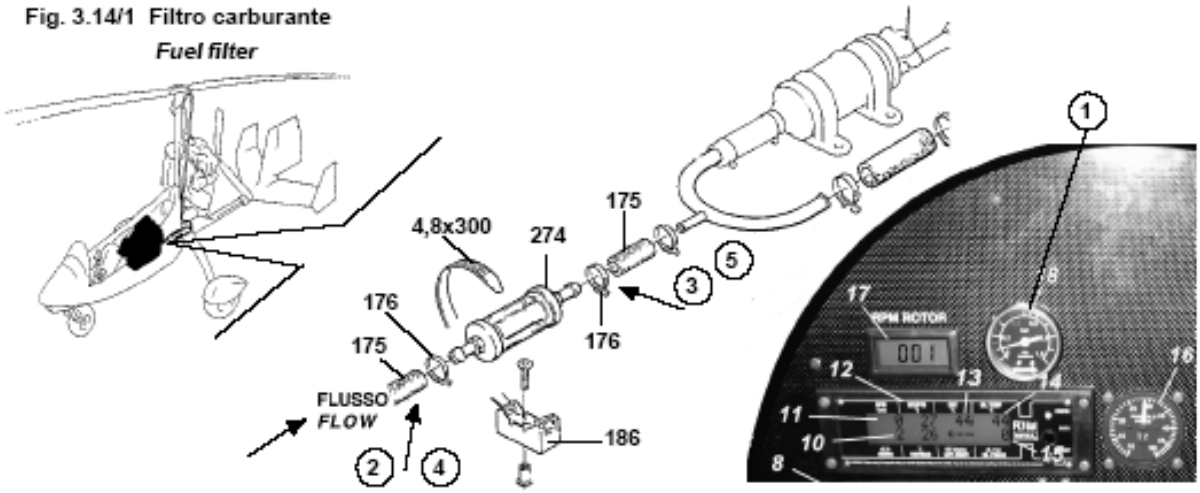
CAUTION:
If the fuel line is not completely empty, then adequate caps or pipe wrenches should be prepared before starting the operation. They will be useful to avoid any unwanted discharge of fuel from the hoses when removing the used filter.

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Cut the cable tie pn 4,8x300 and free the fuel filter pn 274 from the support pn 186;

3. Loosen the clamps pn 176 placed near the filter connections;
4. Place the pipe wrenches (4) and (5) on the lines upstream (2) (tank-filter) and downstream (3) (filter-carburettors) the filter;
5. Remove the fuel filter pn 274 by extracting it from the hoses pn 175;
6. Insert the new filter in the upstream (2) part of the line. Take care to respect the correct flow direction, indicated by arrows;
7. Gently loosen the pipe wrench (4) located upstream the filter;
8. Check that the new filter gets filled up with fuel and that the fuel flows out the downstream connection;
9. Fit the filter in the hose, downstream (3) the line;
10. Remove the pipe clamps (4) and (5);
11. Fit and tighten the clamps pn 176;
12. Place the filter on the support pn 186 and block it with a new hose tightening cable tie (ty-rap).

CAUTION:
Steps 7 and 8 are very important as they allow priming the fuel from the main tank and pumping it more easily. Carry them out carefully! Some air in the fuel filter may hinder or reduce the correct flow of fuel in the line.

Fig. 3.14/1 Filtro carburante
Fuel filter



3.15 REPLACEMENT OF ENGINE MOUNT VIBRATION DAMPERS

(See fig. 3.15/1)

Engine mount vibration dampers pn 243 are made of silicon-rubber, with a specific mixture which allows to reduce the vibrations of the fixing between the engine and the structure.

Aging and wear of the vibration dampers modifies the silicon mixture, resulting in a variation of the angle between thrust axis and longitudinal axis of the gyroplane. This deformation and its effect reduce the damping capabilities and the distance between the edges of the propeller blades and the keel tube. Vibration dampers need periodical replacement to avoid the risk of interference between the propeller blade and the keel tube in case of heavy landing.

3.15.1 REPLACEMENT PROCEDURE

(See fig. 3.15/1)

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;

WARNING:
Replace the vibration dampers on the right side first and only then the dampers on the left side.

2. Unscrew the 2 bolts M10x100 on the right side of the engine mount;
3. Remove both right side bolts;
4. Using a slotted screwdriver to lever, remove the front vibration damper units (spacer pn 242, vibration damper pn 243);
5. Apply a constant force (FC) on the propeller flange along the transversal axis, so as to be able to free the rear vibration dampers from their housing on the engine mount (see picture);
6. Fit new vibration dampers pn 243 in the engine mount housings; spray some releasing agent (WD40) to make this operation easier;

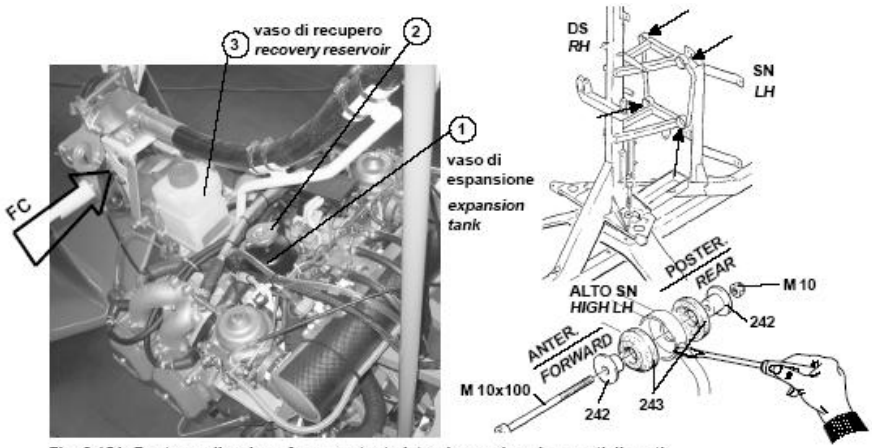


Fig. 3.151 Punto applicazione forza costante laterale per rimozione antivibranti
Point where to apply a constant side pressure and remove the dampers

7. Insert the original spacer pn 242 in the vibration dampers pn 243; spray some releasing agent (WD40) to make this operation easier;
8. Remove the lateral load applied previously to the propeller flange, so as to place the engine back to its correct position and be able to insert the engine fixation bolts M10x100;
9. Replace the fibrelock nuts M10 and tighten them;
10. ***Repeat steps 2 to 9 for the vibration dampers on the left side.***

3.16 REPLACEMENT OF FUEL PIPES

WARNING DANGER:
A visual check of all visible fuel lines needs to be done as a pre-flight check. Pipes must not show abrasions, cuts or wear marks.

Vulnerable points will be close to the clamps where longitudinal cuts of the outer covering may occur because of ageing.

Furthermore, the fuel system must not show any leaking or marks of undue rubbing on the pipes.

If some of the anomalies cited above are found during the visual check, the replacement of the fuel pipes becomes necessary. Follow the procedure described below.

3.16.1 FUEL PIPES REPLACEMENT PROCEDURE

(See Fig. 3.16/1 and 3.16/2)

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Examine the complete layout of the fuel pipe and of the fixing systems pn 176 along the line taken into account;
3. Loosen the fixing clamps pn 176 of the pipe that needs replacement;
4. Remove the fuel pipe pn 175 from the connections of the various devices, paying attention to possible spilling or loss of fuel, especially if the pipe pn 175 is placed lower than the fuel level inside the tank;
5. Replace the damaged fuel pipe pn 175 with a new pipe of the same length; respect the original fuel line layout and its fixing systems.
6. Insert the new pipe in the connections of the devices concerned and fix it with the special clamps pn 176 (replace these clamps if possible);
7. If the gyroplane has a ROTAX 914 engine and if some pipe upstream the fuel filter pn 274 (10, fig. 3.16/2) has been replaced, the bleeding of the system is required. Therefore remove the delivery pipe from the pressure regulator (7);
8. Fit a connection with an extension to the delivery pipe (11, fig. 3.16/2) so as to extend the line to an external can;

WARNING DANGER:
9. Check that there are no people or objects close to the power plant;

10. Insert the 10 A Equipment (2) and 20 A Generator (3) breakers;
11. Put the MASTER switch (4) in ON position;
12. Put the fuel electric pumps switches (5) and (6) in ON position and let them function for approx. 10 seconds to allow the cleaning of the pipe inside and the complete bleeding of the system.

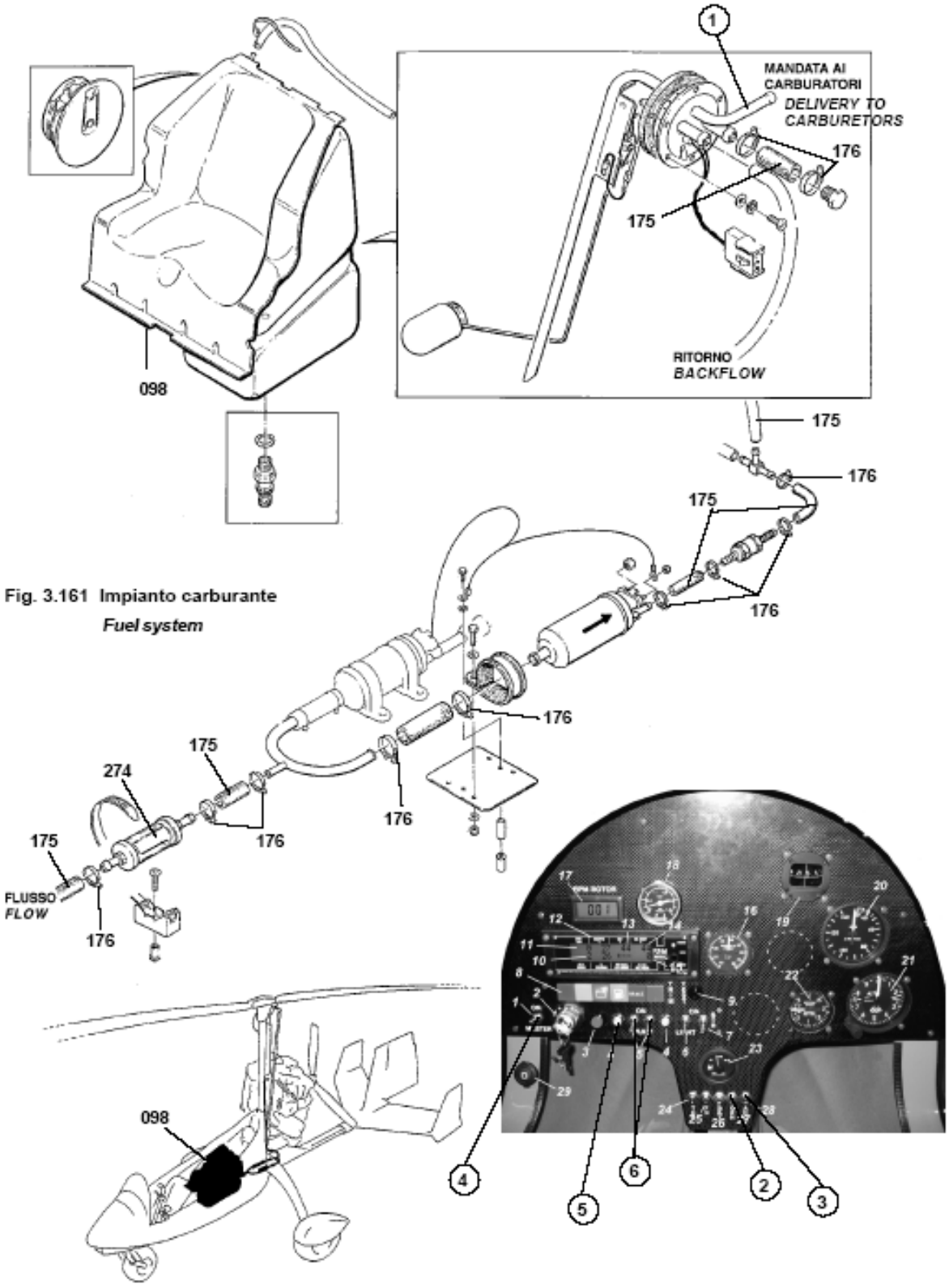
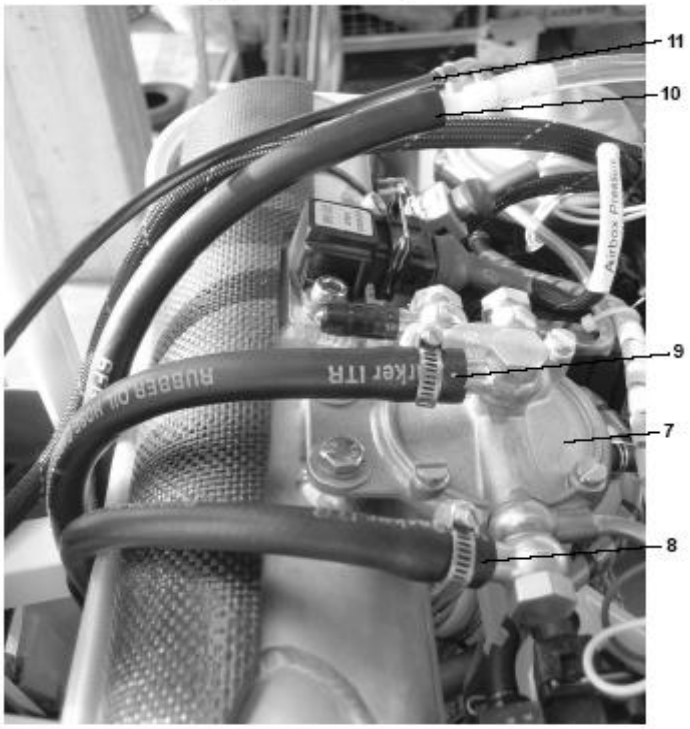


Fig. 3.161 Impianto carburante
Fuel system

Fig. 3.16/2 Regolatore di pressione e relativa tubazione
Pressure regulator and its tubing



7 - Pressure regulator
8 - Fuel pressure
9 - Backflow to fuel tank
10 - Delivery pipe to carburettors
11 - Backflow to external recovery reservoir
12 - Put the MASTER switch (4) in OFF position.
13 - Disconnect the connection (1) and the pipe extension.
14 - Connect the delivery pipe to the pressure regulator.
15 - Tighten the clamp pn 176 and fix the fuel pipe pn 175.

