



# QUIK RANGE OF AIRCRAFT

## Aircraft Operating Instructions - Issue 3

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# NOTICE

This product has been manufactured for use in a reasonable and prudent manner by a qualified operator.

The minimum qualification for flying this aircraft is a formal certificate or license following successful completion and assessment of the BMAA flexwing microlight syllabus, Sport Pilot Certificate for Weight-Shift Control or equivalent, or under authorization from a qualified Instructor whilst training for your License or certificate. In addition, it is your personal responsibility to ensure that you are qualified to fly in the state/country where you intend to operate the aircraft.

For your personal safety, the safety of others and the safe operation of the aircraft, it is very important that this operator's manual is read in full before operating or flying the aircraft for the first time, and that the relevant sections are understood before any trimming or maintenance work is undertaken. Should you not understand any of the Aviation terms to be found in this manual, then ask your instructor for clarification.

If you have just acquired this aircraft then it is important that you register as the new owner/operator with your nearest P&M Aviation Distributor, or with P&M Aviation direct at the following address:

P&M Aviation Ltd  
Unit B,  
Crawford St,  
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[flying@pmaviation.co.uk](mailto:flying@pmaviation.co.uk)

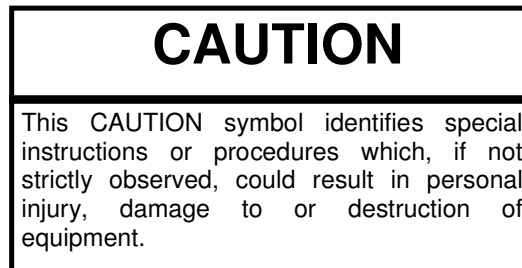
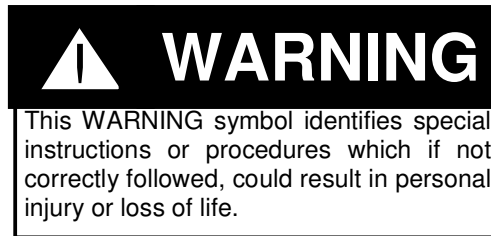


## WARNING

Failure to register will mean that you may not get important safety information issued by the company in support of its products.

# IMPORTANT!

Wherever you see the symbols shown below, heed their instructions! Always follow safe operating and maintenance procedures and practices.



## NOTE

- *This NOTE symbol indicates points of particular interest for more efficient and convenient operation.*



## WARNING

Microlight/Light Sport Aircraft flying and all other airsports can be dangerous even when practised under ideal circumstances. Pilot error, component failure, adverse meteorological conditions or sheer bad luck can, as in all aviation, result in injury or death. Every customer purchasing goods or services whether directly or indirectly from the Company is warned that Microlight/ Light Sport Aircraft flying and similar air sports are not controlled in the same way that are other forms of aviation. As a result Microlight/ Light Sport Aircraft components and related equipment are manufactured from commercially available materials and components and some of these materials and components are not designed specifically for aviation use. Every purchaser must ensure that he inspects fully every primary product (part or service) item upon delivery and before every flight thereafter and he must make himself aware of all trends or changes which may make a particular item unsuitable for the use for which it was originally purchased. He must also satisfy himself totally that a purchased item is suitable for the use to which he intends to employ it. The Company can offer advice but the final responsibility for the use of the goods purchased, primary product (part or service) rests solely with the purchaser (whether direct or indirect) or other user who employs such goods at his own risk. This Warning applies to every part, item or service offered by the Company and acceptance of or payment for goods is an implicit acceptance of this Warning.

The Quik range of Microlight/ Light Sport Aircraft must only be flown where the following conditions apply:

1. The aircraft must not be flown over any terrain except where it may be landed safely and without harm to occupants or third parties in the event of a power reduction or failure of the engine at any stage of the flight.
2. The pilot of the aircraft is competent and has been trained to land the aircraft safely and without harm to occupants or third parties in the event of a power reduction or failure of the engine at any stage of the flight and is in current practice of forced landing procedures.

## FOREWORD

We wish to thank you for choosing this P&M Aircraft.

Read this Operator's Manual before flying your aircraft so you will be thoroughly familiar with the proper operation of your Quik aircraft controls, its features, capabilities and limitations. This manual offers many safe operating and flying tips, but its purpose is not to provide instruction in all the techniques and skills required to fly this weight-shift control light sport aircraft safely. All operators of this weight-shift control light sport aircraft safely must qualify in a pilot training programme, to the minimum standard of the BMAA flexwing microlight pilot's licence syllabus, to attain awareness of the mental and physical requirements necessary for flexwing Microlight operation.

To ensure a long and trouble free life from your Quik aircraft, give it the proper care and maintenance described in the Aircraft Operating Instructions, Aircraft Maintenance Manual & Flight Training Supplement. For Engine Information and Service & Maintenance schedules, please refer to the relevant Engine Manufacturers Manual.

### Note

Manuals are liable to be revised in the future and pages or sections re-issued. Amendments will be available from the website at [www.pmaviation.co.uk](http://www.pmaviation.co.uk)  
Amended pages should be printed and replaced in the manual at the earliest possible time, and the amendment details entered in the amendment pages by the owner.

Issue 1 – Introduction of Quik and Quik GT450 with Rotax 912 and 912S engines.

Issue 2 – Introduction of QuikR with Rotax 912S engine.

Issue 3- Introduction of GTR Wing to Quik Range.

| Amendment No | Date | Sections/Pages Changed | Date Inserted | Signature |
|--------------|------|------------------------|---------------|-----------|
|              |      |                        |               |           |
|              |      |                        |               |           |
|              |      |                        |               |           |
|              |      |                        |               |           |
|              |      |                        |               |           |
|              |      |                        |               |           |
|              |      |                        |               |           |

## Abbreviations:

|                       |   |
|-----------------------|---|
| <i>AOI</i>            | Aircraft Operating Instructions   |
| <i>FTS</i>            | Flight Training Supplement  |
| <i>MIP</i>            | Maintenance and Inspection Procedures   |
| <i>PIC</i>            | Pilot In Command  |
| <i>C</i>              | Celsius   |
| <i>CAS</i>            | Calibrated air speed  |
| <i>F</i>              | Fahrenheit  |
| <i>Hg</i>             | Mercury   |
| <i>IAS</i>            | Indicated Air Speed   |
| <i>ISA</i>            | International Standard Atmosphere   |
| <i>Kg</i>             | Kilogram  |
| <i>km/hr</i>          | Kilometers per hour   |
| <i>MPH</i>            | Miles per hour  |
| <i>kt(s)</i>          | Nautical Mile per Hour (knot) (1 nautical mph = (1852/3600) m/s)                |
| <i>lb(s)</i>          | Pound(s) (1 lb = 0.4539 kg)   |
| <i>mm</i>             | Millimeter  |
| <i>cm</i>             | Centimeter  |
| <i>m</i>              | Metre   |
| <i>in</i>             | Inch  |
| <i>ft</i>             | Feet  |
| <i>sq. m</i>          | Square Metre  |
| <i>sq. ft</i>         | Square Feet   |
| <i>cu. in</i>         | Cubic Inches  |
| <i>cm<sup>3</sup></i> | Centimeter Cube   |
| <i>mb</i>             | Millibars   |
| <i>N</i>              | Newton  |
| <i>Nm</i>             | Newton Meter  |
| <i>kW</i>             | KiloWatt  |
| <i>HP</i>             | Horse Power   |
| <i>RPM</i>            | Revolutions Per Minute  |
| <i>ft. lbs</i>        | Foot Pounds   |
| <i>in. lbs</i>        | Inch Pounds   |
| <i>psi</i>            | Pounds per Square Inch gage pressure  |
| <i>s</i>              | Second  |
| <i>min</i>            | Minute(s)   |
| <i>hr(s)</i>          | Hour(s)   |
| <i>SI</i>             | International System of units   |
| <i>VA</i>             | Maneuvering Speed   |
| <i>VC</i>             | Operating Cruising Speed  |
| <i>VDF</i>            | Demonstrated Flight Diving Speed  |
| <i>VH</i>             | Maximum Sustainable Speed in straight and level flight                          |
| <i>VNE</i>            | Never Exceed Speed  |
| <i>VS0</i>            | Stalling Speed, or the minimum steady flight speed in the landing configuration |
| <i>VS1</i>            | Stalling Speed, or the minimum steady flight speed in a specific configuration  |
| <i>Vx</i>             | Speed at which Best Angle of Climb is achieved                                  |
| <i>Vy</i>             | Speed at which Best Rate of Climb is achieved                                   |
| <i>VT</i>             | Maximum Glider Towing Speed   |



**Wsusp** Highest Trike Carriage Weight suspended under the wing  
**Wwing** Wing Weight  
**Wtkmt** Trike Carriage Empty Weight (including required minimum equipment, unusable fuel, maximum oil, and where appropriate, engine coolant, hangbolt and hydraulic fluid)  
**WMAX** Maximum Design Weight ( $W_{wing} + W_{susp}$ )  
**WSC** Weight Shift Control (aircraft)  
**Max** Maximum  
**Min** Minimum

## Units

### Speed

Kts (Knots) = 1.15 mph (miles per hour) = 1.84 km/hr

1 km/hr = 1.6 MPH

### Pressure

PSI = Pounds per Square Inch

in Hg = inches of Mercury

mb = millibar

### Distances

in. = inches = 25.4 millimeters

ft = foot (feet) = .305 meters

### Weights

Kg = kilograms = 2.2 lbs = 2.2 pounds

## Misc

1 Pound (lb) = 0.4536 Kilogram (kg)

1 Pound per sq in (psi) = 6.895 Kilopascal (kPa)

1 Inch (in) = 25.4 Millimeters (mm)

1 Foot (ft) = 0.3048 Meter (m)

1 Statute mile = 1.609 Kilometres (km)

1 Nautical mile (NM) = 1.852 Kilometres (km)

1 Millibar (mb) = 1 Hectopascal (hPa)

1 Millibar (mb) = 0.1 Kilopascal (kPa)

1 Imperial gallon = 4.546 Liters (l)

1 US gallon = 3.785 Liters (l)

1 US quart = 0.946 Liter (l)

1 Cubic foot (ft<sup>3</sup>) = 28.317 Liters (l)

1 Degree Fahrenheit (F) = (1.8 X C)+32

1 Inch Pound (in lb) = 0.113 Newton Meters (Nm)

1 Foot Pound (ft lb) = 1.356 Newton Meters (Nm)

## 1. GENERAL DESCRIPTION

The Quik range are advanced weight-shift controlled aircraft. They may be flown solo or dual without ballast. The aircraft has been developed for advanced cross-country touring performance; a stable hands-off cruise of 65 to 100 mph, depending upon model, makes long cross-country trips very practicable. Using appropriate airfields and the instructor control bars, it can also be used as a safe and reliable training machine.

The Quik GT450 was introduced in 2005 with Rotax 912 and 912-S engine options and 1.72m 3 bladed Warp Drive Propeller. It features a 65L tank, disk or drum brakes and electric trim.

The GT450 is designed for up to 450kg AUW, giving approximately 232kg of payload (fuel, occupants, baggage). The total maximum seat loading is 220kg, 110kg per seat. The aircraft has been designed with a wide speed range enabling slow speed flight at very low fuel consumption, short takeoff and landing as well as cruising speeds up to 95mph. The electric trim system gives precise fingertip control of hands-off trim speeds from approximately 50 to 80 mph.

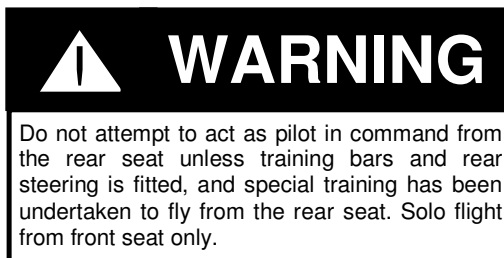
A roll augmentation system has been developed for the GT450 wing, which actuates the wing trailing edge and keel pocket when a roll input is made. The system noticeably lightens roll control. The wing planform and twist are designed to improve L/D performance. The wing is also equipped with tip fins to improve directional stability at high speed as well as low speed sink rate and glide. They are vented to control internal wing pressure.

The QuikR and GTR wings are strutted wings designed for optimum performance, capable of 100mph high speed flight, whilst stalling at less than 40mph fully laden. The topless design giving enhanced drag reduction for great fuel economy whilst allowing high speeds.

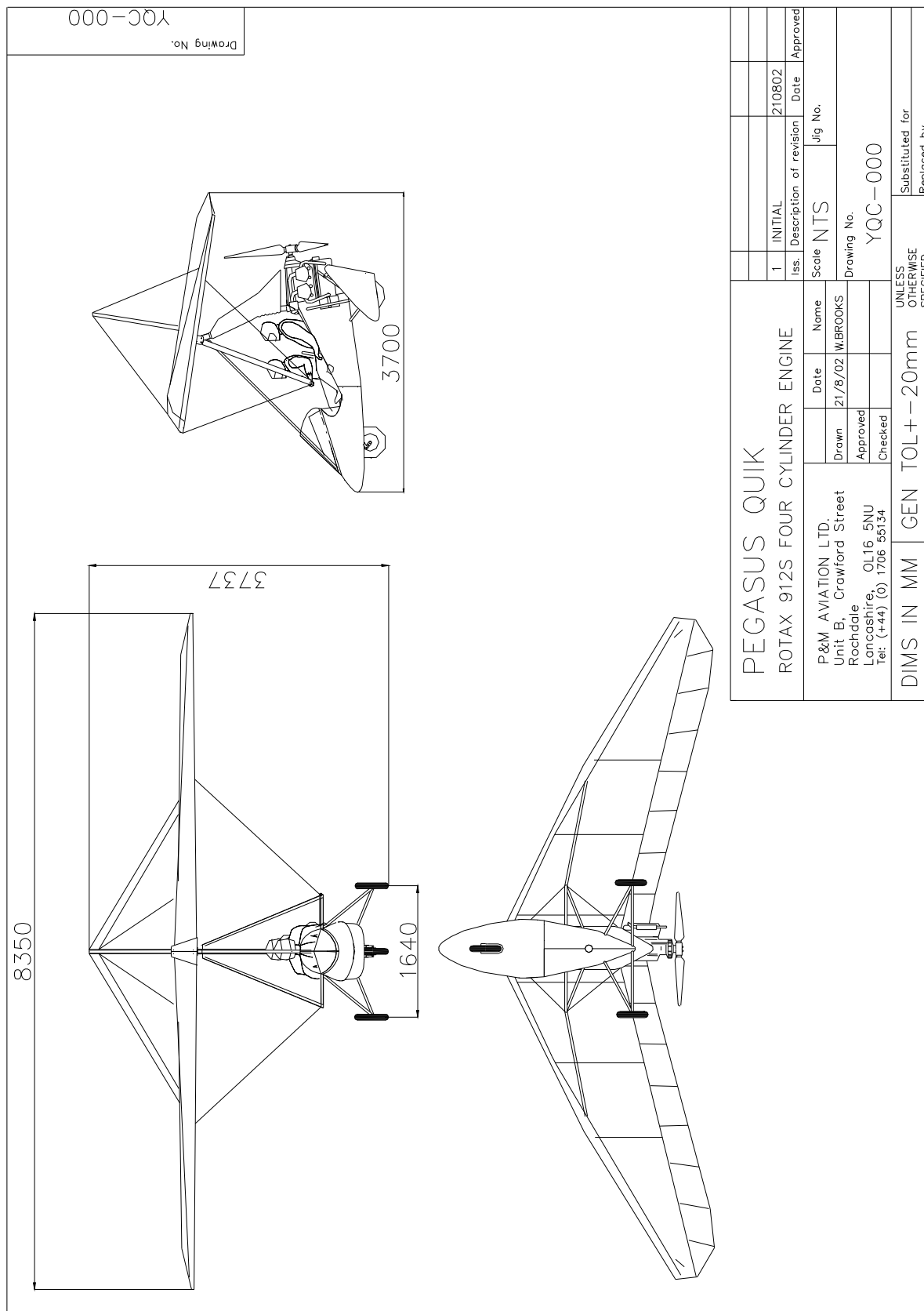
The Quik range have been designed for easy single-person rigging. The pylon hinges for folding independently of the engine and undercarriage mountings, which allows for better undercarriage geometry and structural rigidity.

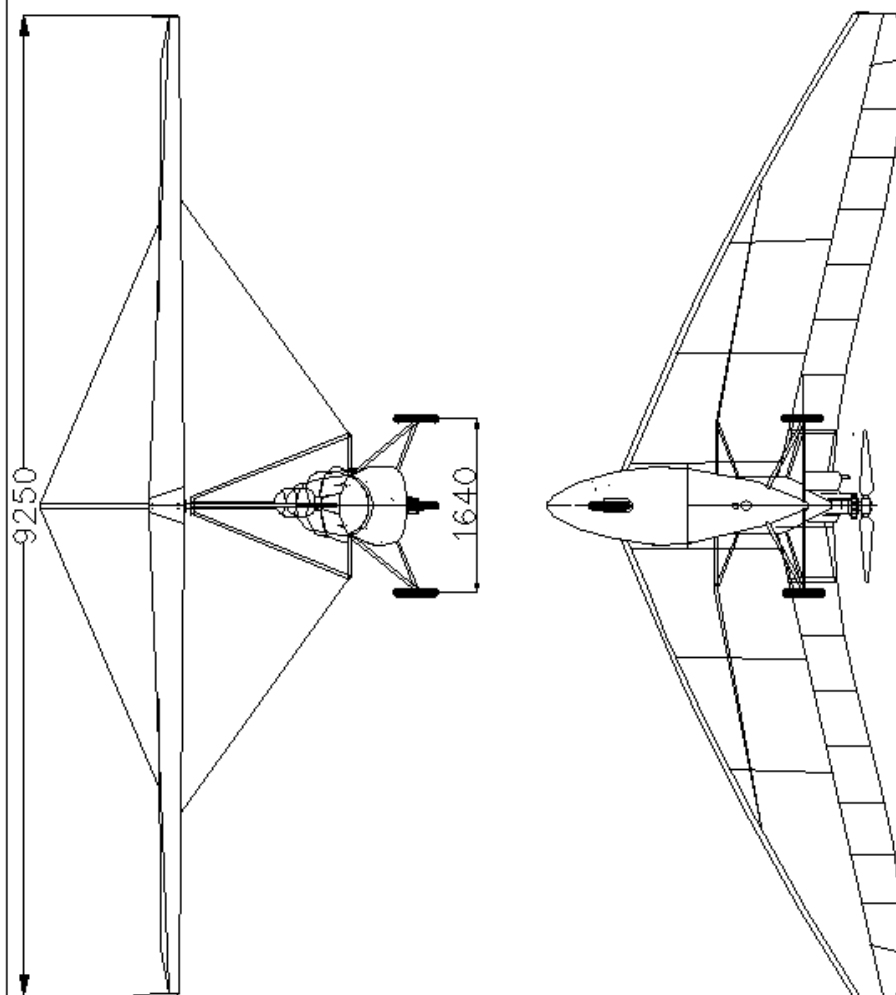
These features make the aircraft capable in a multitude of roles including long distance touring, competitions and training.

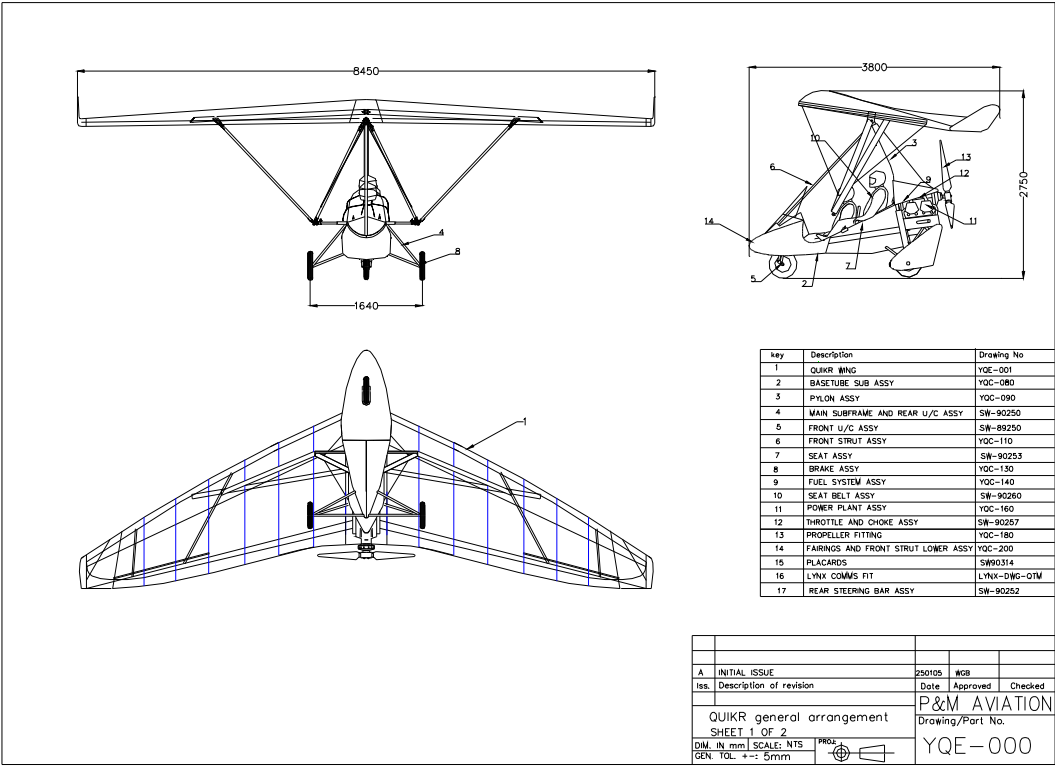
Optional equipment includes low-drag panniers, a pod bag and instructor control bars.



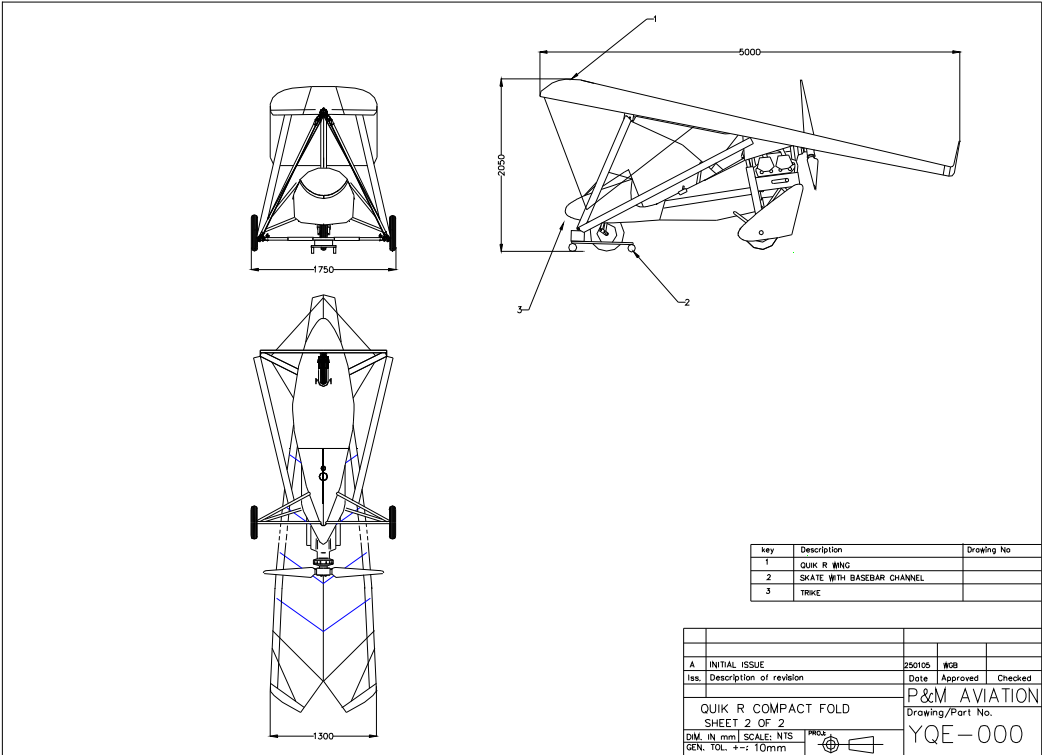
## 1.1. GENERAL ARRANGEMENT DRAWINGS



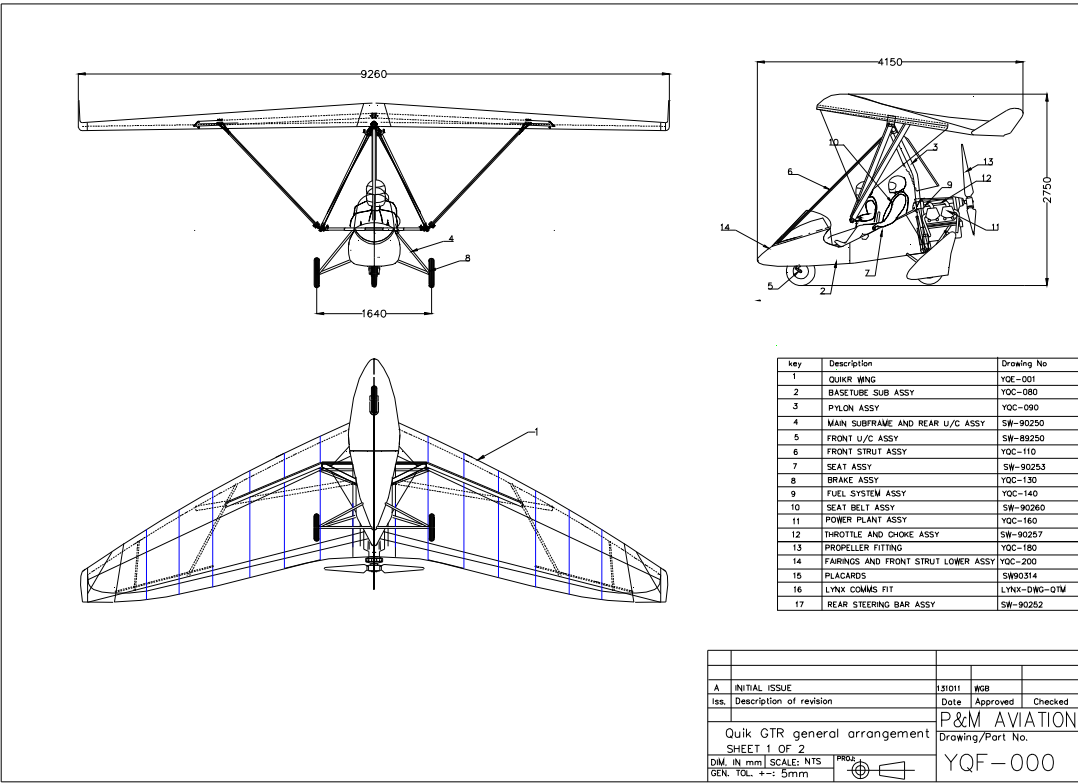
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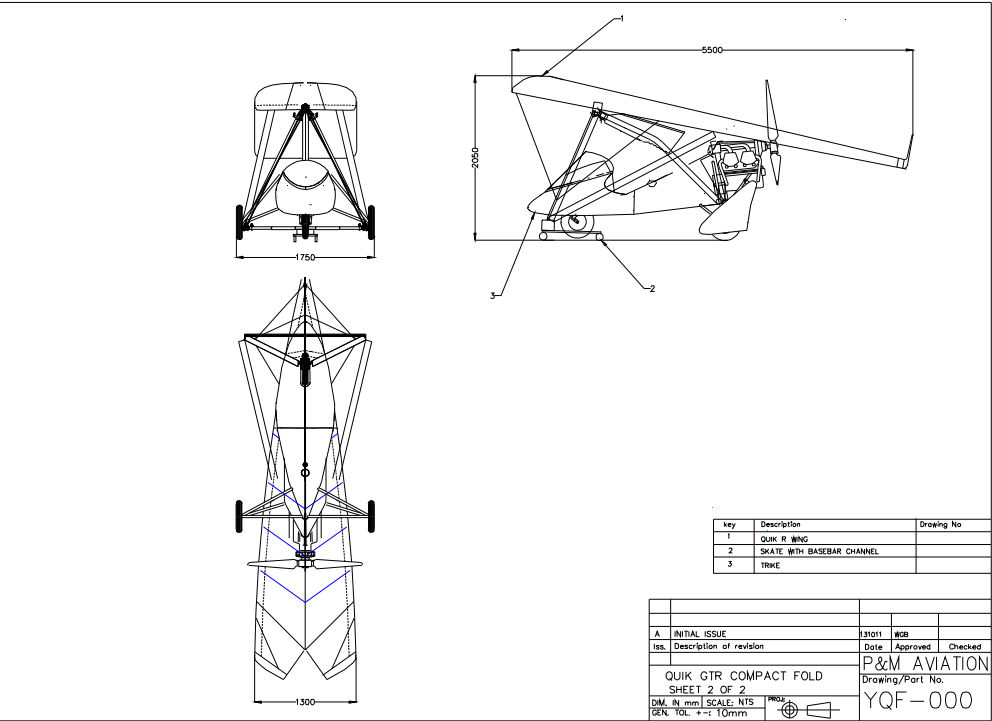
QuikR general arrangement



QuikR in compact folded configuration using a nosewheel skate with control bar channel.



