Pilots Handbook

Gyroplane Type MT-03 (UK spec only)

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Approval number DAI/9917/06

Applicability

Aircraft Registration:	**G-**
Aircraft serial no.	**RSUK/MT-03/**
Engine type:	**Rotax 912ULS or 914UL**
Engine serial No:	
Rotor blade type & diameter:	**Autogyro 8,4m (black end cap),, or Autogyro hub/Aircopter blade (supplied with aircraft serial 004 and 005), or Aircopter rotor (AutoGyro modified, supplied with aircraft serial 002 and 003), or Autogyro 8.4m RotorSystem II (red cap only) when modified under SB-040 Iss1, or Autogyro 8.4m RotorSystem II TOPP (blue cap only) when modified under SB-040 Iss2**

Note! Operation at 500KgMTOW on aircraft embodying service bulletin SB-013 is only permissible when flown with AutoGyro rotor blade and AutoGyro rotor hub assemblies.

Propeller type:	**HTC 1,73m**

NOTE!

This autogyro may be operated only under adherence to the operation limits and the information contained in this manual. The manual should be carried on board the aircraft.

The manual is not a replacement for theoretical and practical training as to how to operate this machine. Failure to adhere to its provisions or to take proper instruction can have fatal consequences

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AMENDMENTS CONTROL PAGE

1. Where & when necessary RotorSport UK Ltd (hereafter referred to as RSUK) will issue updates to this maintenance standard, and will notify known owners to review the changes via the RSUK website with changes appropriately identified by a strike in the margin.
2. Aircraft operators are responsible for ensuring that amendments to their publication are carried out immediately and in accordance with instructions contained in amendment transmittal letters (where issued).

ISSUE NUMBER	DATE	INSERTED BY	ISSUE NUMBER	DATE	INSERTED BY
Initial			11	01.04.15	
1	05/08/06		12	**21.06.16**	
2	20/11/06		13		
3	16.8.07		14		
4	21/11/08		15		
5	09/02/09		16		
6	06.07.09		17		
7	11.3.10		18		
8	17.12.10		19		
9	12.9.11		20		
10	02.04.12		21		

Issue	Change summary
8	MC and SB changes incorporated to date, further Rotax information added
9	Best glide speed/text amended. Conair SSM incorporated RotorSystemII incorporated. Notes on retrofit of MTOS enclosure. OEM stick grip option, ATR833 radio option added
10	Section 7 Comment on sunlight & damp conditions (p60).
11	Warning on Binx nuts (p31), different rpm gauges (p51), nitrogen-filled tyres (p52) and pressures clarified in Checklist (p32), ATR833 audio socket (p57), cooler unblanking highlighted (p61), turbo cooling note (p37), UL91 and Mogas E10 (p16), rotor brake technique (p37).
12	TOPP rotor option added pages 2,5,6,15,16,26,27. Clarification of CG limits p15, Binx photo added p31, format changes p56, typo correction (hydrometer) p61

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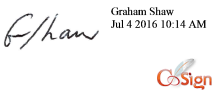
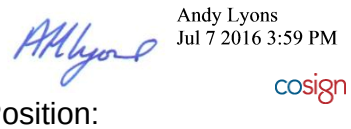
RotorSport UK Ltd approval signatures for this Pilots Handbook		
Signature:  Position: Test Pilot & Eng. Manager	Signature:  Position: Flight Test Observer & Inspector	Signature:  Position: Head of Airworthiness

GENERAL INFORMATION

1.1 INTRODUCTION

This manual is provided to give pilots and instructors information which contributes to the safe and efficient operation of this autogyro.

It also contains basic information from the aircraft manufacturer, as well as the legal basis for flight.

Pilots of this aircraft must hold an appropriate type licence, with type conversion training by an authorised instructor.

Pilots must make themselves familiar before flight with the special characteristics of this autogyro. You are obliged to read both this pilots manual and the maintenance manual to ensure you are familiar with all equipment and aircraft structure/engine.

1.2 AUTHORITY FOR FLIGHT WITHIN THE UK

The legal basis for the operation of this MT-03 autogyro is regulated in the Airworthiness Approval Notification (AAN29134), issued by the Civil Aviation Authority (CAA). It has been shown to comply with the requirements of BCAR Section T issue 3, and is considered as a factory built aircraft.

It is supplied by RotorSport UK Ltd.

The aircraft is equipped and permitted for daytime VFR flight only.

1.3 EXPLANATIONS AND SENSIBLE SAFETY MEASURES

The manual is not a replacement for theoretical and practical training on the operation of this machine. Failure to take proper instruction can have fatal consequences.

The following definitions are used in this manual with warnings, precautionary measures and remarks. Their sense and their meaning are described as follows.

WARNING: means that the neglect of the appropriate procedure will result in a direct or critical reduction of flight safety.

NOTE: means that the neglect of the appropriate procedure will lead, on a longer time base, to a reduction of flight safety.

REMARK: stresses the attention for a special circumstance, which does not affect safety directly, but is still important.

PRECAUTIONARY & SENSIBLE SAFETY MEASURES

Before flight pilots should familiarise themselves with the appropriate navigational, weather and safety information pertinent to their planned route.

Flight in severe turbulence is prohibited.
Flight near thunderstorms is prohibited
Aerobatics and manoeuvres resulting in reduced “g” are prohibited
Smoking in the aircraft is prohibited

The choice, selection and use of this particular aircraft for the purpose chosen is at the sole discretion and responsibility of the owner/pilot. RotorSport UK Ltd takes no responsibility for your decision to fly.

In common with other aircraft of this type the MT-03 utilises a non-certified engine. This means that there may be a higher risk of engine failure than in a certified aircraft, with the associated risks of damage or injury as the result of an unplanned landing. Therefore strict compliance with the engine manufacturer's maintenance schedules, operational procedures and any additional instructions which may be given to you by RotorSport UK Ltd, on behalf of the engine supplier, is essential. The aircraft must always be flown with the risk of engine failure in mind, and must not be flown over any areas where a forced landing cannot be safely executed.

1.4 AIRCRAFT DESCRIPTION

Characteristics:

- Autogyro with nose gear wheel chassis
- Airframe manufactured from inert gas welded stainless steel tube
- Two-seat tandem configuration
- GRP spring spar mainwheel undercarriage
- Main wheels fitted with hydraulic disc brakes (operated from the front seat only).
- Extruded aluminium rotor
- Rotor head controlled with connecting rods
- Rudder controlled via cable
- GRP or optional carbon fibre fin, rudder and horizontal stabilizer
- Engine four-stroke flat-four Rotax 912 ULS or optional Rotax 914 UL
- Three-blade ground-adjustable 1.73m diameter HTC propeller

TECHNICAL DATA (see also fig. 1)

- Rotor diameter: 8.40m
- Rotor is either a modified version of the Aircopter product, with RSUK pre coned hub system, or fully manufactured at AutoGyro.
- Length: 5.08m
- Height: 2.65m
- Width: 1.82m
- Rotor blade profile: NACA 8H12
- Empty weight: 250 kg nominal (see individual aircraft load sheet for specific version weight)
- Payload: 250 kg nominal (if 500Kg MTOW, see individual aircraft load sheet for specific version weight)
- Take-off mass (max.): 450 or 500kg as shown on the permit to fly.
- Fuel tank capacity: 35 ltrs or 70ltrs with optional second tank

Note: Aircraft may only be operated at 500kgMTOW if incorporating RotorSport modification MC-070/AAN 29134 addendum 4. This is integrated in the aircraft under RotorSport Service Bulletin SB-013.

1.5 PICTORIAL VIEWS OF THE MT-03

View from the left hand side

View from the rear

View from in front

View from left side, second generation front seat

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2. OPERATIONAL LIMITS

2.1 INTRODUCTION

This section defines the limit values for safe operation of the MT-03 autogyro. It contains the operation limits established during flight testing, as well as limit values established by test or computation. The existing instrument placards are described.

SPECIFIC LIMITATIONS AS PER THE CAA AIRWORTHINESS AUTHORISATION NOTICE

These limitations are mandatory, and are printed out on the aircraft Permit to Fly. Ensure you are aware of the limitations specific to your aircraft.

RSUK Aerobatic Limitations

Aerobatic manoeuvres are prohibited.
Manoeuvres involving a deliberate reduction in normal 'g' shall be avoided**.**
Maximum bank angle 60 degrees from vertical
Flight in icing conditions is prohibited.
Flight in strong gusty winds or wind velocities of more than 72 km/h = 20 m/s = 40 kts is prohibited.
VMC (Visual Meteorological Conditions) only.
This aircraft shall be flown by day and under Visual Flight Rules only

Ensure you read your *CAA Operational Limitations* (part of the Permit to Fly) for exact limitations of your aircraft.

2.2 AIRSPEED

The values below are indicated speeds (IAS) measured via the ASI metering hole, centrically located in the fuselage nose, and based on an MTOW of 450Kg. or 500kg (if SB-013 is incorporated)

V_{NE}	Maximum speed	100 mph
V_{climb}	Best climb speed	60-65mph
V_A	Manoeuvre speed	50mph
$V_{Approach}$	Approach speed.	70mph (1^{st} stage) 55mph (final)
V_T	Max speed in turbulence	70mph
	Best glide speed (for maximum range)	60mph
	Min rate of descent speed (min height loss)	40mph

2.3 AIRSPEED INDICATOR MARKS

- Green range (normal range) from 0-50mph
- Yellow range (caution, especially nearing Vne) from 50 to 100mph
- Red line (V_{NE}) at 100mph

2.4 ENGINE

Manufacturer:	Bombardier Rotax, Gunskirchen/A
Type:	Rotax 912 ULS or Rotax 914UL
Take-off power:	100 HP/5800 rpm (5 minutes max operation) for 912ULS, 115HP/5800 rpm for 914UL (5 mins max operation)
Continuous duty:	90 HP/5500 rpm for 912ULS (90HP/5000 rpm max continuous for 914UL unless a/c upgraded to 500kgMTOW, then 100HP/5500rpm– see Section 2.5 for further information)
Propeller:	HTC 3 blade. Pitch angle: 19.5deg 912ULS, 20.5deg 914UL (ground adjustable to suit engine and working environment). Note that due to the concave face of the propeller measuring this angle is difficult. Propeller is pitched for max ground rpm of 5700.

For further data refer to the engine manual and parts catalogue.

WARNING! The engine must not be run without the propeller fitted – doing so may result in severe engine damage.

2.5 ENGINE INSTRUMENTS

The following engine values are placarded on the instruments:
Note that, other than the engine rpm, the gauges are marked with these values internally.

	Range	**Maximum value**	**Unit of measurement**
Engine RPM	Green 1600 - 5500	912ULS-Amber 5500 - 5800/5min, red line 5800. 914UL – Amber 5000 to 5800rpm, red line 5800. Amber 5500 to 5800 if 500Kg MTOW under SB-013	rpm
Oil temperature	50 - 130	130 max	°C
Cylinder head temperature	to 135	135 max	°C
Oil pressure	0.8bar min to 3,500 rpm, 2-5bar above	7 (cold weather starting)	bar

2.6 WEIGHT & BALANCE

The maximum take-off weight of the MT-03 is 450Kg (or 500kg if incorporating RotorSport Service Bulletin SB-013/AAN 29134 addendum 4). This represents the empty weight (with normal equipment), occupant weight(s), fuel and luggage.

If any accessories are fitted which increase the empty weight of the aircraft then the aircraft's maximum payload must be reduced accordingly.

The pilot is responsible for ensuring the aircraft is not flown overweight.

NOTE! Flying the aircraft overweight invalidates your Permit to Fly.

The maximum permissible positions of the centre of gravity may not be exceeded.

The centre of gravity of the aircraft type was determined during Section T Compliance evaluation. The envelope operational extremes were tested and found satisfactory. However operation outside of these evaluated points has not been tested!

Evaluation recorded that the approved envelope extremes (with maximum 10Kg baggage in the rear passenger footwell) are as below (and affected by MTOW and rotor type):

Most Forward limit - 120pilot, 60Kg pass, min fuel – 596mm forward of mainwheel axle
Most Rearwards limit - 60Kg pilot, max fuel – 371mm (500kg) or 376mm (450kg) forward of mainwheel axle
Most Highest limit - 60Kg pilot min fuel – 952mm (RS1, RSII rotors) or 972mm (RSII TOPP rotor) above mainwheel axle
Most Lowest limit - 125Kg pilot, max fuel - 814mm (500kg) or 819mm (450kg) above mainwheel axle

Vertical CG position (z) is relative to the wheel axle plane drawn between the main and nose wheel. Longitudinal CG position (x) is fore or aft of the mainwheel axle plane (positive forwards).
The weight and balance report (AWC) supplied with the aircraft shows the Empty Weight and CG envelope calculated for that specific aircraft, with options supplied as new. Empty weight means aircraft containing minimum flight accessories and minimum fuel.
The report also shows, for reference, the thrust line offset.

WARNING! Care must always be taken when flying at extremes of the operational envelope.

Maximum occupant weight in the front seat = 125 kg
Maximum occupant weight in the rear seat (with a 60Kg front seat occupant) = 120Kg
Minimum occupant weight in the front seat = 60 kg
Front seat occupants under 60kg body weight must carry ballast.

Fuel loading permissible is 450Kg (or 500Kg if incorporating SB-013/AAN29134 addendum 4) minus occupant weight, minus aircraft empty weight, minus any baggage or items added to the aircraft since weighed. Aircraft empty weight is placarded. Fuel mass is 0.72Kg/ltr.

Example: 500Kg – 256Kg (empty wt) – 90Kg (rear seat occupant) – 90Kg (pilot) – 5Kg (luggage bag) = 59Kg. Useful fuel load is 59/0.72 = 82ltrs.

Maximum possible fuel load is 70ltrs, 50.4Kg

If ballast is required to meet the minimum front seat loading condition of 60Kg, then it should be in the form of thin lead sheet placed behind and under the pilot seat cushion.

Carrying of bags or other items inside the aircraft is not recommended due to the presence of control cables and linkages. If used, ensure there is no control obstruction! Bags fitted into the rear seat must be securely attached to the seat harness, and included in the weight/balance calculation.

WARNING! The rear seat harness must be fastened correctly around the seat in single seat operation. DO NOT leave loose behind the seat, it may entangle with the rotor controls and prevent correct function!

A small detachable bag is fitted inside the aircraft. Its purpose is to carry the rotor tie down strap and basic aircraft documents only.

Note: MC-184 enables replacement of a damaged MT-03 enclosure with the MTOsport enclosure. The latter has a fwd luggage locker accessible through a hatch in the nose of the aircraft. Inside this locker there is a bulkhead to contain the contents, which must be no more than 10kg (in accordance with the local placard). If the luggage locker is fully loaded the front seat loading limit is reduced to 110kg (from 125kg) thus having no effect on aircraft CG.
If MC-184 is incorporated there is an alternative “Aircraft Payload Specification” placard (see para 2.8)

2.7 FUEL
The engine manufacturer recommends unleaded gas station premium fuel (MOGAS). AVGAS 100LL can be used, although not recommended for long term operation, as the lead in the fuel causes excess plug fouling and problems with the slipper clutch – refer to the engine manual for further information. Alternatively, unleaded aviation gasoline Avgas UL91 is now available at some airfields and is approved for use with Rotax engines.

MOGAS should not be used if the fuel temperature exceeds 20°C or at altitudes above 6000ft due to the increased risk of vapour bubble formation in fuel lines. In these conditions AVGAS 100LL should be used. Note: MOGAS E10 (unleaded gasoline blended with 10% ethanol) is not recommended.

Whilst refuelling:

1. Ensure that the fuel is clean and water-free.
2. Always use a filter when refuelling, preferably with a water trap
3. Ensure the aircraft keyswitch is OFF before commencing refuelling
4. If refuelling on the port (LH) aircraft side, adjacent to the electrical passenger switches, take care not to spill fuel on the switches. If a spillage occurs, mop up quickly and leave to evaporate totally before turning electrical system back on.
5. Ensure filler caps are tight after refuelling, and any spillage in the base of the aircraft drained/mopped up pre flight.

The balance pipe between the two fuel tanks (where two are fitted) is not capable of transferring fuel from tank to tank at the same rate that fuel can be input to a tank; it may take several minutes for a full tank to equalise levels with an empty one. If it is required to refill both tanks at a fast rate, fill one tank first, then the other, and top up either as required.

Before flight, use the water drain points under each tank to ensure the fuel is water free.