3.17 AIR FILTER INSPECTION

(See Fig. 3.17/1)

The air filter pn RU800 (ROTAX 914) must be inspected in accordance with the maintenance schedule. This inspection must check:

- the cleanliness of the filter;
- the entireness of the filter (ensure there are no deformation, cracks and damages);
- the correct tightening of the filter fixing clamp;
- the presence of the safety wiring.

3.17.1 INSPECTION AND CLEANING OF FILTER

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Completely remove the safety wiring (3) of the filter;
3. Loosen the fixing clamp (2) and remove the filter (1);
4. Visually inspect the filter (1) and evaluate its general state;
5. Clean the filter with compressed air (4); blow air from inside towards outside;
6. If possible, apply protective oil to the filter RU810 (or RU 800);
7. Restore the safety wiring of the filter (3);

WARNING:
The filter pn RU800 installed on the Rotax 914 engine is not preset for safety wiring. Therefore, pierce the collar of the filter (5) with the safety wire.

8. Place and tighten the filter fixing clamp (2);
9. Finish the safety wiring (3) by anchoring it to the clamp (6).

CAUTION:
The air filter RU800 is fixed directly to the engine's turbine assembly, which can reach very high temperatures when the engine is running. Because of these high temperatures, the collar (made of rubber) of the filter (1) gets altered; this in turn can affect the tightening action of the filter clamp (2). It is strongly recommended to check the correct tightening of the clamp (2) within the first hour of use of the engine after the replacement of the filter.

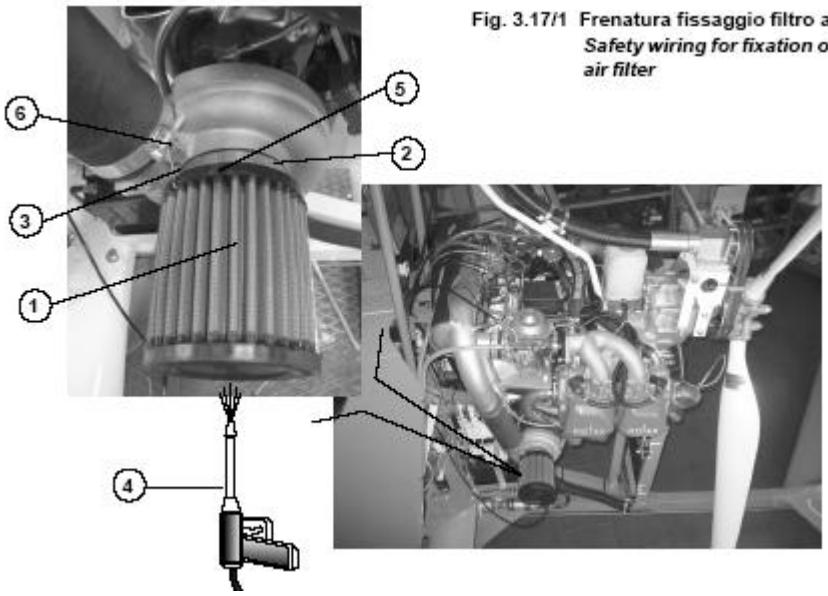


Fig. 3.17/1 Frenatura fissaggio filtro aria motore
Safety wiring for fixation of engine air filter

3.17.2 AIR FILTER REPLACEMENT

WARNING DANGER:
The air filter (RU 800 or RU 810) must be replaced exactly as prescribed in the maintenance schedule, except if the gyroplane is used in a very dusty situation. In that case, the inspection and replacement should occur twice as often.

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Completely remove the safety wiring (3) of the filter;
3. Loosen the fixing clamp (2) and remove the filter RU800;
4. Install a new filter, as per specifications requested in the latest version of the spare parts catalogue;
5. Restore the safety wiring of the filter (3);

NOTE:
As the RU800 filter installed on the Rotax 914 engines are not preset for safety wiring, pierce the collar of the filter (1) with the safety wire.

6. Place and tighten the filter fixing clamp (2);
7. Finish the safety wiring of the filter (3), anchoring the filter to the engine.

CAUTION:
It is strongly recommended to check the tightening of the filter fixation clamp after one hour of use of the engine after having replaced the filter. This to compensate a possible play due to the alteration of the collar of the filters.

3.18 PROPELLER MAINTENANCE

Before each flight the blades must be carefully inspected. The inspection should look for signs of impact, particularly on the leading edges. Evidence of cracks or defects in the blade coating should also be looked for.
There should be no signs of play between the blade and hub. A clean finger should be run around the rod end and provide no trace of grey or black dust.

3.18.1 CLEANING INSTRUCTIONS

The composite blades can be cleaned using household detergents and water. Polyurethane coated blades may be cleaned using soap or car polish. Regular cleaning and inspection of the blades will keep them at their peak performance. The leading edge tape should be replaced if showing signs of wear (the addition of the tape does not detract from the aerodynamic performance of the blades).

Each blade is balanced before leaving the factory and any unauthorised re-painting will degrade this balancing. Examination of the blade rod-ends will reveal a factory sticker containing the factory balancing repair number. The sticker is used to cover a balancing hole which contains small lead balls providing the fine balance to the blades. The lead balls may sometimes move within the hole, this is acceptable. However, if the sticker becomes loose, or detached, the balls may be lost and the propeller balance destroyed. Do not remove the sticker that indicates Factory's balancing number for repair.

3.18.2 LEADING EDGE IMPACT DAMAGE

The extent of repairable damage on the leading edges is less than 4mm in diameter. The damaged area should be filled with epoxy glue. Once dried the glue should be smoothed to suit the aerodynamic profile of the blade and then recovered with a section of the leading edge tape.

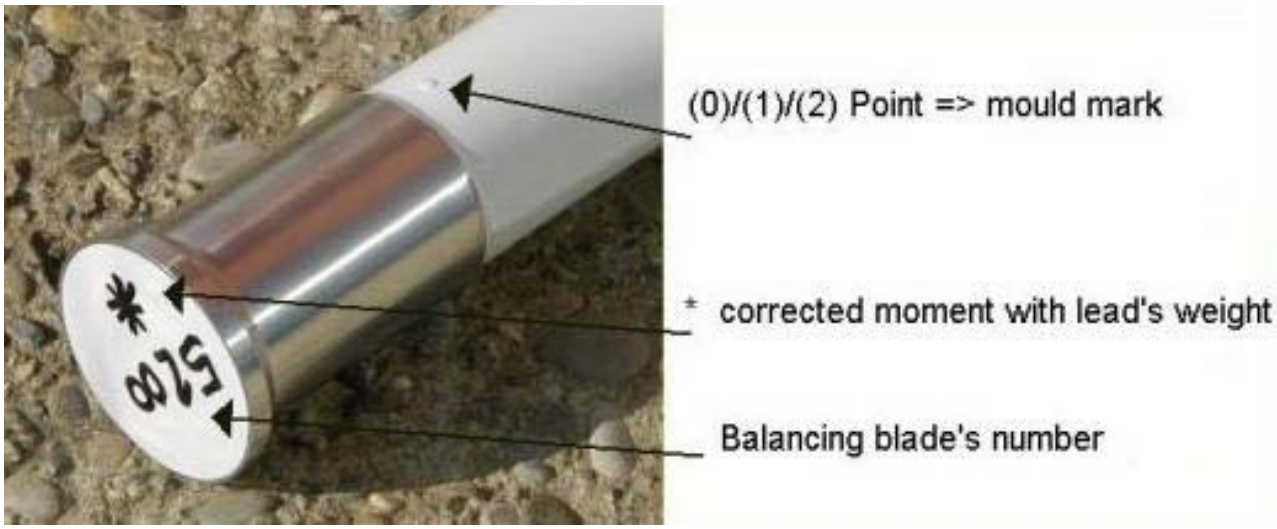
3.18.3 CRACKS

The blade should not have any cracks along its length, although minute cracking may appear in the surface gel-coat, or paint, if the blade has been heavily loaded. If small (less than ½") cracks are observed then the position and size should be monitored to check that the crack does not grow in size. If elongation of the crack is noted then the blade should be returned immediately to the factory for repair.

3.18.4 ROD-END

If any defect is observed on the rod-end, or any dust is evident upon wiping with a clean finger, then the blade should be immediately returned to the factory for repair.

The ECOprop range of propellers is highly resistant to the shock loads that the Rotax 914 series of engines, with gear-box produce. Life expectancy of the blades, with correct usage and if correctly maintained, is limited to 3000 hours. Care however should be exercised as excessive loadings may produce damage to the internal structure that is difficult to detect.



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SECTION 4

4 CARE AND CLEANING

Care and cleaning of the gyroplane is of great benefit to both the owner and operator. Cleaning involves close contact with all the aspects of the gyroplane and may arouse early warning of any potential problem.

The use of solvent or caustic cleaning materials is not necessary.

A mild detergent solution and a soft cloth will remove all the dirt from the gyroplane's fuselage, rotor blades, rudder and propeller.

After washing and drying the surfaces, it is recommended to polish them with a good quality bodywork polish until removing all residues.

This will also enhance the aerodynamic properties of the surfaces. Magni Gyro's choice of cleaning products is supplied as a sample with the STARTER KIT.

The STARTER KIT includes products and instructions on how to use them best, so as to clean your gyroplane in a safe and appropriate manner.

A vacuum cleaner should be used to remove any dirt inside the aircraft.

It is possible to use a jet of water under moderate pressure to clean any possible mud or dirt from the floor of the gyroplane cockpit. In fact, there are drainage holes in the floor of the cockpit for this purpose.

Magni Gyro recommends the use of AvioClean S23 and C32 products (supplied in the STARTER KIT) for cleaning the windscreens.

Do not use solvent, petrol or caustic cleaning detergents to avoid material hardening, cracking and breakages.

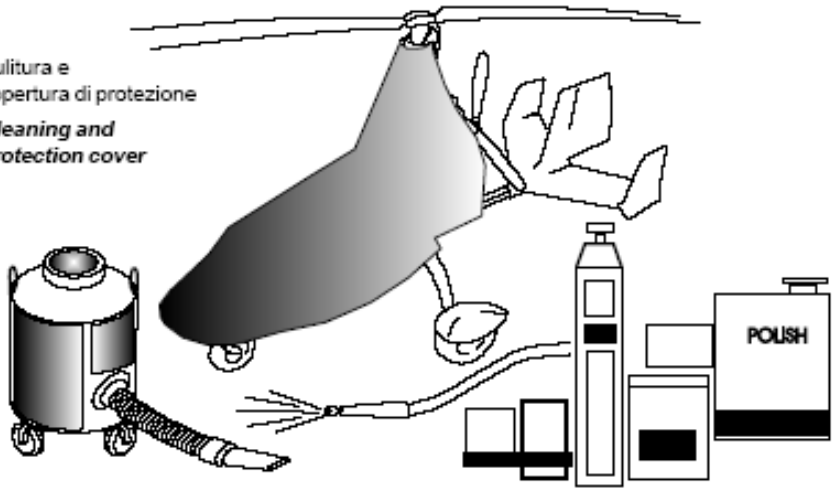


Fig. 4.1/1 Pulitura e copertura di protezione
Cleaning and protection cover

The instrument panel should be dusted with a soft clean paintbrush. Any dirty instrument dial should be wiped with a soft dry cloth.

The use of a pressure washer or of strong jets of water is strongly not recommended. Their use may result in damage to instruments, engine or electrical systems. There is also a danger that the use of these systems could wash away protective grease from bearings and controls.

When stored in a hanger or outside, it is recommended to cover the gyroplane with a snug fitting, non marking cover.

The use of an adequate cover supplied by Magni Gyro is strongly recommended. This cover is produced with ventile materials to allow the evaporation of humidity that can occur when the cover touches the gyroplane's surface.