Quik GTR General Arrangement



Quik GTR in compact folded configuration using a nosewheel skate with control bar channel.

## 1.2. AIRCRAFT DIMENSIONS

### Quik Wing Data

|               |            |             |
|---------------|------------|-------------|
| Wing Span:    | 27.4 ft.   | 8.35 m.     |
| Sail Area:    | 114 sq ft. | 10.6 sq. m. |
| Aspect Ratio: | 6.57       |             |

### GT450 Wing Data

|               |            |           |
|---------------|------------|-----------|
| Wing Span:    | 30 ft 6in  | 9.3 m.    |
| Sail Area:    | 140 sq ft. | 13 sq. m. |
| Aspect Ratio: | 6.65       |           |

### QuikR Wing Data

|               |            |              |
|---------------|------------|--------------|
| Wing Span:    | 27 ft 9in  | 8.45 m.      |
| Sail Area:    | 123 sq ft. | 11.43 sq. m. |
| Aspect Ratio: | 6.24       |              |

### QuikGTR Wing Data

|               |            |           |
|---------------|------------|-----------|
| Wing Span:    | 30 ft 5in  | 9.26 m.   |
| Sail Area:    | 140 sq ft. | 13 sq. m. |
| Aspect Ratio: | 6.6        |           |

### Trike Data

|                     |           |          |
|---------------------|-----------|----------|
| Length (erect):     | 111.0 ins | 290.0 cm |
| Length (fold down): | 114.0 ins | 290.0 cm |
| Width:              | 72.0 ins  | 83.0 cm  |
| Track:              | 65.0 ins  | 165.0 cm |
| Height (erect):     | 98.0 ins  | 230.0 cm |
| Height (fold down): | 61.0 ins  | 140.0 cm |

## 1.3. POWERPLANT SPECIFICATIONS

| MODEL             | 912   | 912S  |
|-------------------|---|---|
| Type              | 4 stroke                                    | 4 stroke                                    |
| CC                | 1211  | 1352  |
| Power             | 80 bhp                                      | 100 bhp                                     |
| Ignition system   | Dual CDI                                    | Dual CDI                                    |
| Cylinders         | 4   | 4   |
| Reduction ratio   | 2.27:1                                      | 2.43:1                                      |
| Overload Clutch   | No  | Yes   |
| Fuel/oil ratio    | n/a   | n/a   |
| Min fuel rating   | 95 RON                                      | 95 RON                                      |
| Prop manufacturer | Warp Drive                                  | Warp Drive                                  |
| Prop type         | Warp Drive,<br>1.72m,90mm<br>parallel chord | Warp Drive,<br>1.72m,90mm<br>parallel chord |
| Prop pitch        | 11 <sup>0</sup>                             | 16 <sup>0</sup>                             |
| Measured @ radius | Tip u/surface                               | Tip u/surface                               |

### NOTE

- For all other engine data refer to the engine manufacturers handbook supplied as a supplement to the Aircraft Operators Handbook. See also Section 4.
- For 912-S engines, an overload clutch with "lost motion friction damping torsional vibration absorber" is recommended to be fitted for smoother start-up/shutdown.  
For 912 engines, the overload clutch with special damper is not necessary, saving 1.7kg. It may be fitted as a customer option. The modification specification and empty weight of your aircraft appears in section 3.1.

## 2. OPERATING LIMITATIONS

### 2.1. GENERAL LIMITATIONS



The Quik range must be operated in compliance with the following limitations:

- The aircraft is to be flown only under **Visual Flight Rules (VFR)**.
- The minimum instrumentation required to operate the aircraft : ASI, altimeter, tachometer (RPM), coolant temperature . 4 strokes should also be fitted with oil temp & oil pressure. An EGT gauge should be fitted if mixture control is installed.
- When flown solo, the aircraft must be flown from the **front seat only**.
- The aircraft must be flown such as to maintain positive normal acceleration (positive 'g') at all times.
- The aircraft must not be flown in negative 'g'.
- Do not pitch nose up or nose down more than 45° from the horizontal. Never climb at full power at less than 40mph/75kph/35kt.
- Do not exceed more than 60° of bank.
- ALL aerobatic manoeuvres including whipstalls, wingovers, tail slides, loops, rolls and spins are prohibited.

| GENERAL LIMITATIONS - QUIK                            |        |        |         |
|---|--------|--------|---------|
| Max. Empty weight (Subject to approved equipment fit) | 484lb  | 220kg  |         |
| Min. empty weight                                     | 418lb  | 190kg  |         |
| Max. take off weight                                  | 900lb  | 409kg  |         |
| Min. take off weight                                  | 540lb  | 254kg  |         |
| Min. total occupant weight                            | 121lb  | 55kg   |         |
| Max. front seat weight                                | 242lb  | 110kg  |         |
| Max. number of occupants                              | 2      |        |         |
| Max. passenger weight                                 | 242lb  | 110kg  |         |
| Max Cockpit Weight                                    | 440lbs | 200kg  |         |
| Max. useable fuel 49L tank                            | 75lb   | 34kg   | 47.4ltr |
| Max. useable fuel 65L tank                            | 99lb   | 45kg   | 63.6Ltr |
| Manoeuvring airspeed (Va)                             | 80mph  | 128kph | 70kn    |
| Max. load factor at Va                                | +4     |        |         |
| Vne   | 115mph | 185kph | 100kn   |
| Max. load factor @ Vne                                | +4     |        |         |
| Max. wind operating conditions                        | 23mph  | 37kph  | 20kn    |
| <b>Cross wind limits</b>                              |        |        |         |
| Taxiing   | 23mph  | 37kph  | 20kn    |
| Take off  | 12mph  | 20kph  | 10kn    |
| Landing   | 12mph  | 20kph  | 10kn    |



| <b>GENERAL LIMITATIONS – QUIK GT450</b>               |        |        |         |
|---|--------|--------|---------|
| Max. Empty weight (Subject to approved equipment fit) | 583lb  | 265kg  |         |
| Min. empty weight                                     | 451lb  | 205kg  |         |
| Max. take off weight                                  | 990lb  | 450kg  |         |
| Min. take off weight                                  | 594lb  | 270kg  |         |
| Min. total occupant weight                            | 121lb  | 55kg   |         |
| Max. front seat weight                                | 242lb  | 110kg  |         |
| Max. number of occupants                              | 2      |        |         |
| Max. passenger weight                                 | 242lb  | 110kg  |         |
| Max. useable fuel 65L tank                            | 99lb   | 45kg   | 63.6Ltr |
| Manoeuvring airspeed (Va)                             | 80mph  | 128kph | 70kn    |
| Max. load factor at Va                                | +4     |        |         |
| Vne   | 110mph | 176kph |         |
| Max. load factor @ Vne                                | +4     |        |         |
| Max. wind operating conditions                        | 23mph  | 37kph  | 20kn    |
| <b>Cross wind limits</b>                              |        |        |         |
| Taxiing   | 23mph  | 37kph  | 20kn    |
| Take off  | 12mph  | 20kph  | 10kn    |
| Landing   | 12mph  | 20kph  | 10kn    |

| <b>GENERAL LIMITATIONS – QUIKR</b>                    |        |        |         |
|---|--------|--------|---------|
| Max. Empty weight (Subject to approved equipment fit) | 583lb  | 265kg  |         |
| Min. empty weight                                     | 451lb  | 205kg  |         |
| Max. take off weight                                  | 990lb  | 450kg  |         |
| Min. take off weight                                  | 594lb  | 270kg  |         |
| Min. total occupant weight                            | 121lb  | 55kg   |         |
| Max. front seat weight                                | 242lb  | 110kg  |         |
| Max. number of occupants                              | 2      |        |         |
| Max. passenger weight                                 | 242lb  | 110kg  |         |
| Max. useable fuel 65L tank                            | 99lb   | 45kg   | 63.6Ltr |
| Manoeuvring airspeed (Va)                             | 90mph  | 144kph | 78kn    |
| Max. load factor at Va                                | +4     |        |         |
| Vne   | 120mph | 192kph | 104kn   |
| Max. load factor @ Vne                                | +4     |        |         |
| Max. wind operating conditions                        | 23mph  | 37kph  | 20kn    |
| <b>Cross wind limits</b>                              |        |        |         |
| Taxiing   | 23mph  | 37kph  | 20kn    |
| Take off  | 12mph  | 20kph  | 10kn    |
| Landing   | 12mph  | 20kph  | 10kn    |

| <b>GENERAL LIMITATIONS – QUIKGTR</b>                  |        |        |         |
|---|--------|--------|---------|
| Max. Empty weight (Subject to approved equipment fit) | 583lb  | 265kg  |         |
| Min. empty weight                                     | 451lb  | 205kg  |         |
| Max. take off weight                                  | 990lb  | 450kg  |         |
| Min. take off weight                                  | 605lb  | 275kg  |         |
| Min. total occupant weight                            | 121lb  | 55kg   |         |
| Max. front seat weight                                | 242lb  | 110kg  |         |
| Max. number of occupants                              | 2      |        |         |
| Max. passenger weight                                 | 242lb  | 110kg  |         |
| Max. useable fuel 65L tank                            | 99lb   | 45kg   | 63.6Ltr |
| Manoeuvring airspeed (Va)                             | 90mph  | 144kph | 78kn    |
| Max. load factor at Va                                | +4     |        |         |
| Vne   | 120mph | 192kph | 104kn   |
| Max. load factor @ Vne                                | +4     |        |         |
| Max. wind operating conditions                        | 23mph  | 37kph  | 20kn    |
| <b>Cross wind limits</b>                              |        |        |         |
| Taxiing   | 23mph  | 37kph  | 20kn    |

|          |       |       |      |
|----------|-------|-------|------|
| Take off | 12mph | 20kph | 10kn |
| Landing  | 12mph | 20kph | 10kn |



## WARNING

HIGH WINDS & CROSS WIND LANDINGS AND TAKE-OFFS: the figures shown above were demonstrated by experienced factory test pilots. Low hour and student pilots must avoid strong crosswind conditions.

## 2.2. POWERPLANT LIMITATIONS

| Engine                      | ROTAX 912  | ROTAX 912S   |
|-----------------------------|--|--|
| Max RPM                     | 5800 (5min)  | 5800 (5min)  |
| Max continuous RPM          | 5500   | 5500   |
| Idle RPM                    | Approx 1400  | Approx 1400  |
| Min. fuel spec.             | Min RON 90<br>EN228 Premium<br>EN228 Premium Plus<br>AVGAS 100LL * | Min RON 95<br>EN228 Premium<br>EN228 Premium Plus<br>AVGAS 100LL * |
| 4 stroke engine oil         | API SF or SG<br>e.g. Shell VSX 4                                   | API SF or SG<br>e.g. Shell VSX 4                                   |
| Max. coolant temp.          | 150C (measured at<br>cyl.head)                                     | 135C (measured at<br>cyl.head)                                     |
| Antifreeze mix. %           | 100%   | 100%   |
| Max. CHT                    | 150 ° C  | 135 ° C  |
| Max. EGT                    | 800 ° C  | 800 ° C  |
| Max. oil temp.              | 140 ° C  | 130 ° C  |
| Min. oil temp. for take off | 50 ° C   | 50 ° C   |
| Max. oil pressure           | 7bar (after cold start )   | 7bar (after cold start )   |
| Min. oil pressure           | 0.8bar (below<br>3500rpm)  | 0.8bar (below<br>3500rpm)  |

### NOTE!

*1 4 Stroke Engine Oils: if the engine is to be run in extremes of temperature, refer to the Engine Manual for appropriate oil viscosity. \*See also engine operators manual and P&M Service Bulletin 0094 for Rotax 912/912S, especially if using AVGAS.*



## WARNING

If any limitations are reached or abnormal readings noted in flight, land immediately and investigate the cause. Do not attempt to fly until the problem has been solved.

### 3.0. EMERGENCY PROCEDURES

#### Engine Failure in Flight

You should always be flying within easy glide distance of a suitable forced landing area, and keep track of the wind direction. At any stage of your flight you should have your forced landing area selected. If your engine should stop, the first priority in any engine failure situation is to **FLY THE AIRCRAFT**. Set up a steady glide, fly at 45 mph for minimum sink rate and 47mph for best glide. Increase speed to 55 mph for the final approach. The best glide of the QuikR is approximately 9:1 at 57 mph, but this can be reduced to 4:1 at 90 mph.

The second priority is to **CONFIRM YOUR SELECTED FORCED LANDING AREA**. Be particularly vigilant for power lines, electric fences, slopes and lee turbulence from obstacles. Determine wind direction from smoke, water ripples, cloud shadows (remember to mentally calculate for Coriolis effect) or otherwise if there is time, make a steady 360° turn to determine drift. Refer to your map for altitude above the forced landing zone. Plan a proper approach into the area, and set up a glide towards it.

With these things in mind, if there is time to attempt a restart, check:

- 1) Both ignition switches on.
- 2) Hand throttle closed.
- 3) Fuel contents ok.
- 4) Fuel turned on.
- 5) Choke off unless cold or if suspected fuel starvation.
- 6) Mixture fully rich
- 7) Foot throttle no more than 1/4 open.

With the aircraft in a stable hands-off glide, operate the electric starter.

#### FORCED LANDING DRILL:

Throttles SHUT.  
Both ignition switches OFF.  
Fuel OFF.  
Brakes OFF.  
Harness secure (do not over tighten pilots shoulder strap).  
Plan approach.

#### Engine-off Landings



## WARNING

Always be prepared for the engine to fail when it is least convenient and therefore always ensure that you are within gliding distance of a suitable emergency landing field. Regular practice of glide approaches on engine idle will pay dividends. Warm the engine periodically when doing this.

#### The Approach – Quik, QuikR & Quik GTR

The most important part of the approach is the base leg. Aim to start the base leg at approximately 800 feet agl and set up an approach speed glide of 60-65 mph. It is inadvisable to make the final approach slower than about 60 mph unless the field is very small, as wind gradient may reduce the airspeed too much and make the final flare unsuccessful. Gauge the right moment to turn onto finals at 4-500 feet as the base leg progresses. On finals, quite a lot of glide angle control can be made by varying the airspeed.

The best technique is to maintain 60 mph airspeed through the wind gradient to a low level, say 10 ft, and then progressively ease the bar out as the speed decays until a smooth touchdown is made.

#### The Approach - Quik GT450

The most important part of the approach is the base leg. Aim to start the base leg at approximately 800 feet agl and set up an approach speed glide of 55-60 mph. Gauge the right moment to turn onto finals at 4-500

feet as the base leg progresses. On finals, quite a lot of glide angle control can be made by varying the airspeed.

The best glide of the GT450 is approximately 8:1 at 50 mph, but this can be reduced to 4:1 at 80 mph. It is inadvisable to make the final approach slower than about 55 mph unless the field is very small, as wind gradient may reduce the airspeed too much and make the final flare unsuccessful.

The best technique is to maintain 55-60 mph airspeed through the wind gradient to a low level, say 10 ft, and then progressively ease the bar out as the speed decays until a smooth touchdown is made.

### **Engine Failure on Take-Off (see WARNING in Section 7.4)**

In order to minimise the potential safety hazard in the event of an engine failure on take-off, never climb-out at a steep angle when close to the ground (an airspeed of not less than 60 mph is recommended for the first 200ft) and always use an airfield long enough to allow a safe engine off landing straight ahead when the aircraft is too low to turn into a shortened circuit. Resist the temptation to pull the control bar violently in after such a power failure as this will produce a steep nose down attitude. Instead, let the bar assume the neutral trim position until the aircraft regains airspeed and levels out. For minimum height loss, the nose-down rotation of the aircraft can be checked by pushing out once the nose has dropped below the horizon. The bar can then be eased in again to take up a glide. From that point, treat the situation as an engine off landing. Using the trimmer to trim hands-off at the climb speed gives increased pitch damping compared to using the fast trim setting. Always set trimmer prior to takeoff.

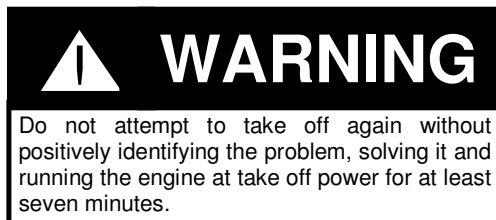
### **Instrument / electrical Failure**

The essential instruments required by the conditions of the Permit to Fly are an altimeter and an airspeed indicator. Basic engine instruments such as the oil pressure gauge are also essential for flight safety. If these basic instruments fail, a landing should be made as soon as it is safe to do so. In the case of an over voltage fault, it may be prudent to turn off the master switch to prevent avionics damage.

### **Engine Overheating**

With a well maintained engine, overheating should not occur. The two basic reasons are weakening of the fuel/air mixture, and cooling system failure. Condition of the fuel filter, float bowls and the fuel itself are very important. Check also the radiator, coolant level, condition of hoses.

Fuel starvation may be detected by a sluggishness of the engine to respond to the throttle, a reduction in RPM, and a change in the exhaust note. If fuel starvation is suspected, then it may be possible to keep the engine running by pulling out the choke. Reducing the throttle setting may also keep the engine running. These measures should only be used to fly the aircraft to the nearest safe landing area, where a forced landing should be planned. If temperatures continue to rise, execute a forced landing as described above.



### **Fire**

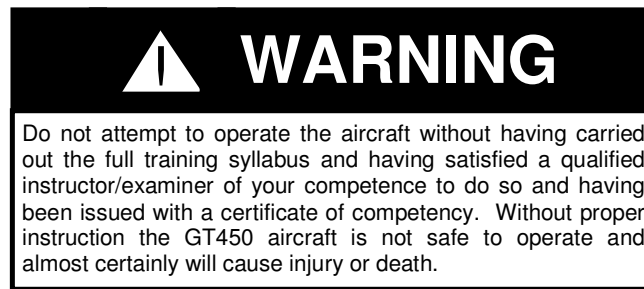
If a fire occurs on the ground, then immediately close both throttles, switch OFF the engine and exit the aircraft, turning OFF the fuel as you go.

A fire in the air is a considerably greater hazard. Two possible causes are electrical or fuel. Smoke or fire at the front of the aircraft is almost certain to be electrical in origin while occurrence at the rear could be from either cause.

In the case of an electrical fire, turn OFF all electrical equipment and land as soon as is safely possible.

In the case of a fuel fire, select a landing area, turn OFF the fuel and allow the engine to run until it stops. Turn OFF the ignition and perform an engine-off landing as described above.

## 4. PREPARATION FOR SAFE LSA OPERATION.



### 4.1. TRAINING

Safety is no accident. The safe operation of an aircraft stems from many factors, but one of the most important is pilot training. Please ensure that the following conditions always apply:

#### Qualifications

Before taking command of your aircraft, you must hold a pilot's licence valid for microlight aircraft issued by the national or state aviation authority, or be under instruction towards your licence. You must have gained your licence on flexwing aircraft, or have passed a flexwing alternative controls test to the satisfaction of a qualified flexwing microlight instructor. The training standards must be at least equivalent to the BMAA microlight pilot's syllabus for flexwings.

#### Type Conversion

Conversion to the Quik range by a qualified instructor or experienced Quik range owner is essential unless you are very experienced on flexwings (200+ hours as a guide) and current. First flights must be in smooth conditions with less than 5kt cross wind and at least 400m clear unobstructed runway.

The Quik range are easy to fly, but have a very wide trimmable speed range. It is essential that proper control of speed is exercised for different phases of flight, especially landing approaches.

#### Currency

If you have not flown within the previous 3 months, take a refresher lesson with a Qualified Instructor before flying as Pilot in Command, and do not operate the aircraft until the Instructor is satisfied with your ability.

### 4.2. PRE-FLIGHT PLANNING

Planning is pivotal to the legal safe operation of all aircraft. Please ensure that the following conditions always apply:

#### Air Law

Before flight, check that your aircraft documents and pilot qualifications qualify in the states or countries in which you intend to operate. Air Law can vary from country to country and from state to state; be sure to always fly within the letter of the Air Law that operates in your state or country. Make sure you have permission to fly from both your take-off site and your intended landing site.

#### Weather Conditions

Flexwing Microlights should only be flown in calm conditions. The prudent pilot takes care to avoid flying in strong winds (more than 15mph), gusty, thermic conditions, crosswinds, rain and any kind of storm. (See Section 8 for more detailed weather limitations.) Remember also that the weather at your destination may be different from your starting point, so check before you set off. Detailed aviation weather reports are usually available from your local airfield, and on the internet. If the weather unexpectedly changes for the worse during a flight, then the safest option is to land at a suitable landing site at the earliest opportunity.


#### Route Planning

Plan your route using an appropriate pilot's map, properly folded and stowed in an appropriate map-holder which is securely fastened to the pilot/passenger or airframe. Ensure that your planned route remains within the operational Air Laws of your state/country. Always plan your route so that you fly within safe gliding distance of a suitable landing area in the event of power loss or complete engine failure. Avoid flying over mountains or large hills, seas or lakes, built-up areas, woods or forests, deserts with soft sand or anywhere else that renders a safe landing impossible in the event of an emergency. Remember that there is a greater risk of turbulence when flying near mountains. Never fly in the lee of hills or mountains if the surface wind is anything other than calm, since lee rotor can be extremely dangerous. Always plan for the possibility of having to divert to an alternate airfield because of bad weather, and make sure you carry enough fuel to

reach your alternate destination with a further 60 minutes of flying time in reserve. Use the advice in this paragraph in conjunction with that obtained in your formal training. This advice must not be taken as a substitute for proper training.

### **Clothing**

Both extreme heat and extreme cold can be dangerous to pilot and passenger, since they can affect the human brain's decision making process. Please ensure that you wear clothing appropriate to the conditions in which you fly. Crash helmets, ear defenders, gloves and a purpose-built flight suit should always be worn, irrespective of the conditions! In bright conditions, high quality unbreakable sunglasses are also a sensible precaution. Remember that the temperature drops 2-4 degrees F per 1000 feet of altitude, so clearly if your route demands high altitude flying you should dress appropriately. Remember also that the pilot and passenger in open cockpit aircraft will suffer from wind chill, which has the effect of making the ambient temperature seem much lower than it actually is. Finally, check that neither pilot nor passenger has any objects which can fall out of their pockets since any loose objects are likely to pass through the propeller arc, destroy the propeller in doing so and seriously threaten the safety of the aircraft and its occupants.

**WARNING**

Articles of clothing, such as gloves and scarves that may be taken off in flight, or glasses/sun-glasses must be secured by a tie short enough to ensure that they cannot fall out of the aircraft or be blown into the propeller.


Other objects that are carried in the cockpit such as maps, knee boards and other navigation equipment must be similarly secured.

Occupants with long hair, particularly in the rear seat, must have it tied to ensure that it cannot reach moving or hot parts of the engine.

Failure to take these precautions could result in injury or death.

### **The Payload**

The aircraft available payload is the difference between its dry empty weight (see Section 10.2) and its maximum authorised take off weight (MAUW - see Section 10.3). Before each flight you should calculate the combined weight of the aircraft, fuel, pilot and passenger and ensure that it never exceeds 990lb (450 kilograms).

**WARNING**

It is extremely dangerous to exceed the 450kg (990 lb) take off weight limit, it could cause structural failure or loss of control leading to injury or death.

### **Fuel**

Before each flight, you should calculate your fuel requirement. (For an approximate fuel consumption guide, see Section 10; remember that fuel consumption can be affected by many factors including engine condition, take off weight, density altitude, speed). You should ensure that you have enough fuel and reserve for your planned flight (See paragraph on Route Planning above) by carrying out a visual check of the fuel level before you set off and calculating the endurance limit of the aircraft leaving at least a 30% reserve factor. Never rely only on fuel gauges, use them only in conjunction with your calculated fuel endurance notes. Check the fuel is of the appropriate quality (see Section 2.2), properly filtered against impurities. Drain a small quantity of fuel via the drain valve before each flight to check for water.

### **Human Factors**

Before flying, check the Human Factors learnt as part of your flying license. Never fly with a cold, under the influence of drink or drugs, after an illness/accident without clearance from your Doctor, or when feeling depressed.