2.8 GENERAL PLACARDS AND MARKINGS:

In conformity with BCAR Section T the following placards and markings are installed:

- All emergency controls are coloured red.
- All cockpit controls are clearly marked as to their function and method of operation.
- Fuel and oil filler openings are clearly marked, together with the grade or type required.
- Fuel tank capacity is clearly marked.
- Loading conditions are clearly marked as follows:
- Standard placards

Loading conditions (Placard will show 450 or 500Kg MTOW as permitted)

Aircraft Payload Specification
Front seat; max occupant weight 125Kg max, 60Kg min
Front seat occupant must carry ballast to meet 60Kg min.
Rear seat occupant 120Kg max
Empty weight (as measured) Kg
Fuel load 0.72Kg/ltr
MTOW 500Kg

For aircraft incorporating MC-184 only this placard is changed to:

Aircraft Payload Specification
Front seat pilot: 125Kg max, 60Kg min
Reduced pro rata to 110Kg max with up to 10Kg (max) of luggage in the nose locker.
Pilot must carry ballast to meet 60Kg min.
Rear seat passenger 120Kg max
Empty weight (as measured) Kg
Fuel load 0.72Kg/ltr
MTOW xxxKg

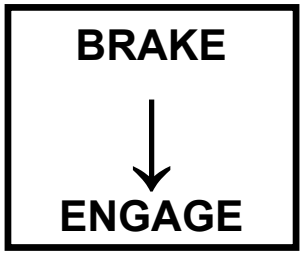
Aircraft must only be flown solo from the front seat.

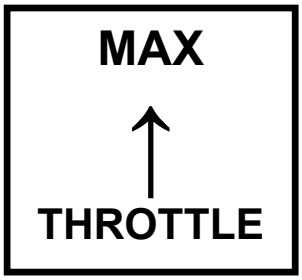
Where xxxKg is either 450Kg or 500Kg (if SB-013 has been embodied)

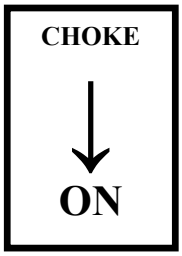
Occupant warning

OCCUPANT WARNING
This aircraft has not been certificated to an International Requirement

Primary control marking







Limitations

OPERATING LIMITATIONS

Aerobatic Limitations
Intentional spinning is prohibited.
Aerobatic manoeuvres are prohibited.
Manoeuvres involving a deliberate reduction in normal 'g' shall be avoided.
CG Range Limits (Gyroplane) – refer to Pilots Handbook data.

Airspeed Limitations
Maximum Indicated Airspeed (Vne): 100mph

Other Limitations
This aircraft shall be flown by day and under Visual Flight Rules only.
Smoking in the aircraft is prohibited
The aircraft shall not fly closer than 110 metres to any assembly of persons

Fuel gauge (for those gauges with pushbutton)

Press before reading!

Auxiliary socket (where fitted). May alternatively be engraved on the panel.

12v DC auxiliary socket

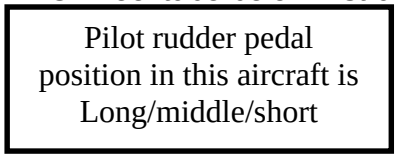
Rotor RPM gauge (only where the gauge is marked internally as ‘x100’, but actually reads x10)

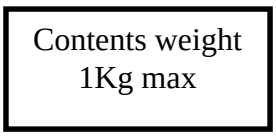
Coolant overflow bottle

Engine oil tank

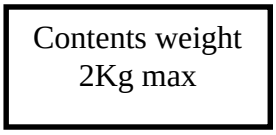
Fuel tank (both, where two fitted) (on tank or side of enclosure by filler neck)

On keel tube below instrument panel





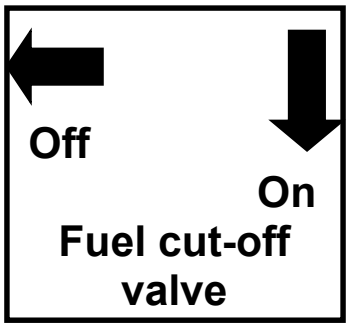
Placard for side pockets (where fitted to rear of the front seat)



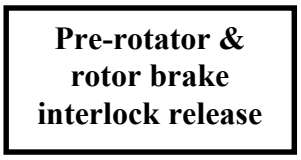
Placard for glove box (where fitted)

For nose luggage locker (where fitted)

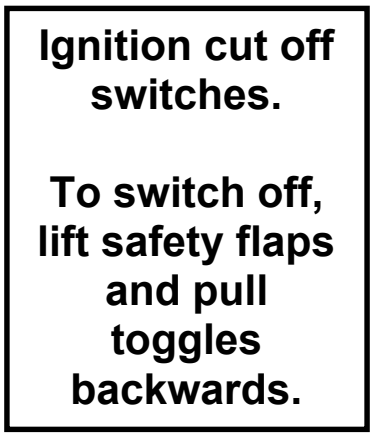
Fuel cut-off valve

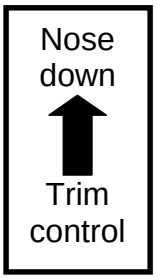


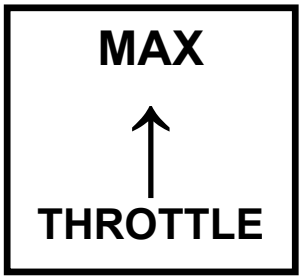
Interlock placard (until engraved on panel)

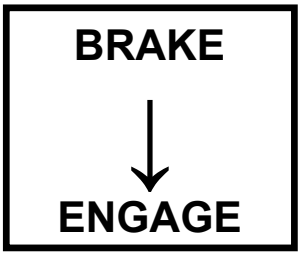


Instructor pack (where fitted). On early versions the switch toggles may go forwards ‘off’ rather than backwards). Brake placard only where brake is fitted.

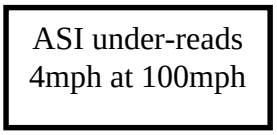




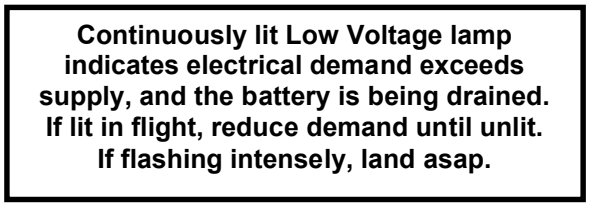




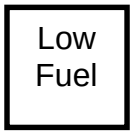
Note! Where a deviation exists between the front master and rear seat slave ASI’s, it is permissible at initial build for RotorSport UK Ltd only to placard the rear seat ASI accordingly to show the error (front is assumed as the correct ‘master’). E.g.

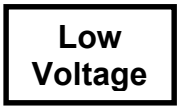


Low voltage placard mounted on instrument panel (where fitted).

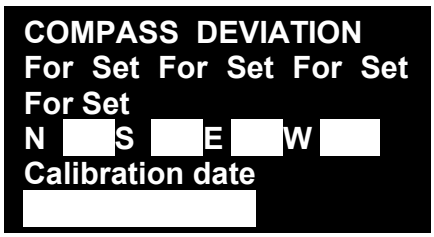


Warning lamp placards (where fitted)





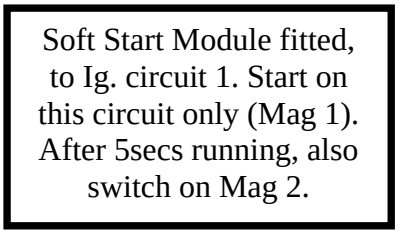
- Other
If the compass deviation is more than 5° on all headings, then a deviation placard must be present. (new placard format from serial /004 and /006)



Instrument placards as section 2.5

The aircraft is fitted with a permanently attached fireproof plate with the aircraft registration number and serial no. marked on it, on the keel or in front of the instrument panel.
The registration letters are placed high on the tail fin, and are 68cm long, 30cm high. This has been accepted to CAP523, the CAA standard for aircraft registration. Alternative markings and position of markings is acceptable provided they comply with this standard.

Options and upgrades
If SB-041 “Conair Sports SSM” is incorporated an additional placard is fitted adjacent to the Mag switches



Front stick (if fitted with G205 stick-grip or OEM stick-grip)
On top of control stick (either type of stick grip)

(L Roll and R Roll only if roll-trim system fitted)

Note that all placards must have the same units of measure as the instruments.

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3. EMERGENCY PROCEDURES

3.1 INTRODUCTION

The MT-03 gyroplane uses an engine which is not certified to normal aviation standards. Whilst normally reliable, engine reliability cannot be guaranteed, so always bear this in mind.
NOTE: Plan your flight route to allow for unplanned engine failures and subsequent forced landings. Regularly practice your forced landing procedures & techniques. During your type conversion ensure that you have experienced a full engine out landing, to experience the glide angle and distance required to land.

This manual is not a replacement for theoretical and practical training as to how to operate this machine. Failure to take proper instruction can have fatal consequences.

3.2 ENGINE FAILURE

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

Taxying, before take-off – maintain directional control, brake and stop where safe.

Immediately after take-off - land immediately ahead.

In flight. **with some height (depends on wind speed and direction)** - consider the wind speed and direction. Select a suitable forced landing field, preferably up any slope, and if practical land into wind

Landing in trees or high vegetation – take the vegetation surface as the runway, and position the landing to leave the minimum fall to the ground. Try to flare onto the surface to achieve minimum roll on speed. When the wheels contact the vegetation centre the control stick to reduce the risk of the rotor contacting the vegetation.

Rough running of the engine and power loss can be caused by carburettor icing. This is extremely unlikely on this aircraft (912ULS version) as it is fitted with a hot water heated jacket around the carburettor inlets.
WARNING! Taking off into carb icing conditions without the engine warmed up properly may prevent the water jacket from stopping carburettor ice from forming.

3.3 ENGINE START IN THE FLIGHT

The engine should not be deliberately stopped in flight except as part of forced landing training under the supervision of a competent Instructor.
Where practical, to limit engine damage, leave the engine to idle at 3000 rpm for about 30 sec to cool before turning it off.

The engine can be restarted in flight using the starter. Use the procedure for starting described in Section 4.2, if possible allowing a 30 second period for warming up before applying full power. Note that to restart the key must be turned completely to off, and then back to start. This interlock is to prevent inadvertent starter engagement.

3.4 ABANDONING THE AIRCRAFT

In normal circumstances occupants should not leave the aircraft while either the propeller or the rotors are turning.

If abandoning the aircraft in an emergency the pilot should turn the off the engine magneto switches and turn the Master switch to “OFF” if this can be done without endangering the occupants.
If abandoning the aircraft with either the propeller and/or the rotors turning the occupants should follow a path in line with the nose of the aircraft, to minimise the risk of being struck by either the rotor or the propeller.

Occupants should be briefed before flight on emergency evacuation procedures, including:

- Actions to be taken in the event of a forced landing
- Operation of the seat harness
- Disconnection of any intercom leads or other connections to the aircraft
- How to safely exit and move away from the aircraft

3.5 SMOKE AND FIRE

Indications of smoke should be treated in the same way as a fire.

Fire on the ground: exit and abandon the autogyro, call the emergency services, use local fire fighting equipment if trained to do so

Fire in the air: Make an emergency landing, exit and abandon the autogyro. Call emergency services.

3.6 GLIDING FLIGHT & FORCED LANDINGS

The minimum rate of descent speed is 40mph (engine idle), giving a vertical descent rate of about 500ft/min at low aircraft loading, and 800ft/min at MTOW. Note that the rate of descent does not increase dramatically with speed increases up to 56mph. However, with the engine off, airflow over the rudder surface reduces as airspeed drops, to the point where there is limited directional control - so take care at very low airspeeds. The best glide speed is 60mph. The height:distance ratio with engine on tickover is approximately 1:5 (500 feet of forward movement for every 100 feet of height). With the engine stopped the ratio is approximately 1:4.
If there is sufficient height, take the time at best glide airspeed to make the choice of landing site, and then balance airspeed versus descent rate to make a safe landing in that area. When gliding into a headwind increasing airspeed will have a significant effect on groundspeed and noticeably improve the glide ratio. In the final approach ensure airspeed is above 50mph, by lowering the nose, to give sufficient rotor energy for the deadstick flare, and airflow over the rudder for positive direction control.

Height loss with engine failure is, of course, greater than that with idle power. Ensure you understand the HV chart (5.3) to know what airspeed and height combinations are safe to operate within.
If gliding for a long distance, either keep on a little power, or increase power periodically to keep the engine warm.

3.7 PRECAUTIONARY LANDINGS

Forced landings, and Precautionary landings (e.g. suspected mechanical problem or weather problem).
For a landing with a deflated tyre, proceed as follows:
Approach normally, with the intent of a 0mph run on landing directly into wind (& across the runway if needed). Flare the aircraft to achieve this, and use the rotor drag/brakes to limit forward speed. Only if impossible to recover the aircraft from the landing area should it be manoeuvred under it own power, as this could further damage the tire and wheel rim.

3.8 LOSS CONTROL

Loss of primary control systems could be

1. Engine power control. If jammed on, use ignition switches turned on/off to reduce power, and turn off when clear to land in a suitable place. If jammed off, land as per engine off.
2. Rudder control. Use power and rotor to drive into wind, and descend for landing into as large and as soft an area as possible, flaring for minimum ground roll.
3. Rotor head control. Normally the trim device will keep the aircraft flying in pitch. Roll control failure may lead to a flat descending turn. Use rudder, trim and power to balance aircraft, and descend for immediate landing into as large and as soft an area as possible.

3.9 ALTERNATIVE METHOD OF ENGINE SHUTDOWN

Turning the engine off with the mag switches simply earths the coils. If there is an electrical fault the engine can be stopped by isolating the fuel supply. Firstly, ensure the standby electrical pump is switched off. For the turbo engine, turning the keyswitch off will also turn off the primary fuel pump, starving the engine. For the 912ULS engine, which has an engine driven mechanical pump, turn the emergency cut off valve located on the enclosure edge, on the left hand side, just rear of the front seat. It will take about 30secs min for this method to stop the engine. Alternatively, in an emergency, fully close the choke, wait a few seconds, and open the throttle suddenly. This normally chokes the engine and causes it to stop, but is not guaranteed.

4. NORMAL OPERATIONAL PROCEDURES

4.1 INTRODUCTION

Section 4. contains check lists and procedures to be used for the normal operation. Procedures for additional equipment are in Section 8.

REMARK! There are two rotor head assemblies released on the MT-03, as of the release of change MC-105. This latter change reduces the stick travel in pitch, giving a more positive stick force, and increased clearance to the instrument panel and back of the rear seat.

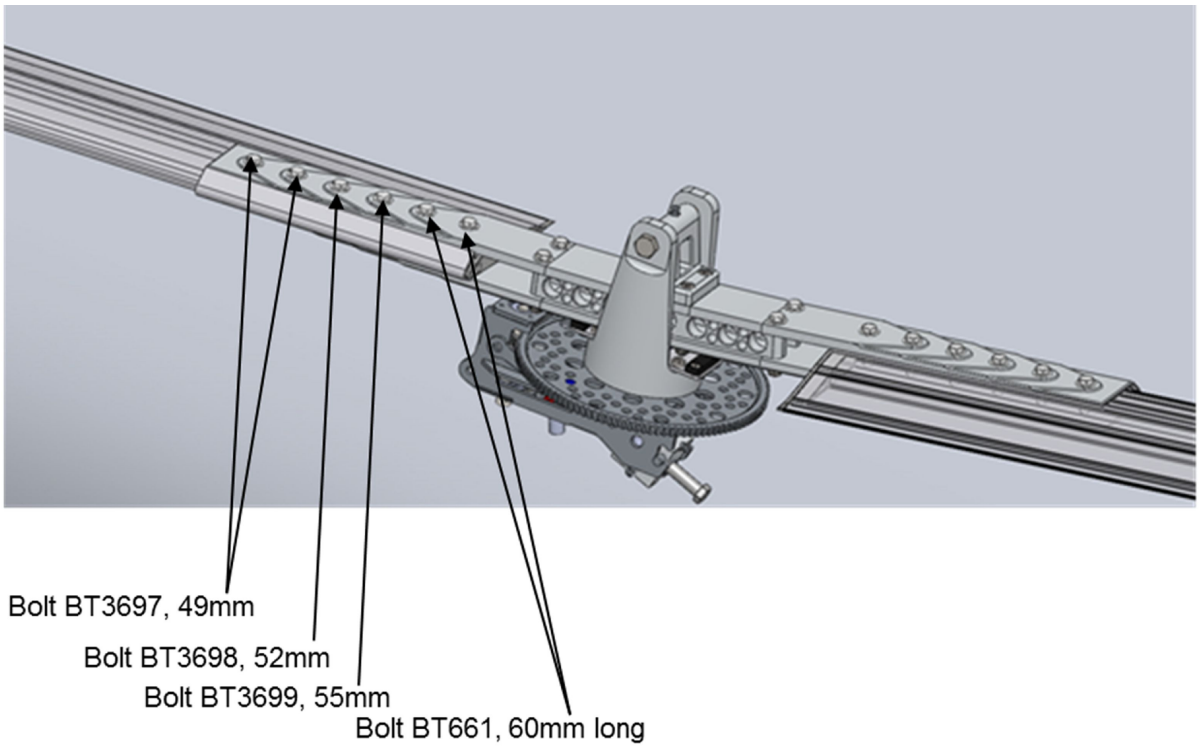
WARNING! Pilots transiting from one MT-03 to another must make themselves aware of this or any other aircraft differences, which may lead to changes in flight characteristics or aircraft flight management. Failure to do so may lead to unexpected pilot workload! Check the Service bulletin incorporation record in the logbook, and the modification list in chapter 6.12.