Before covering the gyroplane, ensure that all the surfaces are dried up well, so as to avoid blistering on painted surfaces.

Blades must be blocked longitudinally using the rotor brake. It is strongly advised not to tie blades, except in case of very strong wind. In this case, use the adequate tip protection so as to avoid undue loads on the blades.

SECTION 5

5 UNSCHEDULED MAINTENANCE

(See Fig. 5.1/1 – 5.1/3)

WARNING:
Should an unscheduled maintenance of the gyroplane be necessary, then it is to be carried out and recorded in the gyroplane or engine logbook.

By its very nature, it is very difficult to predict any unscheduled maintenance and how to carry it out. The best solution is to apply standard diagnostic and repair techniques and to seek advice from a suitably qualified engineer or directly from Magni Gyro.

To facilitate unscheduled maintenance, we are listing here below some of the problems and/or anomalies of the systems or installations, with their symptoms and the procedures to resolve them.

5.1 TRIM SYSTEM ANOMALY

(See fig. 5.1/1 and 5.1/2)

The following are the possible anomalies of the trim system of the M16 (M16C) gyroplane and the correct procedures to solve the problems.

5.1.1 DESCRIPTION OF SYSTEM

The trim system consists of an electric linear actuator pn 102, placed behind the mast (1), that acts through a sheathed cable 2x1.500 pn 104 on the spring pn 109 fixed to the rotor head fork pn 046.

When the actuator is operated, there is a constant stress applied to the rotor head. This allows to obtain the angle of incidence and by consequence the gyroplane attitude required by the pilot.

The pilot controls the actuator pn 102 via the switch pn 112 placed on the handle of the control stick.

The forward and backward movement of the control switch pn 112 leads to an attitude variation that is proportional to the period.

Forward impulses correspond to nose down attitudes - fast. Backward displacements correspond to nose up attitudes - slow.

5.1.2 ANOMALY

The displacement of the trim switch pn 112 does not correspond to movements of the actuator pn 102.

Solutions:

a. Ensure that the 10 A breaker (Accessories) is switched ON.

b. Check the efficiency of the actuator pn 102.

1. Remove the cable ties pn 2,4x197 that fix the trim control connector pn 115;
2. Disconnect the connector pn 115;
3. Extract all the breakers (1) of the instrument panel (2), except the 10 A breaker (Accessories);

4. Put the master switch (20 A) in ON position (2);
5. Create a bridge between the contacts (pin) pn 102/A of the control connector pn 115 on the actuator side in the positions 1-2 and 2-3; verify the functioning of the actuator pn 102.

NOTE - results of check:
Positive connection contact pn 102A (pin) 1-2: rack pn 271 displacement upward; connection pin 2-3: rack pn 271 displacement downward; continue inspection as to steps c, d and e.

Negative no displacement of the rack Pn 271: continue inspection as to steps f and g

c. Verify the complete freedom of movement of the switch pn 112.

The trim switch pn 112 may accidentally remain stuck inside the handle.

This limits the movement of the switch and by consequence the control of the actuator.

1. Loosen the grub-screw pn M4x6 of the trim switch;
2. Lift the switch pn 112 so as to guarantee the control movement;
3. Tighten the grub-screw pn M4x6 again.

d. Inspection of the welding on the trim switch pn 112 contacts.

WARNING:
When assembling the switch pn 112, take care to place the blue (or gray) wire towards the front.

1. Loosen the grub-screw pn M4x6 of the trim switch;
2. Extract the trim control switch pn 112 and check the welding (3) on the switch;
3. Reposition the switch pn 112 in its seat, while keeping the blue wire in front;
4. Tighten the grub-screw pn M4x6 again.

e. Verify the continuity of the trim control cable pn 113.

f. Verify the freedom of movement of the rack pn 271.

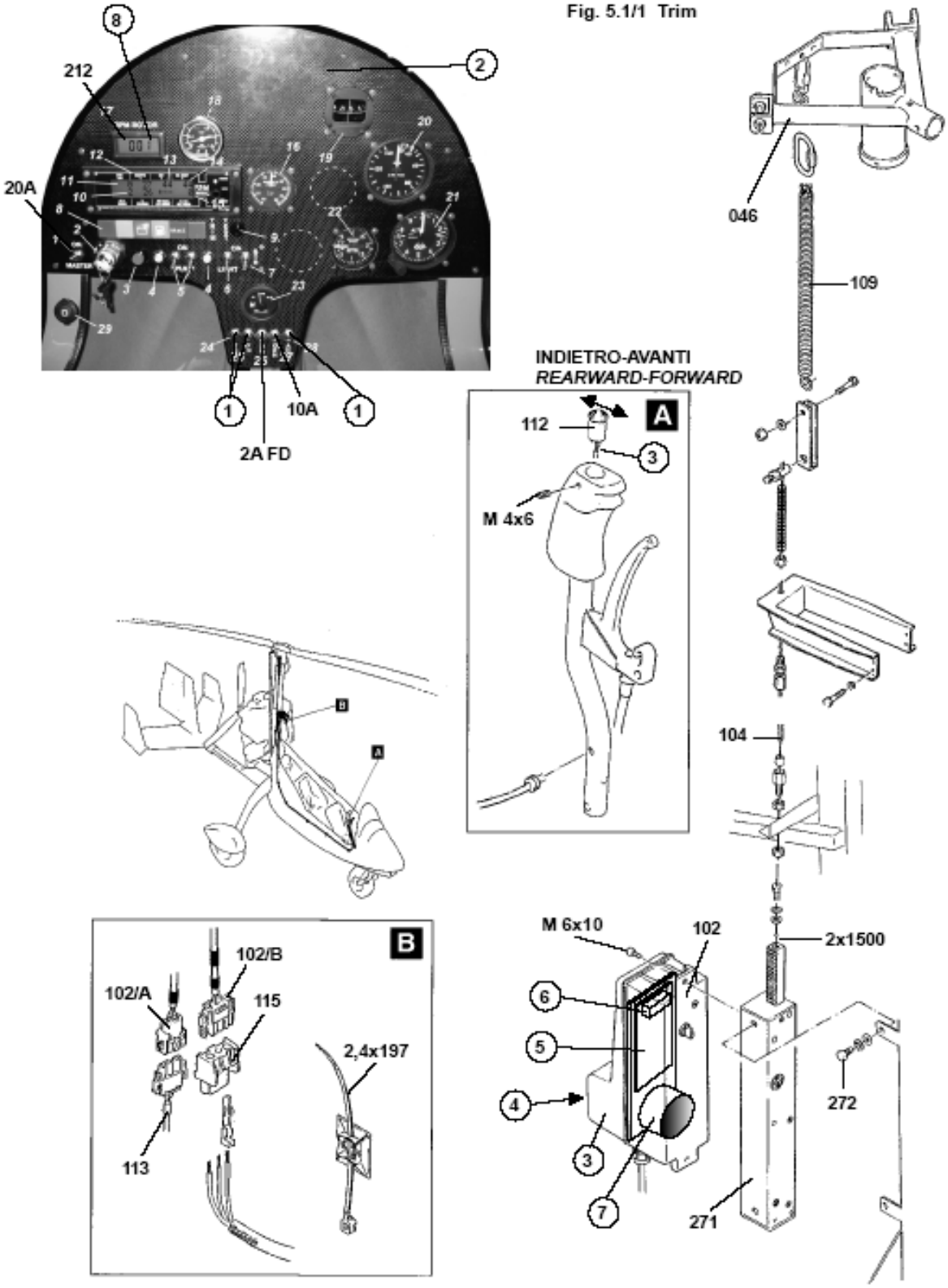
1. Loosen the fixing bolts M5x10 that fix the actuator to the rack pn 271 and remove the trim actuator pn 102;
2. Verify the freedom of movement of the rack pn 271, moving it by hand. If the movement has some hindrance, check that the bolts pn 272 that fix the rack pn 271 do not interfere with the movement of the rack itself;
3. If the problem is not solved, the rack pn 271 will need replacement.

g. Verify the continuity of the wiring of the actuator's power supply connector pn 115.

If none of the above mentioned operations solve the problem, replace the actuator pn 102 or the unit board.

Therefore, proceed as described in paragraph 5.1.3.

Fig. 5.1/1 Trim


8
212
2
20A
1
10A
1
2A FD
046
109
INDIETRO-AVANTI
REARWARD-FORWARD
112
A
3
M 4x6
B
A
104
B
102/B
102/A
115
2,4x197
113
M 6x10
102
2x1500
6
5
4
3
7
272
271

5.1.3 REPLACEMENT OF TRIM UNIT BOARD

(See Fig. 5.1/2)

1. Remove the power supply connectors pn 102/A and 102/B, and the trim control connectors pn 115;
2. Loosen the socket head screws M5x10 and remove the electric actuator pn 102;
3. Remove the actuator's cover (3), unscrewing the four socket head screws (4) that fix it.

In this way it is possible to access the trim management unit board (5). Proceed as follows:

1. Gently lift the unit board (5) so to access the terminal board (6) more easily and loosen the terminals so as to extract the cables;
2. Extract the engine power supply connector (7) (black and red wires) so that the unit board is completely free;
3. Reconnect the engine power supply connector (7) to the new unit board supplied by Magni Gyro;
4. Re-insert the six numbered wires in the terminal board, in progressive order as per drawing:

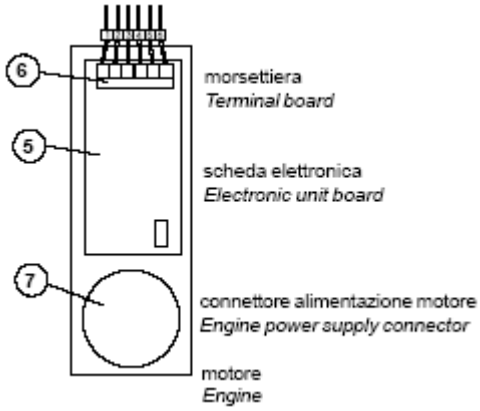


Fig. 5.1/2 Scheda elettronica
Electronic unit board

Complete the operation as follows:

1. Place the unit board (5) in its original position;
2. Put the actuator's pn 102 cover (3) back in its original position, taking care not to damage the numbered wires;
3. Tighten the cover fixing screws (4);
4. Reposition the actuator pn 102 in its seat and fix it to the rack pn 271 with the bolts M6x10;
5. Insert the power supply connectors pn 115 and trim control connectors pn 113.

5.2 ANOMALIES OF THE ROTOR TACHOMETER READING

(See Fig. 5.1/3)

Reading error of the rotor tachometer pn 212 for serial numbers up to sn 16062564 (included), and pn 431 for the following serial numbers.

5.2.1 UNSTEADY READING ANOMALY

Unsteady reading, non progressive and uneven reading of the rotor revolutions number.
Presence of anomalous points on the display (8, fig. 5.1/1).

Actions
Inspect and clean the rotor revolutions sensor pn 238.

Ensure the distance between the sensor pn 238 and the notched gear pn 061 is within the tolerances (9).
Ensure correct tightening (bolt M5x25) and positioning of the rotor revolutions sensor pn 238.

Procedure
The sensor pn 238 must always be kept clean.
Grease residual on the sensor can noticeably reduce its precision in giving the correct rotor r.p.m. reading.
This kind of problem is likely to happen after the first few hours of use of the gyroplane, if the notched gear pn 061 has been over-greased.

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Clean the sensor pn 238 using some paper and passing it between the sensor and the notched gear so as to remove residual grease and dirtiness;
3. Verify the distance between the sensor pn 238 and the notched gear pn 061, which must be within the following range: 1,0 mm +0,4 -0,4. If the distance is out-of-range, remove or insert washers (5mm diameter) so as to take the distance to an acceptable value;
4. Verify the correct position of the sensor versus the teeth of the notched gear. If necessary, position (10) it correctly, following the indications given in the figure;
5. Verify the correct tightening of the bolt M5x20 (or M5x25) that fixes the sensor to the rotor head;
6. Proceed with efficiency tests.

If the above mentioned procedure does not solve the problem, the following step will be to check the correct tightening of the connectors on the back of the rotor tachometer instrument (8, fig. 5.1/1).