## **4.3. MODIFICATIONS**

You must not carry out unauthorised modification to the aircraft. It is illegal and for the most part unsafe to carry out unauthorised modifications to your aircraft.

#### 4.4. PRE-FLIGHT CHECKS

It is essential that rigorous checks are carried out daily before flight, exactly to the schedule in Section 5. In addition to the full daily inspection and pre-flight checks detailed in Section 6, ensure that:

SERVICING: the engine and airframe are within Service limits (see Maintenance Manual).

LIFED COMPONENTS: the engine and airframe are within lifing limits (see Maintenance Manual).

If there are any grounds for suspicion about any element of your aircraft's safe operation, do not fly.

#### 4.5. SAFETY HARNESES

The Quik range are equipped with a 3 point harness for the pilot, and a four point harness for the passenger. These should be worn at all times; it is particularly important for the safety of the pilot in an accident that the passenger should wear the shoulder straps provided. Double check that both harnesses are secure as part of the Pre-take-off check (See Section 7.4). If flying solo, ensure the rear seat harness is secured so that the straps and in particular the shoulder straps cannot flap around in the wind and get into the engine magneto or catch the hot exhaust pipe, which may cause them to melt and lose some or all of their strength.



#### 4.6. GROUND HANDLING

A flight has not been successfully and safely concluded until the engine has been stopped, the aircraft has been securely parked and picketed or hangared, and the pilot and passenger have disembarked. Do not make the mistake of losing concentration just because you have landed safely. Never taxi at more than walking pace. Use the brakes gently. Remember to make sufficient allowance for the span of the aircraft when manoeuvring in confined spaces. Always be ready to switch off the engine in the event of any problem. Respect ground handling limitations and avoid taxiing in strong winds and gusty conditions. For fixed wing pilots: remember the nose-wheel steering operates in the opposite direction to that which you are used to. See section 7.2 for further information

#### 4.7. AIRSTRIP CRITERIA

Your airstrip should be smooth, flat, devoid of obstructions, clear of stones and other obstacles which may damage the aircraft and more particularly the propeller. Short cut grass or tarmac are ideal surfaces. The strip should be sufficiently long to allow for a straight ahead landing in the event of an engine failure on climb out. Both the approach and the climb out zones should be free of any high obstructions like trees, pylons & buildings, and ideally there should be some alternate landing fields in these zones to allow for safe landings in the event of engine problems when landing or taking off. Airstrips surrounded by trees or other obstacles should be avoided, particularly in windy conditions, since low-level turbulence and rotor are likely to be present. Exercise great care when visiting other airstrips for the first time, since it is quite possible that they are not suitable for safe Microlight operation.

#### 4.8. SPECIAL HAZARDS

You should be aware of the following special hazards and it is your duty to point them out to passengers and spectators:

##### Propellers

Rotating, and indeed even stationary propellers pose potential dangers. Rotating propellers are very hard to see, so special attention should be made to keep persons, and especially children and pets, clear of the aircraft once it has been started. Persons should never stand either in line with the arc of the propeller or



behind it since there is always a possibility that stones or other objects can be picked up and hurled at great speed in any direction. In the event of a propeller strike close down the engine immediately and do not re-start until you are satisfied that no structural damage has been done to the propeller or airframe. If any damage is visible, do not fly until the damaged blade has been repaired or replaced and the engine has been inspected for shock load damage.



## WARNING

**THE EXHAUST SYSTEM:** Do not touch the exhaust while the engine is running or directly after it has been shut down. It will be very hot and will inflict serious burns if touched. Keep items of clothing and the aircraft's seat belts clear also. Inspect the entire exhaust system for cracks and damage before and after each flight. Do not fly if there is any damage.



## WARNING

**THE RADIATOR SYSTEM:** The cooling system is pressurised when the engine is warm, so you should never open the cap until the engine has cooled down. The coolant in the system is very hot and will inflict serious burns if it comes into contact with human skin.

The coolant contains Ethylene Glycol which is harmful if swallowed. Do not attempt to siphon or drain the coolant system by sucking on a tube.

Failure to observe this Warning could result in injury or death.



## WARNING

**THE OIL SYSTEM:** engine oil is stored in the reservoir underneath the left side of the engine. This becomes very hot in use and will inflict serious burns if it comes into contact with human skin.

### **Running up and testing the engine on the ground, with or without the wing attached**

Whenever you need to perform an engine check of any sort, particular care must be taken to observe the following procedures:

1. Move the aircraft to an area clear of people, animals etc. **ALWAYS LEAVE AMPLE ROOM AHEAD IN CASE THE AIRCRAFT BREAKS FREE WHILE RUNNING UP.**
2. Check the ground around the propeller area for loose stones etc. and remove any such objects.
3. Tie the aircraft to a solid object - a large and sound tree, a car with its parking brake applied, a concrete post etc - using webbing or rope which is sufficiently strong to take a load of 225 kilos (500lbs) minimum. Securely attach both ends of the rope/webbing to the rear axles of the Quik, GT450 or QuikR just inboard of the wheels. Then, ensuring that the V bridle is long enough to give sufficient clearance from the propeller, attach it to your chosen solid object. Make sure that the bridle cannot ride up the object when under load.
4. **DOUBLE CHECK** all knots and attachments before starting.
5. Carry out a proper inspection before starting. See Section 5.
6. Do a full pre-start security check as described in Section 6.3.
7. Make sure there is a qualified pilot on board, properly strapped in and with his/her fingers on the ignition switches at all times when the engine is running
8. Maintain an adequate look out while conducting tests; adults, children & animals may approach from behind.
9. Wear a helmet and ear defenders when in the vicinity of an engine being tested. If you choose to wear a headset then ensure that the connecting cables cannot get near the propeller or rotating parts of the engine.



## WARNING

Unprotected exposure to engine noise on test will cause long or short term hearing loss. Wear ear defenders or appropriate ear defending headset at all times when in the vicinity of a running engine. Ensure that the headset connecting cables cannot get near the propeller or rotating parts of the engine.

## 5. PRE-FLIGHT INSPECTION

| 5.1. WING (QUIK & GT450)   | Action | Done? |
|--|--------|-------|
| Nose catch secure, locking washer fitted                                     |        |       |
| Leading-edge spar undented, shape correct                                    |        |       |
| Crossboom junction secure (zip flap closed), restraint webbing ok            |        |       |
| Sail secure on tip, tip settings correct                                     |        |       |
| Washout tube secure and undamaged  |        |       |
| Reflex retention lines secure & untangled                                    |        |       |
| Crossboom tensioner secure & not twisted, safety pin fitted                  |        |       |
| Reflex (luff lines) and trimmer lines straight & secure                      |        |       |
| Keel pocket components undamaged   |        |       |
| Top rigging secure.  |        |       |
| Top rigging over centre lever is tensioned                                   |        |       |
| Hang-point secure and freely rotating, hang bolt secure                      |        |       |
| Control frame safety rings   |        |       |
| Trimmer set and functioning properly, trim cord attached to keel             |        |       |
| Cables to control frame secure   |        |       |
| Condition and security of composite flexible ribs                            |        |       |
| All other ribs secure, elastics fitted correctly & undamaged                 |        |       |
| Nose rib and nose cone secure and correctly fitted                           |        |       |
| Tip fins secure and correctly fitted   |        |       |
| Rigging tool detached and stowed.  |        |       |
| 5.1.1 WING (QUIKR & GTR)   | Action | Done? |
| Nose catch secure, locking washer fitted                                     |        |       |
| Leading-edge spar undented, shape correct                                    |        |       |
| Crossboom junction secure, restraint webbing ok                              |        |       |
| Sail secure on tip, tip settings correct                                     |        |       |
| Washout rods fully deployed  |        |       |
| Upper strut connections secure, wingnuts and safety rings in position        |        |       |
| Crossboom tensioner secure & not twisted, safety pin fitted                  |        |       |
| Keel pocket and rocker components undamaged                                  |        |       |
| Hang-point secure and freely rotating  |        |       |
| Control frame wingnuts and safety rings on basebar and lower strut fittings. |        |       |
| Trimmer set and functioning properly, trim cord attached to keel             |        |       |
| Cables to control frame secure   |        |       |
| Condition and security of composite flexible ribs                            |        |       |
| All other ribs secure, elastics fitted correctly & undamaged                 |        |       |
| Nose rib and nose cone secure and correctly fitted                           |        |       |
| Tip fins secure and correctly fitted   |        |       |
| Rigging tool detached and stowed.  |        |       |
| Inspection zippers and undersurface Velcro secured                           |        |       |
| 5.2. TRIKE   | Action | Done? |
| Ignition off; engine controls closed   |        |       |
| Front strut secure, safety rings attached                                    |        |       |
| Pylon catch locked   |        |       |
| Front tyre inflated and in good condition                                    |        |       |
| Front forks and suspension in good condition                                 |        |       |
| Axles secure   |        |       |
| Rear tyres inflated and in good condition                                    |        |       |

|   |  |
|---|--|
| Seat secure; harness straps secure, buckles functioning                       |  |
| Throttles, choke control cables - condition OK, no kinks                      |  |
| Engine mounting secure  |  |
| Exhaust secure  |  |
| Carburettor(s) secure, check for water or debris in float bowl                |  |
| Gearbox check for oil leaks   |  |
| Propeller secure and undamaged  |  |
| Plugs and leads secure  |  |
| Fuel contents adequate, check drain valve for water                           |  |
| Brakes functioning correctly, check for leaks, parking brake lever OK         |  |
| Throttles - check both hand and foot for correct operation then set closed    |  |
| Steering functioning correctly  |  |
| Radiator coolant full, cap secure, overflow bottle pipe secure                |  |
| Coolant level overflow bottle approx. 1/3 <sup>rd</sup>                       |  |
| Hydraulic fluid reservoir level and cap secure.                               |  |
| Engine oil level (nb turn engine SLOWLY till tank gurgles)                    |  |
| Oil radiator cover secure (if fitted) and set appropriately for ambient temp. |  |
| Hang bolt secure and tight as possible using hand                             |  |
| In addition carry out pre-flight checks in engine operators manual            |  |




## WARNING

You should never, under any circumstances, consider flying the aircraft before you have completed a thorough pre-flight check!


## 6. PREPARATION FOR FLIGHT

### 6.1. GENERAL

Stow baggage carefully in the compartments provided. Do not exceed the loading limits or use non-authorised loading spaces. The space between the panel and the screen must not be used to store baggage or any other items unless they weigh less than 1kg and are secured by a lanyard. The wing rigging tool can be dismantled into 3 sections and stowed in a pouch under the rear seat. The pouch must be secured by the strap provided.

**WARNING**

Baggage carried in unauthorised places can cause control obstruction, disruption to systems or/and get loose & be caught in the propeller. Any of these outcomes can result in serious injury or death.

**WARNING**

An inexperienced, inappropriately dressed or panic-stricken passenger could jeopardise the safety of the aircraft and crew. Ensure that you give all passengers the following briefing.

Before offering to take a passenger, ensure that you have ascertained that they do not suffer from any physical or mental condition that would make the flight hazardous either for the passenger or for the safety of the aircraft. Your first task before starting the engine is to seat your passenger (if applicable) in the aircraft, to check his/her harness, to check for loose objects, and then before having him/her put on a crash helmet, to give the following briefing:

#### **PASSENGER BRIEFING:**

Do not touch the ignition switches.

Do not touch the hand throttle.

Do not touch the control frame.

Fold arms, or rest them on knees.

No loose scarves, and tie up long hair.

Ensure cameras, maps etc are secure. Pockets empty and no loose objects in the cockpit.

Describe takeoff, landing and intention of flight.


Explain that there are hot and rotating engine parts directly behind which should not be touched in any circumstances.

**HELMET:** A protective helmet must be worn, fit correctly and be secured.

**VISORS:** A positive lock must be fitted to the visor and be engaged during flight. This is to ensure that the passenger does not wrench their head or neck if the wind should lift the visor, and also that it is not wrenched off completely where it will probably go into the propeller.

**WARNING**

On Rotax 912/912S engines, ensure the passenger's hair or scarf cannot get caught in the magneto.

**WARNING**

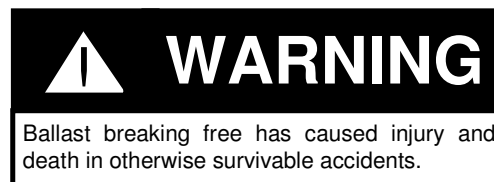
1. You should never attempt to start the aircraft before satisfying yourself that the appropriate checks and procedures have been satisfactorily carried out (see below).
2. Rotating propellers (which are very difficult to see), hot coolant, hot and moving engine parts can all be very dangerous if not treated with due care and respect.

## 6.2. STRAPPING IN

Lap straps should be adjusted snugly across the hips to reduce tendency for either occupant to slide forwards under the strap. Shoulder straps should be adjusted with a little slack to allow any necessary movement during flight and to ensure that the lap straps remain in place without slipping upwards in the event of accident.



Ballast for solo flight is not normally necessary, however if ballast is carried, it must be in a P&M Aviation approved container and securely strapped into the rear seat using lap and shoulder straps.



## 6.3 STARTING ENGINE

The pilot must **always** start the engine when sitting in the cockpit with seatbelts secured and helmet worn.

Pre-start checks:

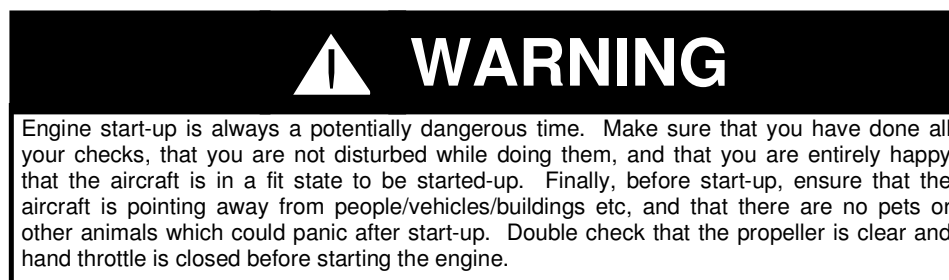
1. Passenger should also be strapped in and briefed.
2. Throttles both working and fully shut (never use the hand throttle for engine control on the ground).

- *If starter interrupt switch is fitted, starter will not operate unless hand throttle is CLOSED.*

1. Check ignition switch operation and be prepared to turn off rapidly if required, before starting according to paragraph 7.3 below.

Parking brake set. Check by pushing firmly on propeller hub (ensure that the ignition switches are in the OFF position before touching the propeller). Chock the aircraft securely.

All controls should be checked closed and ignition should be off. The parking brake if fitted should be applied. Check the fuel is turned on.



**ROTAX 912/912S ENGINES:** Before the first start of the day it is a good idea to turn the engine over for 2 bursts of about 5 seconds, IGNITION OFF, to get the oil pumping around the engine and to fill the float bowls. For the first start of the day use full choke, especially in very cold conditions. The choke system on the 4-stroke engines is progressive, unlike the 2-stroke's, and the choke system automatically raises the idle speed quite considerably, so you **MUST** have brakes applied. For all other starts unless hot, use about 1/3 choke. Before start-up, check that both carbs are shut.

Before attempting to start, use the following mnemonic as a final check:

**S**ecurity: passenger/ pilot harness attached, no loose objects, brakes ON.

**T**hrottles: set to SHUT, choke as required

**A**ll clear: all persons & animals clear of propeller arc to the side and prop blast behind

**I**gnition: contact switches set as required

**M**ixture: fully rich


**P**ress/pull: starter action as required

**STARTING:** check visually again that the propeller area is clear and call “**Clear Prop**” loudly. Pause. Turn on the key switch, set the contacts to ON, then push the button in 5 seconds bursts. Release the button as soon as the engine fires.


If the engine refuses to start after 5 or 6 attempts, close the controls and switch OFF the ignition before investigation.

**WARNING**

Do not attempt to start the motor with the throttles open.

**WARNING**

Before touching the propeller, double check that both contact switches are set to the OFF (forward) position, failure to do so could result in injury or death.

**WARNING**

Although unlikely, it is possible that an electrical circuit fault will allow the ignition circuit to remain live with the ignition switches in the off position, it is therefore essential that before attempting to clear a flooded engine with the foot throttle set to OPEN, you ensure that the aircraft has adequate clear space forward for the operator to react to an inadvertent engine start up and to close the throttles. If in any doubt, then chock the aircraft before carrying out this procedure.

**WARNING**

Never attempt to hand start an engine by swinging the propeller! This practice is very dangerous and could result in injury or death.

#### 6.4. ENGINE WARM-UP

**WARNING**

**ROTATING PROPELLERS ARE ALMOST INVISIBLE AND CAN CAUSE INJURY OR DEATH!** Extreme care must be exercised during engine warm-up. Ensure that all spectators/children/pets are kept well clear of the propeller and the propeller arc.



## WARNING

When starting an aircraft engine it is essential that you keep spectators well clear of the immediate area and ensure that all spectators children and pets are totally under the control of a responsible adult. On certain surfaces stones can bounce into the propeller blades and can then become projectiles. Do not start an engine if any loose stones are in the vicinity of the aircraft with any spectators present at all. A stone picked up by a propeller can travel at high speed for hundreds of metres (yards).



## WARNING

If the LED voltmeter remains red after start, it is possible the starter motor has not disengaged, with possible damage/fire risk. Stop engine and investigate.

Also stop engine if oil pressure does not rise within 20 seconds.

The 912/912S engine needs to be thoroughly warmed up before take off. In the winter this can take up to 10 minutes. Apply the parking brake, set no more than 2500 RPM and allow the Oil temperature to climb to 50° Celsius minimum, see also the Engine Operators manual.



## WARNING

Taking off without completing the proper warm up procedure may result in premature mechanical wear in your engine, carburettor icing and possibly engine failure on take off. Always warm your engine thoroughly before take off.

Note: P&M Aviation have a range of oil and water radiator covers available for those who operate in cold conditions (20°C/ 66°F or less), see section 2.11 for instructions for use.

The brakes will hold against a moderate power run-up but the aircraft may slide on wet grass or slippery surfaces or indeed on more powerful options, on any surface. In this case check the engine at reduced RPM. During this operation the pilot must be mentally prepared to switch off the ignition at very short notice. If the engine is stopped after a period of running, the ignition should be switched off at tick over. Switching off at high rpm floods the engine, distorts the cylinders through rapid cooling and makes restarting difficult.



## WARNING

The pilot must always be in the aircraft, helmet and harness properly fitted, during run-up. Use ONLY the foot throttle during run-up, and be ready to turn off at the ignition switch. Failure to follow these instructions could result in injury or death.



## WARNING

The brakes/parking brake are not designed to hold the aircraft against a full power run-up. Exercise extreme caution when ground running the engine.





## WARNING

The Quik range do not have a certified aircraft engine. The pilot must be prepared for the engine to stop at any time and he/she must fly the aircraft accordingly. He must also be trained and in current practice for forced landing procedures. This means the pilot should only over fly terrain where a safe landing is possible at all times. He should avoid over flying towns, forests, mountainous zones etc., and always fly with sufficient altitude to glide to the nearest safe landing area. Failure to do so could result in injury or death.

## 7. FLIGHT

### 7.1. GENERAL FLIGHT CONTROL

#### Roll

Roll control is the action of the pilot moving the wing relative to the trike. The roll response is aided by the intentional flexing of the airframe and sail designed into wing.

The Quik range of wings also incorporates a floating keel and hang-point roll linkage to reduce the effort required to produce and stop a roll, especially in response to small pilot inputs. This makes the aircraft much easier to fly if the pilot inadvertently flies into turbulence.

Because the wing is only deflected a certain amount by the pilot's roll input, the roll rate achieved will be faster at high speeds than low speeds. The roll response will be typically 3.5 seconds to reverse a 30 degree roll at 1.3V stall, fully loaded, to 2 seconds at VNE. At minimum loading, response is approximately 0.5 seconds faster. Care should be taken not to over control at high speeds, only small inputs are required. When cruising, it is most comfortable to keep arms out of the slipstream, using one hand at the centre of the bar. Roll can also be tuned by using the nose wheel (steer right for left roll and vice versa).

#### Pitch

The aircraft incorporates a pitch trimmer so that the pilot can select a range of steady trimmed speeds. This feature makes for easy cross-country cruising performance, or slower, stable flight for climbing, gliding, or when instructing.

The QuikR & GTR wings have low drag and an extremely wide speed range. Care must be taken not to fly the aircraft beyond VNe or into a steep nose up pitch attitude.

The wing will stall if the control bar is pushed out to the front strut and held there. Approach to the stall must be progressive to avoid potentially dangerous very steep nose-up attitudes at the stall giving a violent nose down stall break. Prior to the stall, a buffet felt through the control bar should be noticed. At the stall there may be a mild wing drop with a very new wing at low weight (minimum washout situation). To recover, use standard flexwing recovery techniques. See Section 7.5 for stall characteristics. See also Section 10 for more information on stall speeds.

### Weather Conditions



## WARNING

Never fly the aircraft in very strong thermic conditions, high winds, in or near any kind of storm. Rain is best avoided since visibility is significantly reduced and propeller damage may result. Exercise extreme care when flying in conditions which are beyond your experience level. Respect the limitations set out below.

Microlight flying is most enjoyable in the calm conditions found at the beginning or the end of the day, when the wind and thermals generally die away. If you see any adverse change in the weather approaching - this is usually quite obvious - you are advised to land at the nearest safe landing site.

Rain will not noticeably influence flying control, although the stall speed tends to rise by approximately 5mph, and take-off/landing rolls will be longer than usual. Ice, however, is more serious and can occur through icing conditions, or by flying a wing which is wet from the bag, without giving it time to dry out.



## WARNING

Severe airframe icing can affect handling markedly. At the first sign, you should land or fly out of icing conditions.

Care should be taken in gusty or thermic conditions to maintain at least 60mph on climb-out and approach (to/from 250' minimum), to ensure good roll response and to avoid gust-stalling. The cross-wind limits in section 2 must be observed. The following weather limitations apply:

|                  | EXPERIENCED | INTERMEDIATE | BEGINNER |
|------------------|-------------|--------------|----------|
| Wind (mph)       | 23          | 15           | 5        |
| Thermic activity | Moderate    | Light        | None     |
| Cross wind       | 12          | 5            | 0        |
| Taxiing          | 23          | 15           | 5        |

|                     |                                    |
|---------------------|------------------------------------|
| Experienced Pilots  | 100 + hours pilot in command       |
| Intermediate Pilots | 10 - 100 hours pilot in command    |
| Beginners           | 0 - 10 solo hours pilot in command |

Where the aircraft is flown in a country where there is a formally recognised training scheme leading to a private pilots license or certificate, the wind limitations may be increased at the discretion of a student pilot's instructor, up to the maximum limitations for an experienced pilot.

## Tuning

It is important that the wing is trimmed so that it will fly straight at a range of steady speeds. A wing which exhibits a constant turn when flying 'hands off' will be tiring to fly and uncomfortable in turbulence, particularly when landing or taking off. A properly tuned wing will fly completely 'hands off' throughout the whole range of power settings. *Refer to Section 10 for tuning details.*

## 7.2. PRIMARY CONTROLS

The wing is controlled by standard 'weight-shift' techniques. The speed of response and lightness of action should be borne in mind for those pilots converting from other makes of aircraft.

### Control Bar Movements

Bar pulled rearwards  
Bar pushed forwards  
Bar pushed across to the right  
Bar push across to the left  
Trim switch up  
Nose wheel push right  
Foot throttle push down  
Hand throttle push forward

### Aircraft Response

Nose pitched down, aircraft speeds up  
Nose pitched up, aircraft slows down  
Aircraft rolls to the left  
Aircraft rolls to the right  
Nose pitch up (electric trim)  
Aircraft turns left  
Engine speeds up  
Engine speeds up



## WARNING

It is absolutely essential that all persons wishing to fly the Quik, Quik GT450 or QuikR are trained to a minimum standard of the syllabus as used by the British Microlight Aircraft Association or FAA, carried out by a recognised training organisation for this type of aircraft. It is absolutely essential that all persons with experience of 3 axis aircraft undertake a flexwing conversion course on a dual-control flexwing aircraft before attempting to fly the Quik, Quik GT450 or QuikR.

## 7.3. GROUND HANDLING

Flexwing Microlights require special handling on the ground.

### Parking

The Quik & QuikR may be parked in either the "wing down" method, but only with a block to support the wing tip or "nose into wind" mode. The GT450 & GTR may be parked in either the "wing down" or "nose into wind" modes.

#### Wing Down:

Set the parking brake with the aircraft across and slightly downwind. Bank the into-wind wing down till the tip touches the ground. Apply the Velcro parking tie to the control frame.

#### Into wind:

Set the parking brake and face the aircraft into wind. Pull the control bar back till it contacts the seat and secure it there using the rear seat belt.

If thermals etc are present, the aircraft may be picketed using weights or ground anchors on the side flying cables for the Quik and GT450. If strong gusty thermals or dust devils are present, or the wind regularly changes direction, you are advised not to leave the aircraft parked in this way. Remove the wing and lay it flat on the ground (see Section 14.1).

For the QuikR & GTR in stronger winds the trike pylon should be folded down. If necessary, after de-tensioning the wing and removing the battens, the wings can be folded back. See section 14.4.

#### Taxiing

Always taxi with great care and at a speed never greater than walking pace. For crosswinds, roll the into-wind wing downwards until you find a balanced position, and take care not to let the wind get underneath the into-wind wing when turning or taxiing. When taxiing into wind, hold the nose neutral or slightly down. When taxiing downwind, push the nose up and taxi slightly faster than usual. See Table on previous page giving wind strength limitations.



## WARNING

When taxiing crosswind do not make the mistake of letting the into-wind wing go up as this will greatly increase the risk of the aircraft being blown over. Pull the bar in when taxiing into wind and push the bar out in a tail wind.

#### Foot Operated Brake

The foot operated brake consists of a lever operated by the left foot which controls a master cylinder mounted on the left side of the nose gear ( disk brakes). In the disk system hydraulic pressure is fed through nylon tubing to slave callipers mounted on the wheels in the spat fins.

There is also a parking brake incorporated which locks the brake pedal by means of a hand lever and detent system. To engage the parking brake, press the brake pedal and lift the hand lever until it engages with the hoop on the side of the steering assembly. Release occurs automatically when the brake pedal is pressed. *The parking brake locking lever should be operated by hand only.*

#### Note

- *Do not engage parking brake by pushing on the locking lever.*

#### Brake Operating Limitations

If the brake is needed during landing, exercise great care and remember the following procedures:

1. Apply the brake gently once the aircraft is stabilised after landing.
2. If the rear wheels lock and the aircraft starts to slide, release the pedal immediately and re-apply more gently when the aircraft is stable once more.