4.2 ROTOR RIGGING

Assembly rotor:

The rotor blades, spacer extrusion and hub are provided with numbers to define the installation direction. By matching these numbers, put the blades into the hub. Fit the 9 bolts fitted with 'thin' 9mm washers through the hub and blade assembly from the top, and fit an 8mm 'thin' washer and M8 nyloc on the lower surface. The bolts are a close fit – and may need a light tap to push home. Raise or lower the blade with respect to the hub to achieve this. DO NOT hammer them in! For early blade sets (identified by square edges to the hub bar), hand tighten only, and adjust the tracking. Do this with a taut string between the cut-outs in the blade ends. Tap the blades in the hub bar such that the string passes directly over the centre of the grease nipple in the centre block. When satisfactory, tighten all 18 nuts to 25Nm. For later blade sets no tracking adjustment is normally required. Simply tighten all nuts to 25Nm.

With the black end-cap rotors the bolts are all the same length. With RotorSystemII (standard variant has red end caps, TOPP variant has blue end caps) there are only 6 bolts, of 5 different bolt lengths as these vary to suit the scalloped hub-bars. Ensure that they are fitted in the correct position, as shown below.



WARNING! It is important to fit the correct length bolt in the associated hole! Fitting the wrong length bolt may result in insufficient safety protrusion through the nylock nut, or that the nut jams on the shank of the bolt before the joint is properly tightened.

Other notable differences: the RotorSystem II hub bar is scalloped, with different lengths of blade to hub bar bolt, and is also heavier than the earlier rotor. Typical weight is 30.5kg (standard variant) or 35kg (TOPP variant). The built-in coning angle is also increased from 2deg per side to 2.85deg.

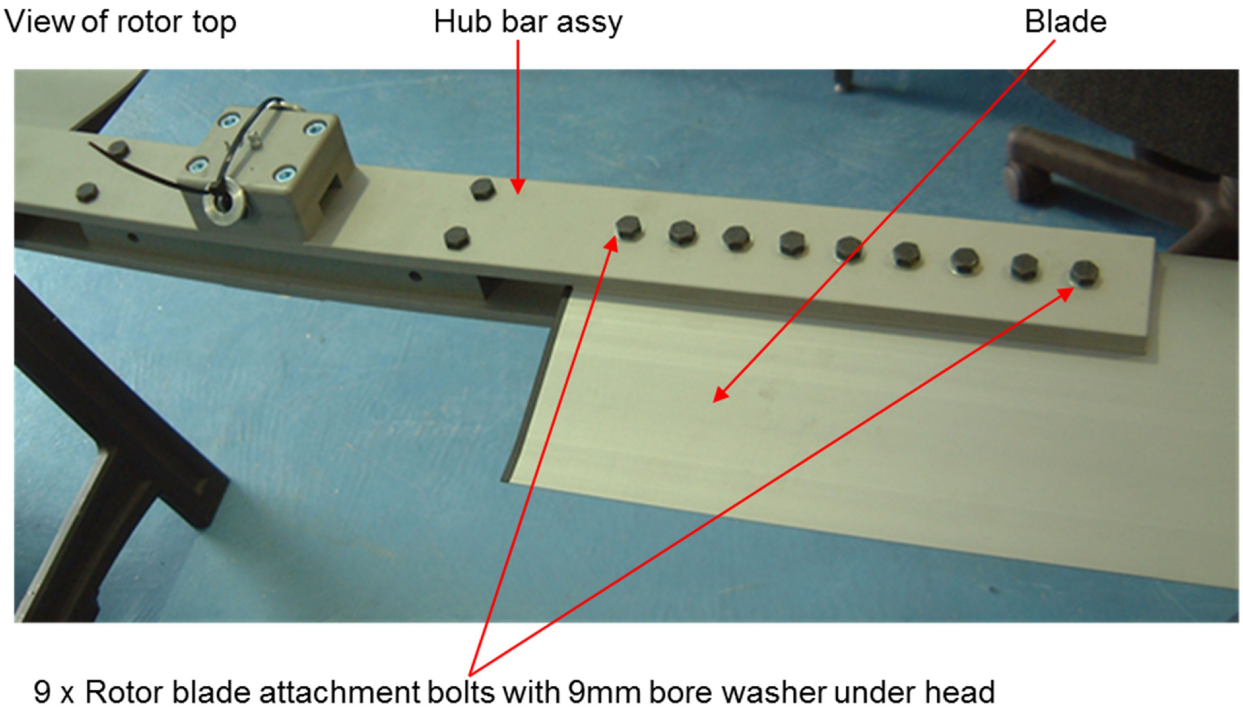
It is very important that the correct rotor is used with the correct type of rotor head tower and teeter stops. The RotorSystemII rotor types will not fit to an earlier rotorhead. An earlier rotor (black end caps) would fit the RotorSystemII rotorhead, but the teeter stops would allow excessive movement, potentially causing rotor to make tail or propeller

contact. The tower used with a RotorSystem II rotor is 40mm higher than that used on earlier aircraft.
When assembling, or dis-assembling, do not remove or adjust any other nuts/bolts on the hub assembly – the tracking is factory set, and adjusting may change these settings and adversely affect rotor balance.

To fit the rotor to the aircraft proceed as follows:
1. Brake the aircraft securely.
2. Engage the rotor brake with the rotor hub set fore/aft.
3. With the aid of a helper, and some steps (or use the rear seat if tall enough), raise the rotor assembly up into the rotor head.
4. Push through the teeter bolt (making sure the two bushes are greased and in place either side of the hub block) and hand tighten. Note that on later blade sets (with plastic end caps) there may be two different length bushes. Fit as dot marked on the rotor and head hub.
5. Tighten the nut to the required torque (hand tight, 1-2Nm, never tight), and fit a safety pin or split pin through the nut, and secure the pin appropriately.
6. There should be at 0.04 to 0.07mm sideways free play between the rotor and the hub (serial no's 003 and 004). Other serial no's are factory balanced, so free play is pre set by the bushes provided the nut is not over tightened.
7. Grease the bolt via the grease nipple where fitted.
8. Ensure the rotor teeters to the stops freely.

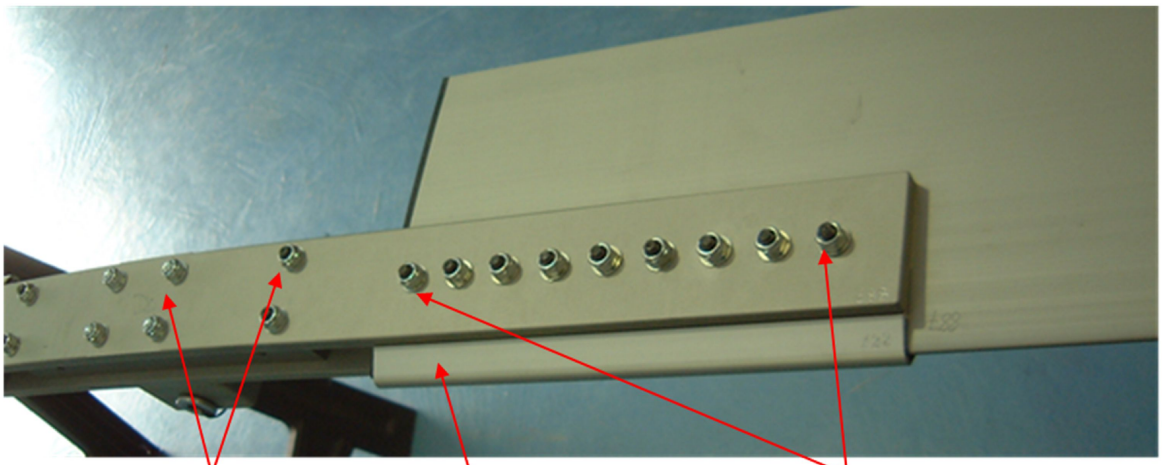
NOTE! From serial no. 004 a new rotor hub is fitted. Refer to the RotorSport UK Ltd if this later design is wanted for 002 or 003.

Views of 9-bolt rotor system (black end-caps)

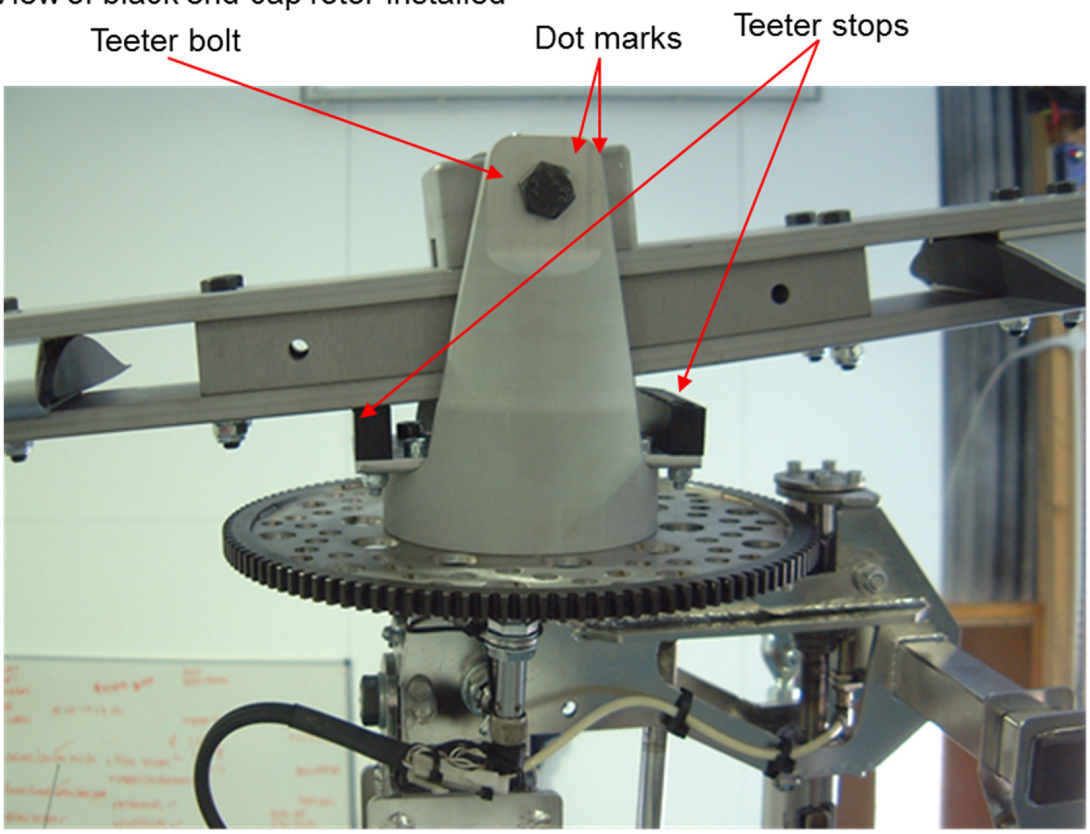


These bolts are all the same length.

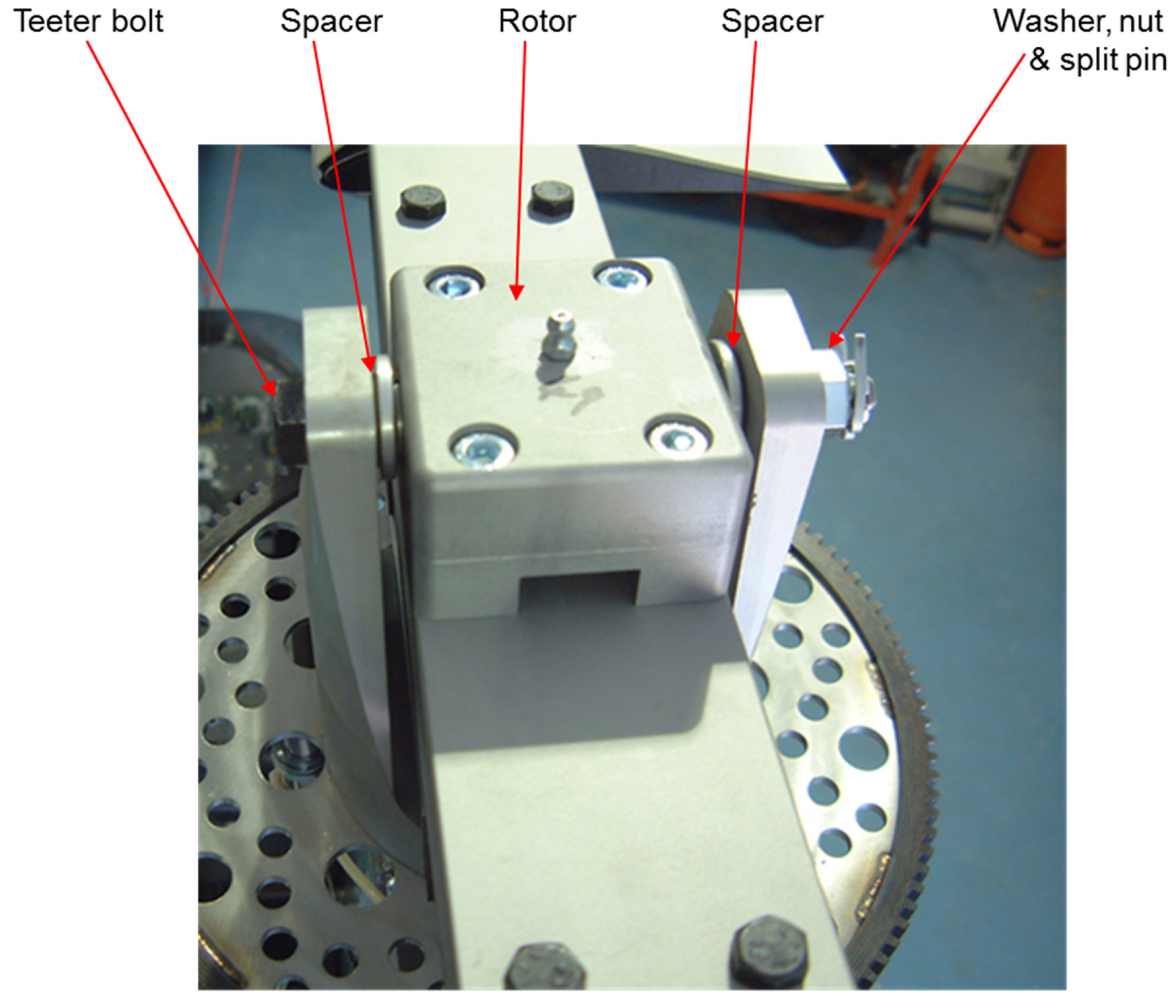
View of rotor bottom



View of black end-cap rotor installed

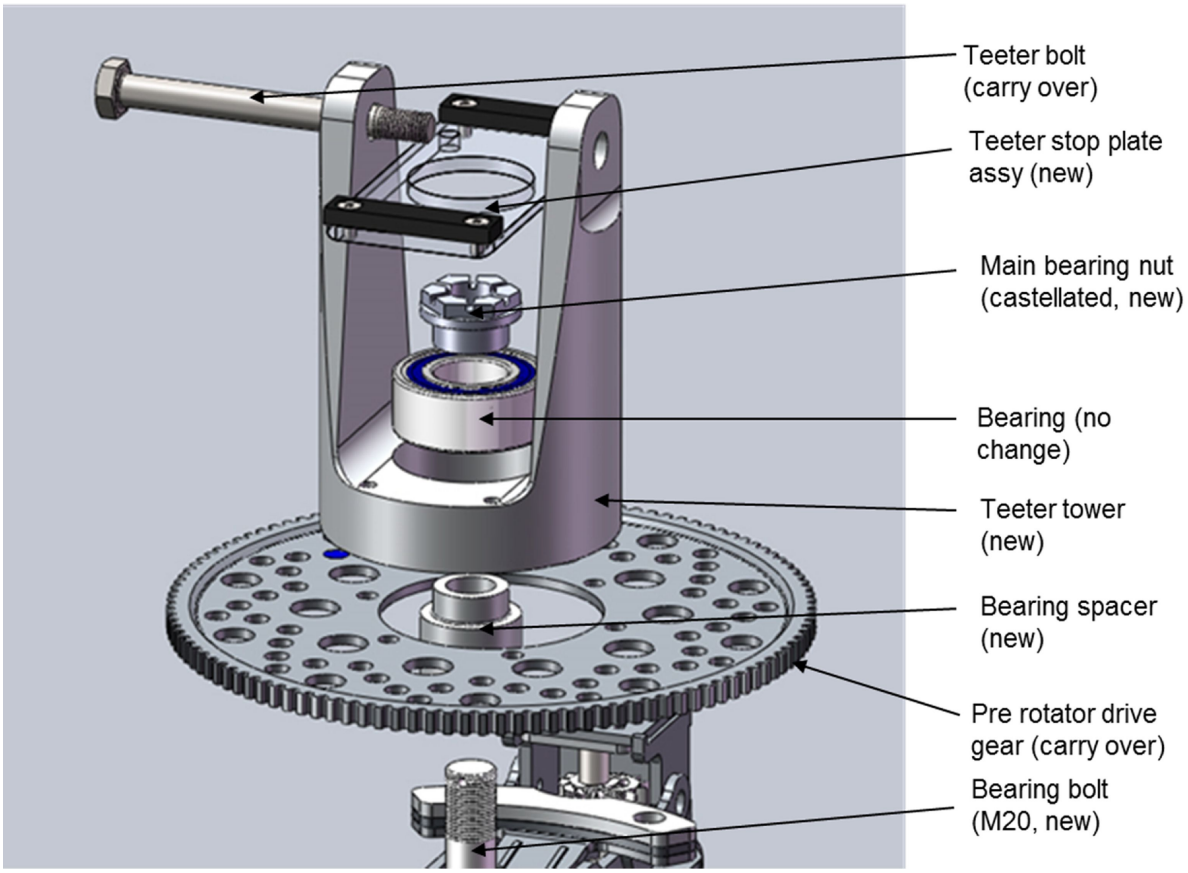


Top view of rotor installed

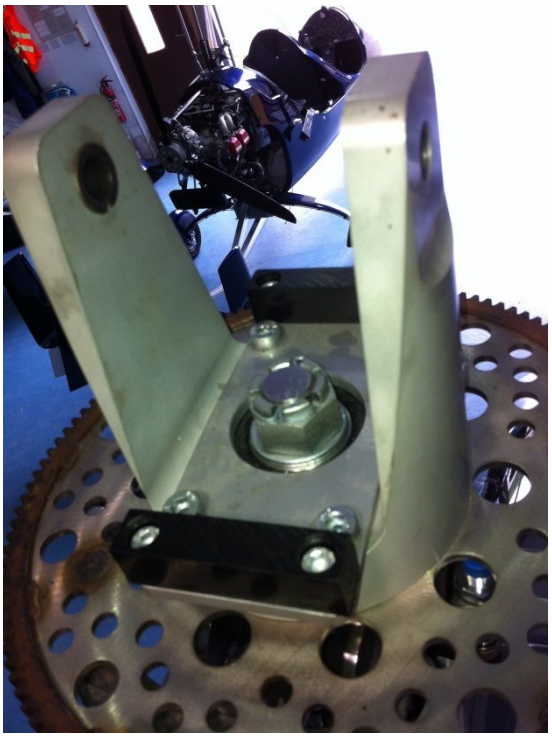


Match parts using dot marks on tower, spacer and hub (normally one dot or two dots)