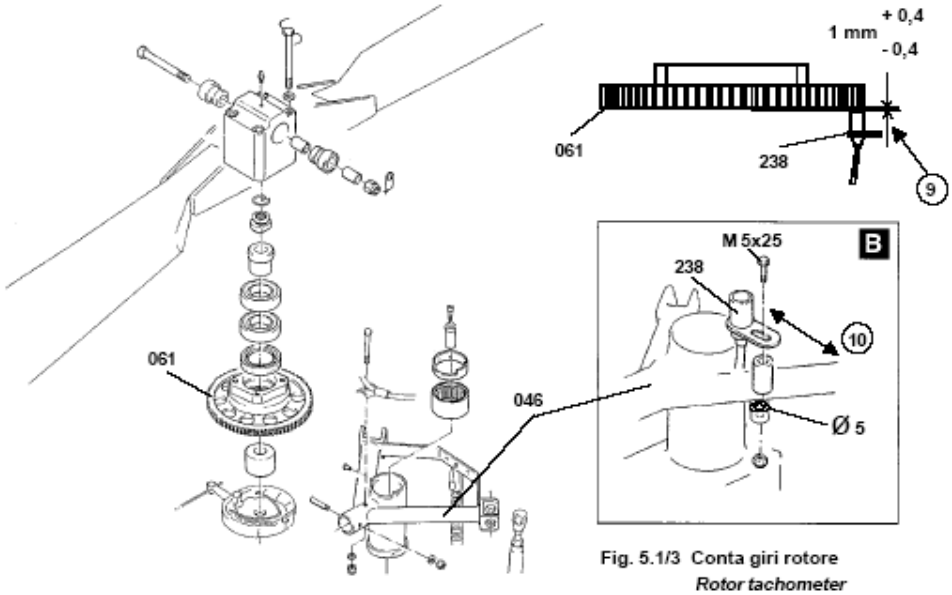


Fig. 5.1/3 Conta giri rotore
Rotor tachometer

5.2.2 OPERATION ANOMALY

(See fig. 5.1/1)

The display stays black and gives no indication.

Actions
Make sure the MASTER switch (20A) is in ON position and the breaker 2A FD is switched ON.
Check the correct tightening of the connectors on the back of the instrument.
Verify the continuity of the power supply wires of the rotor tachometer instrument.

5.3 ROTOR VIBRATIONS

(See Fig. 5.3/1)

It is important to keep the rotor vibrations on the controls and machine within acceptable limits. This contributes to the maintenance of the gyroplane. The frequencies should remain similar to those found during flight testing and adjustments conducted by the producer.

Each gyroplane can show different types of vibrations, characterized by different amplitude and frequency, according to load, speed and rotor assembly.

The pilot must evaluate the vibrations on the controls. Hereby he may find that the vibrations are getting worse with time. But, prior to any adjustment, the vibrations must be checked, during a periodical or special inspection, by a pilot approved by the producer.

The first step towards the solution of the problem is to identify the type of vibration so as to define the type of intervention needed and eliminate the problem more easily.

Lateral vibrations
The control stick shakes laterally (left and right).

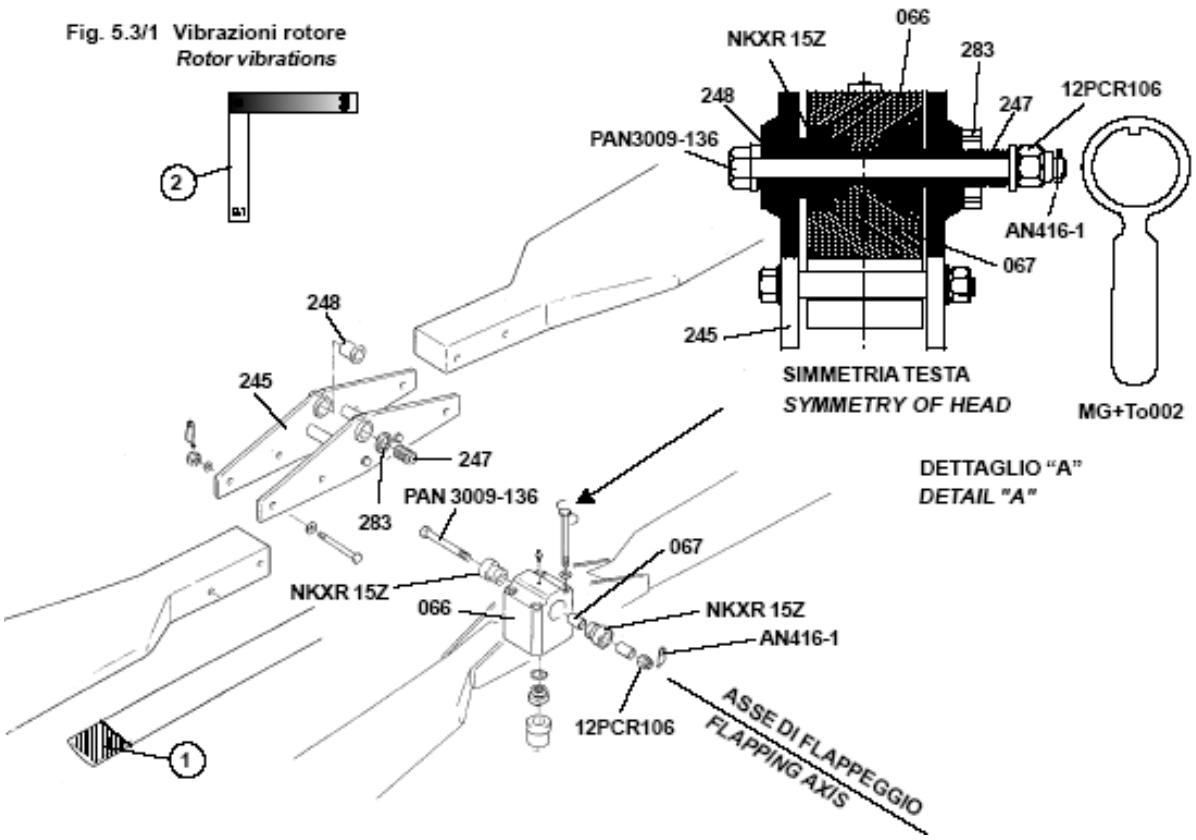
Longitudinal vibrations
The control stick shakes longitudinally (pitch up and down)

Divergent vibrations

5.3.1 LATERAL VIBRATIONS

Lateral vibrations with constant frequency and amplitude can be smoothened by acting on the threaded bushing pn 247 (loose the lock nut pn 283 first to move the threaded bushing pn 247). In fact, screwing the threaded bushing in or out makes it possible to offset the hub-bar pn 245 versus the head pn 066 of the rotor head. *But, if the threaded bush has not been tampered or if the lock nut is not loose, it is better to avoid this intervention.*

Fig. 5.3/1 Vibrazioni rotore
Rotor vibrations



5.3.2 L ONGITUDINAL VIBRATIONS

The longitudinal movement of the control stick (nose up and nose down) can be smoothened acting on the tips of the rotor blades. In particular, it is possible to make the blade tips heavier by laying some tape (1) on the tip along the blade profile.

This should not be done unless the blades have visibly suffered much damage, such as removal of material and consequent alteration of weight and of balance of the set.

5.3.3 DIVERGENT VIBRATIONS

When flying, it may happen that the pilot feels a non constant and divergent vibration when he lightens the grab on the stick, thus releasing the control. These vibrations can be considerably smoothened by following the procedure of paragraph 3.7 "Frictioning of controls".

NOTE - results of check:
The above mentioned information has to be considered purely indicative as each rotor may have a different reaction to adjusting procedures.

5.3.4 REDUCTION OF VIBRATIONS

If the pilot feels an increase of vibrations, the following checks are required:

Check the correct tightening of the lock nut pn 283 on the threaded bushing pn 247. Check the tightening of the control joint bolts (see paragraph 3.7 "Stiffening of controls").

5.3.5 CHECK OF CORRECT TIGHTENING OF LOCK NUT pn 283 ON THREADED BUSHING pn 247

A slight loosening of the lock nut pn 283 might cause high amplitude vibrations on the control stick, possibly with vertical vibrations of the gyroplane due to the anomalous misalignment of the hub-bar pn 245 with the head pn 066.

Checking the tightening of the lock nut pn 283 must be done using the adequate tool MG TO002 and checking the presence of the marking.

If the tightening of the lock nut pn 283 is found to be incorrect, then proceed as follows:

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Tighten or release the threaded bushing pn 247 to centre the hub-bar pn 245 with the rotor head (see DETAIL "A");
3. Tighten the lock nut pn 283;
4. Use a feeler gauge (2) to check if the head pn 066 is symmetrical with the hub-bar pn 245;
5. Flight test the gyroplane for an evaluation of the vibrations.

If the rotor is not smooth enough because of an excess of vibrations, then proceed with the setting of the flapping axis:

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Loosen the lock nut pn 283;
3. Rotate the threaded bushing pn 247 a quarter of a turn (90°) clockwise or counter-clockwise;
4. Tighten the lock nut pn 283;
5. Flight test the gyroplane for an evaluation of the vibrations.

Repeat this adjusting of the threaded bushing pn 247 several times, turning it clockwise or anticlockwise until reaching the best compromise on vibrations. It is very important to move the threaded bushing pn 247 only 90° at a time, for a maximum displacement of one turn and a half (1,5 mm on the pitch 20x1 of the threaded bushing) from central position.

6. Once a satisfying condition has been achieved, mark the position of both the lock nut and threaded bushing with the special marking paint.

5.4 PRE-ROTATION SYSTEM ENGAGING ANOMALY

(See Fig. 5.4/1)

If the pre-rotation system does not get engaged, an inspection is required to identify the anomaly generating the problem. According to the anomaly found, proceed as described below.

5.4.1 ANOMALY: NO POWER TRANSMISSION, NO SYSTEM ENGAGING

Pulling the control lever pn 415 during pre-rotation, the system does not get engaged. No strange noises are heard nor anomalous vibrations are felt.

It is quite likely that there is no power transmission between the propeller pn 125 and the belts pn A28. The belts pn A28 are not driven or their movement is not sufficient to engage the system.

a. Verification of the pre-rotation control line

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Make sure the pre-rotation control cable pn 1,5x3900 is not damaged;
3. If the cable is broken, replace it as explained in paragraph 3.9.4.

b. Verification of the tension of the pre-rotation belts

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Pull the pre-rotation control lever pn 415 until it reaches its stop;
3. Once this condition is reached, inspect the tension of the belts pnA28 on the relative pulleys pn 124 and (1).

5.4.2 ANOMALY: POWER TRANSMISSION OK, NO SYSTEM ENGAGING

During pre-rotation the system does not get engaged when pulling the control lever pn 415. Presence of anomalous vibrations.
The flexible shaft's outer sheath pn 119 gets overheated. In this situation it is very likely that the flexible shaft pn 118 is rotating even if the system does not work.

a. Verification of the flexible shaft's entireness

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the

breakers are switched OFF;

2. Move the pulley (1) of the pre-rotation assembly by hand. This movement of the pulley (1) should correspond to the movement of the Bendix gear (2). If the gear (2) does not move, go to next step. Otherwise, go to verification b;
3. Inspect the flexible shaft pn 118 as explained in paragraph 3.1.2;
4. Replace it the flexible shaft pn 118 if it is broken.

b. Verification of the Bendix gear

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Inspect the Bendix gear, as explained in paragraph 3.6.2.

5.4.3 ANOMALY: NO FLEXIBLE SHAFT ENGAGING, NO SYSTEM ENGAGING

During pre-rotation the system does not get engaged when pulling the control lever pn 415. Anomalous metallic noises can be heard at regular intermittency. The flexible shaft's sheath pn 119 does not get overheated.

In this case, it is very likely that the flexible shaft pn 118 is rotating, but that it does not get engaged in the square section ending of the splined shaft pn 040 of the Bendix gear.

a. Verification of the splined shaft pn 040

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Loosen and remove the two bolts M6x16 first, then remove the flexible shaft's sheath pn 119 from the cup pn 039;
3. Extract the flexible shaft pn 118 from the seat of the splined shaft pn 040;
4. Inspect the shaft pn 040 and verify the entireness of the square section seat and of the square section ending of the flexible shaft pn 118;
5. If the splined shaft pn 040 is damaged, replace it as explained in paragraph 3.6.3.

b. Verification of the square section ending of the splined shaft pn 118

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Remove the flexible shaft's sheath pn 119 from the cup pn 039, unscrewing and removing the two bolts M6x16;
3. Extract the flexible shaft pn 118 from the square seat (3) of the splined shaft pn 040;
4. Inspect the square section ending of the flexible shaft pn 118 and verify its entireness. If some damage is found, it is possible to shim the flexible shaft pn 118 with washers on the lower square ending (3) so as to guarantee an efficient mesh. Proceed with the following steps:
5. Loosen the clamps pn 4B-25-45 that fix the sheath of the flexible shaft pn 119 to the support pn 193.
6. Loosen both bolts M6x16 and remove the sheath of the flexible shaft pn 119 from the pre-rotation assembly.
7. Extract the flexible shaft pn 118 from the pre-rotation assembly (1).
8. Fit two washers12x24 to the square section ending of the flexible shaft pn 118. This shimming allows the flexible shaft pn 118 to work more on the splined shaft pn 040, thus allowing the transmission of power.
9. Insert the flexible shaft pn 118 in the square seat (3) of the pre-rotation assembly (1).
10. Fix the sheath pn 119 to the pre-rotation assembly (1).
11. Insert the flexible shaft pn 118 in the seat of the shaft pn 040 of the Bowden gear (2).
12. Tighten the two bolts M6x16 to fix the sheath pn 119 of the flexible shaft pn 118 to the cup pn 039.
13. Tighten the clamps pn 4B-25-45 that fix the sheath pn 119.