## WARNING

If the brake is used as an emergency landing brake in wet and icy conditions, extreme care must be exercised. If the aircraft veers, or the wheels lock, release the brake pedal immediately and steer towards the direction of the veer.

### Engine Run-Up

Operators should note that with the engine running above idle the aircraft may tend to creep forward with the rear wheels locked on some surfaces. See warning Section 6.4.

### Inspection

The amount of wear that takes place on the tyres and drum brake shoes will vary from one aircraft to another, depending on the type of surface the aircraft normally takes off and lands on. Close inspection of the brake shoes should be made at intervals of no more than 100 hours.

## 7.4. TAKE-OFF

### Performance

The takeoff performance given in section 3.5 is on short mown grass. Takeoff could be shorter from tarmac, but longer if from wet ground, if the ground slopes upwards, or if there is any tailwind. A significant headwind would reduce the length of the take-off run considerably; conversely, long grass or soft ground will considerably increase the take off run. See CAA safety sense leaflet 7A, performance.



Density altitude will affect take-off performance: for example at 4000 ft altitude the takeoff run will be 1.9 times as long, and if the temperature is 32°C at 4000 ft, the run will further increase to 2.1 times as long.



### Before Take off Checklist

- **Performance Calculations:** (see above)
- **Wing visual check:** nose, front rigging, side rigging, tip rods, ribs, rear rigging, hang-point bolt, control frame and bolts, basebar bolts.
- **Trike:** front strut pins/rings, brake operation, steering free, baggage box lids secure, harnesses, side skirts secure, ignition switch check operation and magneto drop, intake and exhaust system secure, hand and foot throttle operation, mixture rich.
- **Magneto drop:** check brakes on, at engine idle turn OFF both magneto switches, check for dead cut, and turn on again. Idle speed should be set at around 1400 RPM for the Rotax 912/912S engine. Run engine to 4000 RPM, then turn OFF front magneto. Listen for any misfire and observe mag drop (see also Engine Operators Manual). There must be a noticeable drop, which is accompanied by a slight change in engine note. Check the other magneto in the same way.

Then use the mnemonic **CHIFTWAMPB** as follows:

**CONTROLS:** full and free movement of control bar & nose wheel; set trimmer to takeoff.

**HELMET & HARNESS:** check both your own and particularly your passengers seat belt & harness.

**INSTRUMENTS:** all functioning, CHTs correct, Altimeter set, Oil temp and Oil pressure, altimeter set, Intercom and Radio switched on and working.

**FUEL:** fuel cap on, fuel tap on and fuel sufficient for planned journey + reserve.

**TRIM:** set to takeoff position.

**WIND DIRECTION & STRENGTH:** within both aircraft and pilot limits?


**ALL CLEAR:** to taxi, to line up for finals, check for other aircraft in the circuit?

**Mixture, Magnetos :** Fully rich, on both

**POWER:** Check full power rpm at the start of the takeoff roll. Abort the takeoff if full RPM is not reached or rough running occurs.

**NOTE: FULL POWER STATIC RPM -** Rotax 912UL-S = 4800, min 4700  
Rotax 912UL = 5100, min 4900

**BRAKES:** Off

**WARNING**

**BRAKES MUST BE OFF BEFORE STARTING TAKEOFF.**

The aircraft will slide under full power on wet grass with locked brakes. Locked brakes will cause loss of directional control during takeoff with high risk of a serious accident.

### Take-off Technique

The hand throttle should not be used during take-off. Set the pitch trim control to the placarded take-off position. Check brakes are OFF. The correct technique on smooth surfaces is to allow the wing to trim in pitch during the initial stages of the take off run so as to reduce the drag and increase the acceleration. The Quik, QuikR & GTR all demand a definite push to rotate on takeoff. In smooth air conditions, push forward until the aircraft unsticks at around 40mph (64km/h, 35kn) [GT450] and 45 mph (72km/h, 40kn) [Quik, QuikR & GTR] and then allow the aircraft to accelerate to around 60 - 70mph (96-112km/h, 52-61kt) [GT450 & GTR] and 65-75mph (105-120 km/h, 56-65kts) [Quik & QuikR] for the climb. When established in the climb, adjust the trimmer to remove the bar pressure and climb at 65mph.


In smooth air conditions on rougher ground, push the bar out to its fullest extent for the whole takeoff run, to get the weight off the wheels as soon as possible. The trike unit will then swing forward under the wing. Allow the control bar to float back as this happens and climb away in the manner indicated above. It follows that taking off from rough ground in turbulent air conditions could either result in a slower takeoff speed than is desirable or in greater stress to the aircraft structure during a fast takeoff run. Therefore, consider carefully the advisability of flying in such circumstances.

### Crosswind takeoff

Set the wing at a neutral or small positive angle of attack (i.e. in the middle of the range of pitch movement available)

Roll the into-wind wing down until there is neutral or small into-wind wing down tendency.

Check brakes off, accelerate at full power keeping straight with the nose wheel. Push out at 5-10mph faster than normal (45-50mph) so as to leave the ground cleanly with no skipping. Apply a small amount of bank into wind and allow the speed to build to 65mph.

**WARNING**

**DO NOT PERFORM STEEP CLIMB-OUTS.** Allowing a steep climb to develop at a slow airspeed immediately after takeoff is dangerous. If the engine fails, the aircraft will pitch nose down through a large angle before taking up a glide. Roll control is also impaired at low airspeed. If at low level, there may not be enough time for recovery to landing mode, which could result in injury or death.

### Solo Flight Take-off

The aircraft is only to be flown solo from the front seat. No ballast is required if the pilot weight is above 55 kg. The initial rotation of the trike to a nose-up attitude will be more pronounced when flying solo. For the initial 200 ft (61m) of climb, the attitude of the trike should be controlled to allow for the possibility of engine failure and airspeed should be maintained at 60mph (GT450 & GTR) & 65-75mph (Quik, QuikR & GTR). The full-power setting may have to be reduced to achieve a comfortable climb angle.

### Climb - QUIK

The speed at which maximum climb rate is achieved is 57mph. Once established in the climb, the bar force can be removed with the trimmer. See the table in Section 3.5 for performance. All climb rate figures were

taken at 409kgs (900lbs) Max AUW, sea level, 15°C (59°F) conditions (ISA). Beware of the effect of density altitude on the climb performance. The climb rate will reduce to around 0.65 of the sea level figure at 4000 ft, and if the temperature at 4000 ft is 32°C (90°F), the factor will be 0.52.

#### **Climb – QUIK GT450**

The speed at which maximum climb rate is achieved is 55mph. Once established in the climb, the bar force can be removed with the trimmer. See the table in Section 3.5 for performance. All climb rate figures were taken at 450kgs (990lbs) Max AUW, sea level, 15°C (59°F) conditions (ISA). Beware of the effect of density altitude on the climb performance. The climb rate will reduce to around 0.65 of the sea level figure at 4000 ft, and if the temperature at 4000 ft is 32°C (90°F), the factor will be 0.52.

#### **Climb – QUIKR & GTR**

The speed at which maximum climb rate is achieved is 60 mph. Once established in the climb, the bar force can be removed with the trimmer. See the table in Section 3.5 for performance. All climb rate figures were taken at 450kgs (990lbs) Max AUW, sea level, 15°C (59°F) conditions (ISA). Beware of the effect of density altitude on the climb performance. The climb rate will reduce to around 0.65 of the sea level figure at 4000 ft, and if the temperature at 4000 ft is 32°C (90°F), the factor will be 0.52.

### **7.5. EN-ROUTE**

During all aspects of flight the aircraft should be flown so that in the event of engine failure or loss of power, safe landing areas are always within reach. Providing the aircraft is being flown sensibly, the pilot has been trained and is in current forced landing practice, an engine failure should not lead to an accident and any competent and well-trained pilot will be able to cope.

Levelling off into the cruise, set the attitude then the power setting and finally trim out the bar force using the trimmer knob or switch for pitch. The nose wheel steering can be used to provide some lateral trim, if required. (Left steering gives a small left yaw, which translates into a slow right roll.) Once a steady cruise is set at a constant altitude, power and speed, the mixture may be leaned out observing the EGT limit of 800C. Monitor other engine limits before and after leaning. Revert to full rich before changing altitude, power or speed.



#### **Descent Rate – QUIK at MAUW 409kg**

With the reflex trimmer set slow, the minimum sink rate is approximately 600fpm at 53mph (85km/h, 46kn)  
With the electric trimmer set slow, the minimum sink rate is approximately 490fpm at 45mph (72km/h, 39kn)  
At 65mph the sink rate for both systems is similar, approximately 850fpm.

#### **Descent Rate – QUIK GT450 at MAUW 450kg**

Fully loaded, the engine-off sink rate is around 517 fpm at 47 mph (75km/h, 41kn) and increases as speed is increased. Best glide angle is 8:1 at 47mph (1.3 nautical miles/1000 ft in still air)

#### **Descent Rate – QUIKR at MAUW 450kg**

Fully loaded, the engine-off sink rate is around 500 fpm at 50 mph (80km/h, 43kn) and increases as speed is increased. Best glide angle is 9:1 at 57mph (1.5 nautical miles/1000 ft in still air)

#### **Descent Rate - GTR at MAUW 450kg**

Fully loaded, the engine-off sink rate is around 450 fpm at 50 mph (80km/h, 43kn) and increases as speed is increased. Best glide angle is 10:1 at 55mph (1.6 nautical miles/1000 ft in still air)

#### **Pitch**

Whether flown solo or dual, pitch control is very smooth and positive, progressive and damped, providing good "feel" at all times and in all manoeuvres. Pitch control is lighter when flown solo than dual. Pitch control force is also affected by the trimmer; heavier in the slow trim setting than the fast. If caught out in turbulent conditions, set trim to take-off to give more pitch feel. For the QuikR & GTR fast trim should not exceed 100mph (forward hang point) or 90mph (rear hang point (QuikR)). If out side these limits refer to section 9.4



Never pitch nose up or nose down more than 45° from the horizontal. Do not apply steep pitch attitudes at low airspeeds.

### Roll Control and Turns

At normal cruising speeds of 55 mph upwards, turns may be initiated by simply moving the control bar to the side away from the required direction of turn. As the turn develops, the control bar should be eased out to maintain the desired airspeed. As the desired bank angle is reached, the turn control input should be relaxed. Increasing bank angles requires increasing bar-out pitch control forces to coordinate the turn. Roll control becomes slower at low airspeeds, so the bar should be pulled in slightly to increase airspeed before commencing the turn. For roll-out the control bar is moved towards the lower wing tip, and the nose is lowered as the horizon levels. When the aircraft is flown solo, the roll response is faster for the same control force. Roll response is also less damped especially at high speeds in excess of 90mph. Small control inputs should be used. Co-ordinated turns can be achieved with a maximum bar movement of 3 inches.



### Trim – Longitudinal

The aircraft should be set at the desired steady speed/attitude/power and then the trimmer operated to remove the pilot's pitch force on the control bar.

Trim for takeoff at the placarded position on the indicator, 60-65mph (GT450), 65-70mph (Quik/QuikR/GTR). When established in the climb, trim back for maximum rate of climb 55mph (GT450), 60mph (Quik/QuikR/GTR). For landing approach, trim at 55-60mph solo, 60-65mph dual.

|                   |             |             |         |
|-------------------|-------------|-------------|---------|
| <b>CLIMBING</b>   | 1. Power    | 2. Attitude | 3. Trim |
| <b>DESCENDING</b> | 1. Attitude | 2. Power    | 3. Trim |

### Trim – Lateral

When cruising, the nose wheel can be used as a rudder to trim out mild turns or to provide mild course corrections. RIGHT nose wheel steering gives a RIGHT yaw which creates a slow LEFT hand turn. The effect is most noticeable above 70mph. The wing should be tuned straight enough to be turned slowly each way by this method.

### Effect of Power Adjustment on Pitch

As the thrust line is set low, the effect of reducing power is to lower the nose of the trike, and an increase in power will cause it to rise. The wing will continue to trim at a similar airspeed, power on or off.



### Hand Throttle

The engine RPM can be set with the cruise control lever and then the pressure on the foot pedal may be removed until an increase in RPM is required. Thereafter, the RPM will always return to the cruise setting when foot pressure is removed. To obtain the full RPM range on the foot pedal, the hand throttle lever must be in the fully-off position.





Do not use the hand throttle for engine control on the ground or on take-off or landing.

### Stall characteristics

Fully loaded, the stall occurs at approximately 33 mph Min. AUW, 40 mph Max. AUW, and is clean and easily handled. As the speed is reduced, aft bar pressure increases, noticeably so immediately prior to the stall. You will also notice a slight nodding tendency and a stiffening of roll response. As the wing stalls, the nose pitches down and corrective action is to bring the bar back slightly to prevent the aircraft re-entering the stall state. Pulling the bar violently in to the chest and holding it there will result in an unnecessary rapid nose-down rotation and consequent steep nose-down attitude. The quickest stall recovery will result if the bar is allowed to come back no further than the trim position, then as soon as the trike nose drops below the horizon, power should be applied to check the nose down rotation, and then the pitch adjusted to resume normal flight.

At the stall, a light wing drop may be found but is easily corrected. If necessary, hold the bar firmly to counter any tendency for the nose to pitch up excessively during the recovery. The wings are remarkably stable, and even if stalled in a turn will not spin, but pitch down, increase air speed and roll out into a shallow turn or straight flight. On brand new wings, which have the least wash-out, if any wing drop tendency is found, rotate both tips up 2 divisions. See tuning section.

Stall recovery is fastest with the trimmer set slow, as the trimmer pitching moment applied to the wing will quickly pitch it out of the dive. It is recommended that stalling exercises are done with the trimmer in the middle position (approximately 65 mph [GT450], 70mpg [GTR], 75mph [Quik & QuikR]).



## 7.6. LANDING

**Pre-approach checks: use the mnemonic FAWNTSIMB**

**FUEL:** sufficient to go around.

**ALL CLEAR:** long finals & runway clear.

**WIND:** strength & direction.

**NOSEWHEEL:** straight, hand throttle off, brakes off.

**TRIM :** set

**SECURITY:** harnesses/helmets tight.

**INSTRUMENTS:** set to QFE.

**MIXTURE:** fully rich.

**Brakes:** OFF.

### NOTE

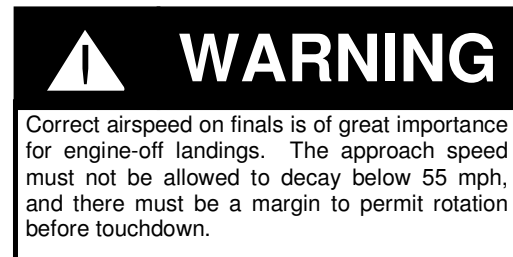
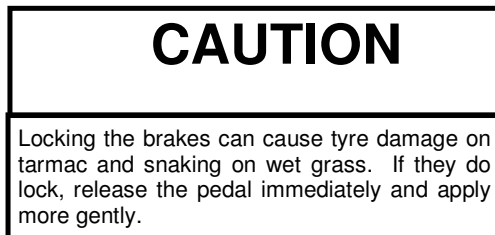
- Periodically warm the engine in the descent, particularly in cold and moist conditions.

Because of the great speed range of the Quik range, the aircraft must be trimmed to a reduced speed for landing in order not to overshoot the runway. If the speed and/or the altitude are too high, make the decision to go around early. Short field operations should be practiced on a marked section of long runway first.

The hand throttle should not be used during landing. Trim your approach airspeed down to 60-65 mph for the Quik, QuikR and GTR, and 55-60 mph for the Quik GT450 and be aware of wind gradient during strong wind days.



The flare is conventional (for a flexwing, but is of course opposite to a 3 axis aircraft), but the light pitch response can cause over correction and 'ballooning'. Allow the speed to bleed off, and once established in ground effect gradually push out until the bar contacts the front strut as the main wheels touch. Safeguard the nosewheel by keeping the bar pushed out until the speed decays and the nosewheel drops. The practice of immediately pulling the bar in once on the ground puts unnecessary load on the nosewheel and should only be used in an emergency situation where the available stopping distance is marginal; in normal landings the wing should be set at a neutral incidence and the brakes used progressively if required.



#### **Crosswind Landing (see Table in Section 2.1)**

The aircraft copes well with cross-wind landings, but sensible pilots take great care to land into wind wherever possible. If a crosswind landing is unavoidable, approach at slightly higher speed than normal, and then bleed off the speed 1 or 2 metres (3 to 6 ft) above the ground where the cross wind is least. Be ready for the twisting of the Trike unit as soon as the rear wheels touch. Whenever possible utilise whatever into wind distance you can. Pilots should exercise great care in strong crosswind conditions and should not exceed the limitations in Section 4. Because of the high torsional loads which can be imparted to the trike pylon and wing keel tube, always carry out a detailed inspection after every cross-wind landing, especially at the pylon top and bottom fittings.

## 8. POST FLIGHT INSPECTION

After flight, and particularly if you have had a heavy landing or suspect damage may have occurred through ground handling or cross wind landings, you must inspect the aircraft thoroughly. Check the Maintenance and Repair section in this Manual.

Even after a flight without incident you should still carry out a thorough Post-Flight Inspection, paying particular attention to:

- The exhaust system
- The propeller
- The undercarriage, tyres & wheels
- Loose objects
- Oil and coolant levels

### NOTE

- *If leaving the aircraft rigged, the trimmer should be left slack in the high speed position..*

## 9. TUNING THE WING



### WARNING

Those operators who wish to tune their wing should contact a P&M Aviation agency for additional advice. Before any tuning is attempted, a careful and thorough check of the airframe is essential. A sudden indication that the wing requires tuning may be the result of damage caused in an unreported accident or from a heavy landing. Unless you are an experienced flexwing pilot, you should ask your Instructor/Dealer or Check Pilot to assist with all tuning operations and have him/her carry out the flight tests.

### 9.1. NEW AIRCRAFT



### WARNING

Prior to delivery to the customer all new aircraft are flown and set up by either the Factory or by Appointed Dealers. A full check flight is carried out and adjustments made to the wing to ensure that it is properly trimmed out and flies hands off at the right speed. Owners are discouraged from making any adjustments. If you feel your new P&M aircraft is not performing as it should, it is essential that your dealer is immediately informed.

The following notes are for guidance only. Since tuning of flexwings is a specialised technical procedure, no adjustment should be made without a full understanding of the principles involved. Please observe the following simple guidelines:

1. Before making any adjustments check for correct rib profiles against the rib plan supplied. If the aircraft is not new, then also check the airframe components, particularly the outer leading edges.
2. Never exceed the adjustments specified in this Tuning Guide.
3. Make notes of every adjustment made. Only ever make one adjustment at a time, and carry out a flight test to gauge the effect before making further adjustments.
4. When the exercise is complete, you should discuss any adjustments made with your Instructor or Dealer and then enter them in the Aircraft Technical Log.
5. If you cannot get the aircraft to fly as it should, then first return all the settings to standard and reassess the situation. If this cannot be made to work, contact your Dealer immediately.

### 9.2. WING TRIM

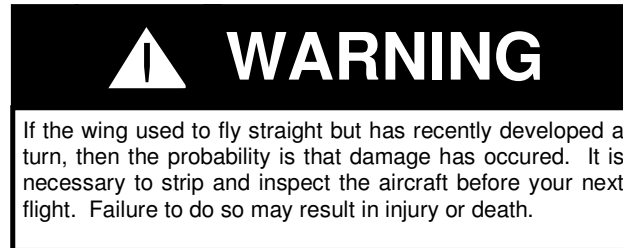
A well tuned wing will fly in a straight line hands-off and will respond to control inputs equally in each direction. However, fabric can stretch slightly with age and ribs can alter shape and get bent or distorted. The most common problem with flexwings is the tendency for the wing to acquire a turn one way, which can be irritating and tiring on a long flight. Turns like this can be tuned out and are invariably due to rib shape or tip setting problems. However, it may be that airframe damage has occurred so if a turn becomes apparent the first thing to do is to check the frame carefully, inspecting for bends and distortion particularly in the leading edges. If the frame is alright, you should check the ribs against the template and adjust accordingly.

For the QuikR & GTR in fast cross country flight the nose wheel can be used as a trimmer (nose wheel right = slow left turn in flight). With a well tuned machine, in smooth conditions it should be possible to fly with arms folded, making course corrections using the nose wheel.

With the STARS system on the QuikR & GTR, it has been found best to move the tip adjuster plugs symmetrically, only for trim speed adjustment. Instead of adjusting the tips asymmetrically, the STARS cords can be used to tune out low speed turns and the wing rib reflex technique used for high speed turns.

### 9.3. TUNING GUIDE QUIK & GT450

For successful tuning, the weather conditions must be smooth, small adjustments must be made ONE AT A TIME, and notes must be made immediately any changes have been made and check flown. The loading of the aircraft must also be similar for trials to have comparable results.



#### Tuning turns

**Example:** The aircraft turns right at all speeds. The trim speed is correct.

**Solution:** In this case use asymmetric movement of the tip turn adjusters. On the tips you will find an adjustment scale where the leading edge emerges from the sail. Rotate the starboard tip plug 1mm on the scale anti-clockwise (i.e. trailing edge down). Check in flight. If the turn persists, rotate the tip one further mm. Check fly. Rotate the left tip 1mm anti-clockwise (i.e. trailing edge up). Check results before moving the tips further.



**Example:** At high speed, the aircraft turns to the right. At low speed, the turn is not so pronounced. The trim speed is correct.

**Solution:** Use ribs numbers 7-10 (the tip rib is number 11 and has very little effect) on the **starboard (right wing)** side to tune out the turn. The tip ribs respond well to "tab effect", i.e. application of reflex near to the trailing edge will produce a downforce at the trailing edge which will increase the incidence of the section as a whole. The overall effect is to increase the lift on the side where reflex is applied, so correcting the turn. The effect becomes more pronounced as the speed rises. The reflex should be applied 200mm (8 inches) from the trailing edge and applied in small increments up to a maximum of 25mm (1 inch). Start with 10mm (3/8 inch) reflex, test fly, then 15 - 20 - 25mm (5/8 - 3/4 - 1 inch) as required. Do not exceed 25mm reflex!

**Example:** The wing flies completely straight sometimes, and turns to the right at other times!

**Solution:** This is happily an easy problem to solve, since it usually only happens when you have to rig everytime you fly. Then it is a question of exactly how the tension sets up on the outer leading edge webbings. Simply take hold of the leading edge cloth right out near the trailing edge and twist it anti-clockwise; you should feel it move. It will then be held there by the tension.

#### Tuning in pitch

The GT450 wing is designed to be stable in pitch even with the trimmer fully fast, at a trim speed of 73 - 80 mph. The bar force when pulling in must steadily rise to at least 7kg (15 lbs) to achieve 95mph.

The electric trimmer applies a spring nose-up moment to the wing directly. In the fast trim setting, the trim cord should be just slack with the bar fully in to the pilot's chest.

When making adjustments in pitch, always tune in smooth air and climb to test altitude with the trimmer set at 60 mph, before winding the trimmer gradually to the test position. The settling of the sail on the airframe generally tends to slow the wing down and make it more stable both in pitch and laterally/directionally, as the washout increases.

If the wing has slowed unacceptably with the trimmer fully fast, then the tip adjusters can be rotated both together by 1mm on the scale so as to bias the trailing edges downwards. Check the result at each 1mm adjustment until the trim speed and pitch feel are correct. Do not exceed 5mm of adjustment.

As a rough guide, the sail should ride approximately 25mm (1 inch) clear of the washout rods when flying solo at fast trim.

If the trim speed is too fast and pitch feel too light at the fast trim setting, then the tips can be rotated both upwards until the correct speed is set. Again, use small adjustments to achieve the desired result. If the wing is very new (less than 5hrs) then it will probably settle down by 4-5mph over the next 20hrs.

Once the fast trim has been set, then the slow trim can be checked by winding to the full slow position. The slow trim will be 5 mph faster at maximum all-up weight than at minimum loading.

The minimum trim speed should not be lower than 45 mph at solo loading and the pitch control should feel very stable and damped at this setting.

It is not desirable to trim slower than 55mph (88km/h) when on approach or when climbing from takeoff as the roll control becomes more delayed and the chances of getting gust stalled are greater.

If the wing still has a slow trim speed after tuning, and it has flown more than, say, 250 hours, then the probability is that the outer (rear) leading edge tubes have developed a "set", an inwards bend that slackens the tension along the trailing edge. This is not a problem in itself, but if the trim speed is unacceptable then the only answer in this case is to replace the pair of outer leading edges. Maximum tolerance on straightness is L/600.

If the minimum trim speed rises above 60mph, solo, with the electric trimmer, then the bungee may need replacing. See maintenance section.

### **Roll response**

Roll response should not exceed 3 seconds at 60mph to reverse a 30 degree bank at a control force of 15kg. In addition, the response to very small inputs of 1-2kg should be good so that it is possible to fly through moderate turbulence with one hand on the bar.

If the roll response is unsatisfactory, firstly check that the main roll bearing and associated control frame top joints are all moving smoothly. A silicone aerosol spray on the hang point bearings and also on the battens will help.

The fore and aft rigging should not be too tight. If necessary adjust the tensioner on the rear top wire, but always leave at least 10mm of thread in the barrel and ensure that the locknut is tight.



## **WARNING**

Those operators who wish to tune the Quik or GT450 wing should contact a P&M Aviation agency for additional advice. Before any tuning is attempted, a careful and thorough check of the airframe is essential. A sudden indication that the wing requires tuning may be the result of damage caused in an unreported accident or from a heavy landing. Unless you are an experienced flexwing pilot, you should ask your Instructor/Dealer or Inspector to assist with all tuning operations and have him/her carry out the flight tests.

### **9.4. TUNING GUIDE QUIKR**

For successful tuning, the weather conditions must be smooth, small adjustments must be made ONE AT A TIME, and notes must be made immediately any changes have been made and check flown. The loading of the aircraft must also be similar for trials to have comparable results.

The settings of the washout rods are critical. If they are too high, roll handling will be adversely affected. If they are much too high, trim speed will also reduce. If the washout rods are too low, the wing may become unstable in pitch during turbulence or in steep dives. The washout rods should **not** be used to attempt to tune out turns.



## WARNING

Never lower the washout rods below the factory setting. See section 12.  
If the wing used to fly straight but has recently developed a significant turn, then the probability is that damage has occurred. It is necessary to strip and inspect the aircraft before your next flight. Failure to do so may result in injury or death.

### Tuning turns

#### Example:

The aircraft turns right at all speeds. The trim speed is correct.