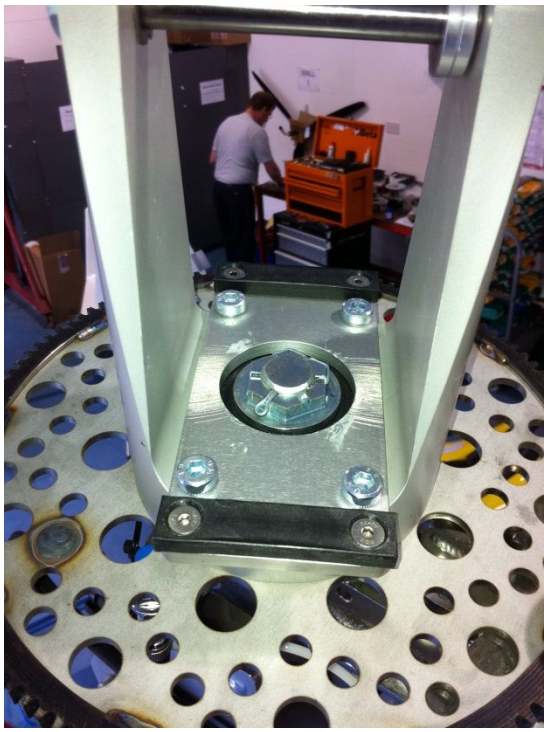
Additional views below show the differences between the original and RotorSystem II construction.



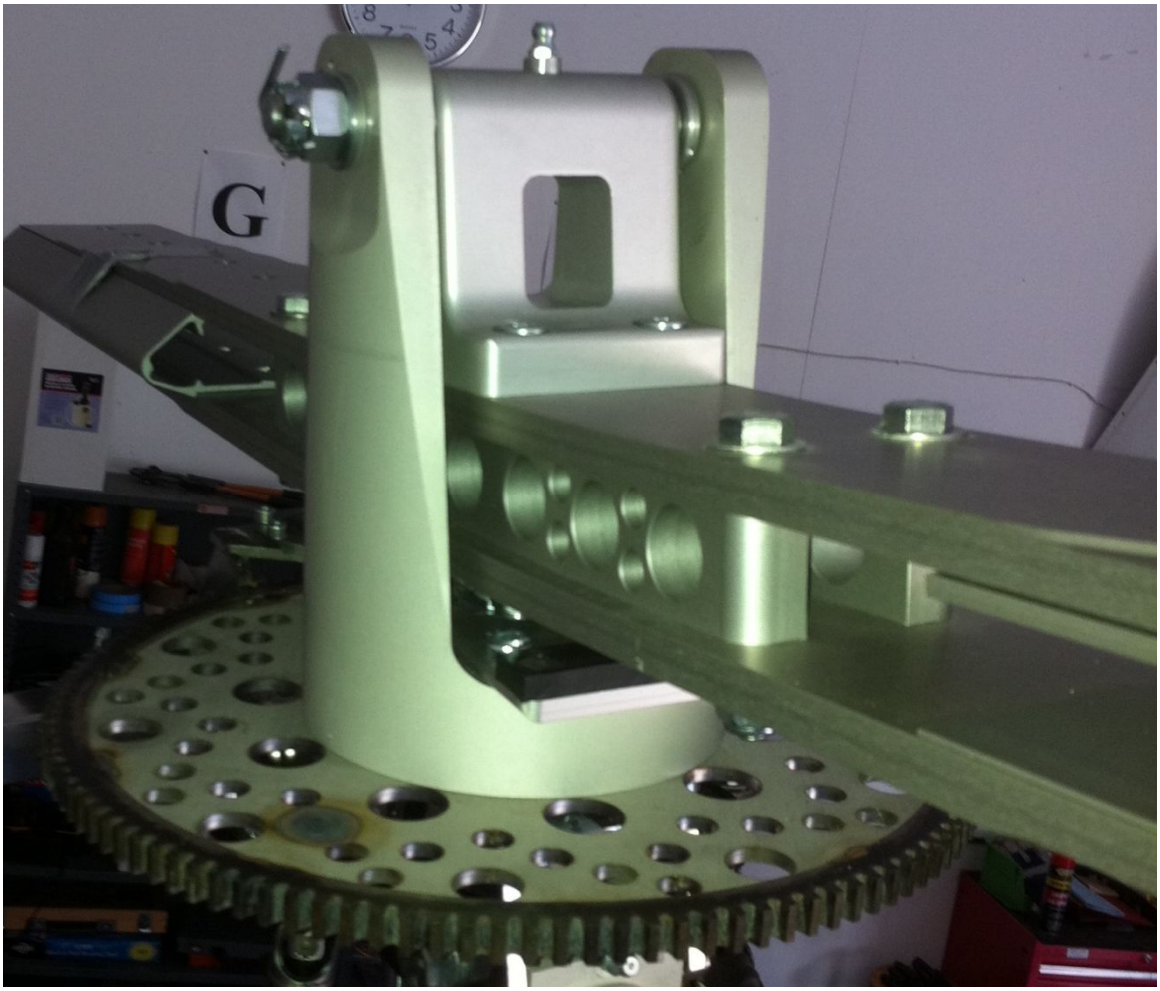
Section view of rotor head with RotorSystem II parts shown.



Old rotor head assy



RotorSystem II head assy



View of RotorSystem II fitted (rotor blades not installed).

WARNING - under MC-227 low-profile metal lock-nuts known as “Binx” nuts replace nyloc nuts for attachment of the teeter-block to the hub-bars. These two nut types must not be interchanged. For further information see AMM RSUK0012.

Binx low-profile self-locking nuts

4.3 DAILY & PREFLIGHT INSPECTION

Most, if not all, technical problems can be found with a conscientious and careful pre-flight inspection. In your own interest, take the necessary care and attention with your aircraft. The safety and integrity of an autogyro stands and falls with its regular, conscientious examination and maintenance.

The full pre-flight checklist is shown below.

MT-03 GYROPLANE PRE FLIGHT CHECKLIST

This list is a guideline of items to be checked prior to the flight. No checklist is "All Inclusive", nor is it to be construed as a substitute for proper training or pilot experience.

Task	Aircraft area	Task & task type
A1	General	Note; wherever possible checks should be carried out with a qualified person in the pilot seat in case of accidental starting, and to operate controls correctly. Op/C - Both ignition (magneto) switches in sound condition and switched OFF Remove frost, snow or ice, if present Check - that the gyroplane documents are available and in order. Ensure all loose equipment is correctly stowed and the gyroplane is free of extraneous items. If single seat operation, ensure rear seat cushion is stowed securely, and seat belt fastened. Check – weight & balance, and carry suitable secure ballast if required If the gyroplane has not been regularly used, ensure before resumption of flying that: (a) Either (i) the engine has been turned weekly or run fortnightly or (ii) the manufacturer's recommendations have been complied with (b) Previously reported defects have been addressed
A2	Windscreen	Inspect - for damage and cleanliness (clean as required)
A3	Composite enclosure	Remove pitot head cover if fitted, and inspect orifice for cleanliness Inspect - radio aerials for damage and security Inspect - condition and security of fiberglass enclosure
A4	Landing Gear	Inspect - that extension appears normal Inspect - tyres for proper inflation (MW 1,5-2,2bar, NW 1,5-1,8bar), damage & creep Inspect - brake installation for external evidence of leaks and correct fluid level, and for damage and security Inspect – brake disc securing screws (4 each) are secure Inspect – that nose wheel pivots easily, both springs are correctly attached, and control rods are fastened correctly Inspect – suspension bow for cracks and security of fastenings
A5	Flying Controls	Op/C - Rudder controls move rudder and nosewheel from lock to lock and operates in the correct sense. Inspect - Rudder pedals for security of hardware, for proper operation, and for absence of binding. Inspect - Rudder cables for security of hardware and nico clamps, cables for fouling, fraying and kinking, and for cable tension. Op/C – Both control sticks moves freely to roll and pitch stops simultaneously with the rotor head and in the correct sense. Inspect both stick fastening bolts/nuts for security. Inspect – Pneumatic control set to ‘BRAKE’ not ‘FLIGHT’. Inspect – linkages between stick and rotor head for loose bearings, loose items, bent or damaged tubes or excess backlash (undo rear seat top fastening and fold forward for access). Op/C – vertical pre rotator slider moves freely without any jamming.
A6	Power-plant/ Engine	Service/lube - Oil reservoir level correct & cap secure, & coolant system full with correct fluid. Inspect – coolant (water and oil) hoses free from splits Inspect - All springs secure and wired where appropriate, esp exhaust Inspect - Exhaust system securely mounted, and free from splits or cracks, leaks etc. Inspect - Air filters clean and secure

		Inspect - Engine mountings in place and secure and rubbers free of cracks or any deterioration Inspect - Plugs and plug caps secure Inspect – coolant and oil radiator for condition, security and leakage, **Note:** inspect all soldered joints for evidence of cracking. Op/C - engine controls for full and free movement in the correct sense Inspect – all 'loose' cables around engine for correct attachment and connection Inspect – security of SSM module (if fitted)
A7	Propeller	Inspect - Propeller blades & hub clean and free of cracks, splits & damage Inspect – Prop tape secure and undamaged (if fitted) Inspect - Propeller blades securely mounted to hub, and hub to engine (all bolts present and secure, and check torque stripes to ensure that bolts have not turned) Op/C - Propeller and engine turns over smoothly (in normal direction of travel only) with no undue noises etc (with ignition OFF and throttles closed!!) *Remember, it may start!! If possible chock the aircraft and/or apply brakes!*
A8	Fuel System	Inspect - Both tanks (where fitted) for security and condition, ensure absence of leakage, check cap for seal and security, check sight gauge & fuel level, check fuel shut off valve for proper operation. Op/C - Check fuel gauge reading same as actual tank level. Inspect – fuel for water content via drain points under each tank. Inspect - check fuel line for security, cuts, dry rot, and kinks**.** Inspect - Fuel filter – ensure filter is clear of debris
A9	Rotor	Inspect - Rotor teeter bolt, nut and locking pin in place and rotates freely Inspect - Blade to hub bolts, washers and nuts in place Inspect - No sign of blade cracking or other failure (visual check) Op/C - Rotor teeters freely to stops (both planes) and rotates freely (check with/without control stick). Inspect - Blades clean and free from chips, dents or damage Inspect – that teeter bolt has been correctly lubricated. Note: it will be beneficial to service life if the teeter-bolt is greased (thru the nipple) every 5 hours. Check – bolts (6) connecting prerotator gear to rotor hub are secure
A10	Spin up mechanism	Op/C - Secure and free, and that the belt is free of splits/cracks (note; if the belt is dry vibration during pre rotation may be experienced: lube with dry lube PTFE or equivalent silicon spray) Inspect – pre rotator gear wheel for cracks or damage Inspect - pre rotator universal joints for free operation or failure Inspect – engine mounting bracket for cracks/fractures Op/C – pre rotator brake works with panel switch switched to 'BRAKE' Inspect - lower shaft rubber boot for damage and free movement of slider shaft.
A11	Tail and rudder assembly	Op/C - condition and security, check surface for delamination, check cables for fraying and secure connection to rudder, check nico clamp for security, Inspect - horizontal stabiliser and fins for security and any sign of damage from heavy tail down landings Inspect – trim tab is bent where expected, normally around 25deg to the left. Op/C – check rudder bearings for security and operation Op/C – check that cable pulleys work smoothly with no cable fraying
A12	Cabin area & Instruments	Op/C - Safety harness mountings secure, webbing free of tears/frays, and connects/disconnects freely on demand Inspect that seats are securely attached to airframe (and rear seat refixed in place) Inspect - Radio secure, battery charged (if applicable) Inspect - Electrical wiring sound and secure - no sign of overheating or damage Inspect - instrument readings are consistent with ambient conditions Inspect - Test operation of electrical circuits Inspect - that markings and placards are legible Inspect – Roll trim, where fitted, is set fully left (no trim)
A13	Airframe	Inspect – Welded joints for any sign of distress or accident damage (all areas, but especially the mast to lower airframe behind the seat and under the engine). Inspect – all hardware for tightness/security
A14	Pneumatics	Inspect airlines and cylinders for loose fittings

A15	Other	Op/C – brake lever operates normally and brakes function. Op/C - Ground run. Check both electric fuel pumps (where fitted) are operational before starting engine. Confirm full power obtainable (if practical), & that engine, propeller & rotor vibration is within normal limits. Confirm all gauges reading normally. Check - Remove any rotor retaining straps, and close any luggage bags.

4.4 FLIGHT OPERATION

The manual is not replacement for theoretical as well as practical training as operates this machine. Failure to take appropriate instruction can have fatal consequences. Before commencing flight operations, and before each flight, the pilot must complete a visual check of the autogyro. Expertise necessary to do this it is obtained during the pilot training.

4.5 NORMAL PROCEDURES AND CHECK LIST

ENGINE START PREPARATION

The engine must only be started if the pilot's seat is occupied by a person trained in the aircraft operation.

Fig 2. gives the basic control layout. Control elements, functions and operation are as follows:

Item function	Status	Operation
Main switch (9) key	OFF	Turn anticlockwise
	ON	Position centre
	START	Turn fully clockwise (spring return to centre)
Throttle (4)	CLOSED (IDLE)	Pull to the rear
	FULL POWER	Push forward
Choke (5)	ON	Pull back to the rear
	OFF	Push forward & down
Ignition switch (23)	IGNITION ON	Both switches up
	IGNITION OFF	Both switches down
Brake (6)	ENGAGED	Operate by pulling the hand lever back to the throttle lever. Lock if needed with pawl.
	OFF	Squeeze lever to throttle and unlock pawl – open hand.
Fuel cock (912ULS)	ON	Lever in line with aircraft centre line
	OFF	At 90 degrees to a/c centre line
Fuel level (12)	Fuel level must be visible in the tank, to the level required for the flight	Also view fuel gauge for same reading as on tank

TO START ENGINE (WITH STANDARD IGNITION SYTEM)

Main switch	ON (generator warning light on)
Choke	Engage (until engine warm and will run without choke.)
Throttle	Closed
Propeller	Danger area – keep clear!
Brake operation	Lock brakes on
Magneto switches	On (both)
Starter	Operate until engine starts. Take care! Do not run the starter continuously for more than 10secs, and no more than 30 secs in 2 mins – damage to the battery or starter may result

TO START ENGINE (IF SB-041 Conair Sports SSM INCORPORATED)

Main switch	ON (generator warning light on)
Choke	Engage (until engine warm and will run without choke.)
Throttle	Closed
Propeller	Danger area – keep clear!
Brake operation	Lock brakes on
Magneto switches	Mag1ON, Mag2 OFF for initial start using ignition circuit 1 only. When the engine has started ignition circuit 2 should be introduced (after about 5 secs) by selecting Mag2 ON. When the engine has been warmed to normal operating temperature the pre-flight “Mag-drop” checks must be performed in the normal way
Starter	Operate until engine starts. Take care! Do not run the starter continuously for more than 10secs, and no more than 30 secs in 2 mins – damage to the battery or starter may result.