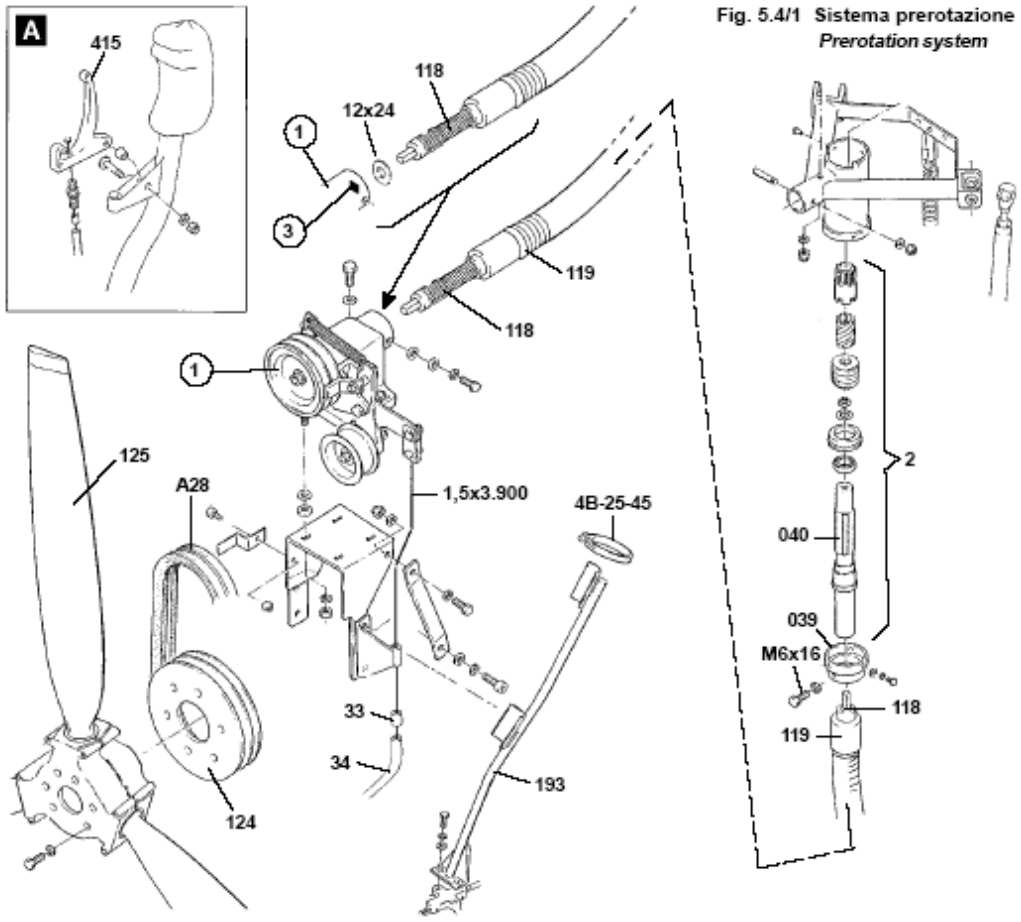


Fig. 5.4/1 Sistema prerotazione
Prerotation system

5.5 CHECK PROCEDURE AFTER SUSPECTED HEAVY LANDING

WARNING DANGER:
If the gyroplane has been subject to a hard landing or even only suspected of having had a hard landing, then it must not be flown again until it has been inspected and cleared as fit for further flight. An entry to this effect must be put in the logbook.

When inspecting for damage it must be remembered that the damage may not just show at the point of impact, but may be referred to another point of the gyroplane.

All the controls and components of the gyroplane must be examined for distortion or damage.

Any distortion of the airframe, cracked welds, jammed controls, bent rods, bent rod ends, etc. make the gyroplane unfit to fly and must be referred to Magni Gyro for advice and classification of damage.

Any damaged part removed from the gyroplane must be either destroyed or returned to Magni Gyro.

WARNING:
Independent inspection of the gyroplane prior to returning it to flight, done by a qualified engineer or inspector, and a statement in the logbook to back it up is recommended policy.

5.6 CHECK PROCEDURE AFTER SUSPECTED DAMAGE CAUSED BY FOREIGN OBJECT

WARNING DANGER:
This damage will predominantly affect the rotating parts of the aircraft, that is either the rotor blades or propeller. In both cases the components must be withdrawn from service until checked and either replaced or certified as fit for return to further use. For engineering advice on the rotor blades the owner should contact Magni Gyro or follow the instructions given in the paragraph " Evaluation of damage to rotor blades". For the propeller, he should contact either Magni Gyro or the manufacturer as per the aircraft documents.

5.7 EVALUATION OF DAMAGE TO ROTOR BLADES

(see fig. 5.7/1)

The Magni Gyro rotor blades do not need any scheduled maintenance. Their useful life is approximately 2500 h.

However, superficial damage may occur during flight, as the blades may be hit by foreign objects, or while garaging the gyroplane, etc.

Some simple indications on how to evaluate a damage and how to intervene are given below.

5.7.1 DAMAGE TO TRAILING EDGE

The trailing edge is the most delicate part of the Magni Gyro rotor, because of the reduced thickness which is extremely efficient from an aerodynamic point of view, but at the same time most exposed to damage during garaging, transport and installation.

The following diagram shows the relation existing between the deepness (on the chord) and the length (on the diameter) of the damage on the blade's trailing edge.

Measure the maximum dimensions of the damage and transfer them to the diagram:

1. If the point found is located in the lowest part of the diagram, the gyroplane can continue to fly. Repair can be done during the first inspection of scheduled maintenance.
2. If the point found is located in the middle part of the diagram, flying remains possible only if no anomalous vibration occurs. Repair must be done as soon as possible by engineers competent with composite materials, under the supervision of either Magni Gyro personnel or personnel authorized by Magni Gyro.

WARNING DANGER:
3. This If the point found is located in the upper part of the diagram, the gyroplane can not fly.

The rotor with its two blades and its hub-bar pn 285 (for 28 ft) must be completely removed from the gyroplane, according to the procedure indicated in paragraph 6.3, and sent to Magni Gyro for control, repair or replacement.

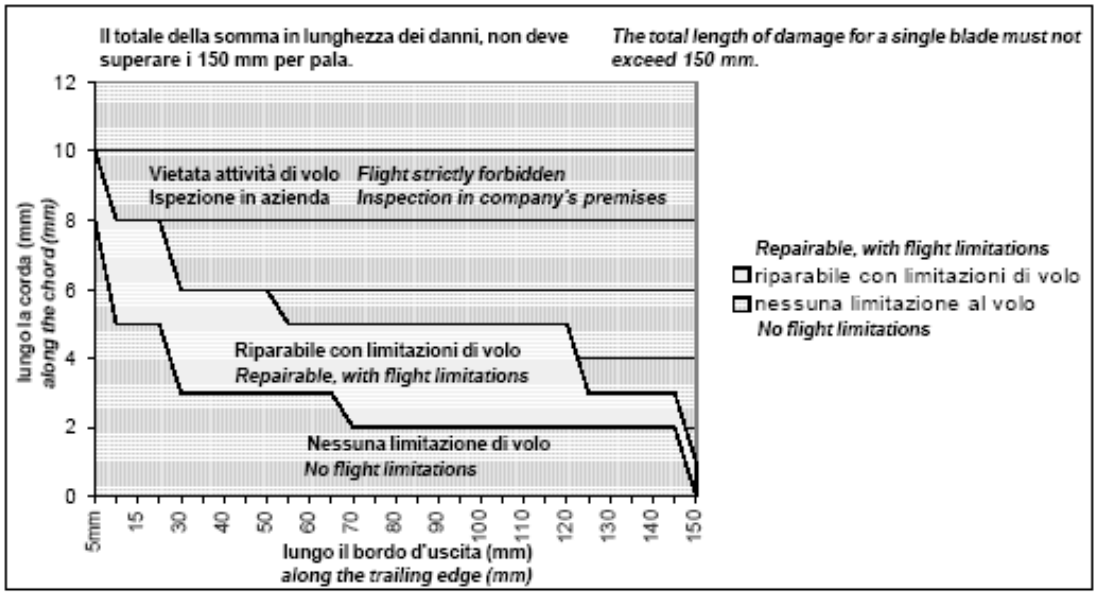
5.7.2 DAMAGE TO LEADING EDGE

The leading edge corresponds to the very strong blade spar. It withstands unexpected impacts very well.

The efficacy of the gyroplane can only be limited by de-bonding of the superficial covering along the leading edge or by more than 5 mm deep deformations.

In this case, the rotor with its two blades and its hub pn 285 (for 28 ft) must be completely removed from the gyroplane, according to the procedure indicated in paragraph 6.3, and sent to Magni Gyro for control, repair or replacement.

Fig. 5.7/1 Riparazione bordo rotore
Repair of rotor edge



5.7.3 DAMAGE ALONG BLADE'S FACE OR BACK

WARNING DANGER:
It is strictly forbidden to use the gyroplane in case of damage along the rotor blade's top and/or bottom, especially if the covering shows signs of abrasion or unraveling on the fibre glass covering or if part of the core is torn.

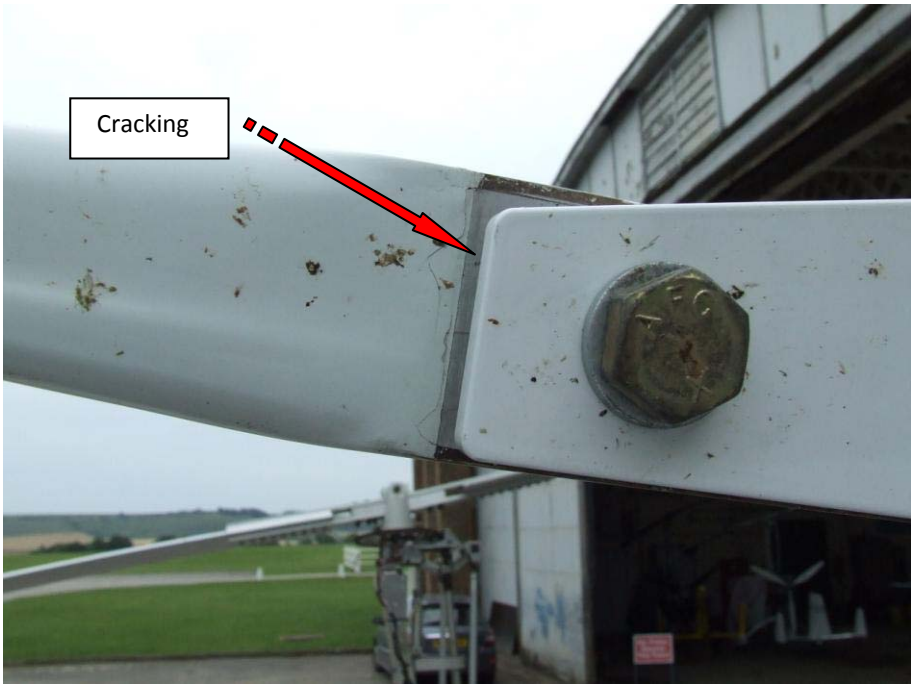
In this case, the rotor with its two blades and its hub pn 245 (for 27 ft) or pn 285 (for 28 ft) must be completely removed from the gyroplane, according to the procedure indicated in paragraph 6.3, and sent to Magni Gyro for control, repair or replacement.

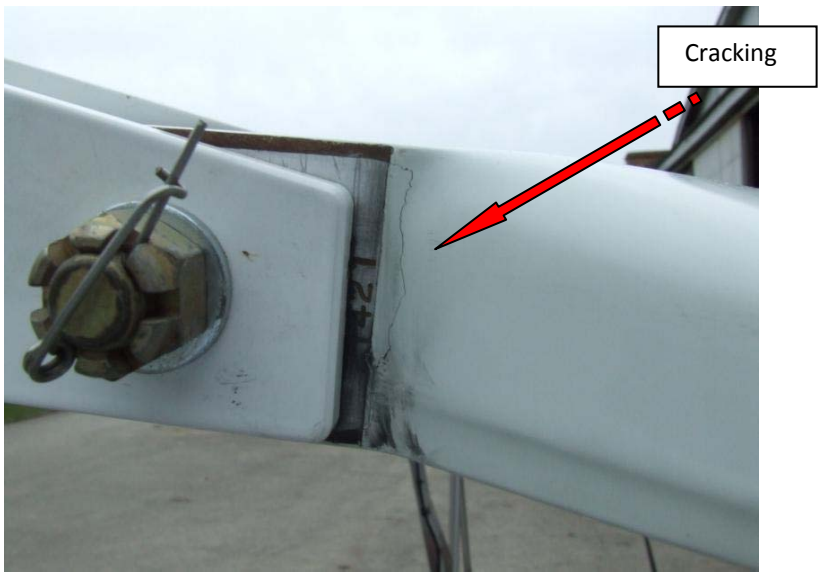
WARNING DANGER:
Flight is forbidden in case of debonding of the covering of the blade's face or back, of deformation and anomalous swelling.