#### Solution:

In this case use asymmetric movement of the tip turn adjusters. On the tips you will find an adjustment scale where the leading edge emerges from the sail. See the diagram below for the standard factory setting. Rotate the starboard tip plug 1mm down on the scale and the port tip plug 1mm up on the scale. Check in flight. If the turn persists, rotate the tips one further mm. Check fly until the turn is removed.



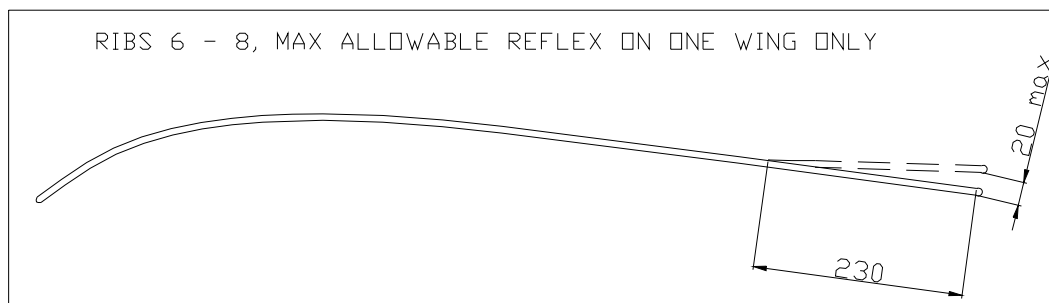
## WARNING

Do not exceed the adjustment range which is  $\pm 6\text{mm}$  (1/4 inch) from the initial factory setting, or the aircraft may become unstable.

**Example:** At high speed, the aircraft turns to the right. At low speed, the turn is not so pronounced. The trim speed is correct.

#### Solution:

Use ribs numbers 7-9 (the tip rib is number 10 and has very little effect) on the **starboard (right wing)** side to tune out the turn. The tip ribs respond well to "tab effect", i.e. application of reflex near to the trailing edge will produce a downforce at the trailing edge which will increase the incidence of the section as a whole. The overall effect is to increase the lift on the side where reflex is applied, so correcting the turn. The effect becomes more pronounced as the speed rises. The reflex should be applied 230mm from the trailing edge and applied in small increments up to a maximum of 20mm. Start with 5mm reflex, test fly, then adjust in 5mm increments as required. Do not exceed 20mm reflex!





## WARNING

Reflex has a powerful effect at high speed. Apply in small increments. Do not apply reflex to both wings as pitch stability at high speed will be reduced.

**Example:** The wing flies completely straight sometimes, and turns to the right at other times!

**Solution:** This is happily an easy problem to solve, since it usually only happens when you have to rig everytime you fly. Then it is a question of exactly how the tension sets up on the outer leading edge webbings. Simply take hold of the leading edge cloth right out near the trailing edge and twist it anti-clockwise; you should feel it move. It will then be held there by the tension.

### Batten tension

The inner 4 top battens are unsprung and should be tight enough to remove spanwise wrinkles from the sail. They can be adjusted by shimming if necessary.

The outer 5 battens are sprung and adjustable. Wind them clockwise to increase tension and vice versa.

The tip 5 battens should be lightly tensioned so as to allow easy movement for good roll control. Too much batten tension will give heavier roll response, increase trim speed and reduce directional stability. The standard setting is just enough tension to keep the D ring secure. Differential tensioning of the tips to attempt to tune out a turn has not been found effective.



**Sprung adjustable battens 5-9**



## Tuning in pitch

When making adjustments in pitch, always tune in smooth air and climb to test altitude with the trimmer set at 75 mph, before winding the trimmer gradually to the test position. The electric trimmer applies a spring nose-up moment to the wing directly. In the fast trim setting, the trim cord should be just slack with the bar fully in to the pilot's chest. This must be checked before any pitch tuning commences.

## Selection of Hang Point

There are two hang points, giving a difference in speed of approximately 10mph. For economical cruising or training, the rear position is recommended.

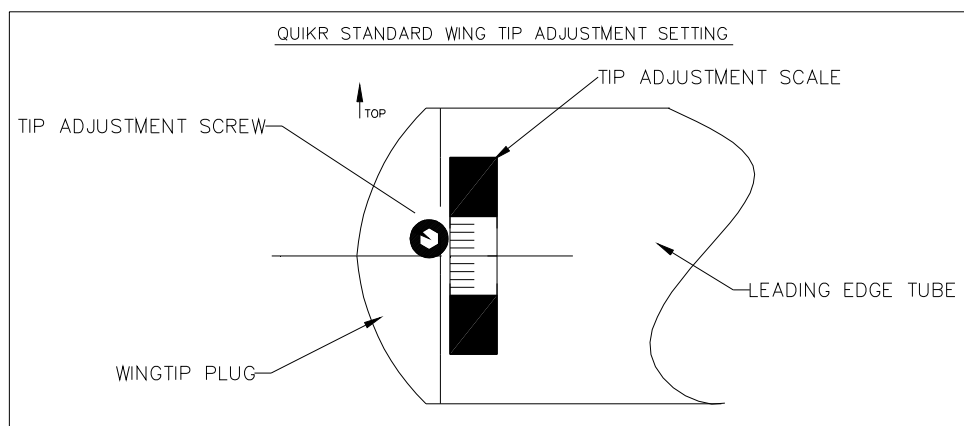
For general purpose and high speed XC cruising, or if the fast trim speed on the rear position drops below 85mph as the sail ages, the front position is recommended. See section 3.8 for optimum trim speeds.

## Fast trim setting:

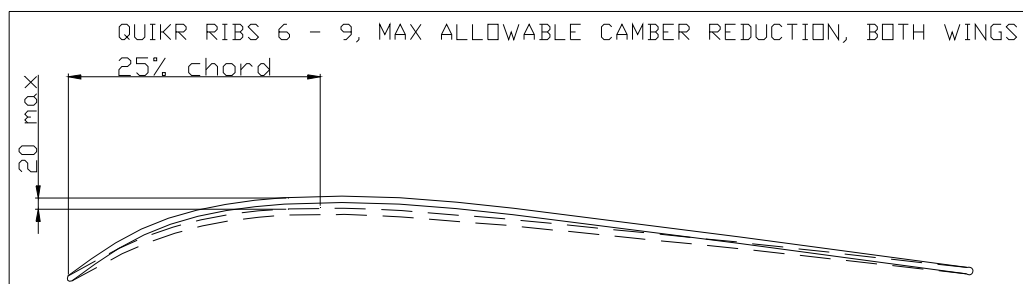
The QuikR wing must be tuned to be stable in pitch even with the trimmer fully fast, at a trim speed of between 92-100 mph (front hangpoint) or 82-90mph (rear hangpoint). From the fast trim speed, an increasing pull force must be necessary to increase speed and an increasing push force necessary to reduce speed. When the speed is displaced by 5mph from trim, the aircraft should re-trim within 2-3mph of the original trim speed. In a dive to Vne 120mph, the aircraft must pull out upon release of the bar force. The most critical condition is with a brand new wing at minimum weight (i.e. minimum washout condition).

## Fast trim too fast:

If the fast trim speed is too fast and pitch feel too light, both the tips can be rotated both upwards by up to 3 divisions above the standard factory setting, until the correct trim speed is achieved. Again, use small adjustments to achieve the desired result. If the wing is very new (less than 5hrs) then it will probably settle down by 4-5mph over the next 20hrs.



If the trim speed is still too fast, the profile of the battens should be checked. The nose ribs should never be modified from the plan. The plan shows 2 profiles for ribs 7-10, issue B is a flat profile designed to give a slow trim speed and is used for new production.



### Fast trim too slow:

If the wing has slowed unacceptably with the trimmer fully, the tip adjusters can be rotated both together in 1 division increments on the scale so as to bias the trailing edges downwards. Check the result at each 1mm adjustment until the trim speed and pitch feel are correct. Do not exceed the adjustment shown on the scale, measured against the bottom edge of the screw. If the trim speed is still too low, the ribs 7-10 may be re-cambered to the issue B profile on the plan. Finally, the leading edges should be removed and checked for straightness to a tolerance of L/600.

The settling of the sail on the airframe generally tends to slow the wing down and make it more stable both in pitch and laterally/directionally, as the washout increases.

Once the fast trim has been set, then the slow trim can be checked by winding to the full slow position. The slow trim will be 5 mph faster at maximum all-up weight than at minimum loading.

The minimum trim speed should not be lower than 45 mph at solo loading and the pitch control should feel very stable and damped at this setting.

It is not desirable to trim slower than 55mph (88km/h) when on approach or when climbing from takeoff as the roll control becomes more delayed and the chances of getting gust stalled are greater.

If the minimum trim speed rises above 60mph, solo, with the electric trimmer, then the bungee or trim cord may need replacing. See maintenance section.

On no account should the washout rod settings be dropped in an effort to increase trim speed, as dangerous pitch instability may result.

### Combinations of pitch and roll tuning:

The above adjustments for pitch and roll may be superimposed, up to the adjustment limits specified.

### Roll response

Roll response should not exceed 3 seconds at 65mph to reverse a 30 degree bank at a control force of 15kg. In addition, the response to very small inputs of 1-2kg should be good so that it is possible to fly through moderate turbulence with one hand on the bar.

If the roll response is unsatisfactory, firstly check that the main roll bearing and associated control frame top joints are all moving smoothly. A silicone aerosol spray on the hang point bearings and also on the battens will help. Ensure the tip 5 sprung battens are not set too tight.



## WARNING

Those operators who wish to tune the QuikR wing should contact a P&M Aviation agency for additional advice. Before any tuning is attempted, a careful and thorough check of the airframe is essential. A sudden indication that the wing requires tuning may be the result of damage caused in an unreported accident or from a heavy landing. Unless you are an experienced flexwing pilot, you should ask your Instructor/Dealer or Inspector to assist with all tuning operations and have him/her carry out the flight tests.

## 9.5 TUNING GUIDE GTR


A well tuned wing will fly in a straight line hands-off and will respond to control inputs equally in each direction. However, fabric can stretch slightly with age and ribs can alter shape and get bent or distorted. The most common problem with flexwings is the tendency for the wing to acquire a turn one way which can be irritating and tiring on a long flight. Turns like this can be tuned out and are invariably due to rib shape or tip setting problems. However, it may be that airframe damage has occurred so if a turn becomes apparent the first thing to do is to check the frame carefully, inspecting for bends and distortion particularly in the leading edges. If the frame is alright, you should check the ribs against the template and adjust accordingly. In fast cross-country flight the nosewheel can be used as a trimmer (nosewheel right = slow left turn in flight). With a well tuned machine, in smooth conditions it should be possible to cruise with arms folded, making course corrections using the nosewheel.

With the STARS system, it has been found best to move the tip adjuster plugs symmetrically, only for trim speed adjustment. Instead of adjusting the tips asymmetrically, the STARS cords can be used to tune out low speed turns and the wing rib reflex technique used for high speed turns.

### 11.3. TUNING GUIDE

For successful tuning, the weather conditions must be smooth, small adjustments must be made ONE AT A TIME, and notes must be made immediately any changes have been made and check flown. The loading of the aircraft must also be similar for trials to have comparable results.

The settings of the washout rods are critical. If they are too high, roll handling will be adversely affected. If they are much too high, trim speed will also reduce. If the washout rods are too low, the wing may become unstable in pitch during turbulence or in steep dives. The washout rod screwed adjusters should **not** be used to attempt to tune out turns.

**WARNING**

Never lower the washout rods below the factory setting. See section 12.  
If the wing used to fly straight but has recently developed a significant turn, then the probability is that damage has occurred. It is necessary to strip and inspect the aircraft before your next flight. Failure to do so may result in injury or death.

#### 11.3.1 Tuning turns

**Example:**

The aircraft turns right especially at low speed. The trim speed is correct.

**Solution:**

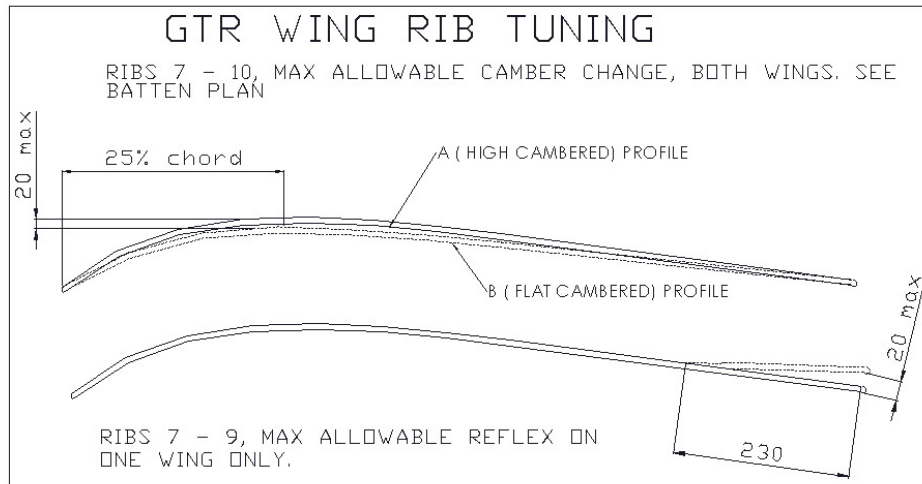
In this case use asymmetric tension in the STARS cords. Tighten the left hand cord slightly using the adjustment loop by the left hand side of the keel pocket.

Check fly and adjust until the turn is removed.

**Example:** At high speed, the aircraft turns to the right. At low speed, the turn is not so pronounced. The trim speed is correct.

**Solution:**

Use ribs numbers 7-9 (the tip rib is number 10 and has very little effect) on the **starboard (right wing)** side to tune out the turn. The tip ribs respond well to "tab effect", i.e. application of reflex near to the trailing edge will produce a downforce at the trailing edge which will increase the incidence of the section as a whole. The overall effect is to increase the lift on the side where reflex is applied, so correcting the turn. The effect becomes more pronounced as the speed rises. The reflex should be applied 230mm from the trailing edge and applied in small increments up to a maximum of 20mm. Start with 5mm reflex, test fly, then adjust in 5mm increments as required. Do not exceed 20mm reflex!



## WARNING

Reflex has a powerful effect at high speed. Apply in small increments. Do not apply reflex to both wings as pitch stability at high speed will be reduced.

### Batten tension

The inner 4 top battens are unsprung and should be tight enough to remove spanwise wrinkles from the sail. They can be adjusted by shimming if necessary.

The outer 5 battens are sprung and adjustable. Wind them clockwise to increase tension and vice versa.

The tip 5 battens should be lightly tensioned so as to allow easy movement for good roll control. Too much batten tension will give heavier roll response, increase trim speed and reduce directional stability. The standard setting is just enough tension to keep the D ring secure. Differential tensioning of the tips to attempt to tune out a turn has not been found effective.



**Sprung adjustable battens 5-9**

### **Roll response**

Roll response should not exceed 3 seconds at 65mph to reverse a 30 degree bank at a control force of 15kg. In addition, the response to very small inputs of 1-2kg should be good so that it is possible to fly through moderate turbulence with one hand on the bar.

If the roll response is unsatisfactory, firstly check that the main roll bearing and associated control frame top joints are all moving smoothly. A silicone aerosol spray on the hang point bearings and also on the battens will help. Ensure the tip 5 sprung battens are not set too tight.

### **11.3.2 Tuning in pitch**

When making adjustments in pitch, always tune in smooth air and climb to test altitude with the trimmer set at 75 mph, before winding the trimmer gradually to the test position. The electric trimmer applies a spring nose-up moment to the wing directly. In the fast trim setting, the trim cord should just be coming under tension with the bar fully in to the pilot's chest. This must be checked before any pitch tuning commences.

### **11.3.3 Selection of Hang Point**

There are two hang points, only the rear hangpoint is approved for the Quik-GTR and should be set to give approximately 90mph hands off trim speed with the trimmer set fully fast. For economical cruising or training, the rear position is recommended.



## **WARNING**

Do not tune the wing to exceed 95mph hands off trim or pitch stability will be degraded.  
The front hang point is not recommended for the Quik trike.

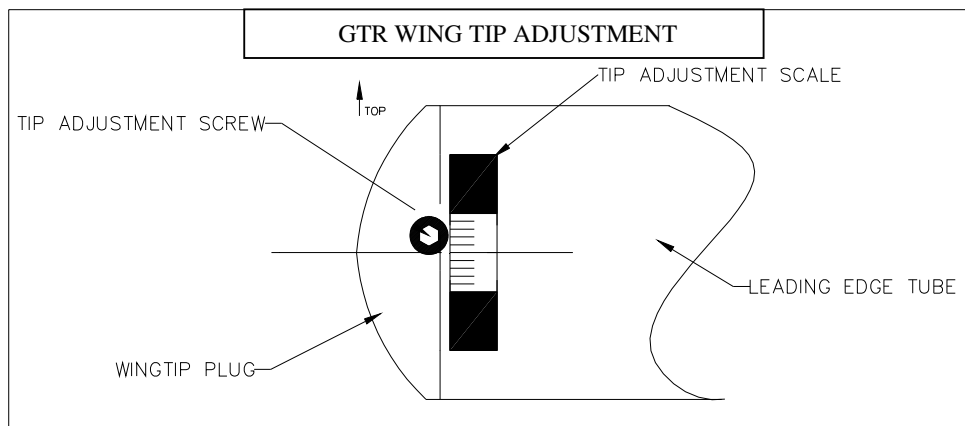
### 11.3.4 Hang Point Adjustment

#### Fast trim setting:

The GTR wing must be tuned to be stable in pitch even with the trimmer fully fast. From the fast trim speed, an increasing pull force must be necessary to increase speed and an increasing push force necessary to reduce speed. When the speed is displaced by 5mph from trim, the aircraft should re-trim within 2-3mph of the original trim speed. In a dive to Vne 120mph, the aircraft must pull out upon relaxing of the bar force. The most critical condition is with a brand new wing at minimum weight (i.e. minimum washout condition).

#### Fast trim too fast:

If the fast trim speed is too fast and pitch feel too light, both the tips can be rotated both upwards by up to 3 divisions above the standard factory setting, until the correct trim speed is achieved. Again, use small adjustments to achieve the desired result. If the wing is very new (less than 5hrs) then it will probably settle down by 4-5mph over the next 20hrs.



If the trim speed is still too fast, the profile of the battens should be checked. The nose ribs should never be modified from the plan. The plan shows 2 profiles for ribs 7-10, issue B is a flat profile designed to give a slow trim speed and is used for new production.

#### Fast trim too slow:

If the wing has slowed unacceptably with the trimmer fully slack, the tip adjusters can be rotated both together in 1 division increments on the scale so as to bias the trailing edges downwards. Check the result at each 1mm adjustment until the trim speed and pitch feel are correct. Do not exceed the adjustment shown on the scale, measured against the bottom edge of the screw. If the trim speed is still too low, the ribs 7-10 may be re-cambered to the issue B profile on the plan, see the rib drawing above. Finally, the leading edges should be removed and checked for straightness to a tolerance of L/600.

The settling of the sail on the airframe generally tends to slow the wing down and make it more stable both in pitch and laterally/directionally, as the washout increases.

Once the fast trim has been set, then the slow trim can be checked by winding to the full slow position. The slow trim will be 5 mph faster at maximum all-up weight than at minimum loading.

The minimum trim speed should not be lower than 45 mph at solo loading and the pitch control should feel very stable and damped at this setting.

It is not desirable to trim slower than 55mph (88km/h) when on approach or when climbing from takeoff as the roll control becomes more delayed and the chances of getting gust stalled are greater.

If the minimum trim speed rises above 65mph, solo, with the electric trimmer, then the bungee or trim cord may need replacing. See maintenance section.

On no account should the washout rod settings be dropped in an effort to increase trim speed, as dangerous pitch instability may result.

### **Combinations of pitch and roll tuning:**

The above adjustments for pitch and roll may be superimposed, up to the adjustment limits specified.





## 10. PERFORMANCE

### 10.1 Quik Wing General Performance

| Performance data in mph & feet          | 912      | 912S Arplast | 912S Warp Drive |
|---|----------|--------------|-----------------|
| Best safe descent rate, power off, MAUW | 600fpm   | 600fpm       | 600fpm          |
| IAS for best safe descent, power off    | 50mph    | 50mph        | 50mph           |
| With electric trimmer                   | 46mph    | 46mph        | 46mph           |
| VNE                                     | 115 mph  | 115mph       | 115mph          |
| Flight manoeuvre loads                  | +4,-0    | +4,-0        | +4,-0           |
| Best rate of climb, MAUW (ISA)          | 845fpm   | 845fpm       | 1200fpm         |
| Airspeed for best rate of climb         | 60mph    | 57mph        | 57mph           |
| Take off distance to 50', Max AUW**     | 879ft    | 959ft        | 872ft           |
| Landing distance from 50', MAUW         | 738ft    | 738ft        | 738ft           |
| Trimmed cruise @ Max/Min AUW            | 75-82mph | 75-82mph     | 75-82mph        |
| Trimmed slow speed @ MAUW               | 55mph    | 55mph        | 55mph           |

\*\* Includes a safety factor of 1.3

| Performance data in km/h & metres       | 912          | 912S Arplast | 912S Warp Drive |
|---|--------------|--------------|-----------------|
| Best safe descent rate, power off, MAUW | 3.0m/s       | 3.0m/s       | 3.0m/s          |
| IAS for best safe descent, power off    | 80 km/h      | 80 km/h      | 80 km/h         |
| With electric trimmer                   | 74km/h       | 74km/h       | 74km/h          |
| VNE                                     | 184 km/h     | 184 km/h     | 184 km/h        |
| Flight manoeuvre loads                  | +4g/-0g      | +4g/-0g      | +4g/-0g         |
| Best rate of climb, MAUW 390kgs (ISA)   | 4.3m/s       | 4.3m/s       | 6.1m/s          |
| Airspeed for best rate of climb         | 91 km/h      | 91 km/h      | 91 km/h         |
| Take off distance to 15m, Max AUW**     | 268 m        | 292 m        | 266 m           |
| Landing distance from 15m, MAUW         | 225 m        | 225 m        | 225 m           |
| Trimmed cruise @ Max/Min AUW            | 120-131 km/h | 120-131 km/h | 120-131 km/h    |
| Trimmed slow speed @ MAUW               | 88 km/h      | 88 km/h      | 88 km/h         |

\*\* includes a safety factor of 1.3

## WARNING

Take-off and landing performance figures were measured from a short dry grass surface at maximum weight 409kgs (900lbs) at sea level @ 15° Celsius (59°F) (ISA). Temperature, air density, altitude and take off surface can severely affect take-off and landing performance. Make the appropriate calculations before take-off.

#### Fuel Consumption – Rich mixture setting

| Approx. values, 375 kgs TOW | 912     | 912 S Arplast | 912 S Warp drive |
|-----------------------------|---------|---------------|------------------|
| At 60 mph (80 km/h)         | 9       | 10            | 10               |
| At 80 mph (100 km/h)        | 15      | 16            | 16               |
| Full takeoff power          | 18 L/hr | 18 L/hr       | 20 L/hr          |

## WARNING

Fuel consumption figures are guide figures only. Always fly with a minimum of 1 hour's reserve fuel.

## Stalls

| At 409kg max AUW & 254kg min AUW              | All Models |
|---|------------|
| Wings level stall, power off, MAUW            | 37mph      |
| Height loss during recovery, MAUW             | 60ft       |
| Max. pitch down below horizon                 | 30°        |
| Wings level stall, power on, MAUW             | 37mph      |
| Height loss during recovery, MAUW             | 0ft        |
| Max. pitch down below horizon, MAUW           | 0°         |
| 30 degree banked stalls, power on, @ Max AUW  | 38mph      |
| Wings level stall, power off, @ Min AUW       | 34mph      |
| Height loss, during recovery @ Min AUW        | 50ft       |
| Max. pitch down below horizon @ Min AUW       | 30°        |
| Wings level stall, power on, @ Min AUW        | 35mph      |
| Max. pitch down, power on recovery, @ Min AUW | 0°         |
| 30 degree banked stalls, power off, @ Min AUW | 35mph      |

### NOTE

(See also Section 7.5 paragraph on Stall Characteristics.)



## WARNING

It is important to understand that the data recorded during stall tests were ascertained using the CAA requirement of a reduction of airspeed of not more than 1 mph per second. If accelerated and therefore unauthorised stalls are undertaken, the aircraft may then lose significant height before recovery is made, or in extreme cases, may become unstable to the extent of being unrecoverable.

## 10.2. GT450 Wing PERFORMANCE

### General Performance

| Performance data in mph & feet          | 912 Warp Drive | 912S Warp Drive |
|---|----------------|-----------------|
| Best safe descent rate, power off, MAUW | 517fpm         | 517fpm          |
| IAS for best safe descent, power off    | 47mph          | 47mph           |
| Best Glide Angle at the above airspeed  | 8:1            | 8:1             |
| VNE                                     | 110 mph        | 110 mph         |
| Flight manoeuvre loads                  | +4,-0          | +4,-0           |
| Airspeed for best rate of climb         | 55mph          | 55mph           |
| Take off distance to 50', Max AUW**     | 921ft          | 863ft           |
| Landing distance from 50', MAUW         | 735ft          | 735ft           |
| Trimmed cruise @ Max/Min AUW            | 73/80mph       | 73/80mph        |
| Trimmed slow speed @ Max/Min AUW        | 55/47mph       | 55/47mph        |

\*\* Includes a safety factor of 1.3



## WARNING

Take-off and landing performance figures were measured from a short dry grass surface at maximum weight 450kgs (990lbs) at sea level @ 15° Celsius (59°F) (ISA). Many factors including temperature, air density, altitude and take off surface can severely affect take-off and landing performance. Make the appropriate calculations before take-off.