Check list before the start

1. Safety belts on and secure
2. Helmets secure
3. Parking brake on
4. Fuel supply on
5. Altimeters adjusted
6. Rudder control effective
7. Wind direction known

Commence start

After turning the master switch on, the alternator light will come on, and the boost and TCU electronic check lamps will light for about 2 secs (if Turbo engine). Before starting the Turbo engine, listen for fuel pump noise, and then switch on second pump, and listen for noise increase. If either pump does not run, STOP and investigate. Second pump may be left on, or turned on when ready for flight.

The second pump should be used as a backup for take off and landing only. It is not required for normal flight use.

Where fitted, the low voltage warning light may also come on, especially if already using heated clothing. It flickers gently when the alternator voltage is similar to demand voltage, and goes off when demand is exceeded. Check that it goes off when the engine is run up. Flashing intensely (about 2 to three times per second) & very bright means the alternator

supply voltage has exceeded the set levels, and is overcharging. In this case stop and resolve.
Once started the 'Gen' light will go off, indicating the alternator is working. In low light conditions it may be seen to flicker gently. This is normal.

Check oil pressure. If not increasing correctly shutdown engine immediately and find the cause. When the engine is warm, close the choke. For starting a cold engine, have the choke fully out and throttle closed, otherwise the choke does not work. With a warm engine do not use the choke. Warm the engine up at approx 2000rpm, then at 2,500rpm until the oil temperature reaches 50°C. Check for mag drop at 4,000 rpm by turning off each ignition switch in turn. There should be a 300rpm max drop off, and max 115rpm difference between coils.

GROUND HANDLING:
The behaviour of the nose gear wheel is easily learned with some taxiing practice. The nose wheel is self centering, and linked to the pedals via springs and mechanical limit stops. When turning at low speeds use brakes and power to turn as well as the pedals in order to reduce the turning circle.
It is possible that high speed taxiing, or certain loading and ground conditions may cause nose wheel shimmy. In this event, either slow down, or if wheel balancing, slow down or raise the nose.
When moving on the ground take care where the rotor disc is relative to the wind direction, and unless loading up the disc, keep the stick into the direction of the wind to avoid being tipped over.

The aircraft has a high centre of gravity, and is most at risk during ground handling when lightly loaded. Whilst taxying at up to 30mph is safe in a straight line, corners must be taken slowly to prevent the aircraft tipping over.
Be careful not to keep the brakes engaged for a long taxy with the choke on – the choke idle rpm is higher, and the resultant thrust increases the brake loads, and can lead to brake fade on a long taxy. Intermittently apply the brake instead.
WARNING! Excessive idle rpm on long distances will cause brake pad fade and possible pad damage. Idle rpm should be approx 1600.

START AND CLIMB
If possible always take off into wind.
The maximum cross-wind component for take off is 22kts.
Switch the pneumatics switch to 'TRIM', which releases the rotor brake.
Keep the engine at about 2000rpm, and the control stick forward.
Disengage the parking brake lock pawl, and hold brakes on by squeezing throttle and brake lever together.
Actuate the pre rotator by pressing the button, and as rotor speed increases, increase engine speed to suit. Normal pre spin is a rotor speed of 200 rpm (maximum Prerotator speed is 270 rpm). If the rotor speed overtakes the pre rotator, and the pre rotator disengages, release button. Increase engine rpm and re engage.
Disengage pre rotator and pull the stick fully back. Check/adjust trim pressure to about 2bar or less if lightly loaded to reduce stick load on take off
Let go brakes, and bring the engine up to take off power.
Hold direction using the rudder, and as soon as the nose gear wheel takes off, keep the nose down to build up airspeed and take off in a flat attitude.
If necessary reduce stick force by actuating the trim.
The best climb speed is 60-65mph.

After reaching 260ft, throttle back to about level flight rpm, between 4 and 5,000rpm.
Pay attention in hot weather to the cylinder head and oil temperatures. If these should rise with long climbs over the placarded values, then adjust your speed or attitude to compensate.

Note that it is possible to operate without the pre rotator. In this situation, start the blades by hand to about 45rpm. Taxy slowly into wind, and, holding the stick back, let the rotor speed increase. It will take about 320m to reach over 200rpm, at which stage full power can be applied and normal take off procedures continued with.

CRUISE
Turn off the back up electric fuel pump
Transit from climb to cruise, and use the trim to reduce stick force in the chosen cruising speed. Trim position can be seen from the pneumatic pressure gauge.
The speed range for the cruise lies between 50 and 90mph with engine speeds from 4000 to 5500 rpm.
The most economical speed is 56 to 62mph.
The permissible maximum speed (V_{NE}) is 100mph and must not be exceeded.
In strong gusty conditions do not fly faster than 70mph. 50-56mph is a safe manoeuvre speed for such conditions
The cruise fuel consumption is approx. 12 ltr/hr at speeds under 62mph to approx. 20 ltr/hr plus at 100mph, depending on aircraft loading.

LANDING
Before making the approach check all key equipment and functions.
Ensure brakes are not locked on, and electric fuel pump turned on.
If fitted, trim roll for left position.
The landing should take place into wind. Maximum crosswind limitation is 15kts.
Reduce engine rpm and speed to 70mph on short final.
Final approach speed should not be under 55mph. If in turbulence or rain, 62mph. As the aircraft closes to the ground, reduce the speed by flaring and touch down with the main wheels. Hold the stick back to use the rotor as a brake, and reduce speed for taxy. Reduce engine power as required for taxi or idle if at rest.
When required, turn pneumatics selector switch to ROTOR BRAKE to engage the rotor brake and automatically push the stick forwards. Take care in windy conditions to prevent blade flap, and move stick into wind if needed! Blades can be parked fore and aft the aircraft by either increasing brake pressure at the appropriate time by pulling the stick rearwards, or by depressing the brake interlock release button, and momentarily engaging the prerotator. A little practice may be required.
Caution: If the stick is moved in this way use only a small movement (no more than half travel) because:

- the leverage increases the pressure in the system, which could exceed allowable pressure 10bar
- the slow moving rotor blades will have reduced clearance to the tail

After engine has idled for at least 30 secs (2mins for a 914UL due to the extra heat generated – if stopped early the engine oil may carbonise in the turbocharger and result in damage), turn the engine off using the ignition switches, and then turn main switch off. Do not exit the gyroplane until the rotor stops turning.

An emergency landing is made exactly the same way, except that the above speeds should be maintained in order to ensure sufficient rotor energy is left for the final flare.

WARNING! FUEL MANAGEMENT!
The fuel tanks retain an increasing amount of unusable fuel depending on the nose down (descent) angle. At a 5 degree descent there is approximately 1.1ltr of unusable fuel per tank. At 10 degrees nose down this increases to 3.4ltrs per tank. Be careful that you do not descend at a steep attitude with low fuel! The engine may stop from fuel starvation!
Zero fuel contents is marked at 3.4ltrs per tank

Descent angles are steepest when flying at 450Kg TOW (or at 500Kg if permitted). The following nose down angles (recorded with 75Kg pilot, 100Kg passenger, 28ltr fuel) are for reference only, as exact loading conditions will vary:

Normal power on descent, engine at 4,000rpm
1. Slow descent, 50mph - 0deg
2. Normal descent, 60mph - 2deg
3. Fast descent, 70mph - 3.5deg

Low power on, engine at 3,000rpm
1. Slow descent, 50mph - 4.5deg
2. Normal descent, 60mph - 6deg
3. Fast descent, 70mph - 7deg

Flight idle, steep descent
1. Slow descent, 50mph - 10deg
2. Normal descent, 60mph - 11deg
3. Fast descent, 70mph - 12deg

Note! A heavier pilot will increase the descent angle.

Note! Implementation of aircraft fuel system modification MC-085 allows use of the LH fuel tank contents in a nose down attitude to the same minimum unusable as in level flight. The RH ‘header’ fuel tank contents are fed to the left hand tank via a crossover tube at the rear of the tank, so prolonged descent under power at very low fuel tank contents may still drain the left tank with some content in the right tank.
ALWAYS plan your fuel loading to suit your flight, with headwinds and alternate airfields in mind.
ALWAYS make a safe precautionary landing to get more fuel, rather than wait for an unsafe emergency landing because you have run out of fuel!

Check list after flight finish

1. Ensure master switch and electrics are off (prevents a flat battery)
2. Clean and check aircraft ready for next flight (better to find failures now than when you are eager to fly!).
3. Park in the proper area, chock wheels, and cover. Unless required for safety, it is best to leave the aircraft unbraked when parked.
4. Complete logbooks.
5. Celebrate an excellent flight!

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5. PERFORMANCE

5.1 PERFORMANCE DATA

The following operational parameters were confirmed as a result of flight testing. Note that this assumes the engine and aircraft are in good condition, with an averagely capable pilot. The parameters apply to standard conditions (sea level, normal pressure, 15°C, zero wind, max take-off weight 450kg (or 500kg if SB-013 incorporated), even field with short grass in good condition). Airfield altitude, higher temperature and low air pressure will change performance data.

SPEEDS
Minimum speed (Vmin) 20mph (914T or lightly loaded 912S)
25mph (912S at MTOW 450kg)

Or if RotorSport service bulletin SB-013 incorporated:
Minimum speed (Vmin) 30mph (914T)
35mph (912S at MTOW 500kg)

Manoeuvre speed (VA) 50mph
Cruising speed up to 90mph
Permissible maximum speed (VNE) 100mph

TAKE OFF DISTANCE (MTOW)
Take-off run 20 - 170 m (66-560ft) (depending upon loading and wind force)
Take-off distance over 15m (50ft) obstacle 320m (1056ft) in still wind with the rotors at 200rpm on grass. This is extended to up to 440m if flying at 500Kg take off weight.
LANDING DISTANCE
Landing run 0 - 20 m (66ft) braked (although brakes are not normally required)
Landing distance over 15m (50ft) obstacle 80m (260ft). This is possible with a reasonably steep nose down attitude, and can be improved upon. A flatter attitude will result in a longer run in, up to 120m. It is important to practice different landing techniques to match attitude and speed if short landing are required

CLIMB RATE (with standard propeller)
At 450kg take-off weight
Single-seat 1,200fpm (912S) or over 1,500fpm (914T)
Two seat 600fpm at MTOW (912S) or 900fpm (914T)
At 500kg take-off weight (only if RotorSport service bulletin SB-013 incorporated)
Single-seat 1,200fpm (912S) or over 1,500fpm (914T)
Two seat 500 fpm at MTOW (912S) or 700 fpm (914T)

ROTOR RPM
Assumes steady state (cruise) conditions

MTOW	380rpm
Average TOW	350rpm
Min TOW	300rpm

Rotor rpm will naturally rise from this for a short time in gusts and turns, and will fall if G loadings are reduced. If a reduction in rotor speed is noted, ensure your flight attitude is one which loads the rotor, and take immediate action to achieve this. If rotor speed fluctuations are observed when in a flight state that they should not, then land and investigate immediately.

Rotor rpm will also fall by about 10 to 15 in a minimum speed 'hover' Be careful, particularly when lightly laden with maximum power that you do not lose further rpm and rest on the engine power alone. Rotor RPM must not drop below 280rpm in flight.

There is also a meter recording the rotor bearing temperature. Land and investigate if there is any significant rise over the ambient temperature!

5.2 FURTHER DATA RANGES

The range depends on the fuel consumption, which is proportionally larger with high airspeed, as with lower. The most favourable consumption lies somewhat above the speed of the best climb. With two full tanks approximately 550 km (340miles) is available with a cruising speed of 100 km/hr (62mph), but this should be established by trial for each individual aircraft/loading condition

CROSS-WIND

The maximum demonstrated cross-wind component for takeoff is 36 km/hr (22kts).
Landing should always be made into wind where practical. The maximum landing crosswind 15kts.

NOISE DATA

The MT-03 meets the German BUT noise protection requirements for ultralight autogyro of 68dB(A) max.

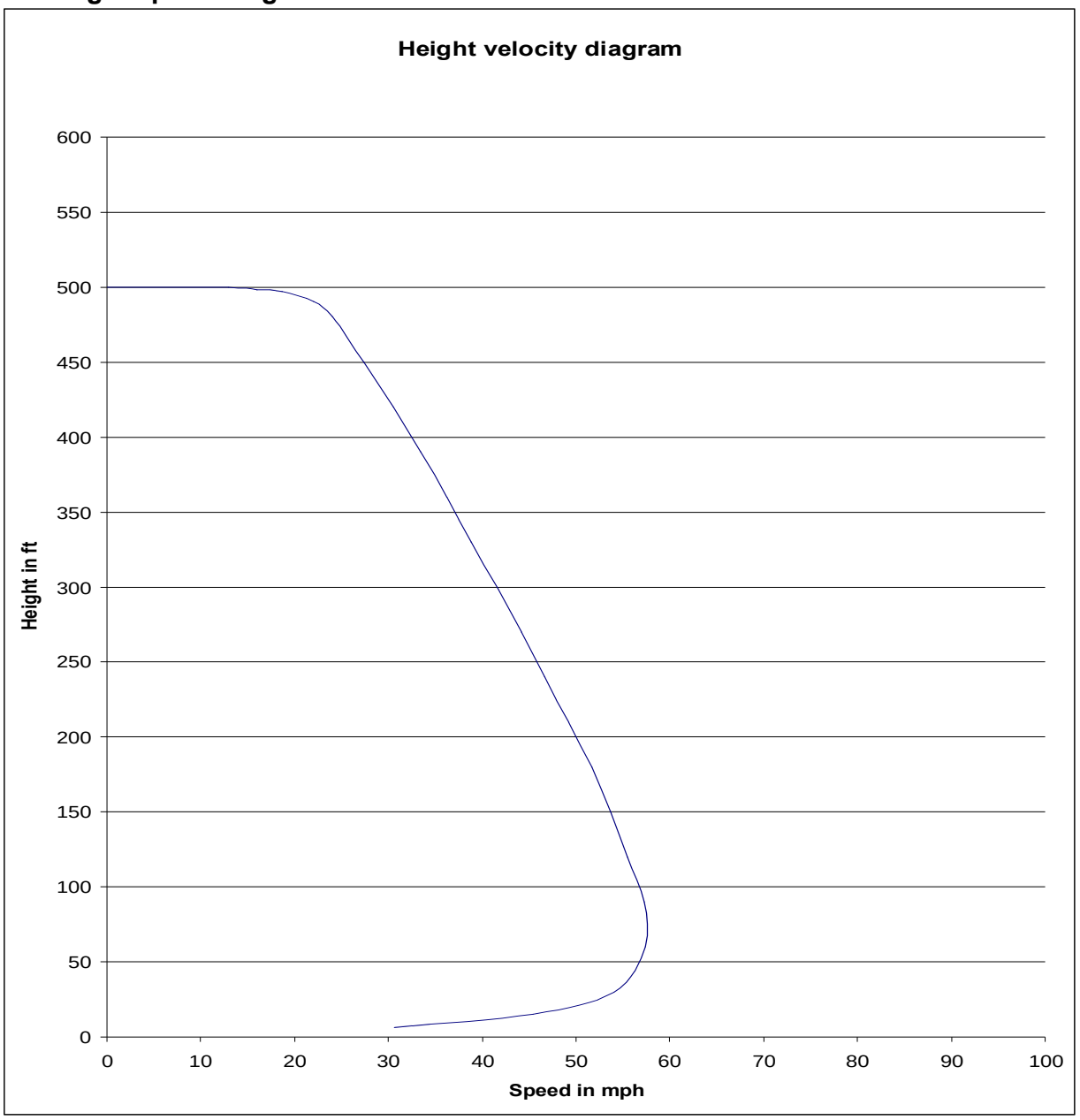
TYRE PRESSURE

Main landing gear wheels 1.5 to 2.2 bar
Nose gear wheel 1.5 to 1.8 bar

SERVICE CEILING

The service ceiling is 10,000 ft.

5.3 Height speed diagram



The height speed diagram indicates the minimum height for the flown speed (IAS), at which a safe landing is considered possible.
Engine failures whilst flying at heights and speeds to the left of the graph line may prove fatal for the pilot and passenger.

6. DESCRIPTION

6.1 GENERAL STRUCTURE

The framework of the autogyro consists of an inert gas-welded high-grade stainless steel tubing framework. The tail unit structure is manufactured in GRP (or in certain cases Carbon fibre RP). The engine is attached over a steel tube carrier (motor mounting frame) at the rear of the mast. The rotor system is manufactured from aluminium extruded sections. The main landing gear sprung spar is made from GRP to withstand most handling situations, and the nosegear mounting fork is steel tubing. The fuel tank is manufactured from PA12 – plastic or polyurethane. Fuel pipe is fire resistant fabric-strengthened rubber hose. The windshield consists of break-proof polycarbonate. The pilot enclosure and wheel spats consist of GRP components material.