Any repainting or repair of the blades must be communicated to Magni Gyro and will only be allowed under the supervision of Magni Gyro authorized engineers.

After this action, the gyroplane rotor blades must be balanced as before it may fly again.

NOTE:
After a period of time some cracking at the root of the rotor blades may become apparent. Examples of this cracking is shown in the photographs below:

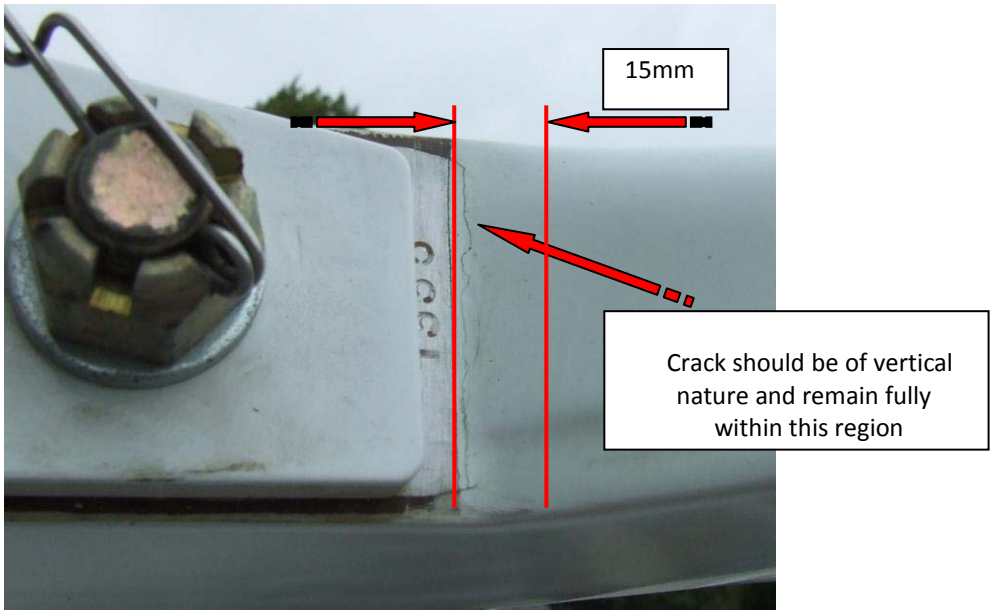




The cracks shown in these pictures are due to the flexing of the paint/filler used in the manufacture of the rotor blades. They are not evidence of the onset of structural failure of the main blades.

All operators are currently required to carry out checks on their rotor blades prior to every flight as part of their pre-flight routine. All operators are requested to pay particular attention to their blades during these checks.

WARNING DANGER:
Any cracks should remain within the zone defined in and be of a vertical nature just outboard of the aluminium root fitting. The cracks must only be evident on the fwd or aft faces of the blade – they must not extend onto the upper or lower faces of the blade. Any cracks that do not conform to the appearance of those shown in the photographs, or lie outside this area should result in the cessation of any further use of the blades.
Immediate consultation of Magni Gyro Srl should be initiated in such instances



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SECTION 6

6 TRANSPORTATION AND STORAGE

6.1 ROTOR RIGGING AND DE-RIGGING

(see fig. 6.1/1)

a. Introduction

The rotor assembly of the M16 (M16C) gyroplane has been designed to offer the best compromise between reliability and easiness of handling during fitting of the rotor to the head and removal from it.

Although the operation itself is quite easy, the procedures of rotor installation and removal must be followed very carefully to avoid problems and damages.

Special care must be given to the trailing edge of the rotor blades, being this the more delicate and fragile part of the rotor.

b. Rotor installation procedure

The rotor blades are produced by Magni Gyro according to a very high production standard. They have demonstrated excellent characteristics during flight. Previously to flight tests, the blades (1) are coupled and balanced; thus the couple must always remain the same. The couple of blades is then flight tested together with the hub-bar pn 245 (or pn 285 for 28 ft. rotors).

The coupling blade-hub-bar is very important. Each blade (1) is marked with colloured adhesive markings (2) (yellow, blue or red) to allow the correct positioning of each blade on the hub-bar. The colour of the marking on the blade obviously matches the side marked with the same colour (see figure).

Fig. 6.1/1 Montaggio rotore
Rotor rigging

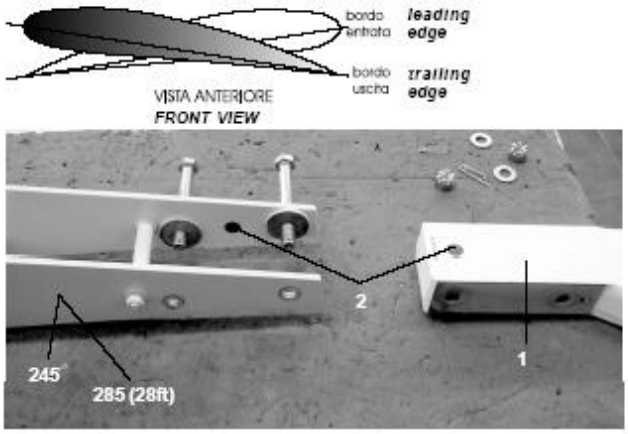
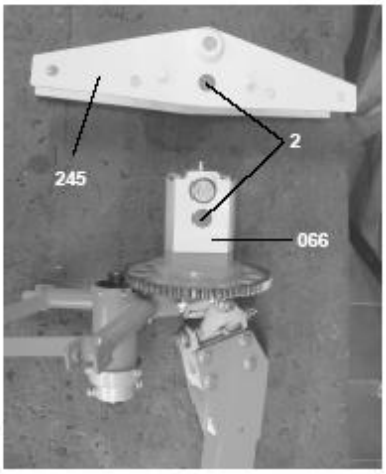


Fig. 6.1/2



c. Rotor rigging
(See Fig. 6.1/2)

1. Prepare the hub-bar pn 245 (or pn 285) by laying a thin layer of grease (1) on the not-painted areas of contact between the hub-bar and the blade, and on the floating bush pn 248;
2. Position the blades on three sturdy supports so that both roots are on the central support and the tips are on the outer supports;

WARNING:
To avoid damages to the blade face or to the trailing edge (2), we strongly recommend to cover the supports with a soft or anti-scratch laying.

3. Fit the hub-bar to one blade accordingly to the coloured markings and insert the two bolts AN8-41A; remember to fit the washer pn 12x24 under the head of the bolt that have to be on the leading edge side (3) of the blade they fix;

WARNING DANGER:
If the force needed to insert the bolts is superior to normal manual force, STOP immediately and find out the reason of this trouble. Usually this indicates that something is wrong and needs to be checked prior to carrying on.

4. With the help of another operator fit the second blade to the hub-bar, always checking the exact matching of the markings (4);
5. Lift the tip of the blade to help lining up the fixing holes of the blade with those of the hub-bar;
6. Insert the bolts AN 8-41A with the washer pn 12x24 under the head of the bolt that have to be on the leading edge side of the blade they fix;
7. Rotate the bolts AN 8-41A so that the hole for the safety pin AN416-1 is in vertical position;
8. Tighten the bolts AN 8-41A with the nuts pn AN310-8 (20 ft-lbs); ensure the presence of the washer pn 12x24 under the nut;
9. Insert the safety pins pn AN416-1. Both the hub-bar pn 245 and the aluminium rotor head pn 066 are marked with a red adhesive marking. It is very important to match the markings, so as to avoid anomalous vibrations (see fig. 6.1/1);

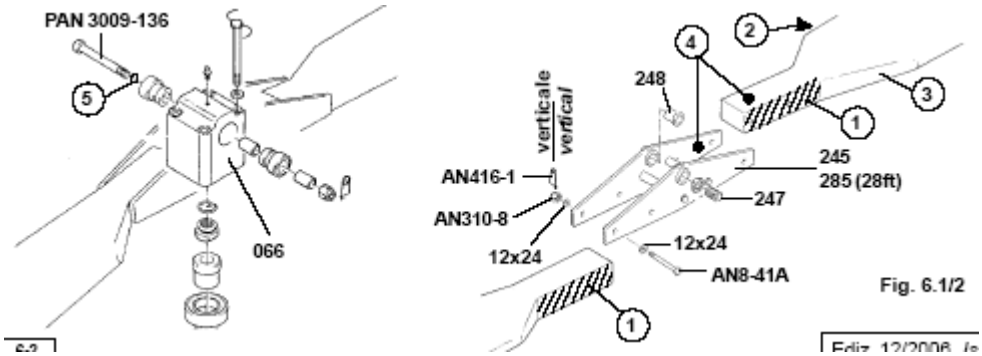


Fig. 6.1/2

Both the hub-bar pn 245 and the aluminium rotor head pn 066 are marked with a red adhesive marking. It is very important to match the markings, so as to avoid anomalous vibrations (see fig. 6.1/1).

10. Lift the rotor with the help of other operators or with a hoist and guide it slowly onto the rotor head, matching the markings.

11. Slowly lower the rotor on the head so as to line up the bushes pn 247 and 248 of the hub-bar with the flapping bearings.

12. Insert the bolt PAN 3009-136, ensuring the presence of a washer (5) under the head of the bolt, thus making the matching of the rotor with the head easier;

13. Tighten the PAN bolt as per the instructions given below.

6.2 CORRECT TIGHTENING OF BOLT PAN 3009-136

(See Fig. 6.1/3)

WARNING DANGER:
The correct tightening of the bolt PAN 3009-136 is of vital importance for the safety of flight. It is important that the operator understands the importance of this operation (installation and removal of the bolt PAN 3009-136) and follows carefully the instructions and indications given by Magni Gyro.

It is impossible to refer to a precise value for the tightening of this bolt due to the low strength required. The operator must rely on the rotation applied to the nut pn 12PCR106, after this nut has put the bushes pn 248 and pn 247 against the bearings pn NKXR 15Z of the aluminium head pn 066. Follow the procedure described below:

1. Tighten the bolt PAN 3009-136 until the bush pn 248 touches the bearings of the head pn NKXR 15Z; stop tightening when the play between the bushes pn 248 and 247 and the washers pn 12x24 disappears and it becomes impossible for the washers to rotate on the bolt pn PAN 3009-136;

2. Rotate the bolt PAN 3009-136 together with its nut and put the bolt 12 PCR 106 in tightening position as shown in the figure. Note that the superior face (hexagon) of the nut pn 12 PCR106 is horizontal and that the violet marking is "anchored" to the rotor hub-bar;

3. Tighten the bolt by keeping it in place and turning the nut up to a maximum value of 30°. Simply follow figure 6.1/3: this will permit the operator a correct tightening without needing any dynamometric measurement.

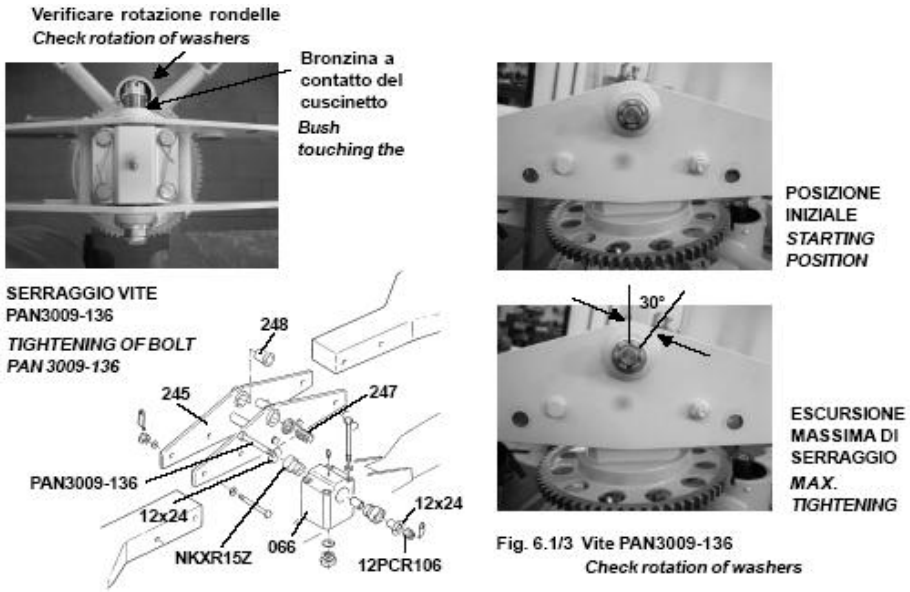


Fig. 6.1/3 Vite PAN3009-136
Check rotation of washers

WARNING DANGER:
A low tightening may generate some play between the hub-bar pn 245 and the aluminium head pn 066; in flight this play will generate vibrations that will affect the entire control chain. Instead, too much tightening will generate stress on the bearings NKXR15Z supporting the flapping movement, thus leading to the breaking of their outer cage. Therefore it is very important to remember and fully understand the importance of the correct tightening of the rotor head bolt. The operator must strictly comply with the procedures listed above. If clarification is needed or if there are doubts, contact Magni Gyro or Magni dealers!