## Stalls

| At 450kg max AUW & 270kg min Auw              | All Models |
|---|------------|
| Wings level stall, power off, MAUW            | 38mph      |
| Height loss during recovery, MAUW             | 60ft       |
| Max. pitch down below horizon                 | 30°        |
| Wings level stall, power on, MAUW             | 39mph      |
| Height loss during recovery, MAUW             | 0ft        |
| Max. pitch down below horizon, MAUW           | 0°         |
| 30 degree banked stalls, power on, @ Max AUW  | 40mph      |
| Wings level stall, power off, @ Min AUW       | 30mph      |
| Height loss, during recovery @ Min AUW        | 50ft       |
| Max. pitch down below horizon @ Min AUW       | 30°        |
| Wings level stall, power on, @ Min AUW        | 30mph      |
| Max. pitch down, power on recovery, @ Min AUW | 0°         |
| 30 degree banked stalls, power off, @ Min AUW | 31mph      |

### NOTE

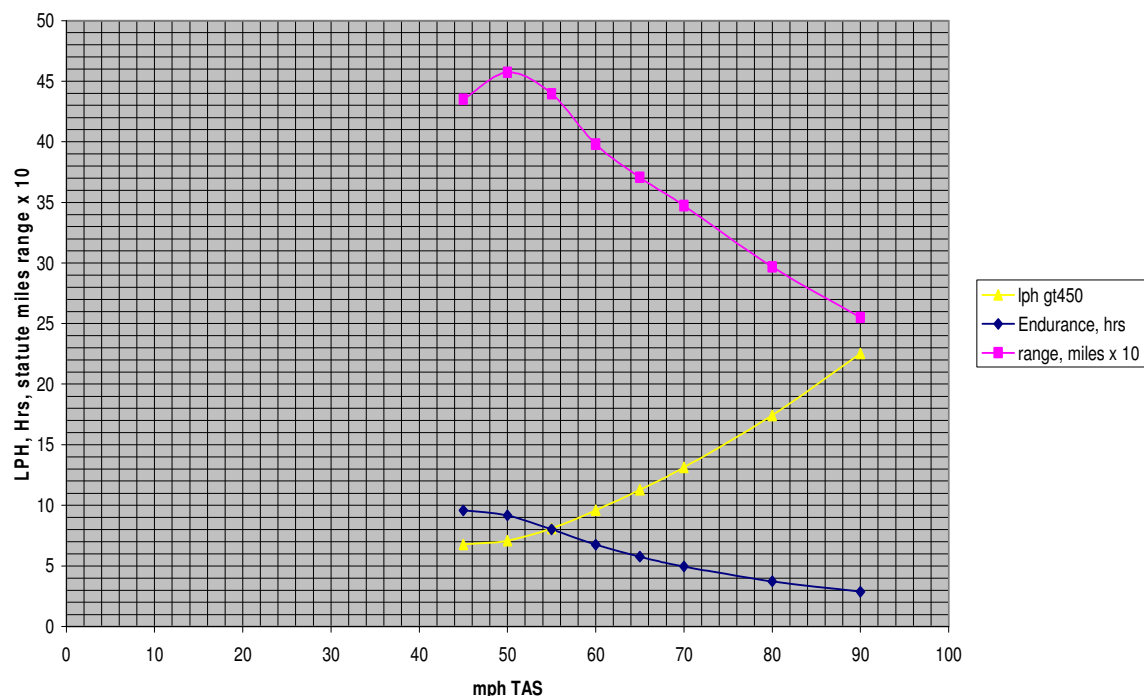
(See also Section 7.5 paragraph on Stall Characteristics.)

## WARNING

It is important to understand that the data recorded during wings level stall tests were ascertained using the CAA requirement of a reduction of airspeed of not more than 1 knot per second. If accelerated and therefore unauthorised stalls are undertaken, the aircraft may then lose significant height before recovery is made, or in extreme cases, may become unstable to the extent of being unrecoverable.

## Fuel Consumption, range, endurance:

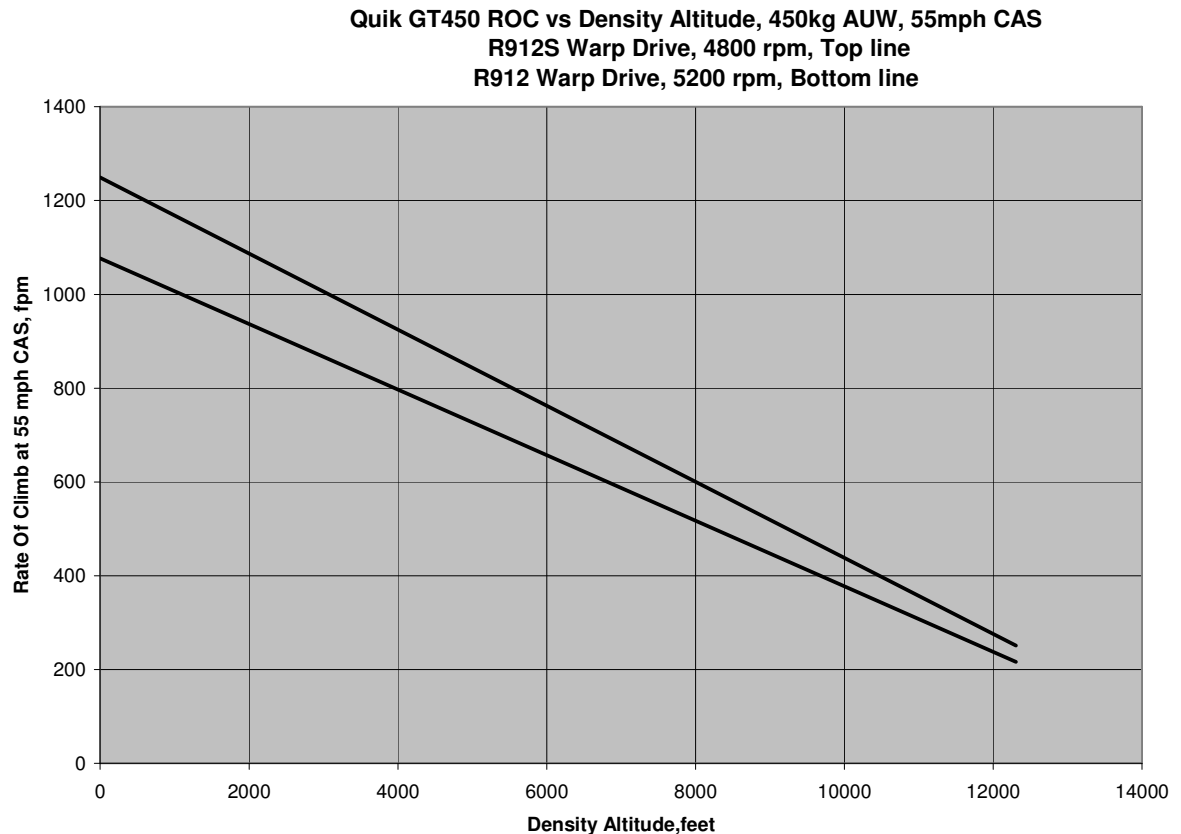
QUIK GT450 912, 912S, 2000 ft, 450kg.  
65L fuel. Note Vh for 912 = 85mph



## WARNING

Fuel consumption figures are guide figures only. Always fly with a minimum of 1 hour's reserve fuel. Consumption and climb graphs were produced with a new aircraft and may degrade over time.

### Rate of Climb:



## 10.3 PERFORMANCE QUIKR Wing

### General Performance

| Performance data in mph & feet                     | 912S Warp Drive |
|--|-----------------|
| Best safe descent rate, power off, MAUW            | 500fpm          |
| IAS for best safe descent, power off               | 57mph           |
| Best Glide Angle at the above airspeed             | 9:1             |
| VNE  | 120 mph         |
| Flight manoeuvre loads                             | +4,-0           |
| Rate of Climb                                      | 1150fpm         |
| Airspeed for best rate of climb                    | 60mph           |
| Take off distance to 50', Max AUW**                | 1170ft          |
| Landing distance from 50', MAUW                    | 902ft           |
| Trimmed fast cruise @ Max/Min AUW, front hangpoint | 97/100mph       |
| Trimmed slow speed @ Max/Min AUW, front hangpoint  | 65/55mph        |

|   |          |
|---|----------|
| Trimmed fast cruise @ Max/Min AUW, rear hangpoint | 93/95mph |
| Trimmed slow speed @ Max/Min AUW, rear hangpoint  | 55/45mph |

\*\* Includes a safety factor of 1.3

| Performance data in km/h & metres                  | 912S Warp Drive |
|--|-----------------|
| Best safe descent rate, power off, MAUW            | 2.5m/s          |
| IAS for best safe descent, power off               | 91 km/h         |
| Best Glide Angle at the above airspeed             | 9:1             |
| VNE  | 192 km/h        |
| Flight manoeuvre loads                             | +4g/-0g         |
| Rate of Climb                                      | 5.8 m/s         |
| Airspeed for best rate of climb                    | 96km/h          |
| Take off distance to 15m, Max AUW**                | 357 m           |
| Landing distance from 15m, MAUW                    | 275 m           |
| Trimmed fast cruise @ Max/Min AUW, front hangpoint | 155/160 km/h    |
| Trimmed slow speed @ Max/Min AUW, front hangpoint  | 104/88 km/h     |
| Trimmed fast cruise @ Max/Min AUW, rear hangpoint  | 149/152 km/h    |
| Trimmed slow speed @ Max/Min AUW, rear hangpoint   | 88/72 km/h      |

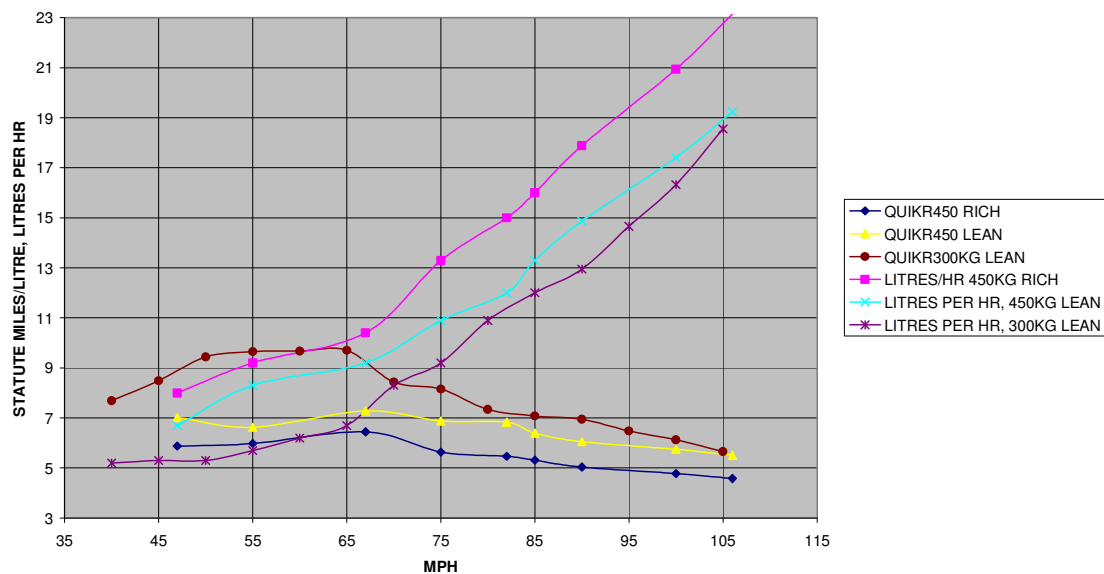
\*\* includes a safety factor of 1.3

## WARNING

Take-off and landing performance figures were measured from a short dry grass surface at maximum weight 450kgs (990lbs) at sea level @ 15° Celsius (59°F) (ISA). Temperature, air density, altitude and take off surface can severely affect take-off and landing performance. Make the appropriate calculations before take-off.

## Fuel Consumption

### QUIKR FUEL CONSUMPTION



Note that flying at high weight and high airspeed increases fuel consumption markedly. At 300kg, the best fuel consumption is approximately 10 miles/Litre (45mpg) at 65 mph. At 450 kg, the best

fuel consumption is 7 miles/litre (32 mpg) at 80mph. At slow speeds, lift dependant drag predominates so loading makes a big difference. At the higher speeds, parasite drag predominates and loading makes less difference.

## WARNING

Fuel consumption figures are included as a guide only. The consumption figures should not be used for planning purposes. Always fly with a minimum of 1 hour's reserve fuel.

### Stalls

| At 450kg max AUW & 270kg min Auw, IAS         | All Models |
|---|------------|
| Wings level stall, power off, MAUW            | 38mph      |
| Height loss during recovery, MAUW             | 60ft       |
| Max. pitch down below horizon                 | 30°        |
| Wings level stall, power on, MAUW             | 39mph      |
| Height loss during recovery, MAUW             | 0ft        |
| Max. pitch down below horizon, MAUW           | 0°         |
| 30 degree banked stalls, power on, @ Max AUW  | 40mph      |
| Wings level stall, power off, @ Min AUW       | 32mph      |
| Height loss, during recovery @ Min AUW        | 50ft       |
| Max. pitch down below horizon @ Min AUW       | 30°        |
| Wings level stall, power on, @ Min AUW        | 32mph      |
| Max. pitch down, power on recovery, @ Min AUW | 0°         |
| 30 degree banked stalls, power off, @ Min AUW | 33mph      |

#### NOTE

(See also Section 7.5 paragraph on Stall Characteristics.)

## WARNING

It is important to understand that the data recorded during stall tests were ascertained using the CAA requirement of a reduction of airspeed of not more than 1 knot per second. If accelerated and therefore unauthorised stalls are undertaken, the aircraft may then lose significant height before recovery is made, or in extreme cases, may become unstable to the extent of being unrecoverable.

### 10.4 Performance GTR Wing

#### General Performance

| Performance data in mph & feet                    | 912S Warp Drive | 912 Warp Drive |
|---|-----------------|----------------|
| Best safe descent rate, power off, MAUW           | 450fpm          | 450fpm         |
| IAS for best safe descent, power off              | 57mph           | 57mph          |
| Best Glide Angle at the above airspeed            | 10:1            | 10:1           |
| VNE   | 120 mph         | 120 mph        |
| Flight manoeuvre loads                            | +4,-0           | +4,-0          |
| Rate of Climb                                     | 1000fpm         | 850fpm         |
| Airspeed for best rate of climb                   | 60mph           | 60mph          |
| Take off distance to 50', Max AUW**               | 1131ft          | 1239ft         |
| Landing distance from 50', MAUW                   | 1050ft          | 1050ft         |
| Trimmed fast cruise @ Max/Min AUW, rear hangpoint | 90/90mph        | 90/90mph       |
| Trimmed slow speed @ Max/Min AUW, rear hangpoint  | 65/55mph        | 65/55mph       |

\*\* Includes a safety factor of 1.3

| Performance data in km/h & metres                 | 912S Warp Drive | 912 Warp Drive |
|---|-----------------|----------------|
| Best safe descent rate, power off, MAUW           | 2.3m/s          | 2.3m/s         |
| IAS for best safe descent, power off              | 88 km/h         | 88 km/h        |
| Best Glide Angle at the above airspeed            | 10:1            | 10:1           |
| VNE   | 192 km/h        | 192 km/h       |
| Flight manoeuvre loads                            | +4g/-0g         | +4g/-0g        |
| Rate of Climb                                     | 5 m/s           | 4 m/s          |
| Airspeed for best rate of climb                   | 96km/h          | 96km/h         |
| Take off distance to 15m, Max AUW**               | 345 m           | 378 m          |
| Landing distance from 15m, MAUW                   | 320 m           | 320 m          |
| Trimmed fast cruise @ Max/Min AUW, rear hangpoint | 144/144 km/h    | 144/144 km/h   |
| Trimmed slow speed @ Max/Min AUW, rear hangpoint  | 104/88 km/h     | 104/88 km/h    |

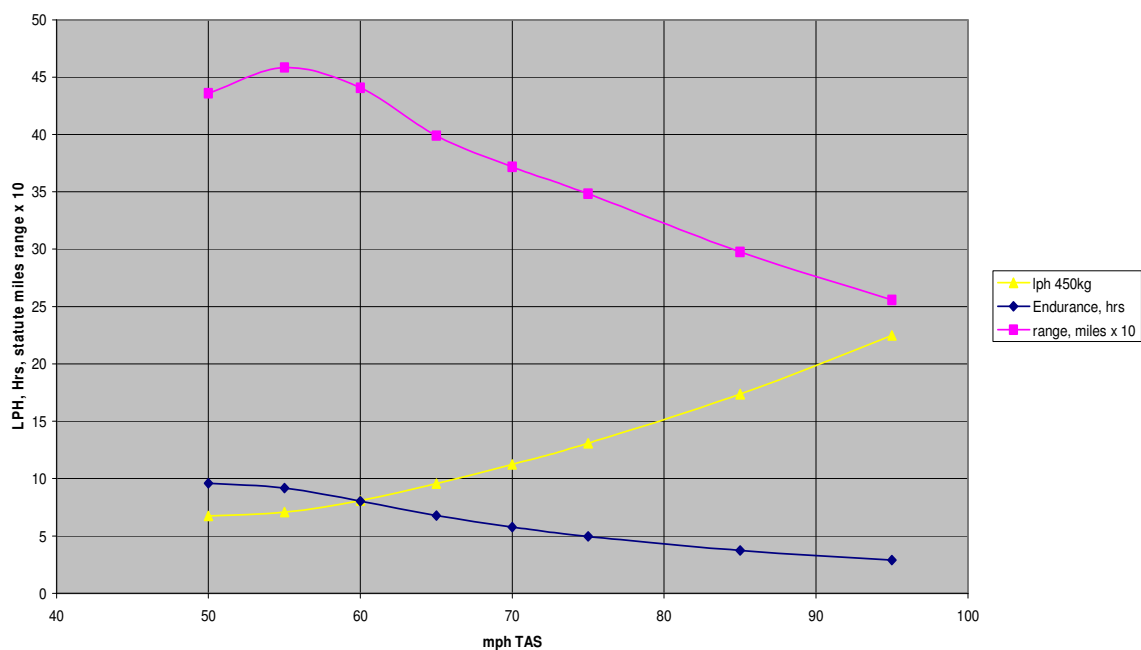
\*\* includes a safety factor of 1.3

## WARNING

Take-off and landing performance figures were measured from a short dry grass surface at maximum weight at sea level @ 15° Celsius (59°F) (ISA). Temperature, air density, altitude and take off surface can severely affect take-off and landing performance. Make the appropriate calculations before take-off.

## Fuel Consumption

QUIK GTR 912, 912S, 2000 ft, 450kg.  
65L fuel.



Note that flying at high weight and high airspeed increases fuel consumption markedly. At slow speeds, lift dependant drag predominates so loading makes a big difference. At the higher speeds, parasite drag predominates and loading makes less difference.

## WARNING

Fuel consumption figures are included as a guide only. The consumption figures should not be used for planning purposes. Always fly with a minimum of 1 hour's reserve fuel.

### Stalls

| At MAUW & 275kg min AuW, IAS                  | All Models |
|---|------------|
| Wings level stall, power off, MAUW            | 39mph      |
| Height loss during recovery, MAUW             | 50ft       |
| Max. pitch down below horizon                 | 30°        |
| Wings level stall, power on, MAUW             | 39mph      |
| Height loss during recovery, MAUW             | 0ft        |
| Max. pitch down below horizon, MAUW           | 0°         |
| 30 degree banked stalls, power on, @ Max AUW  | 40mph      |
| Wings level stall, power off, @ Min AUW       | 34mph      |
| Height loss, during recovery @ Min AUW        | 50ft       |
| Max. pitch down below horizon @ Min AUW       | 30°        |
| Wings level stall, power on, @ Min AUW        | 34mph      |
| Max. pitch down, power on recovery, @ Min AUW | 0°         |
| 30 degree banked stalls, power off, @ Min AUW | 34mph      |

#### NOTE

(See also Section 8.5 paragraph on Stall Characteristics.)

## WARNING

It is important to understand that the data recorded during stall tests were ascertained using the CAA requirement of a reduction of airspeed of not more than 1 knot per second. If accelerated and therefore unauthorised stalls are undertaken, the aircraft may then lose significant height before recovery is made, or in extreme cases, may become unstable to the extent of being unrecoverable.

### 10.5. EMPTY WEIGHT

Typical empty weights for the Quik are as follows:

| 912    | 912 S  |
|--------|--------|
| 206kg  | 207kg  |
| 453lbs | 455lbs |

Typical empty weights for the Quik GT450 are as follows:

| 912   | 912 S |
|-------|-------|
| 214kg | 217kg |



|        |        |
|--------|--------|
| 470lbs | 477lbs |
|--------|--------|

Typical empty weights for the P&M Aviation QuikR are as follows:

| 912    | 912 S  |
|--------|--------|
| 218kg  | 220kg  |
| 480lbs | 484lbs |

Typical empty weights for the P&M Aviation Quik GTR are as follows:

| Rotax 912 | 912 S  |
|-----------|--------|
| 232kg     | 234kg  |
| 510lbs    | 515lbs |

Following modification, repair or at any time required by the CAA or other Airworthiness Authority, the aeroplane must be weighed so that the composition of useful load can be determined. The aeroplane must be dry, clean and in calm conditions for accurate weighing. The empty weight must be recorded below and on the main cockpit placard after each weighing. The aeroplane empty weight must under no circumstances exceed 240kg (528lbs).

The Quik/GT450/QuikR/GTR 912/912S, registration mark....., engine type....., has been weighed empty, including full oil, electrolyte and unusable fuel:

| WEIGHT | MODIFICATION STATE | DATE |
|--------|--------------------|------|
|        |                    |      |
|        |                    |      |
|        |                    |      |
|        |                    |      |
|        |                    |      |
|        |                    |      |
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|        |                    |      |
|        |                    |      |
|        |                    |      |

## 10.6. FUEL LOADS

### FUEL LOADS - QUIK

The fuel tank is 65 litres capacity, including 1.6 litres unusable, giving 63.4 litres useable. The weight of the fuel is  $0.718 \times 65 = 46.7$  kg (102lb). The larger tank is 0.5kg heavier than the 47 litre tank. The fuel load limitations for the range of allowable cockpit loads and aircraft empty weights are placarded in the cockpit as follows:

| EMPTY WEIGHT                       | COCKPIT LOAD               | MAX FUEL LEVEL       |
|------------------------------------|----------------------------|----------------------|
| 205kg (451lbs)                     | Up to 157kg (345lbs)       | 65 litres (full)     |
| 205kg (451lbs)                     | 200kg (440lbs) - max. load | 5 litres             |
| 220kg (484lbs) - max. empty weight | 172kg (379lbs)             | 23 litres (1/3 full) |
| 220kg (484lbs) - max. empty weight | Up to 142kg (312lbs)       | 65 litres (full)     |

Example loading problem:

|                        |                |
|------------------------|----------------|
| Aircraft empty weight: | 202kg (445lbs) |
| Pilot 1:               | 90kg (198lbs)  |
| Pilot 2:               | 90kg (198lbs)  |
| Total:                 | 382kg (841lbs) |

Max AUW = 409kg, therefore  $(409 - 382)\text{kg} = 27\text{kg}$  or  $(900 - 841)\text{lbs} = 59\text{lbs}$

The specific gravity of fuel is taken to be 0.718 g/cc (1.58lbs/cc)

Therefore maximum fuel =  $27/0.718 = 37$  litres or  $59/1.58 = 37$  litres.

### FUEL LOADS – QUIK GT450

The fuel tank is 65 litres capacity, including 1.6 litres unusable, giving 63.4 litres useable. The weight of the fuel is  $0.718 \times 65 = 46.7$  kg (102lb). The fuel load limitations for the range of allowable cockpit loads and aircraft empty weights are placarded in the cockpit as follows:

| EMPTY WEIGHT                       | COCKPIT LOAD               | MAX FUEL LEVEL       |
|------------------------------------|----------------------------|----------------------|
| 217kg (477lbs)                     | Up to 186kg (409lbs)       | 65 litres (full)     |
| 226kg (497lbs)                     | 220kg (484lbs) - max. load | 5 litres             |
| 265kg (583lbs) - max. empty weight | 168kg (370lbs)             | 23 litres (1/3 full) |
| 265kg (583lbs) - max. empty weight | Up to 138kg (304lbs)       | 65 litres (full)     |

Example loading problem:

|                        |                |
|------------------------|----------------|
| Aircraft empty weight: | 217kg (477lbs) |
| Pilot 1:               | 90kg (198lbs)  |
| Pilot 2:               | 110kg (242lbs) |
| Total:                 | 417kg (917lbs) |

Max AUW = 450kg, therefore  $(450 - 417)\text{kg} = 33\text{kg}$  or  $(990 - 917)\text{lbs} = 73\text{lbs}$

The specific gravity of fuel is taken to be 0.718 g/cc (1.58lbs/cc)

Therefore maximum fuel =  $33/0.718 = 46$  litres.

### FUEL LOADS - QUIKR

The fuel tank is 65 litres capacity, including 1.6 litres unusable, giving 63.4 litres useable. The weight of the fuel is  $0.718 \times 65 = 46.7$  kg (102lb). The fuel load limitations for the range of allowable cockpit loads and aircraft empty weights are placarded in the cockpit as follows:

| EMPTY WEIGHT                       | COCKPIT LOAD               | MAX FUEL LEVEL       |
|------------------------------------|----------------------------|----------------------|
| 220kg (484lbs)                     | Up to 183kg (402lbs)       | 65 litres (full)     |
| 226kg (497lbs)                     | 220kg (484lbs) - max. load | 5 litres             |
| 265kg (583lbs) - max. empty weight | 168kg (370lbs)             | 23 litres (1/3 full) |
| 265kg (583lbs) - max. empty weight | Up to 138kg (304lbs)       | 65 litres (full)     |

Example loading problem:

|                        |                |
|------------------------|----------------|
| Aircraft empty weight: | 220kg (484lbs) |
| Pilot 1:               | 90kg (198lbs)  |
| Pilot 2:               | 110kg (242lbs) |
| Total:                 | 420kg (924lbs) |

Max AUW = 450kg, therefore  $(450 - 420)\text{kg} = 30\text{kg}$  or  $(990 - 924)\text{lbs} = 66\text{lbs}$

The specific gravity of fuel is taken to be 0.718 g/cc (1.58lbs/cc)

Therefore maximum fuel =  $30/0.718 = 42$  litres.

### FUEL LOADS - QUIK GTR

The fuel tank is 65 litres capacity, including 1.6 litres unusable, giving 63.4 litres useable. The weight of the fuel is  $0.718 \times 65 = 46.7$  kg (102lb). The fuel load limitations for the range of allowable cockpit loads and aircraft empty weights are placarded in the cockpit as follows:

| EMPTY WEIGHT                       | COCKPIT LOAD         | MAX FUEL LEVEL       |
|------------------------------------|----------------------|----------------------|
| 232kg (510lbs)                     | Up to 172kg (378lbs) | 65 litres (full)     |
| 232kg (510lbs)                     | 208kg (458 lbs)      | 13 litres            |
| 265kg (583lbs) - max. empty weight | 168kg (370lbs)       | 23 litres (1/3 full) |
| 265kg (583lbs) - max. empty weight | Up to 138kg (304lbs) | 65 litres (full)     |

Example loading problem:

|                        |                |
|------------------------|----------------|
| Aircraft empty weight: | 230kg (506lbs) |
| Pilot 1:               | 90kg (198lbs)  |
| Pilot 2:               | 110kg (242lbs) |
| Total:                 | 430kg (946lbs) |

Max AUW = 450kg, therefore  $(450 - 430)\text{kg} = 20\text{kg}$  or  $44\text{lbs}$

The specific gravity of fuel is taken to be 0.718 g/cc (1.58lbs/cc)

Therefore maximum fuel =  $20/0.718 = 27$  litres.