6.2 Controls

Rotor

The rotor head control is via a normal push/pull rod system, mounted on the keel giving both roll and pitch, with a traditional stick in the front cockpit. Pushing the stick forwards tilts the rotor head forwards, and pulling it back tilts the rotor rearwards. Left or right tilts the rotor disc in those directions.

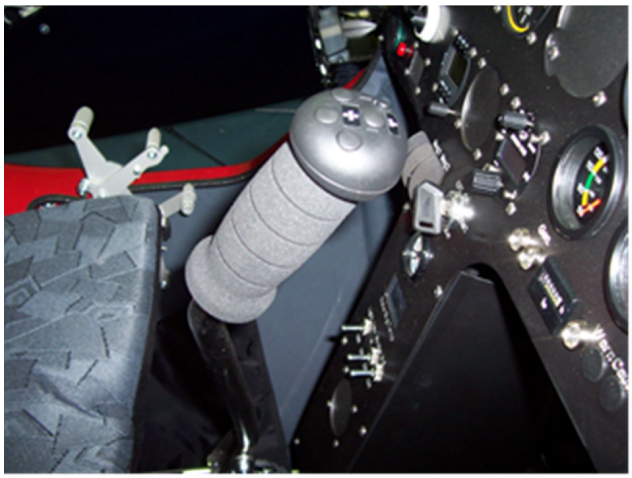
Stick grips and functions - Three grip types are available

Pre rotator engage button

Trim (forward nose down, rear nose up, roll trim left or right where fitted)

Press to talk (PTT)

Spare



The trim pushbuttons on this grip are arranged logically Fwd/Back & L/R. The pre-rotator button is top-left and the PTT on the front face

MC-162 introduces an alternative stick-grip, optimised for use with gloved hands (OEM stick grip). To ensure that operating clearances to instrument panel and seats are maintained the alternative installation is supplied as a pre-wired stick-grip assembly. Its placarding is the same in content but positioned differently. (MTOsport installation is shown below).

Placards fitment if pitch-trim only

Placard fitment if pitch & roll trim fitted

Rear stick

A rear seat stick is available for training purposes. It has a simple rubber grip with no push-buttons.

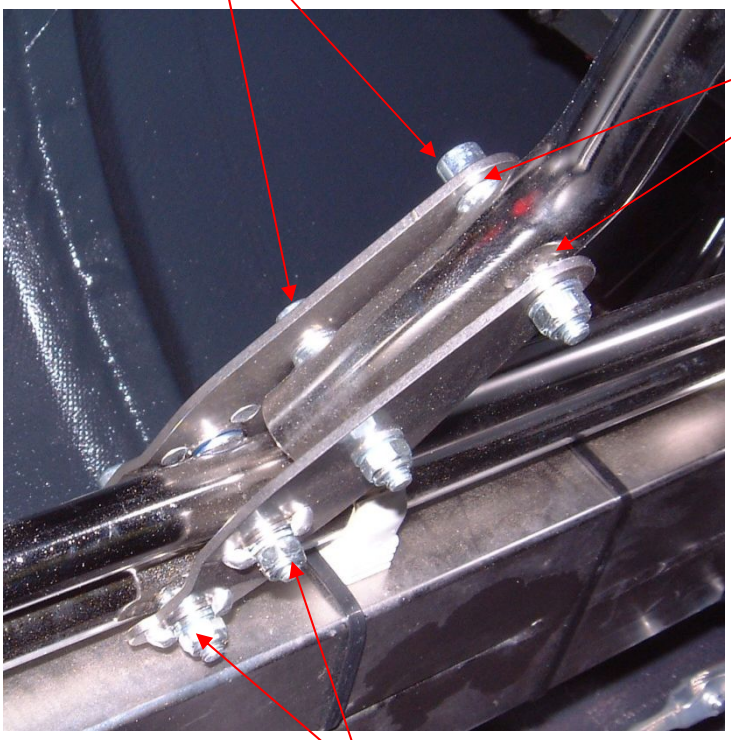
There are two rear seat stick options. The standard stick is the same length as the front stick, and is general purpose.
The 'Instructor' stick is a special long length, giving instructors extra leverage over the student in the front seat. IT IS DANGEROUS to fly with this stick with a normal pilot or student in the rear seat, as that person may be able to overpower the pilot control. When fitted, it is important to ensure full travel of the Instructor stick before flight. The long length means that it moves closer to the instructor's abdomen, and bulky clothing etc will get in the way.
The 'Instructor' stick is clearly marked with a red band and appropriate etching.

The stick may be removed for weight saving or safety by taking out the two bolts holding the stick in. On no account must the bolts holding the side plates to the control rods be removed.

NOTE! The aircraft logbook must be annotated when the stick has been removed or refitted. A duplicate inspection is recommended!

Remove these two M6 cap head bolts.

Note there is a washer between the stick and the side plate, both sides of the stick, both bolts.

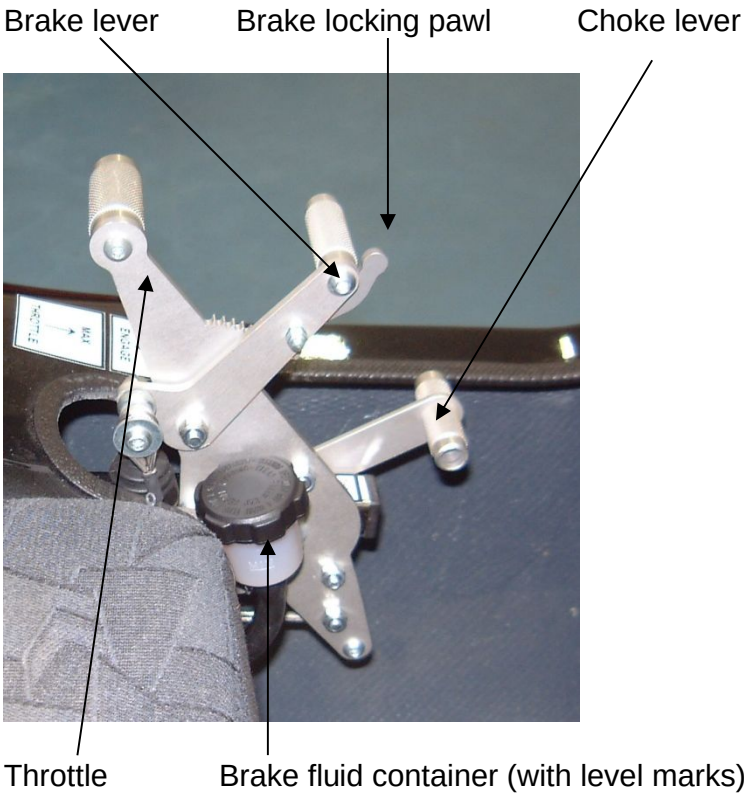


Do not remove these bolts

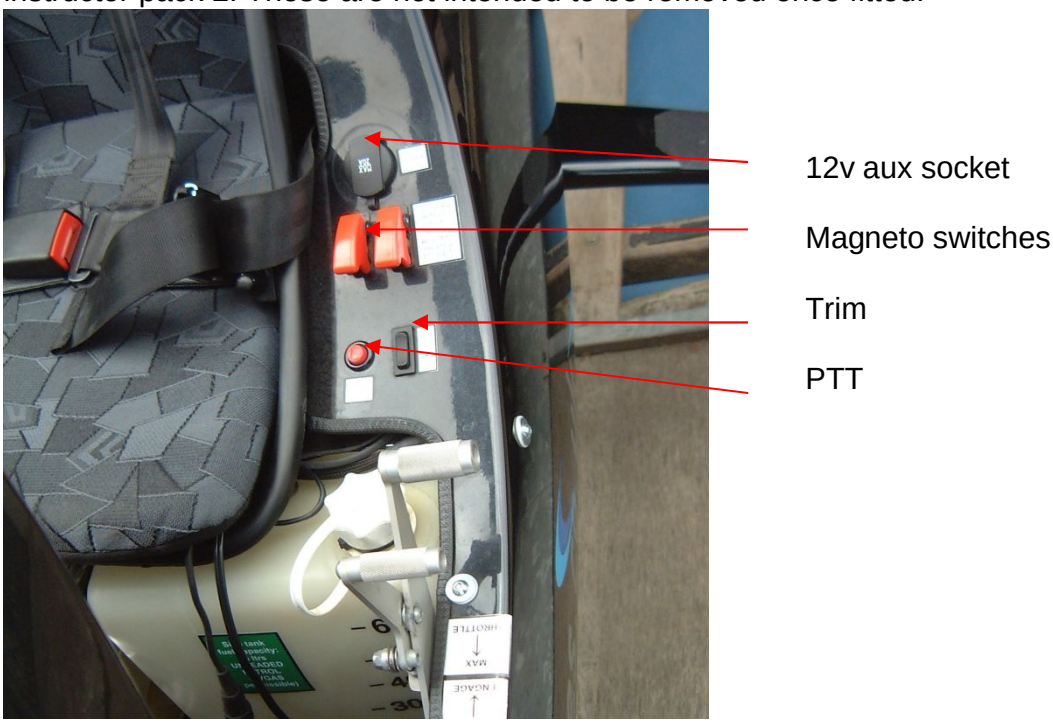
Note: It is also possible to minimise the rear-stick mountings and rear rudder pedals, so that there is less risk of interference with these controls by a rear-seat passenger or baggage. Such modifications require implementation of MC-135 (stick) and/or MC-131 (pedals) – contact RSUK for further information.

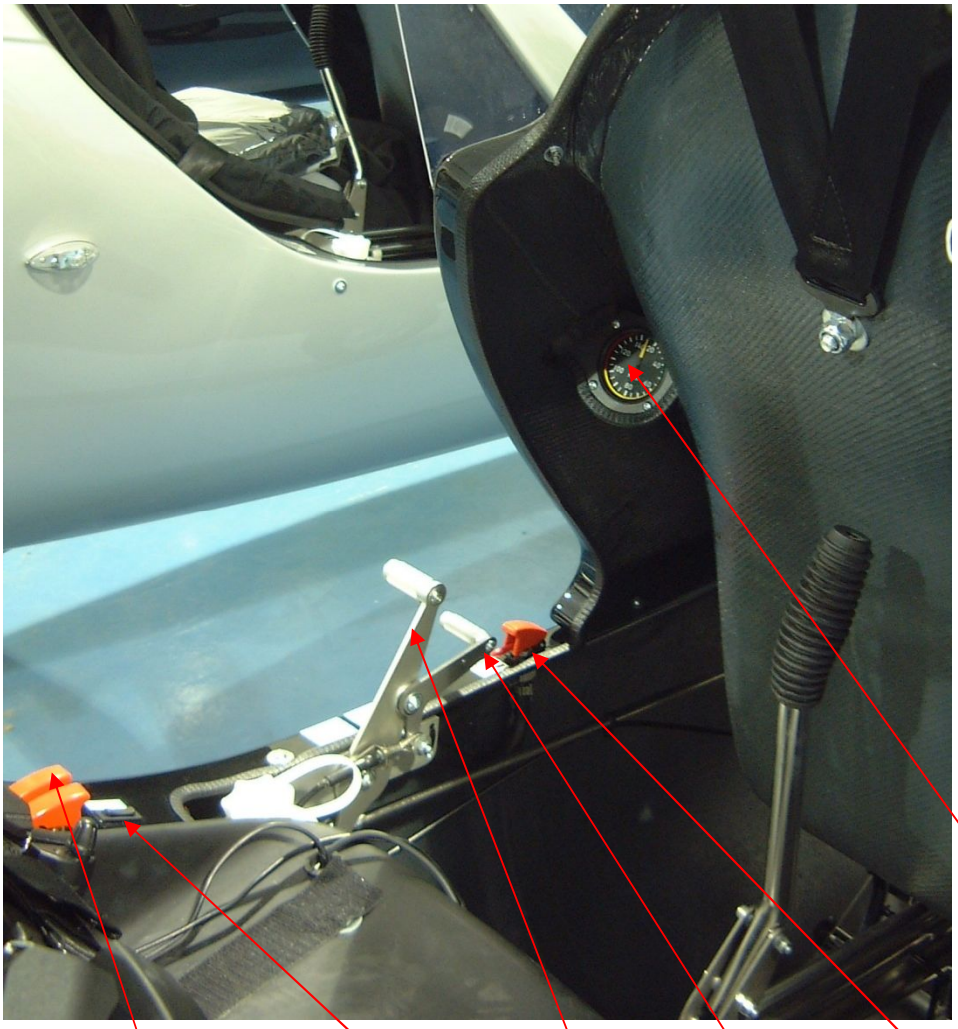
Rudder
The rear rudder pedals are connected to the rudder via steel cable, and to the front pedals by linkages via the nosewheel for steering. Pushing the right pedal will turn the aircraft right in the air and right when on the ground.

Throttle
The front seat is fitted with a throttle, choke and brake lever cluster (see photo). The brakes may be locked on using the detent. Pushing the throttle forward increase power. The choke lever is pulled rearwards to engage, and if inadvertently left on, is pushed off when the throttle lever is moved forwards.



The rear seat is not fitted with a throttle as standard – this is an instructor option fit. The unit is retained with two screws from the top, and one screw and nut retaining the link to the front throttle. The unit may be removed. The unit may also be fitted with a brake lever to operate the mainwheel brakes via a Bowden cable to the front seat throttle cluster. Again, this may be removed, with the appropriate tools and replacement parts.
The rear seat area may also be fitted with a trim switch, mag kill switches and an ASI, as instructor pack 2. These are not intended to be removed once fitted.





Rear seat kill switches Trim switch Throttle Brake Fuel cut off Rear seat ASI

A PTT button is mounted to the left of the seat, and a 12v aux socket fitted if required.

6.3 INSTRUMENT PANEL

The arrangement of the control elements and instrumentation in the cockpit is represented in fig. 2. Differences may occur depending on the equipment fitted.

1. Change over switch pneumatics (TRIM to ROTOR BRAKE)
2. Altimeter
3. Airspeed indicator
4. Engine rpm
5. Oil pressure
6. Cylinder Head temperature
7. Oil temperature
8. Ignition switch (one for each coil)
9. Charging lamp
10. Main switch
11. Rotor rpm
12. Compass
13. Hour meter
14. Carburettor intake temperature
15. Rotor bearing temperature
16. Air pressure gauge for Trim and Rotor Brake
17. Accessory switches
18. Electric fuel pump switch
19. Radio (if fitted)
20. Fuel gauge
21. Rotax engine status lights
22. Pre-rotator & rotor brake interlock release
23. 12v Auxiliary socket
24. Transponder (if fitted)
25. Low fuel light (if fitted)
26 Low voltage lamp (if fitted)

There may be unused switch or indicator positions on the panel, these may be fitted with blanking plugs

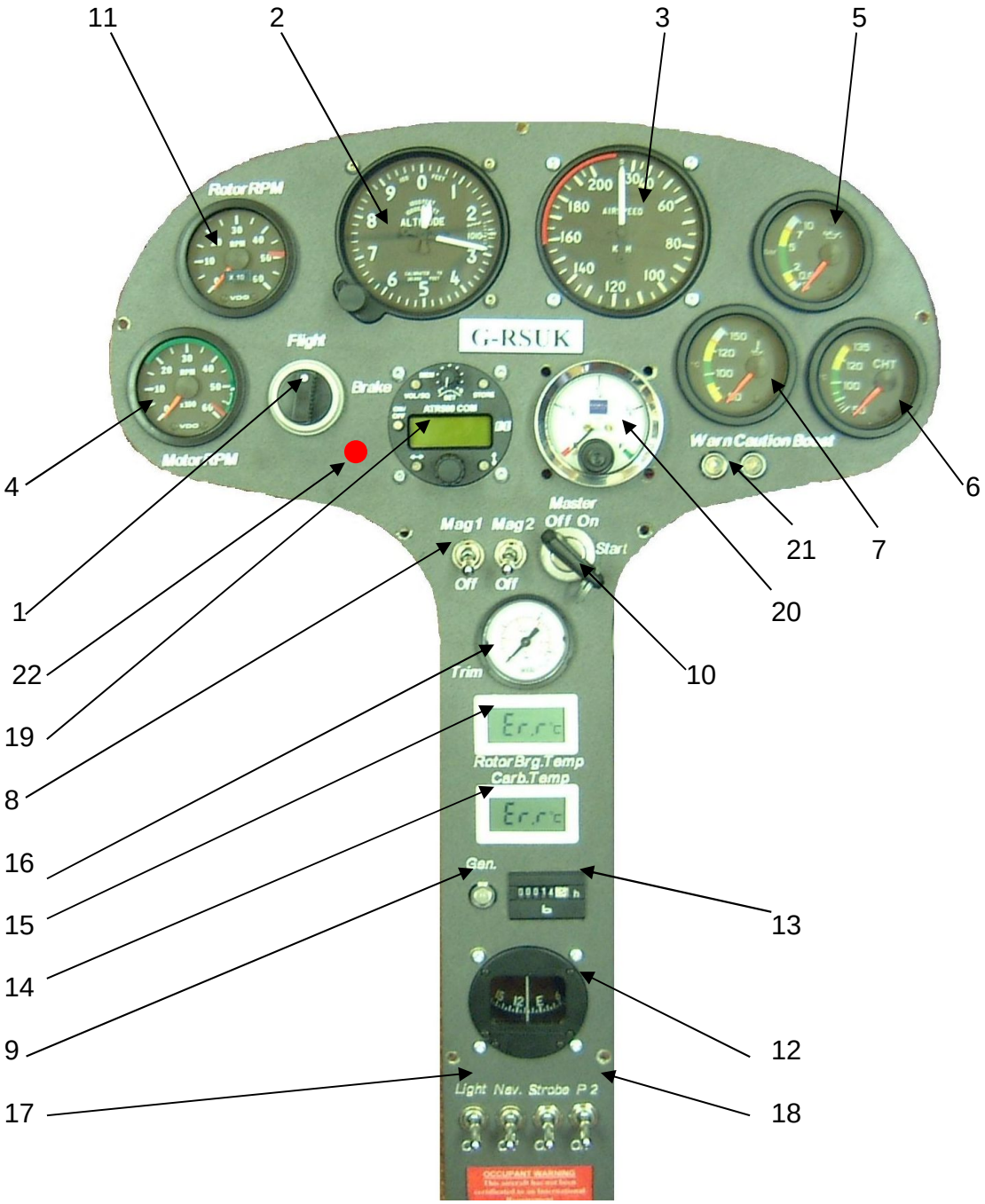


Fig. 2: Control elements and instrumentation in the cockpit – first generation panel

REMARK: Note the pushbutton on the fuel gauges shown above and below. If such a button is fitted in or adjacent to the gauge it must be pressed before reading the fuel level. If there is no button the gauge is an electric type which shows the level at all times the instrument is powered.