6.3 ROTOR DE-RIGGING

(See Fig. 6.1/4)

The rotor disassembly consists in a few easy steps. Notwithstanding the easiness of this operation, it must be done with the greatest care. An adequate area must be prepared to rest the rotor once it has been removed from the gyroplane.

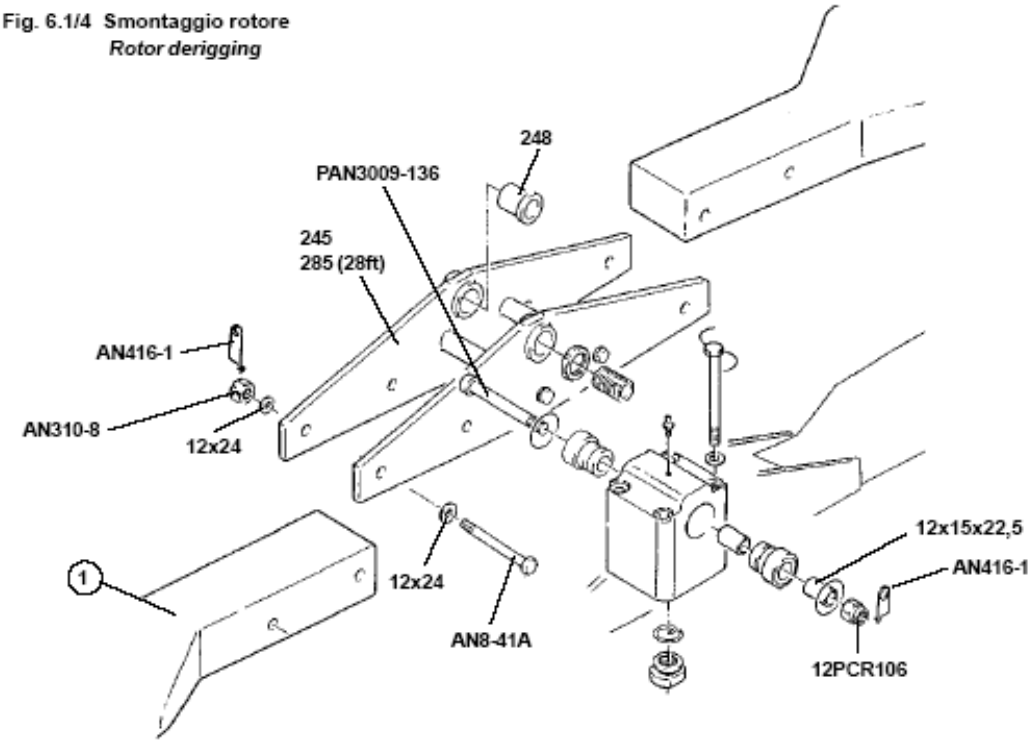
To avoid damages to the blades, it is strongly recommended to use stable platforms on which to disassemble the blades. Furthermore, it is advisable to use anti-scratch coverings on the surfaces to avoid superficial damages, scratches and rubbing to the blades.

1. Before starting verify that the engine's ignition key and push-button are in OFF position and that all the breakers are switched OFF;
2. Remove the safety pin pn AN 416-1 from the bolt PAN 3009-136 of the flapping axis;
3. Loosen and remove the nut 12PCR106 and its washers;
4. Lift the rotor with the help of other operators or with a hoist (see fig. 3.5/1), so as to lighten the load on the bolt PAN 3009-136 and make its extraction easier;
5. Extract the bolt PAN 3009-136 by hand or, if necessary, use a soft rubber hammer;
6. Remove the rotor from the head and place it on the already prepared stable platforms;
7. Before starting the disassembly of the blades form the hub-bar pn 245 (or pn 285 for 28 ft rotor), check that all the adhesive markings are still there;
8. Remove the safety pins pn AN416-1 from one blade (1).
9. Loosen and remove the two bolts AN310-8 that fix the blade;
10. Carefully lift the blade tip with the help of another operator, so as to reduce the load of the blade (1) on the bolts AN8-41A and make their extraction easier;
11. Extract the bolts AN8-41A by hand or, if necessary, use a soft rubber hammer;

NOTE:
A soft vertical oscillation of the blade tip induced by another operator may help the extraction of the bolts AN8-41A.

12. Extract the blade from the hub-bar pn 245 and carefully place it in a safe and protected area;
13. If packing is needed, insert the bolts pn AN8-41A extracted so far in their seats in the hub-bar; thereby position the washers pn 12x24, the nuts pn AN310-8 and the safety pins pn AN416-1 correctly;
14. Use a cable tie (ty-rap) to block any movement of the floating bush pn 248 in relation with the hub- bar pn 245;
15. It is recommended to fix the bolt PAN 3009-136 with its nut pn 12PRC 106 and safety pin pn AN 416-1 along the flapping axis of the rotor head, so as to avoid a possible coming out of the bushes pn 12x15x22,5 of the flapping bearings pn NKXR 15Z.

Fig. 6.1/4 Smontaggio rotore
Rotor derigging



6.4 PRESERVATION OF ROTOR BLADES

The rotor blades supplied by Magni Gyro must be handled with care and attention during all the following operations: rigging and de-rigging, garaging of the gyroplane and possible transportation.

WARNING DANGER:
Whenever the operator intends to execute one of the operations described above and due to the importance of the rotor, he should keep in mind the following instructions given by Magni Gyro:

1. Be sure that you have a stable surface or stable platforms to use as a base during assembly or disassembly of the blades;
2. Be particularly careful when installing the rotor on the gyroplane head not to touch any obstacle with the blades (e.g. walls, doors, gates, etc.), especially along the very fragile trailing edge;
3. Be sure there are enough operators helping you (at least three) or use a hoist (see fig. 3.5/1) to lift the rotor to assemble it on the gyroplane rotor head;
4. When moving the gyroplane to the hangar, move it carefully and pay attention not to damage the blades as said in point 3;

NOTE:
When garaging the gyroplane, the rotor brake must always be ON so as to avoid rotor movements independent from the fuselage of the gyroplane.

5. Never tie the blades when moving the gyroplane to the hangar or keeping it there, either to keep them in horizontal position or to avoid rotation. This could deform the blades in the long term;
6. In case you wish to protect the blades while they are assembled on the gyroplane, use only some kind of material that lets the air pass through freely (no plastic, nor pluriball (plastic material with bubbles), etc.);

7. ***Never put any protective material on the blades if these are not perfectly dry!***
8. For transportation, wrap the blades with some protective material (the best solution is to use a suitable box, available from Magni Gyro) that prevents friction between the blades or against other objects present on the transportation means;
9. For transportation protect the blades with materials that leave free passage of air;
10. Never pack the blades if they are wet or moistened (because of rain, dew or after cleaning them without drying them well);
11. Never leave the blades packed for long. Even the condensation that can develop in the packing can slightly damage the blades;
12. It is better to unpack the blades as soon as their destination is reached, especially if the packing has got wetted (rain, damp roads or damp conditions) during transportation;
13. If you will need to tie packed blades, play special attention to the trailing edge. If necessary, protect it with cardboard before tightening the ropes or belts;
14. Never leave the blades tied up (on trailers or cars) for long, especially if exposed to high temperatures, like under the summer sun, as this could deformed the blades permanently.

6.5 TRANSPORTATION

(See Fig. 6.5/1)

If the gyroplane must be moved by road, then it is necessary to use a suitable trailer (1). On no account must the aircraft be moved by road with the rotor blades (2) fitted.

The gyroplane is best secured by using ratchet straps or strong ropes (3) around the landing gear leaf spring (4) and anchoring them to the supports (5) on the trailer platform. This will prevent forward and rearward movements on the trailer.

An elevating platform (6) placed below the keel tube (as shown in the figure) or a support strut will prevent any vertical movement of the gyroplane and avoid undue loads on the front wheel.

Secure the rotor blades (7) to the platform (8) and protect them well against any potential damage. Therefore follow the indications given in paragraph 6.4 "Preservation of rotor blades".

Make sure that the trim is fully pulled (switch to the rear) so as to have the springs under tension and avoid their bouncing against the control rods.

Last, remove any loose object from inside the aircraft, that could move and/or get lost during transportation. Before starting your road trip, verify that the trailer is in good working conditions and that it complies completely with the requirements in force in the country you are traveling in.

6.6 SHELTERING RULES

For any period of inactivity inferior to three months, please follow the rules described below to guarantee a good storage.

Only the storage in hangars well protected from rain and other atmospheric agents allows to keep the gyroplane in good conditions.

1. Fill the fuel tank at least at ¾ of its capacity. This will help avoid condensate.
2. Clean all the surfaces as indicated in SECTION 4 - CARE AND CLEANING;
3. In order to avoid damages to the air speed indicators, only special caps equipped with large breathers are allowed on the dynamic intake;

4. To avoid any intervention of either malicious persons or of curious and inexperienced persons, remove the keys from the control panel switch OFF all the breakers of the flight services;

Fig. 6.5/1 Trasporto su carrello
Transportation on trailer

5. Remove all the removable instruments from the instrument panel, including satellite navigators, two-way radios, etc;

6. Protect the gyroplane (at least the cockpit and engine) from dust and humidity with the special ventile cover supplied by Magni Gyro.

WARNING:
Do not put the cover on the gyroplane when the engine is still hot, as this could damage the engine cover and cause burning and scorching.

WARNING:
Any rest outside should only be occasional. Proceed as follows:

1. Avoid letting the gyroplane under the sun for lengthy periods.
2. If the gyroplane is exposed to the sun, cover the instrument panel with a refracting cover.
3. In case of rain or of an overnight rest, cover the cockpit, engine and rotor head with the special ventile covers supplied by Magni Gyro, so as to protect the gyroplane from humidity.

6.7 STORAGE RULES

For any extended period of inactivity, please follow the rules described below to guarantee a good maintenance of the gyroplane.

1. Disconnect the battery so as to avoid its discharge.
2. Empty the fuel tank completely.
3. Carry out engine storage procedures as per ROTAX manual.
4. Clean and polish all the surfaces well.
5. Coat all the metal parts with a water-repellent product (anticorrosive ACF-50).
6. If necessary, remove the engine and protect the blades as per the indications given in paragraphs 6.3 – ROTOR DE-RIGGING and 6.4 - PRESERVATION OF ROTOR BLADES.
7. Protect the cockpit, engine and rotor head with the special ventile cover supplied by Magni Gyro.

SECTION 7

7 INSPECTION CHECKLISTS

7.1 CL. 1 - PERMITTED VARIATIONS

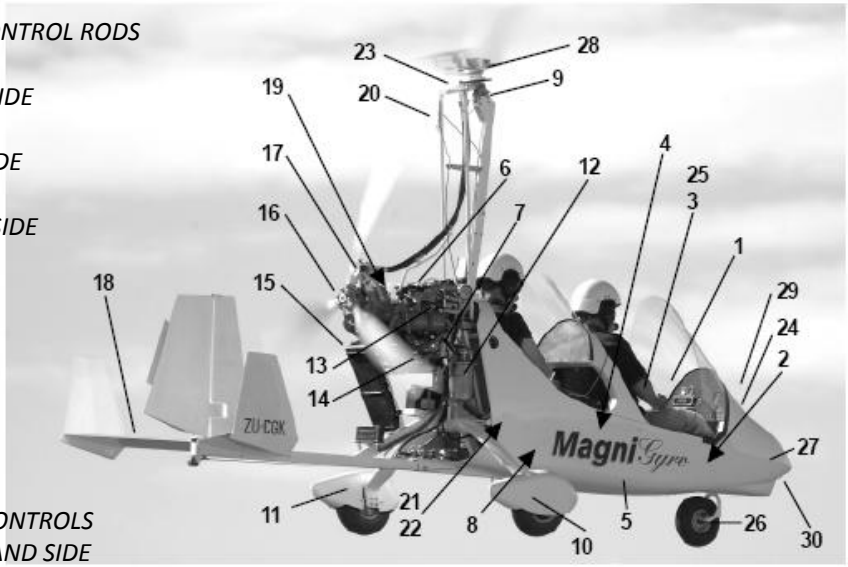
Tasks controlled by flying hours	*Maximum variation*
25, 100, 200, 300, 500, 600, 1200 Hours	*10%*

Tasks controlled on annual basis	*Maximum variation*
Annual, 2, 5, 10 Years	*None*

7.2 CL. 2- DAILY/PRE-FLIGHT CHECKS

WARNING DANGER:
Perform these checks before the first flight of the day (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 hereunder copied checklist.