## **10.7. CENTRE OF GRAVITY**

### **Trike**

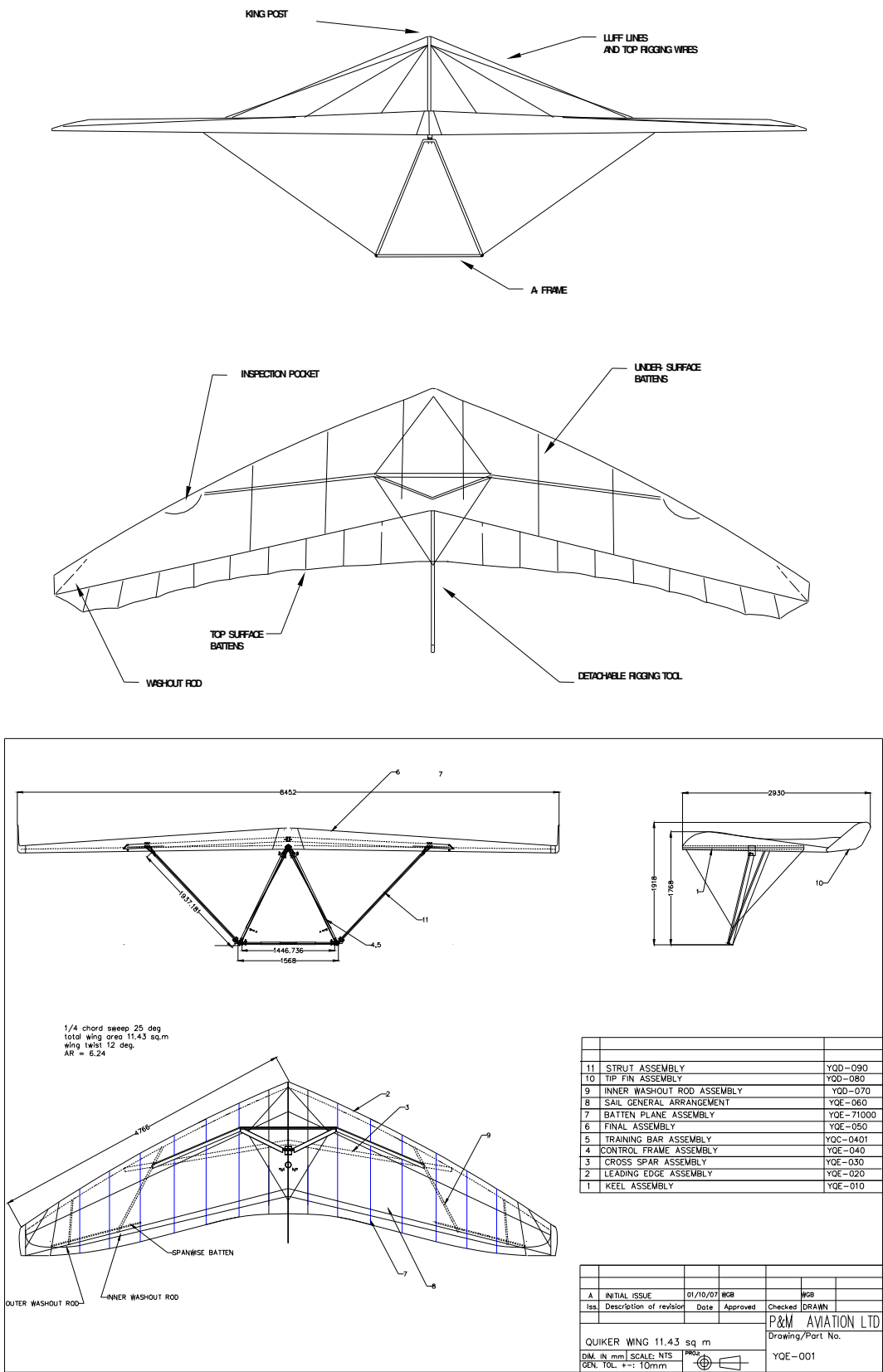
The centre of gravity (CG) of the trike is not very critical - it only affects the range of pitch control movement, not the trim speed. The CG of both the rear seat occupant and the fuel are as close as possible to the hang point with the trike in the suspended attitude, so the suspended attitude is little affected with load variation. Solo flight is from the front seat only.

### **Wing**

The CG of the wing *is* critical. Due to the materials used and the quality control in manufacture, the CG of the wing does not vary significantly in production. Items should not be attached to the wing which significantly change the CG. The hang point position on the wing keel must not be moved from the designed and tested position.

11. PRIMARY STRUCTURES AND SYSTEMS

11.1. PRIMARY STRUCTURES AND SYSTEMS - THE WING



## The Sail

The wing is the product of one the most experienced flexwing design teams in the world today. The sail fabric is cut with exacting accuracy from stabilised polyester using tight, virtually non-porous and tear-resistant weave construction. Double-stitched seams using PTFE UV resistant thread ensure complete panel join integrity. Sail reinforcement is achieved by including extra material at high stress points. A Trilam sandwich leading edge, a Kevlar trailing edge and a spanwise Kevlar tape maintain the wing's performance over a long life.

The aerofoil section is defined by pre-formed aluminium and pre-formed aluminium/composite ribs, with chord wise tension being maintained by attachment to the trailing edge. The predictable low speed stall exhibited by the Quik and Quik GT450 is achieved by the clean lines of the aerofoil's leading edge radius and the spanwise Kevlar tape that limits the wing washout.

## The Airframe

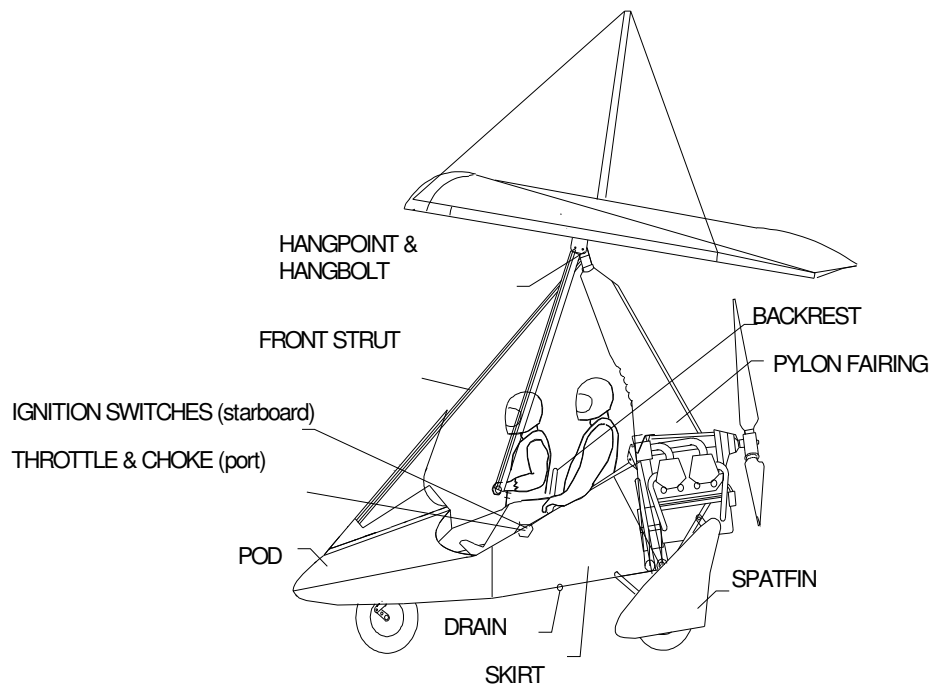
All the main tubing used in the airframe is a high quality aluminium alloy from aircraft quality billets using a special process of mandrel extrusion followed by being drawn to agreed industry specifications. All tubes and inserts are anodised to give protection against corrosion.

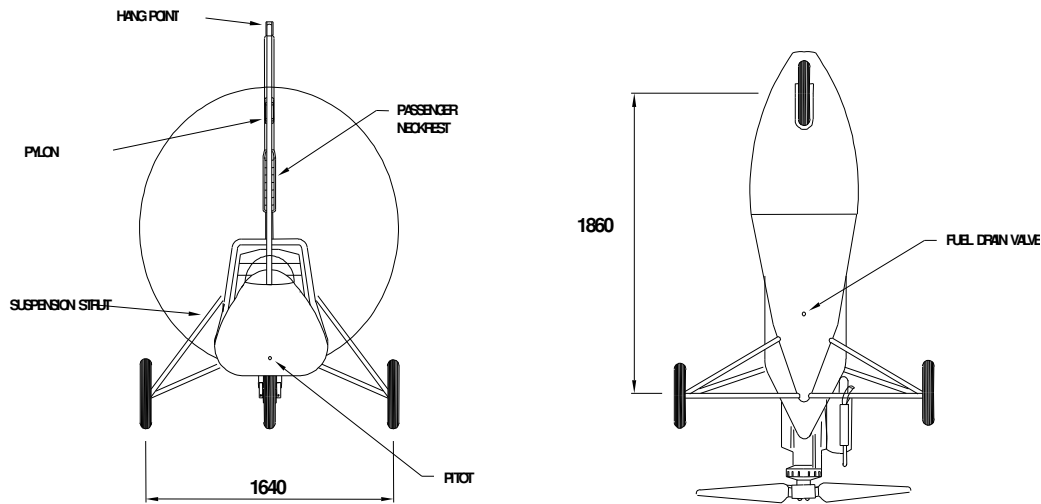
There are no welded components in the wing frame, and sheet fittings are plated, anodised or stainless steel. All bolts are of high tensile steel. Rigging wires are PVC covered where necessary to afford protection to the occupants and to also serve as an anti-kink measure.

### Wing tip fins – GT450, QUIKR & GTR Wings Only

The GT450 and QuikR wing is fitted with composite wing tip fins which improve directional/lateral stability, which is most noticeable in the light weight/high power condition above 70mph. They also reduce the induced drag and increase trim speed by 5-10mph.

## 11.2. PRIMARY STRUCTURES AND SYSTEMS - THE TRIKE





## The Power Units

|                  | Rotax 912      | Rotax 912S       |
|------------------|----------------|------------------|
| Type             | 4 stroke       | 4 stroke         |
| CC               | 1211           | 1352             |
| Power            | 80bhp/5,500rpm | 100bhp/5,500 rpm |
| Ignition         | Dual CDI       | Dual CDI         |
| Cylinders        | 4              | 4                |
| Reduction        | 2.27:1         | 2.43:1           |
| Fuel/oil mix     | n/a            | n/a              |
| Fuel min. rating | 95 RON         | 95 RON           |

# CAUTION

Damage may result on CDI engines if the engines are turned over without the plug leads connected.

## The Rolling Chassis

The main structure of the trike is of square section high strength aluminium alloy tube. A rigid composite tandem seat is fitted which locates onto the tubular seat frame. The seat incorporates a foldable backrest for the front seat occupant.

The rear undercarriage comprises Chro-Mo steel alloy tubular wishbones with suspension by polyurethane elastomer incorporated in the tubular aluminium alloy struts. The braked main wheels are accessible by removing the quickly-detachable wheel spat fins.


The nose undercarriage is steerable and incorporates footrests and throttle/brake controls. A trailing link elastomer suspension system is fitted.

## The Fuel Tank and System

Fuel is fed from a single fuel tank mounted beneath the seats. The fuel system has a fuel cock and external filter backed up by an internal strainer fitted to the end of the fuel tank pick-up pipe. External fuel pipes are fire-resistant to a specification that meets British Civil Airworthiness Requirements - Section S.

The approximate calibration of the fuel tank is as follows:

| % Tank Volume | Gauge Reading |
|---------------|---------------|
| 0 to 15       | 0             |
| 16 to 27      | 1/8           |
| 28 to 41      | 1/4           |
| 42 to 57      | 7/16          |
| 58 to 70      | 9/16          |
| 71 to 85      | 11/16         |
| 86 to 90      | 7/8           |
| 91 to 100     | 1             |

**WARNING**

Never rely on the fuel gauge accuracy alone when calculating flight distances left to run. A forced landing due to running out of fuel could result in injury or death.


Before you place any reliance on your fuel gauge, you will need to calibrate the fuel gauge on your particular aircraft. As is general practice in aviation, you should visually check the fuel tanks to confirm that the contents match the fuel gauge reading before flying. When flying, use your watch to time the flight against known fuel burn at a given rpm, and always leave plenty of fuel in reserve.

### 11.3. SECONDARY STRUCTURES AND SYSTEMS - ENGINE CONTROLS

#### Throttle

The primary throttle control is foot-operated (forward for full power and rearward for power off) and complemented by the friction-damped hand throttle (forward power on and rearward off) on the left side of the seat frame.


- *A cut out switch may be optionally fitted in the hand throttle to prevent starter operation unless the throttle is closed. Therefore for all starts including airborne restarts, THE HAND THROTTLE MUST BE CLOSED.*

**WARNING**

The hand throttle is set by means of a friction device, which means it could be left open. Always check it is fully closed before start-up.

#### Choke

The choke control is by means of a lever located on the left side of the seat. The lever is down for choke OFF, forward for choke ON. Normal operation is always with choke off.

**WARNING**

Check the choke is off before take-off. A warm engine with choke on will not develop full power and could cause serious problems in the climb and could cut out altogether if the power is reduced.

#### Contact Switches

Two ignition-kill switches - one for each ignition system - (up for on/down for off) are fitted, one in front of the other, on the starboard side of the seat frame. The two switches should normally be operated together by stroking with a finger or thumb.



## WARNING

The switches operate in the “normally open” mode, so they have to close the circuit to kill the engine. In the unlikely event of a switch failure, kill the engine using the choke. If this fails, turn off the fuel. With the fuel turned off, the engine may take some minutes to stop, as all the fuel in the carburettors must be used up.

Ensure the contact switches are off whenever you leave the aircraft. Failure to do so could result in injury or death when the propeller is handled during the next pre-flight check procedure.

### Mixture control

The optional mixture control system works by applying reduced air pressure to the carburettor float chambers, so reducing the fuel flow through the carburettor jets. The mixture leaning control is a valve on the instrument panel which applies either ambient pressure (rich) or partial carburettor venturi pressure (lean) to the float chambers. The pressure can be monitored by a gauge. Maximum leaning is limited by the size of the air vent jet.

The mixture should be set fully rich at all times except when cruising at a steady altitude, speed and throttle setting. The exhaust gas temperature (EGT) must be monitored when leaning the mixture, it must not exceed 800C. Observe all other engine limitations before and after leaning.

### Starter - Electric start

The starter is operated by start button on the instrument panel. The key switch must be in the ON position for the starter button to function.

#### NOTE

- *The key switch only switches the power to the instruments, comms & starter. Remember to switch on the ignition switches before start-up!*
- *The hand throttle cut out switch option makes it necessary for the hand throttle to be CLOSED in order for the starter circuit to operate.*

## 11.4. SECONDARY STRUCTURES AND SYSTEMS - BRAKING SYSTEM

The compensated rear wheel brakes are operated by a foot pedal on the left side of the front fork steering bar. Brakes may be cable operated drum or hydraulic disc type according to aircraft specification. A brake locking device is provided for parking. To lock, press the brake pedal and, with the left hand, lift the adjacent locking lever and engage one of its slots with the hoop on the side of the steering assembly. Release occurs automatically when the brake pedal is pressed.

#### NOTE

- *Do not press on the end of the locking ratchet to engage parking brake. There is a risk it could bend.*
- *The travel of the hydraulic brake pedal will be such that the locking lever will engage only in the first or second notches. This is normal.*
- *Use Dot 4 brake fluid e.g. Bendix Universal Dot 4 from a sealed container.*

## 11.5 SECONDARY STRUCTURES AND SYSTEMS - FUEL SYSTEM

Fuel is pumped from the single tank below the seat by the engine pump via the fuel filter. The 912S installation features a recirculation system which returns excess fuel to the tank. The tank is vented via a pipe to discharge clear of the aircraft. A sump with water drain is provided. The tank may be 49L or 65L, the 65L tank has a third mounting point at the centre of the tank. Fuel is supplied to the carburettors via the main shutoff cock.


### Rotax 912/912S

The preferred fuel is 95 RON minimum octane rating unleaded petrol. 4 star leaded fuel (super) can also be used. 100LL AVGAS can be used, but the high lead content causes more plug fouling, so use only when



necessary. Plugs should be checked at least every 25 hours if using AVGAS. If AVGAS is used more than just occasionally, use only semi-synthetic motorcycle oil.

Whichever type of fuel is used, use a reputable source of supply and during your daily inspection, use the water drain facility provided in the fuel tank. Push the drain mushroom upwards and sample the fuel in a transparent container before the first flight of the day. Any water present will sink to the bottom. If any water is found in the tank, check the carburettor fuel bowls for water before your next flight.

**WARNING**

- Gasoline is extremely flammable and can be explosive under certain conditions.
- Refuel in a well-ventilated area with the engine stopped.
- Do not smoke or allow flames and sparks in the area where the engine is refuelled or where fuel is stored.
- Turn the ignition and Master switches OFF. Earth the aircraft.
- Never fill the tank so that the level rises into the filler neck. If the tank is overfilled, heat may cause the fuel to expand and overflow through the tank vents.
- After fuelling, make sure the fuel cap is securely replaced.
- Be careful not to spill fuel when refuelling. Spilled fuel or fuel vapour may ignite. If any fuel is spilled, make sure the area is dry before starting the engine.
- Avoid prolonged or repeated contact with skin or breathing of vapour. KEEP FUEL OUT OF REACH OF CHILDREN.

#### 11.6. SECONDARY STRUCTURES AND SYSTEMS - SEAT BELTS

Lap straps are provided for both occupants. In addition, a single diagonal shoulder restraint is provided for the front seat and twin shoulder restraints for the rear.

**WARNING**

Both safety harnesses must be used in full with shoulder restraints. This must be checked before take off.

#### 11.7. SECONDARY STRUCTURES AND SYSTEMS – COCKPIT, FAIRINGS AND SCREEN

All fairings are made of lightweight composite materials and serve the dual functions of giving the pilot a degree of weather protection as well as improving the aerodynamics of the aircraft. The spat fins and wing tip fins are fitted to improve high speed yaw stability. The polycarbonate screen protects the pilot from the slipstream, it must be kept clear using a clean cloth, soap and plenty of water

- *The screen extension must be removed when folding the pylon for rigging / de rigging.*
- *Any further modifications which add side area to the front of the pod will adversely affect high speed yaw stability and are not recommended without extensive flight testing.*

#### 11.8. SECONDARY STRUCTURES AND SYSTEMS - ELECTRICAL SYSTEM

The aircraft is fitted with two standard wiring systems; one for transmission of electrical power derived from the engine alternator and the other for sensor signals to be used in instrumentation. Two independent sets of cables to the two separate ignition switches are provided. Ignition is independent of the battery/alternator/regulator system.

The power available from the alternator is a function of engine speed and the electrical load.



Connection to the wiring is via crimp connections in rubber connector housings and, in the case of the power wiring loom, via spade terminals to a multiway fuse holder at the front of the aircraft.

All models are fitted with a regulator, which charges the battery where fitted. Electric start models have a solenoid for transmitting current to the starter motor. A safety cut out switch is fitted to prevent starter operation with the hand throttle open.

## 11.9. SECONDARY STRUCTURES AND SYSTEMS - CARBURETTOR HEAT

Evaporation of the fuel at low pressure in the intake tract can lead to carburettor icing in humid conditions particularly between +10 and -5°C ambient temperature. Icing is generally more prevalent at part throttle settings. Symptoms include rough running, power loss and sometimes throttle sticking open. Throttle sticking may also occur through cable freezing if not correctly maintained - see Maintenance Section.

### Rotax 912/912S Carburettor Heat System

A carburettor body warming system supplied with heat from the coolant is installed.

The radiator cover should be adjusted to obtain at least 80°C coolant temperature for the system to work effectively. Power reduction due to intake temperature rise is small and the system can be used with carb heat selected ON continuously. Pipes and connections should be checked regularly for condition/chafing. See maintenance section.

## 11.10. SECONDARY STRUCTURES AND SYSTEMS - RADIATOR COVERS

### 912/912S Oil Radiator Jacket

In accordance with **P&M Service Bulletin No: 0094**, in which it was noted that it was desirable for the oil temperature on aircraft equipped with the Rotax 912/912S four stroke engines to reach 100°C at least once per flight, P&M now supply a neoprene jacket which may be fitted to the oil radiator when the aircraft is operated in cool ambient temperature. The purpose of this jacket is:

1. To make it easier to reach 100°C in normal use, in order to minimise the risk of humidity building up in the oil system.
2. To speed up the warm-up procedure.

**Note!** *If your aircraft regularly reaches 100°C in normal operations, there is no need to fit the cover.*

### Usage

The oil temperature on the 912/912S depends on the use to which it is put. Extended periods at high RPM in hot climates will result in temperatures of 100°C+, whereas at a typical cruise of 4000rpm in an ambient temperature of 23°C or less, 75-85° is the normal oil temperature. Whether to use the jacket with 100% or 50% coverage, or indeed at all, becomes a function of how the engine is used and in what ambient temperatures. The responsibility for ensuring that the oil temperature remains within the correct limits is therefore the pilot's. Regular in-flight checks should be made to ensure that the oil temperature remains within the desired range of 85-100°C and that the following limitations are respected:

2. Lower oil limit: 50°C
3. Upper oil limit: 912 engine: 140°C 912S engine: 130°C

### Adjustment

In the event that 120°C is reached in a typical climb to 2000' or 600m, it is probable that the jacket is covering too much of the radiator for the prevailing conditions. Make a precautionary landing and

adjust/remove as necessary. To adjust from 100% to 50% coverage, simply pull the bottom of the cover up to the top.

The following are typical coverage settings in normal usage:

**AMBIENT TEMPERATURE**

Up to 23°C

24-32°C

33°C+

**RADIATOR COVERAGE**

100%

50%

No coverage - remove jacket

**Inspection**

Check the security of the installation of the jacket as part of your daily inspection, and carefully inspect the jacket for wear or damage every 50 hours.

## 11.11 TRIM SYSTEM

### Electric trimmer

The wing is provided with fixed reflex lines and a small bracket on the wing keel. An electric winch with limit switches and position sensor is mounted at the bottom of the pylon. The winch is operated by a spring-return switch on the throttle box and the trim position is displayed by LED bar graph on the instrument panel. The winch pulls on a bungee inside the pylon fairing which pulls a cord connected via a pulley to the wing keel bracket. This system provides finger-tip control, with lighter pitch and roll forces at low speeds than the reflex trimmer. Aerodynamic efficiency is also better at slow speeds.

### Normal operation

The basic operation of the trimmer is to set the desired attitude and adjust the power setting so that the aircraft is in a steady state, and then adjust the trimmer till the bar force disappears. It is *not* good practice to fight the trimmer by pulling the bar in whilst selecting slow trim.

The trimmer takes approximately 18 seconds to run through the whole range. In the cruise, there may be a delay of a few seconds when selecting nose-up trim as the trimmer takes up the slack.

Note that the takeoff trim placard is set at approximately 65mph, to avoid too much pitch-up on the initial climb. For landing approach, trim at 55 mph solo, 60mph dual.

### Abnormal operation

The trim motor only runs when the pilot holds the trim switch, it will stop as soon as it is released. It can also be stopped by pulling out the 5A circuit breaker or by turning off the main master switch.

The trim motor 5Amp circuit breaker should not trip under any normal operating condition. It may trip if the pilot pulls the bar all the way back whilst selecting full nose up trim; this practice is not recommended as it puts unnecessary load on the system. In this case it is permissible to reset the C.B. after 2 minutes. The C.B. will also trip if the trim motor should run past the normal limit micro switch and the motor is not stopped by the pilot, in which case the bungee will eventually be stopped at the top of the engine mount frame and the trim speed will be very slow, 40-45mph.

With correct inspection and maintenance, trim cord or bungee failure is unlikely. If it happens the aircraft will go to full fast trim. In the case of main electrical system failure, the trim will stay where it is. In any case, fly the aircraft at the normal approach and landing speeds, accepting the out-of-trim force.

### NOTE

- *The aircraft should be left with the trimmer slack ( fast) to prolong the life of the system.*
- *With correct maintenance, failure is unlikely. However It is advisable to practice landing at both extremes of trim occasionally.*



## 12. GENERAL INFORMATION

### PLACARDS:

The fuel capacity placard near the fuel filler neck must be marked with 65 litres.

A pilot weight/fuel weight placard must be filled in showing the trade-off between fuel load and cockpit load, calculated according to the actual empty weight of the aeroplane.

### 12.1. RUNNING GEAR

|                                 |          |         |
|---------------------------------|----------|---------|
| Tyre Pressures - front and rear | 22.0 psi | 1.5 bar |
|---------------------------------|----------|---------|

### 12.2 PLACARDS, DECALS AND LOCATIONS

| Title                              | Location  |
|------------------------------------|---|
| Flight Limitations:                | On port upright   |
| Engine Limitations:                | On panel  |
| Aircraft Weights:                  | On basetube   |
| Baggage Limitations:               | On baggage container  |
| Fuel Type, Capacity and Mix Ratio: | On rear suspension leg  |
| Fuel Cock On/Off Positions:        | On seat   |
| Ignition Switch On/Off Positions:  | On ignition switch bracket                                      |
| Propeller Pitch Setting:           | On airbox or radiator   |
| Hand Throttle:                     | On throttle unit  |
| Wiring Loom Disconnection Warning: | On airbox or carb covers  |
| Trimmer Setting:                   | On trim switch ( electric trim) On trim display (electric trim) |
| Tip Turn Adjusters:                | On leading edge tube tips                                       |
| Latch Locking:                     | On seat next to latch   |
| Oil Type and Quantity:             | On oil cap  |
| Loose Hair or Clothing:            | On rear of seat   |
| Propeller Pitch:                   | On oil cooler   |
| Fuel Load Limitations:             | In the cockpit  |
| Warning Placard                    | On cockpit dash   |
| Warning: folded pylon              | On pylon fairing  |
| Warning: Loose hair                | On seat rear left   |
| Warning: Hot Engine                | On rear of cowling  |
| Warning: hand throttle closed.     | On seat next to hand throttle                                   |
| Operating Instructions             | On cockpit dash   |

### 12.3. ELECTRICAL SYSTEM SPECIFICATION

#### The Alternator

**Rotax 912/912S:** the alternator gives a nominal maximum current of 18 amps AC or voltages up to about 75 volts RMS with very low current. The nominal power rating is 250 Watts DC.