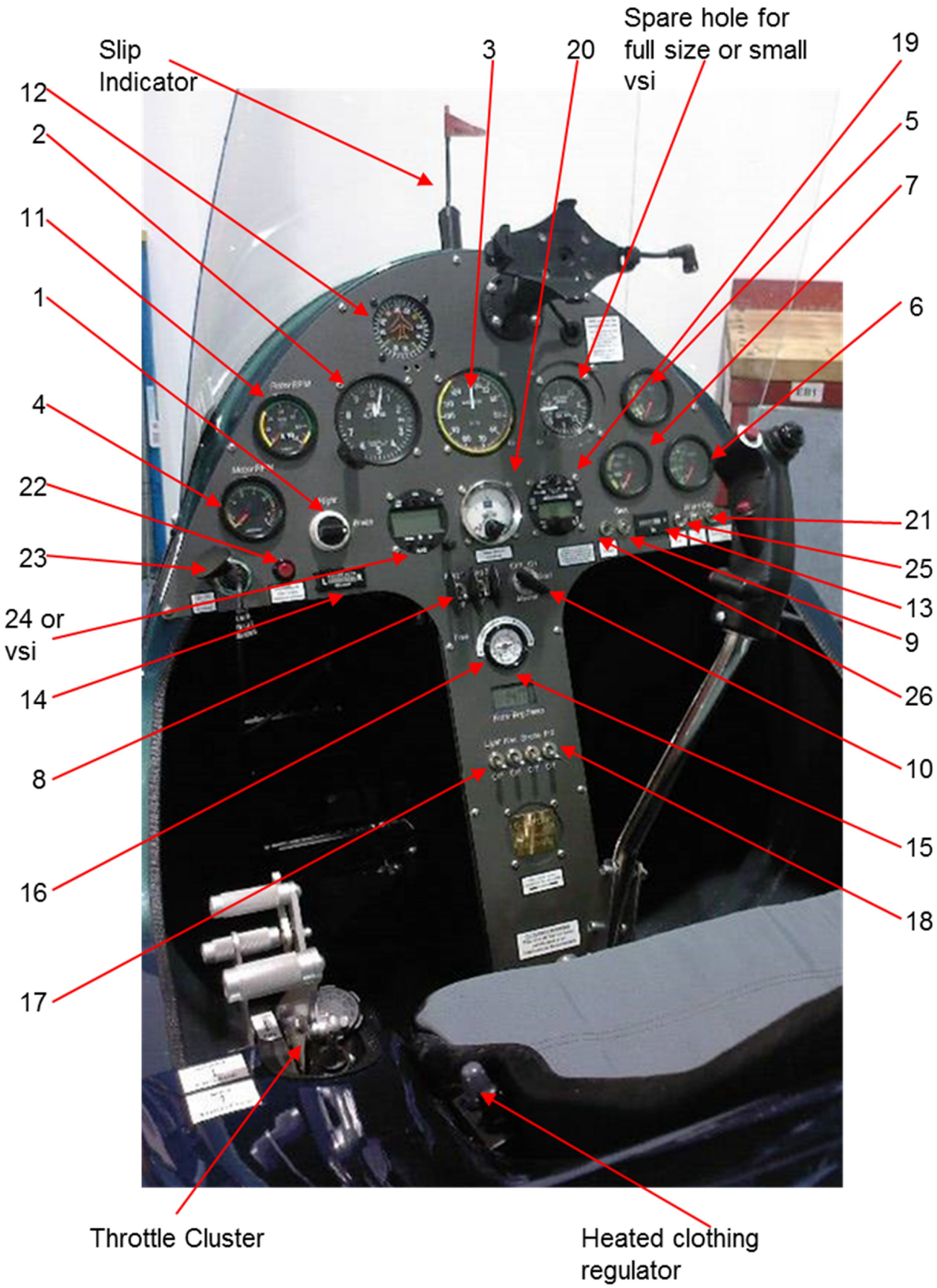


Fig 3: Second generation panel

Under modification MC-218 a new design of rpm gauge was introduced (engine rpm and rotor rpm) and may be supplied as spares. They are visually and functionally similar to the earlier gauges but carry-out a full sweep of the gauge face as a self-test feature when powered-up by the aircraft master switch.

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6.4 Wheels/tyres

Both the mainwheels and nose wheel use tyre size 400/100-2Ply (with inner tube). If flying in the winter with a frozen-over or snow covered runway, it is advisable to remove the wheel spats in order to avoid their damage and snow build up inside them. It is the pilot's responsibility to ensure that in the rear part of the spat no snow has built up, which could lead to freezing against the wheels and stopping them from turning. Always use loctite 243 on wheel spat screws, or any other screws removed that do not have a locking method. RSD4363 Heidenau 4.00-8 55M tyres may be used as an alternative, as approved under MC-106 (1Kg weight increase per tyre). Note that alternative heavy duty tyres will carry a significant weight penalty

Under modification MC-213 new aircraft are supplied with nitrogen-filled tyres. Nitrogen gas provides certain advantages and owners may wish to consider its use (it is available from a number of UK tyre specialists). To denote nitrogen filling green valve caps must be used.

Arrangement nose gear wheel and main landing gear

The main landing gear consists of a GRP 'u' frame, which is fastened to the airframe. There are two options, 450kg and 500kg MTOW. Both are identified by serial number and the 500kg version is etched-marked accordingly. The lower end carries the wheels, which are braked with hydraulic brakes. The nose gear wheel sits in a fork pivoting in the airframe from high-grade steel tube. It is non retractable, has stops in both directions, and is steered by a spring linkage to the pedals. The main landing gear and nose gear wheel are maintenance-free. The nose gear wheel pivot is to be greased as required – it must be always free to rotate, with slight friction load, and has a disc spring under the pivot nut to create this friction load. Check the fixing bolts of the brake disks before each flight. Change tyres when worn (to change the tyre the nose wheel must be removed from the chassis) as per maintenance manual.

6.5 Seats and belts

The seats are GRP bowls, which are fastened to the frame structure by screws, and transfer the pilot weight on the airframe structure. For single-seat flights only the front seat is used, so the cushions of the rear seat have to be removed or secured! A four point harness is fitted in both seats, so the rear belts must be fully fastened prior to single seat operation to prevent excess flapping or loss/damage in flight.

Optional fitment energy absorbing seat cushion foam was released under change MC-102. This allows fitment of two pieces of foam inside the bottom seat cushion, a soft foam on the upper side for comfort and a harder foam to absorb landing loads. Part no's are:

RSD5126	Seat cushion cut foam soft, 12mm, fr sports cushion
RSD5127	Seat cushion cut foam soft, 12mm, rr sports cushion
RSD5128	Seat cushion cut foam hard, 25mm, fr sports cushion
RSD5129	Seat cushion cut foam hard, 25mm, rr sports cushion
RSD5130	Seat cushion cut foam soft, 12mm, std cushion
RSD5131	Seat cushion cut foam hard, 25mm, std cushion

See Service Bulletin SB030 for fitment instructions.

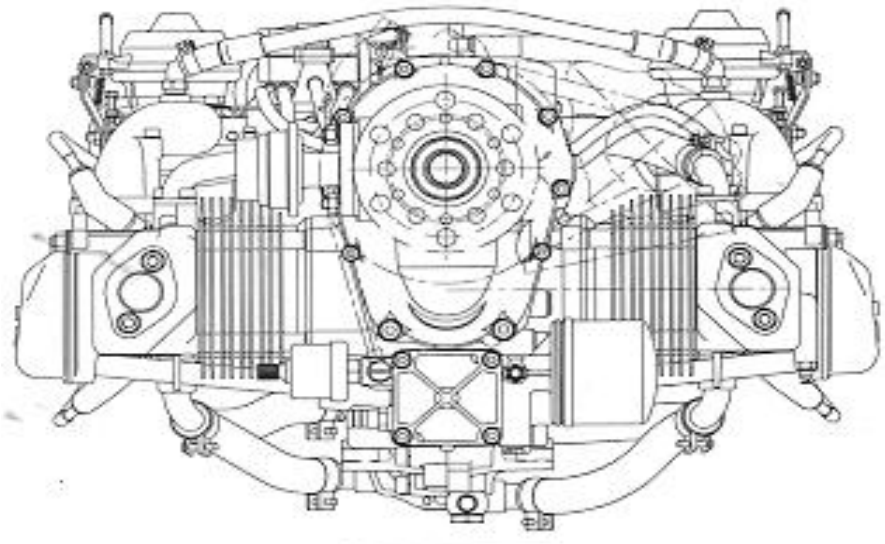
6.6 ENGINE

The engine provided is either a 4 stroke Rotax 912 or 914. This engine is appropriate for the market, and is in use on many other similar aircraft – but possesses no certification. Engine failures occur with more regularity on uncertified engines, so always plan your route and fly in such a way that an emergency landing is safely possible. To ensure maximum reliability, complete all maintenance requirements in line with manufacturer's recommendations on time and regularly check the Rotax websites for information on any engineering changes or service recommendations.

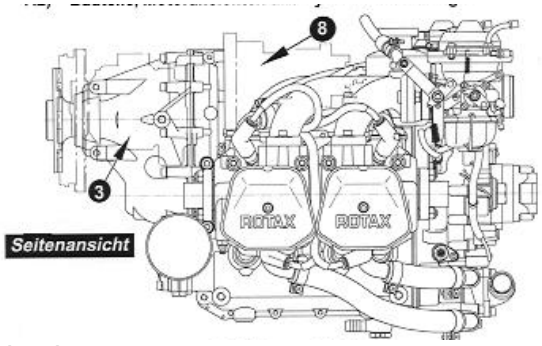
When replenishing cooling agents never use pure water, only the recommended 50/50 mixture of antifreeze and distilled water (or Evans NPG+ or equivalent).

Air cleaners to be replaced or cleaned according to the manufacturer's recommendation.
Fig. 10 engine

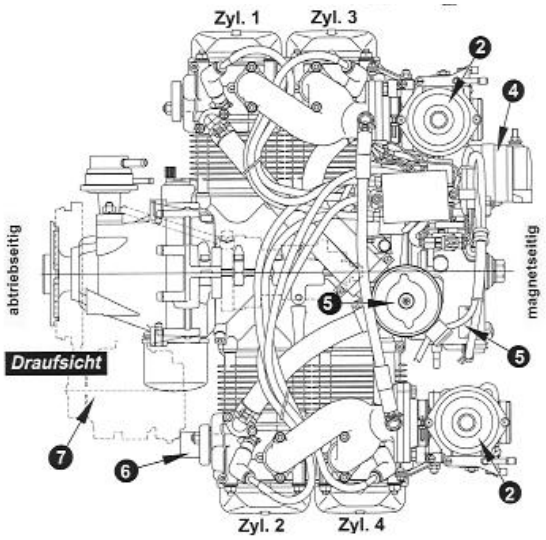
(1) Engine serial number
(2) Carburettor
(3) Propeller gearbox
(4) Electric starter
(5) Coolant filler cap with overpressure
(6) Exhaust manifold
(7) External generator where fitted
(8) Vacuum pump where fitted



Rear end view



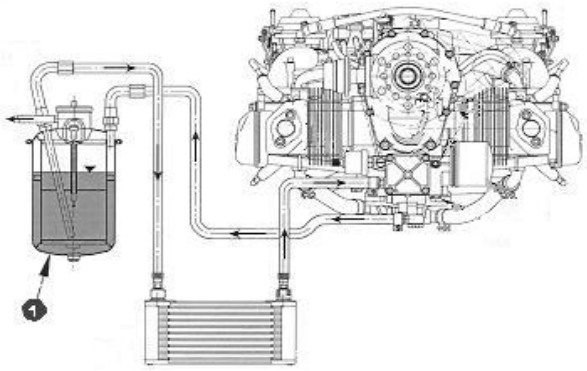
Side view



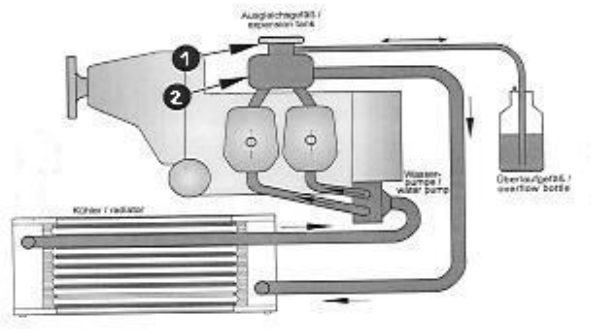
Top view

DESCRIPTION: 4-cylinder.-4 stroke double-piston engine with dry sump lubrication, hydraulic tappets, electronic double ignition, electric starter and transmission. For detail function, technical data etc. see engine manual.
REMARK: 912ULS engines after S/no. 6.775.360 have redesigned ignition modules which give improved starting but different slow-running characteristics (See RSUK SIL-003)
REMARK: The aircraft may be retrofitted with SB-041 “Conair Sports SSM”. This is a different soft-start system to that described in SIL-003. In this system the engine is started on ignition circuit 1 only (Mag1 ON only) and ignition circuit 2 introduced (by additional selection of Mag2 ON) when the engine is running.

Always ensure oil level is correct before flight (oil reservoir is item 1)! The oil level is measured in aircraft level attitude and should reach between the marks on the dipstick. Before checking, turn the engine by the propeller approx.. 8 - 10 revolutions in normal direction of rotation, until you clearly hear the oil gurgle in the tank (take the tank filler cap off first to hear it better). Switch ignition off first!
To get to the tank, remove the top thumbscrew holding the rear seat to the airframe and hinge the seat forwards.



As a check of the coolant level the filler cap (1) of the expansion/storage vessel (2) can be opened, but only with a cold engine.



REMARK
Since the exhaust and its attachment are exposed to high loads by temperature and thermal expansion, these should be frequently checked.

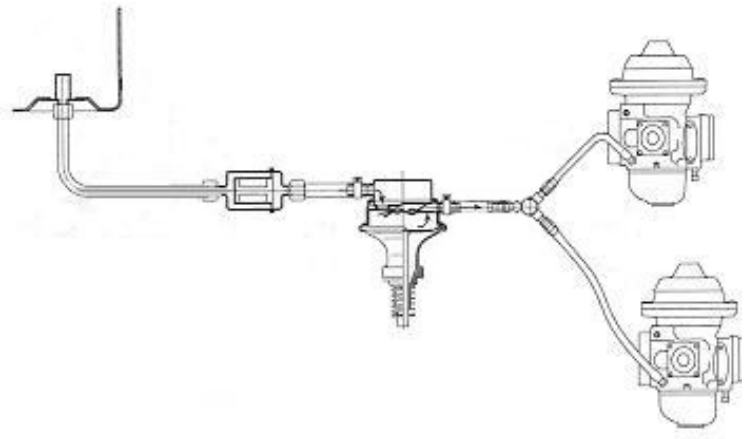
The MT-03 propeller is a 3-Blade-HTC with a diameter of 1,73 m.

6.7 FUEL SYSTEM
The fuel system is under the rear seat and has a capacity of 35 ltr per tank. The tank is ventilated by a ventilation line above the tank to the rear of the mast. Tank level control is via sight lines on the side of the tanks and a fuel gauge on the instrument panel.