1 - INSTRUMENT PANEL
2 - CHECK OF PEDALS
3 - CHECK OF CONTROL STICK
4 - CHECK INSIDE OF COCKPIT
5 - COCKPIT AND FUSELAGE, RIGHT HAND SIDE
6 - COOLANT LEVEL
7 - ENGINE OIL LEVEL
8 - FREEDOM AND ENTIRENESS OF CONTROL RODS
9 - ROTOR HEAD, RIGHT HAND SIDE
10 - UNDERCARRIAGE, RIGHT HAND SIDE
11 - WHEELS AND WHEEL PANTS
12 - ENGINE MOUNT, RIGHT HAND SIDE
13 - ENGINE, RIGHT HAND SIDE
14 - EXHAUST SYSTEM, RIGHT HAND SIDE
15 - RADIATORS
16 - PROPELLER
17 – PRE-ROTATION SYSTEM
18 - TAIL PLANES
19 - ENGINE, LEFT HAND SIDE
20 - TRIM SYSTEM
21 - FUEL SYSTEM
22 - FUEL LEVEL
23 - ROTOR HEAD, LEFT HAND SIDE CONTROLS
24 - COCKPIT AND FUSELAGE, LEFT HAND SIDE
25 - CHECK OF THROTTLE LEVERS
26 - NOSE WHEEL
27 - DYNAMIC HEAD
28 - ROTOR BLADES
29 - NAVIGATION SYSTEM
30 - LIGHTING SYSTEM



1. INSTRUMENT PANEL

Check that the MASTER switch is in OFF-position and that all the breakers are switched OFF.

2. CHECK OF PEDALS

Check the condition and linkage of the rudder pedals. 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 entireness of the transmission rods and the presence of the safety wiring on the cable turnbuckles.

3. CHECK OF CONTROL STICK

Verify full and free of movement of the control sticks. Verify that no damage occurred to the control and torsion rods and verify the fixing of these same rods.

Check the functioning of the pre-rotator lever on the front 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 instrument panel and instruments and ensure that all are in good working condition with all nameplates and markings present and legible.

EXTERNAL CHECKS

5. COCKPIT AND FUSELAGE, RIGHT HAND SIDE

Check the condition of the external surface of the fuselage and remove any foreign object or dirt. Ensure it is clean. Check that the windscreens are fixed well and not damaged. Ensure correct visibility. Examine pilot and passenger restraint systems and make sure they are not damaged. Pay particular attention to any cut, chafing, contamination, worn latch or boss, loose or pulled stitching and any other factors you feel may cause you to doubt their durability and usability. Check the condition and safety of the fuel cap.

6. COOLANT LEVEL

Carefully open the expansion tank placed on the engine (do not mistake it with the white expansion tank) and check the correct level of the coolant in the tank. See paragraph "Coolant level".

7. ENGINE OIL LEVEL

Verify correctness of the engine oil level, checking the measuring stick inside the oil tank.
Note, to check the oil level any residual oil in the crankcase must be returned back to the tank. This is done by removing the filler cap from the oil tank and then “hand turning” the prop in the correct direction of rotation until a gurgle sound is heard coming from the tank. This sound indicates that air, not oil, is now being forced out of the crankcase and the bulk of the oil is in the tank.

8. FREEDOM AND ENTIRENESS OF CONTROL RODS

Closely examine the state and safety of the safety points on the control rods, linkages, bearings and fibrelock nuts. There should be insignificant play in the "Uniball" rod end bearings and no evidence of corrosion or damage. The control rods should be straight and undamaged. The control rods 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.

9. ROTOR HEAD, RIGHT HAND SIDE

Standing upright or on a ladder, check that all the rotor head nuts are fixed well and that all the safety locking systems are present and functional. Examine as far as possible the rotor head and hub-bar assemblies for cracks, damage, wear, corrosion and rubbing. Check the state of the teeth and make sure they are not damaged. Make sure the flexible shaft and the Bendix pre-rotation gear are adequately coated with grease. Check the state of the notched gear.

10. UNDERCARRIAGE, RIGHT HAND SIDE#

Check the state and safety of the leaf spring and mounting bolts.

11. WHEELS AND WHEEL PANTS

Check the state and safety of the anchoring of the wheel, hub, axle and wheel pants. Check all the tires and make sure their inflation pressure is correct. Check their state, possible damage and unbalance of rubbing marks. Either roll the gyroplane forward or remove the wheel pants to check all the tires. Ensure any dirt and debris have been removed from inside the wheel pants. 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.

12. ENGINE MOUNT, RIGHT HAND SIDE

Inspect the welding points of the engine mount and check that there is no crack, damage or chafing. Check the entireness of the vibration dampers and make sure the fixing bolts are tightened correctly. Check the welds of the structure for cracks and damages.

13. ENGINE, RIGHT HAND SIDE

Check the safety, corrosion, state, levels, leaks, damage and chafing of the following components:

- carburettors, linkages and cables
- airbox fixing
- wirings and connections
- cooling system
- oil reservoir and oil
- oil filter
- radiator and oil radiator
- spark plugs and their connection coverings
- engine feelers, connectors and fasteners
- oil and coolant hoses and clamps
- on 914-TCU and its mount
- exhaust system, springs, joints, mounts and safety wires
- pre-rotation assembly, belts, cables and flexible shaft

14. EXHAUST SYSTEM, RIGHT HAND SIDE

Verify the entireness of the exhaust system, checking that there are no cracks in the exhaust pipes. Check the correct fixing of the exhaust gas temperature probes.

15. RADIATORS

Inspect the radiant surfaces and verify that there are no leaks of liquid, damage or chafing. Verify the functioning of the radiator chocking system of the radiant surfaces and the entireness of the clamps and fixing points.

16. PROPELLER

Check the hub bolts and the propeller support flange. Check the whole surface of each blade for any signs of damage or de-bonding. Make sure the blades are clean.

17. PRE-ROTATION SYSTEM

Verify the correct positioning of the pre-rotation assembly and the condition and the tension of the belts. Check the functioning of the pre-rotation system and the freedom of movement of the lever of the belt tensioning pulley. Verify the correct position of the pulleys' brake shoe and check the wear of the pulleys.

18. TAIL PLANES

Check all the lower and upper surfaces and make sure they are free of cracks or damage. Check the anchoring of the tail planes. Check the safety of the rudder and make sure it is completely free to move. (Push down so that the nose wheel is lifted, thus reducing the strain on the controls). Check the state and freedom of movement of the tail wheel.

19. ENGINE, LEFT HAND SIDE

Proceed as for the right side. Furthermore check the state of the battery and 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. Check the state of the air filter and make sure it is fixed well. Check the ROTAX 914 turbocharger unit, air filter, waste gate and springs, waste gate motor and cable.

20. TRIM SYSTEM

Verify the correct fixing of the trim actuator and the entireness of the control cable, springs and electric connections.

21. FUEL SYSTEM

Verify that the quantity of fuel is adequate for the flight planned. Examine the fuel pipes and connectors for serviceability and any sign of leakage. Ensure the fuel filter is clean and that there are no signs of leaks. Draw a sample of fuel from the drain point and check the sample for any water or other contaminant. Check the fuel tank surfaces and seams.

22. FUEL LEVEL

Check the fuel level.

WARNING:
This operation must be done taking advantage of the tank transparency. Keep the gyroplane on three points (nose down) so as to be able to correctly evaluate the quantity of fuel in the tank. It is strongly recommended to check the level looking at the rear left side of the tank.

23. ROTOR HEAD AND CONTROL RODS, LEFT HAND SIDE

Proceed as per the right side. Furthermore, check the rotor brake and cables for freedom of movement and make sure they do not need any maintenance. Check the state of the rotor tachometer pick-up and make sure it is fixed well.

24. COCKPIT AND FUSELAGE, LEFT HAND SIDE

Proceed as per the right side.

25. CHECK OF THROTTLE LEVERS

Check that the full range of movement is available to the throttle lever, with no binding or restriction.
- As regards the ROTAX 914, ensure that the front throttle lever can be extended past the 100% stop and reach the 115% stop. Check the state of the brake levers. Make sure that the maximum braking power is available and that the lever turns back when released.

26. NOSE WHEEL

Check the state of the nose wheel and ensure its correct inflation pressure. Check that the full range of movement is available to the wheel and that it operates in the correct direction with the rudder. Check the fork 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.

27. DYNAMIC INTAKE

Make sure there are no obstructions, dirtiness or other clogging inside the dynamic intake.

28. ROTOR BLADES

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

29. NAVIGATION SYSTEM

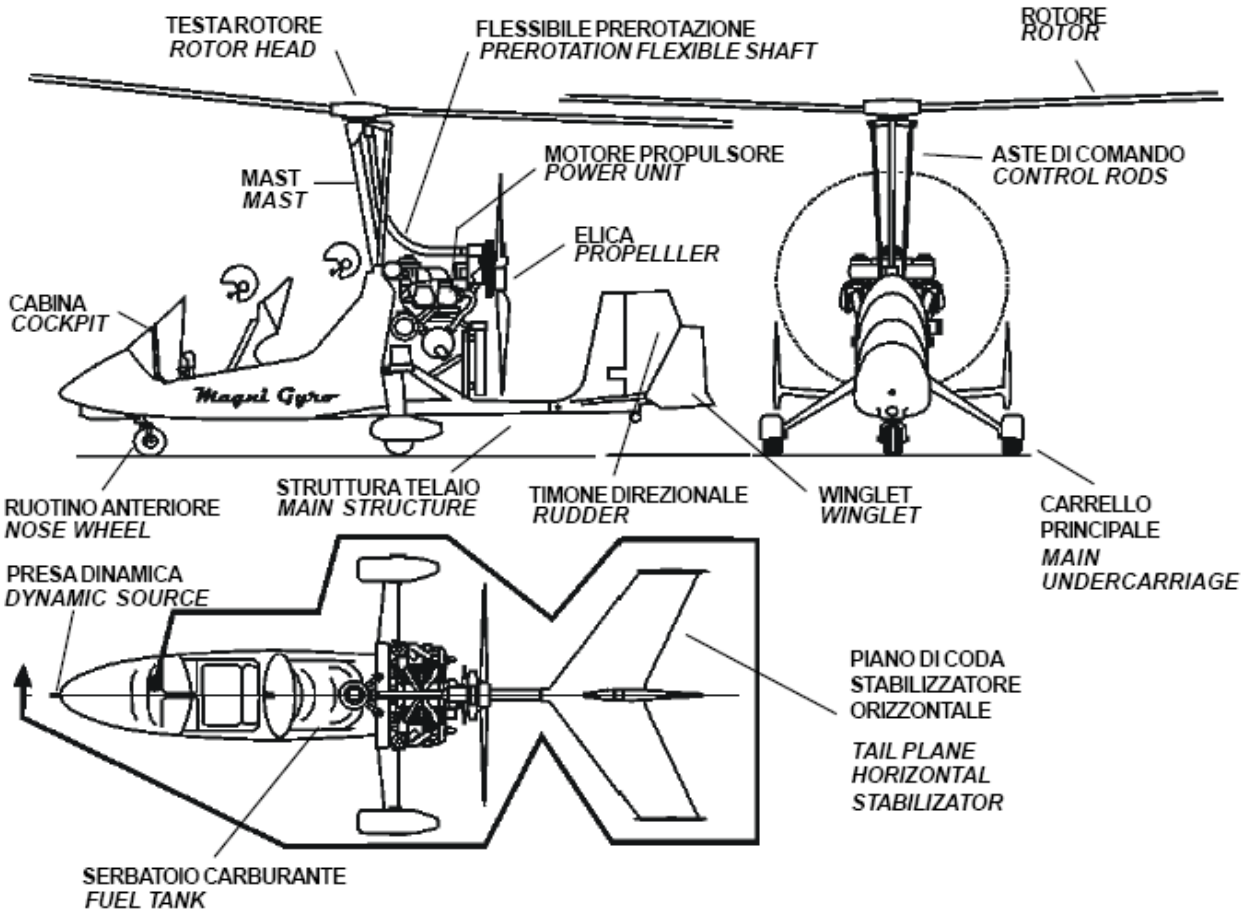
Check the functionality of all the navigation and communication systems.

30. LIGHTING SYSTEM

Check the functionality of all the internal and external lighting systems.

WARNING:
INITIALLY THE DAILY/PRE-FLIGHT CHECKS MAY SEEM A LONG PROCEDURE, BUT WITH EXPERIENCE, THE PILOT WILL SOON BECOME FAMILIAR WITH ALL THE ASPECTS OF THE AIRCRAFT AND WHAT IS CORRECT OR NOT. THE CHECK IS ORGANIZED INTO A LOGICAL PATTERN THAT MAKES ONE COMPLETE ROUND 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, AS DESCRIBED IN THE FOLLOWING FIGURE.

Fig. 3.6/2 PERCORSO ISPEZIONE - *INSPECTION PATTERN*



WARNING:
The importance of this check and the level of diligence needed during it cannot be overemphasized. A well-executed daily/pre-flight check is probably one of the greatest contributing factors to good flight safety.

7.3 CL. 3 - ENGINE STARTING

The engine must be started in accordance with reference to the latest applicable copy 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. Refer to the Magni Gyro Gyroplane Pilot Handbook before attempting an engine start sequence.

Once the engine is started and warmed up, carry out a full functional check of all the engine indicating and warning system, and of its warming up.

7.4 CL. 4 - ORDINARY MAINTENANCE SCHEDULE

The correct maintenance of the gyroplane avoids troubles and inconvenience that can compromise the safety of flight operations.
Magni Gyro strongly recommends complying with the published M16 (M16C) Maintenance Schedule 045-00-16(C).

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