The tanks (unless modified under MC-085) retain an increasing amount of unusable fuel depending on the nose down (descent) angle. At a 5 degree descent there is approximately 1.5ltr of unusable fuel per tank. At 10 degrees nose down this increases to 3.8ltrs per tank. Be careful that you do not descend at a steep attitude with low fuel! The engine may stop from fuel starvation!
Zero fuel contents is marked at 3.4ltrs per tank.

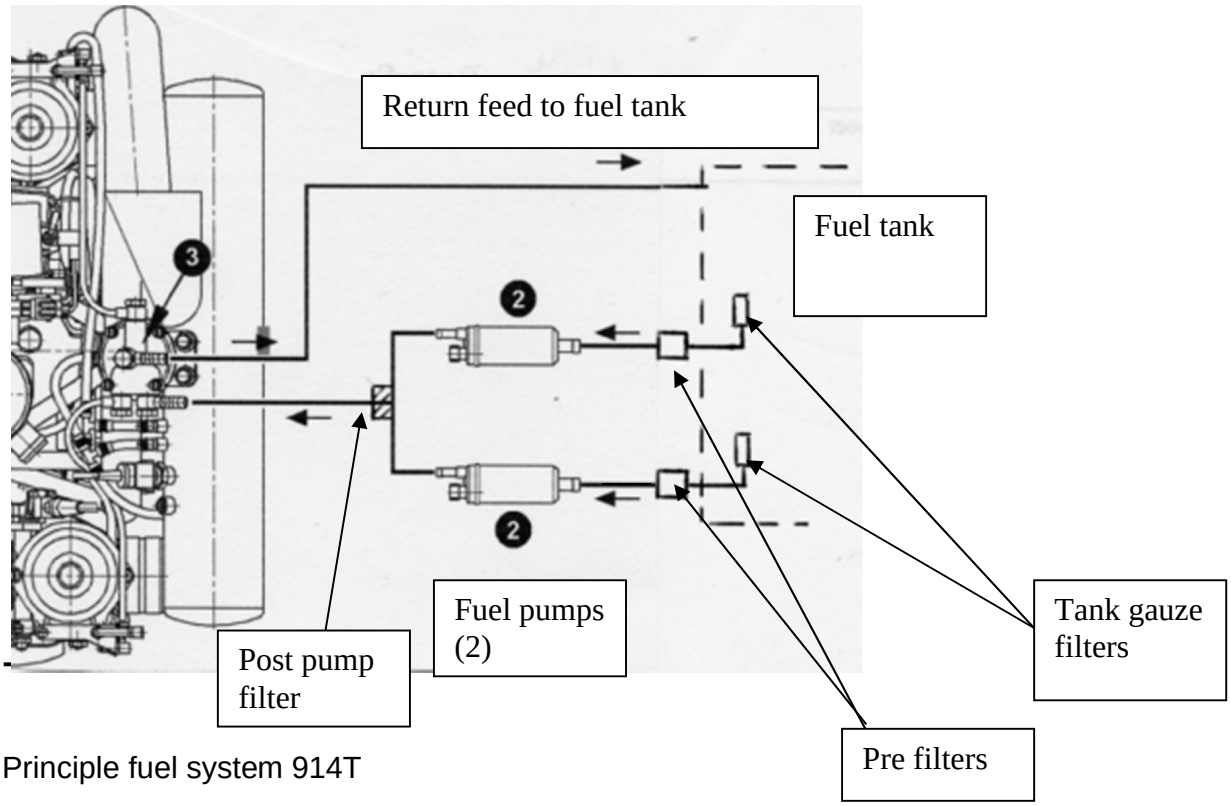
Be sure you are aware of the modification status of the aircraft!

Principle sketch fuel system 912S



The engine mechanical pump is backed up with an electrical fuel pump.

WARNING
Fill tank up to max. 2cm under the filler hole, to allow for thermal expansion of the fuel.



Principle fuel system 914T

6.8 ELECTRICAL SYSTEM

The diagram attached in the Maintenance handbook shows the electrical system of the autogyro.
With the Ignition switch OFF the engine is isolated. However, be aware that unless the master switch is off other electrical items will work, and may draw current.
The Cyclon 8Ah battery fitted to the aircraft is designed for engine starting loads only. The starter should be used for short periods, 10secs maximum, as the nominal running current draw from the starter motor may be up to 75amps. Overuse may result in internal battery damage and early failure.

Use of optional items such as heated clothing all draw a significant amount of current. The amount will depend on individual circumstances.

Engine current availability and usage - MT-03 gyroplane

Item	Amperage	Wattage
Engine and engine systems, inc elect fuel pumps (912ULS)	5A	60W
Engine and engine systems, inc elect fuel pumps (914UL)	8A	96W
Filser ATR 500 or ATR833 radio (when transmitting)	2.5A	30W
(Max 0.5A, or 6W, on standby)		
Filser (Funk Werk) TRT800 Transponder	0.7A	10W
Garmin GPSmap max, normally about 4W	1A	12W
Landing lights, 2x50W	8.3A	100W
Heated gloves (PER PAIR)	1.5A	18W
Heated jacket (PER JACKET)	6.4A	77W
Airworld strobe lights Maximum value	1A	12W
Available from the regulator	22A	250W

Notes: normally only the mechanical or one electrical fuel pump is used in flight, saving 3 amps

Warning!
Overloading the electrical system will drain the battery (rated at 8Ahr). On a 914UL aircraft, both fuel pumps are electrical, so draining the electrical system may stop the engine!

A 'Low Voltage' warning light is fitted to show when the alternator is unable to supply the electrical demand, such that the battery is being drained. If this light comes on, reduce electrical load until it goes out – eg turn off landing lights or heated clothing. When the supply is nearly equal to demand the lamp will gently flicker. If the regulator has failed such that voltage supplied exceeds the normal regulator supply and is overcharging the battery, then the light will flash very brightly, two to three times per second..

6.9 PITOT AND STATIC PRESSURE

The measuring probe for dynamic pressure is in the nose of the enclosure. The hose connecting this to the ASI leads directly to the instruments in the cockpit. There is no aircraft static port, the instrument static ports are vented to the local instrument area.

6.10 AVIONICS

Radio.
Option fit is the Filser ATR500 radio for both external and internal comms. The wiring harness terminates in a Binder connection at each seat, and the antenna may be mounted in the tail as built in, in the nose, or underneath the enclosure (for carbon fibre bodies). Ensure the helmets chosen function correctly before flight.
Note that the ATR833 radio was released under MC-199 as option fit for the MTseries. This radio has "audio in" capability (e.g. warning tones from GPS devices) and a miniature jack socket may be provided for connection, positioned to the left of the avionics equipment.
For radio setup and usage instructions, refer to Funkwerk handbook (ATR500 manual Document-No. 01.1251.010.71e or ATR833 manual Document-No. 01.1402.010.71e).
The ATR500 radio JAA approval number is LBA.0.10.911/113JTSO
The ATR833 radio complies with ETS-2C37e, ED-23B Class4,6 and ETSO-2C38e, ED-23B Class C,E to standards TSO-C37d, RTCA DO-186A Class 4,6 and TSO-C38d, RTCA DO-186A Class C, E.

Transponder.
Option fit is a Filser TRT800 or TRT800H Mode S transponder. The antenna protrudes just in front of the nosewheel. Read the user manual for operational instructions, and take care that the Mode S hexadecimal code and aircraft recognition data is correct!

GPS
Garmin GPSmap 196, 296 and 496 (and variants) are optionally fitted to the panel. Other GPS units as individual modifications. These units are protected from the aircraft, and vice versa, by fuses. Never operate without the fuses in place, otherwise a malfunction in the unit may lead to a fire.
Always read the handbook before operation, and never rely only on the GPS. The software maps or data may be out of date.
Some GPS units and antennas emit magnetic fields that vary with respect to time and/or levels of battery charge. These may change your compass deviations, so always cross check between the compass headings with your GPS installed and placard accordingly if required.

The installation of further devices is possible, but the operator must be aware that this increases the unloaded weight and current draw on the engine.
Note that the avionics are an approved package – modification or other installations require CAA/RSUK approval.

Where fitted the transponder is a Filser TRT 800 ED73, with EASA Approval no. EASA.210.045 or Filser TRT 800H, with EASA Approval no. EASA.210.269

Remark; A Radio Operators licence is required to allow use of the radio, and a Radio Installation licence is required for the radio and transponder (one combined licence, renewed annually).

6.11 NAVIGATION LIGHTS

These lights, where fitted, may not conform to the relevant ANO. They are not intended for use as approved night flight equipment.

Intentionally Blank

6.12 OPTIONS AND MODIFICATIONS

See the aircraft certificate of conformity for modifications fitted at point of release to service.

For confirmation of all modifications permissible in the UK, contact RotorSport UK Ltd or check the RotorSport website aircraft owner's page where they are listed. Alternatively the aircraft TADS issued by the CAA lists all approved modifications for the type, and is available from the CAA website.

7. HANDLING, MAINTENANCE AND SERVICING

7.1 INTRODUCTION

This chapter contains manufacturer's recommendations for correct ground storage of the autogyro, and also recommendations for maintenance and servicing required for performance and reliability. Reference should also be made to the aircraft Maintenance Manual RSUK0012.

The regular care and cleanliness of engine, propeller, rotor system and enclosure is the first point for aircraft reliability. Do this on a regular basis, more often if weather demands. Insect debris build up on the rotors and propeller reduce performance and increase vibration. In order to avoid bird droppings or soiling of the MT-03, one should cover the aircraft with a light plastic tarpaulin or a cloth. Openings to the engine, service points and airspeed indicator should be closed after the flight (beware of insects, birds etc.). Contamination of the autogyro can be eliminated with clean water, possibly with cleaning additives. Do not use gasoline or solvent for cleaning the glazing, as this will DESTROY it!! The parking area of the aircraft should be protected from the sun, wind and humidity. If it stands continuously in the free air, then it is exposed to strong UV aging, corrosion by humidity, sun and wind, and the manufacturers will take no responsibility for the safety margins eroded by such actions.

Dark-coloured aircraft are particularly susceptible to heat build-up from direct sunlight that can cause surface imperfections or distortion to appear in the composite parts. Dark-coloured composites should be protected from prolonged exposure to sunlight-induced high temperatures whenever possible. All aircraft can be damaged by storage in exceptionally humid conditions, as moisture will cause excessive corrosion and can penetrate into the composite materials causing blisters to appear under the paint finish. Whenever possible storage should be in dark, dry conditions.

7.2 REGULAR MAINTENANCE REQUIREMENTS

It is the owner and pilots responsibility to ensure the aircraft is properly maintained in accordance with the Maintenance Manual, document no. RSUK0012. Failure to do so may
invalidate your Permit to Fly. Maintenance and inspection tasks must be performed by CAA (or LAA if an LAA permit) authorised persons or organisations. Repair processes such as welding or composite layup, or others not documented in the maintenance manual, require prior repair process approval from RSUK/CAA.

An annual aircraft inspection and flight test is currently required.

Engine

The engine should be maintained in line with the manufacturer's engine manual, and reference must also be made to their service bulletins, available via their website http://www.rotax-owner.com/.

Propeller

Maintenance is limited with HTC propellers to cleaning and visual inspection. An overhaul is normally only required if significant blade damage is evident, which will require return to RSUK. Minor chips may be filled with resin – see aircraft Maintenance Manual RSUK0012.

Battery

The engine possesses a generator, which charges the battery (rated at 8Ahr) during the flight. The aircraft is fitted with a discharge-safe gel-electrolyte battery, which is maintenance-free.

Maintenance is therefore limited to outside soundness, correct attachment, and cleaning. Monitor also that no contents of the battery has leaked out. This contains corrosive sulphuric acid, which can lead to heavy damage on contact with the airframe and attachments.

7.3 REPAIRS

Repairs may be implemented by the owner, but are limited to the exchange of defective parts in line with LAA Engineering Procedures (when under LAA Permit control) or relevant CAA publications. Unless documented in the Maintenance manual, only original spare parts may be used, supplied with an Approved Certificate. Parts are available from RotorSport UK Ltd. See the maintenance manual for detail information

7.4 GROUND HANDLING & ROAD TRANSPORT

Aircraft are generally exposed to larger loads on the ground than in air, especially in road transport. Since the structure is designed for air use, this can induce a safety risk. Hard landings and rough ground (especially potholes) all induce high accelerations on the autogyro framework, as does being bounced around on the back of a road trailer. Therefore avoid unnecessary road transport, and use trailers with good suspension. Always protect the aircraft from road salt etc with appropriate packaging. If road transport cannot be avoided, transport with minimum fuel, which reduces airframe load.

7.5 CLEANING AND CARE

Contamination of the rotor system and propeller can be removed with clean water, possibly with cleaning additives. Clean rotors will significantly reduce vibration and increase lift.

Be careful when cleaning the windscreen – no solvent or petrols, as these will lead to cracking. Use only soapy water, and dry carefully to avoid scratching.

A good quality polish helps protect the surface finish and reduce surface friction.

7.6 WINTER OPERATION

The cooling system for the cylinder heads of the engine is filled with a mixture of antifreeze and water, which gives freezing protection to -18°C. The density of the coolant, and hence its ability to achieve this performance is checked by a hydrometer, and should be checked prior to winter storage to protect your aircraft. If the winter temperatures fall under this value, then drain the coolant, and if required for service, refill with pure antifreeze. Because anti-freeze ages, renew the cooling agent every two years. Read the engine manual for the manufacturer's recommendations. During winter flying operation the necessary operating temperature for oil and cooling agent may not be reached. It is important that the oil temperature reaches higher than 80°C to prevent engine interior corrosion from condensation, so if necessary carefully blank off a portion of the oil cooler and monitor the temperature. **Don't forget to remove the blank (tape) when the weather warms up!**

As an alternative to the use of temporary blanking tape on the oil cooler, an insulator may be permanently fitted to the oil thermostat. This prevents radiant heat gain from the exhaust silencer and gives better control of the oil temperature. It may be implemented under MC-156 /SB-036.If implemented, the security of the insulator pad must be checked at each service interval.

8. EQUIPMENT

8.1 MINIMUM EQUIPMENT

The pilot must wear suitable personal clothing for the weather and flight planned – eg helmet, footwear, sunglasses, heated clothing etc.

The legally prescribed minimum instrumentation is:
- 1 airspeed indicator, measuring range 0 to 120mph (unless otherwise approved), markings such as Section 2.2
- 1 altimeter, range 3000m or 10.000ft.
- 1 compass

ATTENTION
Take care when installing additional equipment in case it changes the magnetic field of the aircraft, and hence the compass accuracy.

8.2 ADDITIONAL EQUIPMENT.

Various options are available from RotorSport UK Ltd. Do not fit unapproved accessories as these may invalidate your Permit to Fly!

REMARK
Further individual equipment is available on customer's request. This increases the take-off weight and leads therefore to a reduction of the permissible payload.
Take care if carrying luggage bags or other items in the footwell that they do not and cannot move in such a way as to restrict or impede any control movements.
The pilot may wish to consider implementation of MC-131 (Remove rear-seat rudder pedals) and/or MC-135 (minimised rear stick mountings) – refer to RSUK for further information.

Appendix 1 Change of ownership form

This form is supplied to enable the new owner to register the change of ownership, so that he/she may receive any service or other information relating to the aircraft.
The information is stored on a computer, and is only used within RotorSport UK for the above purpose.

If the new owner does not register, then they will not be automatically updated, which may lead to unsafe flight or an un-airworthy aircraft.

Return this form to:
RotorSport UK Ltd, Poplar Farm, Prolley Moor, Wentnor, Bishops Castle, Shropshire, SY9 5EJ
Or email info@rotorsport.org, or fax 01588 650769

Aircraft type	Aircraft serial No.
Aircraft Registration No.	Aircraft Engine No.
Logbook Aircraft hours	Logbook Engine hours

Old owners name and address

Signature & date

New owners name and address

Signature & date

Email:

RSUK Office use only

Date entered onto database	Acknowledgement sent (date)	Job completed by:

Form F024

Appendix 2 Incident reporting form

This form is supplied to enable the owner/operator to inform (anonymously if needed) RotorSport UK Ltd of any incident, accident or other field or service failure that they feel appropriate. The owner must also, of course, inform the relevant authorities if that is appropriate – eg Air Accident Investigation Branch etc.
Depending on the incident information supplied, a corrective action is investigated and, if needed, supplied back to the customer(s)

The information given is stored on a computer, and is only used within RotorSport UK for the above purpose.

Return this form to:
RotorSport UK Ltd, Poplar Farm, Prolley Moor, Wentnor, Bishops Castle, Shropshire, SY9 5EJ
Or email info@rotorsport.org, or fax 01588 650769

Aircraft type	Aircraft serial No.
Aircraft Registration No.	Aircraft Engine No.
Logbook Aircraft hours	Logbook Engine hours
Pilot name	Passenger name

Incident (please include extra sheets as needed, and be as precise as possible)

Incident location and date	Aircraft loading condition (inc fuel)
Weather conditions	Sheet of

Reporting persons name and address

Signature & date

Email:

Form F025