#### Power Wiring

The power wiring loom consists of insulated conductors inside a woven nylon sheath with a rubber connector at the rear end and spade terminals at the front. A 2-core cable and switch for engine ignition control is also included for each ignition circuit.

Note that airworthiness requirements specify that all electrical equipment attached to the wiring system must be protected by overload protection devices and that no protective device may protect more than one circuit essential to flight safety. To this end a multiway fuse holder is provided at the front of the aircraft for the attachment of electrical equipment.

Operators wishing to fit equipment themselves must contact an Approved organisation for the necessary modification approval. Details of all modifications should also be sent to the factory for authorisation.

## Battery State Monitor

A single LED Battery State Monitor (BSM) may be fitted. When power is switched on, it conducts a brief check sequence. It indicates as follows:

|                         |              |               |        |
|-------------------------|--------------|---------------|--------|
| No power                | (0-5v)       | Neutral       | GREY   |
| Low volts               | ( 6- 11.5v)  | Slow flashing | RED    |
| Good battery off charge | (11.5-12.5v) | Steady        | ORANGE |
| Battery on charge       | (12.5-14.5v) | Steady        | GREEN  |
| Over voltage            | (14.5v +)    | Fast flashing | RED    |

Any fault condition should be investigated before further flight. It may be wise to turn the master switch off.



## WARNING

Unauthorised modifications, including the fitting of optional electrical equipment, must not be carried out under any circumstances without official modification authorisation issued by the factory.

## Sensor Wiring

The sensor wiring system comprises a multicore cable intended for transmission of signals not involving significant power levels. No items requiring significant power with an alternating component should have their supply lines attached to this cable as electrical interference with sensor signals may occur.

## CAUTION

When the aircraft is stored for an extended period of time, remove the battery and charge it fully. Then store it in a warm dry place. Never leave the battery discharged.



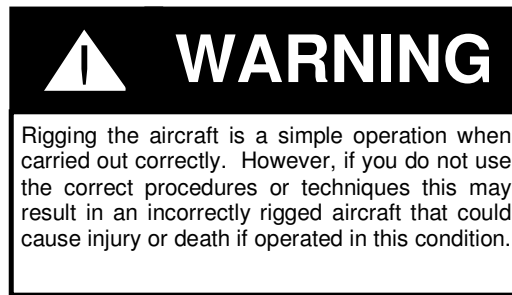
## WARNING

The battery gives off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging or using batteries in an enclosed space. The battery contains sulphuric acid (electrolyte). Contact with skin or eyes may cause severe burns, wear protective clothing and a face shield.

- If electrolyte gets on your skin, flush with water.
- If electrolyte gets in your eyes, flush with water for at least 15 minutes and call a physician immediately.
- Electrolyte is poisonous, if swallowed, drink large quantities of water, follow with milk of magnesia and call a physician immediately.

## 13. RIGGING THE AIRCRAFT

### 13.1 GENERAL



As you rig your aircraft, you should always be meticulous in your inspection of each component. This is the best time to see potential faults or problem areas which may be missed when the aircraft is fully rigged. Never allow yourself to be distracted during assembly of your aircraft and always rig to a repeatable sequence. Do not rely on the pre-flight check to find faults, but look carefully at all aspects of your aircraft as you put it together. Great care should be taken with wings which are left fully rigged, for checks cannot be omitted on that account, and the full inspection procedures should be followed. The design brief for the Quik range of aircraft all called for easy inspect ability, so those components not open to view may be reached from zipped inspection panels. (See airframe parts drawings).

#### Special attention should be paid to the following:

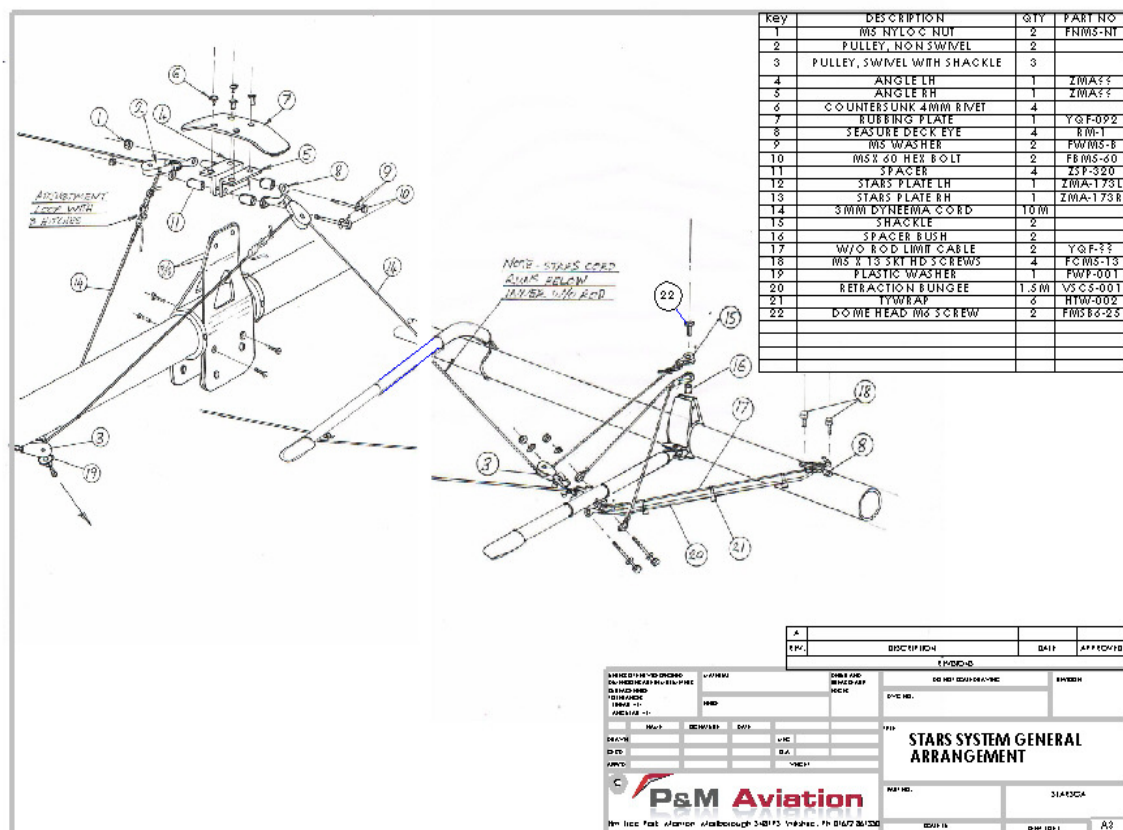
1. The symmetry of the wing and the angle of the kingpost.
2. All tubes straight, undented and without cracks.
3. All cables unkinked, unfrayed and with undamaged sleeves.
4. All nuts and bolts secure and locked appropriately.
5. All quick-release fittings secure.
6. Hang-point and hang-bolt undamaged and secure. Hang point roll bearing adjustment bolt secure.
7. Control frame uprights straight, end fittings and fasteners secure.
8. All sail seams intact, with no frayed stitching.
9. No tears in the sail.
10. Batten elastics not frayed, knots secure, and fitted correctly.
11. **Double check** 7. and 8. in sail areas of high stress.

#### Particular areas of high stress are:

Both tip fabric areas including tip fastening.  
Both leading edge upper surfaces.  
Undersurface at the joint seam with the leading edge, towards the nose.  
Around the securing screws at the nose of the wing (check that securing screws and grommets have not become detached from the sail).  
The trailing edge stitching, grommets and shock cords.  
Keel pocket, particularly at the point of attachment to the upper surface.  
Attachment of upper surface to fin tube (Quik & GT450).  
The point of attachment in the root area of the undersurface to the upper surface.  
All cable entry and exit points with particular regard to the rear upper rigging cable entry. (Quik & GT450)  
Strut entry and exit points (QuikR & GTR)  
The area above the crossboom centre ball.

12. Sail tip adjuster settings correctly aligned and secure.
13. Ribs undistorted, undented, in good condition and profile as supplied batten plan, bungees tight and doubled on all batten ends. (Quik & GT450). Battens all over centred and locked (QuikR & GTR).
14. Lift strut end fittings secure and undamaged. (QuikR & GTR)
15. Lift strut bolts/wingnuts secure. (QuikR & GTR)
16. Lift strut strap to crossboom – check for distortion/cracking. (QuikR & GTR)
17. Inner and outer washout rods both resting under the carbon spanwise sail batten. (QuikR & GTR)
18. Carbon battens including spanwise battens not broken. (QuikR & GTR)
19. Trim cord connected, not frayed.
20. Outer washout rods STARS cords routed clear of inner washout rod cords. See drawing below. (QuikR if STARS fitted & GTR)

21. Lower rear rigging rocker assembly and cables secure, nose catch secure.
22. Nose cone fitted and secure.



### 13.2. WING RIGGING QUIK & GT450

## ⚠ WARNING

Rigging and de-rigging the aircraft is a simple and safe operation when carried out correctly. However, if you do not use the correct procedures or techniques it is possible to injure yourself. It is therefore essential that you receive formal instruction on how to rig and de-rig the aircraft by an instructor, P&M dealer or other competent person before attempting the operation on your own.

1. Select a clean, dry area and lay the wing down, opening the zip to reveal the control frame and underside of the wing.
2. Open out the control frame and attach the base bar to the corner joints. Inspect the basebar holes for damage.

## ⚠ WARNING

The base bar is a primary structural component. Any damage of any kind - bends, dents, deep scratch marks and signs of stress around the holes - means the base bar must be replaced before the next flight.

3. Lift the wing from the front and rotate it so that the wing is now laying on the ground with the assembled control frame flat on the ground underneath.
4. Remove all the sail ties and open each wing about a metre. Lift the kingpost to its upright position and attach the rear top rigging cable to the cable end protruding from the top of the kingpost. Tighten the shackle.
5. Ensure that the upper cables are free from kinks and that the over-centre lever is in the open position.
6. Open the wings in stages, alternating between wings to prevent damage to the crossboom and fittings. Stop and check if any undue resistance is felt.
7. Ensure that all wires are untangled, particularly at the connections.
8. Excluding the nose rib, fit all the top surface ribs starting with the outboard main ribs and working in-board towards the root. Do not force the ribs if they seem hard to push fully home.

## CAUTION

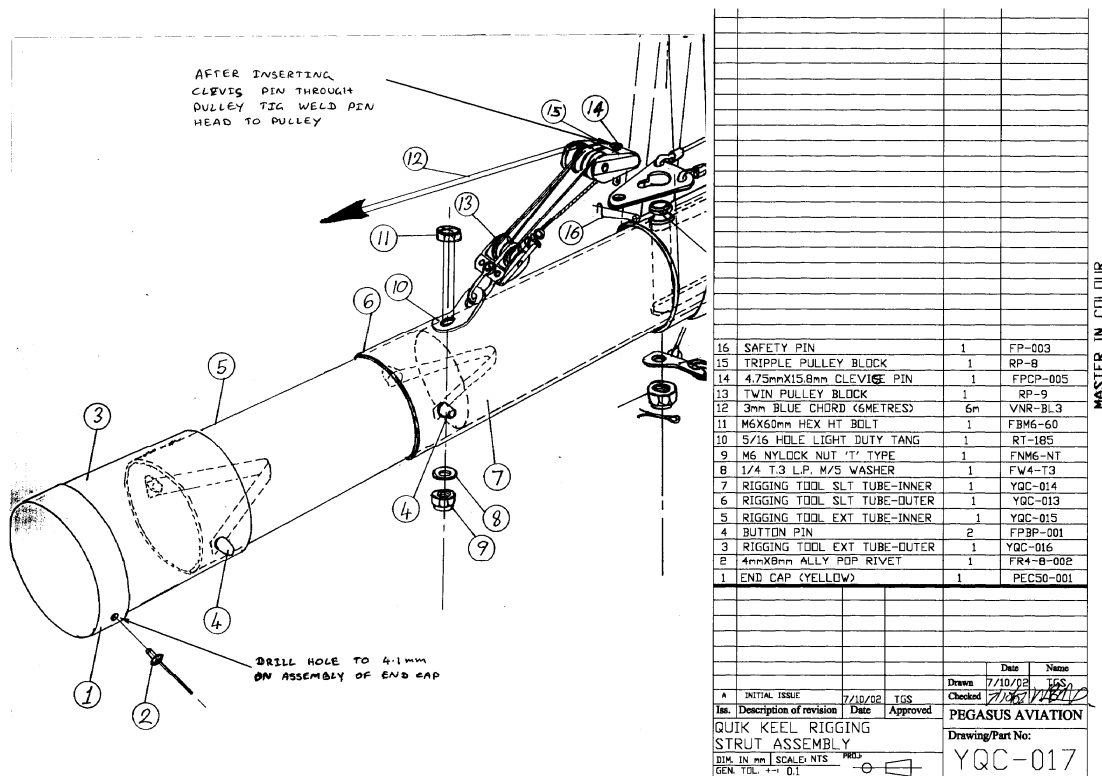
Damage may result to the sail and to the ribs if you force the ribs into the sail. Investigate immediately if undue resistance is felt, and if undue resistance occurs when the ribs are nearly home, leave them at this stage until after the wing has been tensioned at a later stage.

9. On all the upper surface ribs fit the single lower elastic. If the elastics appear overtight at this stage, leave them off until after the final tensioning of the crossboom when it is easier to push the ribs finally home and requires less effort to fit the elastics.
10. After fitting the upper surface ribs, remove the safety pin from the crossboom restraint cable stud just inside the rear end of the keel pocket. Make sure that the crossboom rigging tool (extension to the rear of the keel), is properly located in the keel with the slots engaged. Hook the front rigging tool pulley onto the keyhole tang and secure with a safety pin. Ensure that the cord between the two pulleys is not tangled. Using the pulley cord, pull back the crossboom until the keyhole tang can be located on the restraint cable stud. If you meet any sudden resistance during the tensioning process, stop and investigate, the pulley system multiplies the pulling force by 6:1. (The end thrust in the crossboom is multiplied a further 4.5 times). Fit the safety pin to the crossboom restraint stud.

## CAUTION

Damage to airframe components, the sail and fittings may result if you tension the crossboom with rigging or airframe components caught up. Investigate immediately if undue resistance is felt. Remember, the pulley system multiplies the force applied to the cables by 6.





Rigging tool shown inserted in rear of keel.

Make sure that:

- The tang is located in the stud recess.
  - The tensioner cables are not twisted.
  - The safety pin secures the cable onto the stud and is re-fitted correctly into restraint cable stud.
11. With the crossboom now tensioned, disconnect the rigging tool pulley from the keyhole tang and remove the rigging tool from the rear of the keel. Ensure that the previously fitted ribs are pushed FULLY home and that the upper and lower elastics are fitted to all ribs.

⚠

WARNING

The rigging tool must be removed before flight and before attempting to start the engine. If the rigging tool is not removed, the propeller will strike it.

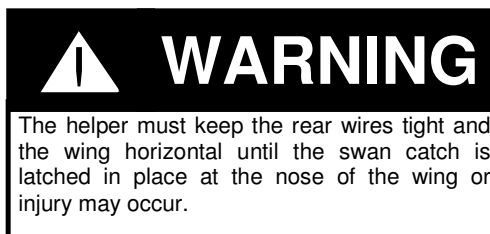
12. Locate the washout tubes onto the sockets, ensuring they are seated firmly down to the limit.
13. Quik GT450 wing Only: Engage each tip fin on the leading edge spigot and then attach the two clevis pins with nylon washers and safety clips.

⚠

WARNING

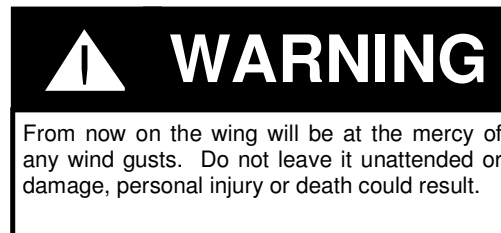
The aircraft becomes less directionally and laterally stable, especially at high speed/light weight/high power, if tip fins are not fitted. Trim speed is also reduced if tip fins are omitted. The tip fin vents must not be covered.

14. Proceed to the front of the wing, lift and support the nose of the wing on the knee. Locate, fit and push fully home the nose rib, finally locating the front end onto the spigot provided on the keel tube.
15. With the assembled wing flat on the ground, ensure that its nose is into wind (with the nose facing the direction that the wind is blowing from). Line up the trike behind the wing with its nose facing the wing, but at least ten feet away to give clearance for the wing to be raised onto its control frame.
16. Ensure that the lower (flying) wires are not tangled, and that the nose wires are laid out with the nose catch towards the front of the trike. When you are ready to raise the wing, have the rigging tool to hand and stand at the nose facing the rear, with a helper stood at the rear facing towards you. Have a final check that the wind is on the nose and not too strong. Lift the nose while the helper lifts the rear of the keel. Keep the wing level and allow the wing to rotate around the control bar as it is raised, by walking towards the trike, when sufficient height has been attained start to allow the A frame to take the weight of the wing. When fully up the rear wires will become taught, keep the wing horizontal and get the helper to keep constant pressure upwards and rearwards on the rear of the keel while you stoop to pick up the nose swan catch.



Hook the swan catch onto the nose plate and place the securing pip pin into position with its securing washer on the ball end. Give the washer a tug to ensure that the ball is locking the washer in place.

Fit the rigging tool into the nose of the wing to provide a support foot to rest the wing on. In light winds, the helper can now release the keel and you can lower the wing nose with it's support foot to the ground.



Note: The following paragraphs 16 and 17 will normally be carried out after the trike has been attached to the wing, but is detailed here for continuity.

17. After inspecting all parts visible through the nose aperture, securely fit the nose cone upper Velcro to the wing top side Velcro and, ensuring symmetry, pull the lower part of the nose cone around the lower front rigging cables. Join the nose cone rigging cable slot edges with the Velcro's provided and attach the nose cone underside to the wing undersurface Velcro.
18. Adjust either the upper or lower wing attachment Velcro patches to give the smoothest and most symmetrical fit.



19. In light winds the nose can again be lowered and the wing allowed to rest on the nose extension.

## CAUTION

In turbulence or strong winds it is best to have an assistant hold the wings level at the nose whilst the under surface ribs are located.

20. Push fully home the undersurface ribs so that the curved aluminium section is facing rearwards and downwards. Fit the single elastic to each undersurface rib rear.
21. Proceed to the rear of the wing and tension the overcentre lever in the rear top rigging.

### 13.3 WING RIGGING QUIKR & GTR



## WARNING

Rigging and de-rigging the aircraft is a simple and safe operation when carried out correctly. However, if you do not use the correct procedures or techniques it is possible to injure yourself and damage the wing. It is therefore essential that you receive formal instruction on how to rig and de-rig the aircraft by an instructor, P&M dealer or other competent person before attempting the operation on your own.

1. Select a clean, dry area and lay the wing down, opening the zip to reveal the control frame and underside of the wing. Remove the sail ties and padding.
2. Open out the control frame and attach the base bar to the corner joints. Inspect the basebar holes for damage.



## WARNING

The base bar is a primary structural component. Any damage of any kind - bends, dents, deep scratch marks and signs of stress around the holes - means the base bar must be replaced before the next flight.

3. Connect the lower front rigging cables to the noseplate using the swan neck catch. Tension it and secure with the pip pin and washer.



Rigging stage 3

4. Lift the wing from the front and rotate it so that the wing is now laying on the ground with the assembled control frame flat on the ground underneath.



Rigging stage 4

4. Gently walk out the leading edges one at a time, lifting the trailing edge till the leading edges are spread about 45 degrees each side of the keel. Lifting the trailing edge will assist the washout rods to swing into position. Stop if resistance is felt and investigate. DO NOT ALLOW THE TIPS TO SCUFF THE GROUND AS EVENTUALLY THE WEBBING AND STITCHING MAY BE DAMAGED.



## WARNING

From now on the wing will be at the mercy of any wind gusts. Do not leave it unattended or damage, personal injury or death could result.



Rigging stage 5

6. Fit the lift struts noting they are handed Left and Right, using the AN-5 bolts, wingnuts and rings. It may prove easiest to attach the top spherical joint first.



Rigging stage 6

7. Pull up the crossboom tensioning cord till the wing is semi-tensioned and secure it to the cleat on the rigging tool. Stop if resistance is felt and ease the washout rods upwards by hand. This stage will bring both washout rods into their final positions.



Rigging stage 7

8. Fit all the top surface ribs ( red = port, green = starboard ) starting with the out-board main ribs and working in-board towards the root. Do not force the ribs if they seem hard to push fully home. To fit the root 2 ribs it will be necessary to lift the rear of the keel to avoid bending them.

## CAUTION

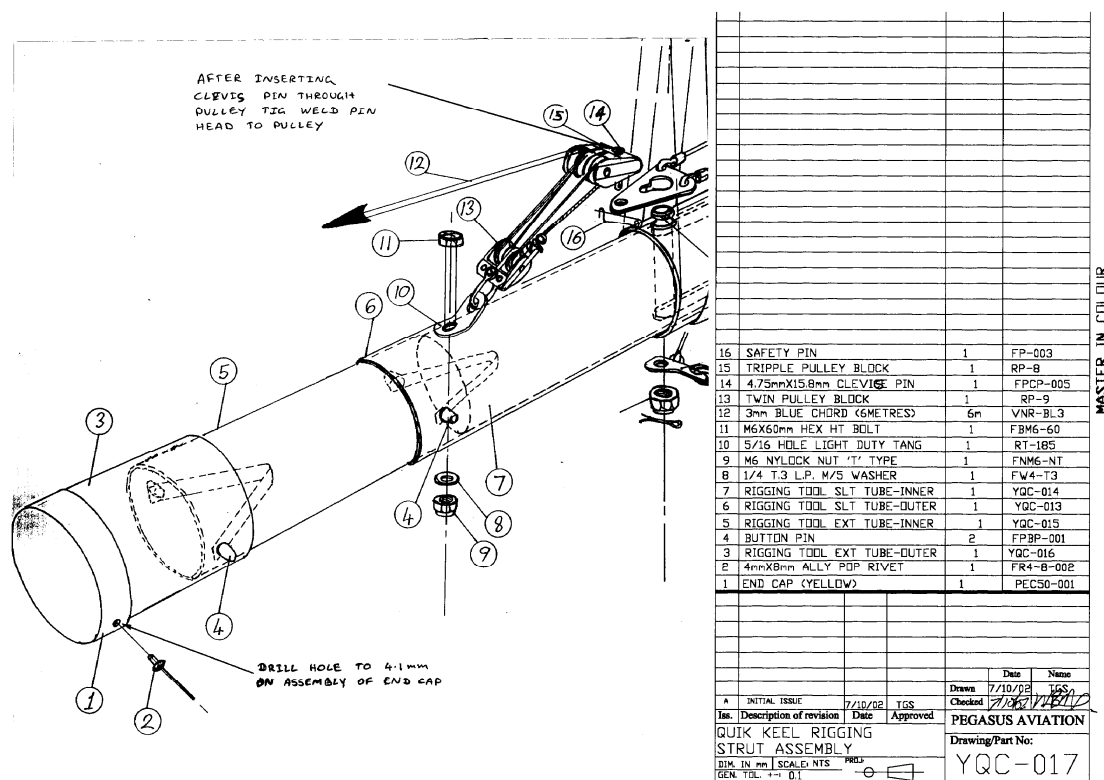
Damage may result to the sail and to the ribs if you force the ribs into the sail. Investigate immediately if undue resistance is felt, and if undue resistance occurs when the ribs are nearly home, leave them at this stage until after the wing has been tensioned at a later stage.

9. Ensure that the cord between the two crossboom tensioning pulleys is not tangled. Using the pulley cord, pull back the crossboom until the sail is just under tension. Check, by observing through the inspection zips and the outer washout rod Velcro panels, that the washout rods are moving correctly into place and that the actuating cords are not tangled. If necessary, lift the sail trailing edge to assist movement or reach into the inspection zips and lift the washout rods over the crossbooms. Check the inner washout rod cord and the outer washout rod cord have free runs without tangling.

10. Pull up the crossboom till the keyhole tang can be located on the restraint cable stud. If you meet any sudden resistance during the tensioning process, stop and investigate, the pulley system multiplies the pulling force by 6:1. (The end thrust in the crossboom is multiplied a further 4.5 times). Fit the safety pin to the crossboom restraint stud.

## CAUTION

Damage to airframe components, the sail and fittings may result if you tension the crossboom with rigging or airframe components caught up. Investigate immediately if undue resistance is felt. Remember, the pulley system multiplies the force applied to the cables by 6.



Rigging tool shown inserted in rear of keel.

Make sure that:

- The tang is located in the stud recess.
- The tensioner cables are not twisted.
- The safety pin secures the cable onto the stud and is re-fitted correctly into restraint cable stud.

## WARNING

The rigging tool must be removed before flight and before attempting to start the engine. If the rigging tool is not removed, the propeller will strike it.

- Disconnect the rigging tool pulley from the keyhole tang and remove the rigging tool from the rear of the keel. Ensure that the previously fitted ribs are pushed FULLY home. Engage the over-centre levers and tension them, ensuring they lie flat against the bottom of the sail. Tip the wing carefully onto it's nose.





Rigging stage 11

12. Ensure both the inner and outer washout rods are fully home and not caught on any ribs. The inner rod can be seen through the zip access panel and the outer rod through the Velcro panel in the undersurface.
13. Ensure the STARS system is routed correctly as shown by the GA drawing. (QuikR with STARS & GTR Wing).






Rigging stage 12 – correct positioning of washout rods.

14. Fit the undersurface battens and secure them with the single bungees.



Rigging stage 13

13. Engage each tip fin on the leading edge spigot and then attach the two clevis pins with nylon washers and safety clips.



## WARNING

The aircraft becomes less directionally and laterally stable, especially at high speed/light weight/high power, if tip fins are not fitted.  
Trim speed is also reduced if tip fins are omitted.  
The tip fin vents must not be covered.

16. Proceed to the front of the wing, lift and support the nose of the wing on the knee. Locate, fit and push fully home the rigging tool to support the nose in the correct position for connecting the wing to the trike.

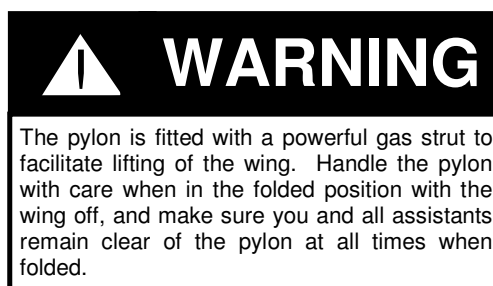
Note: The following paragraphs 17 and 18 will normally be carried out after the trike has been attached to the wing, but is detailed here for continuity.

17. After inspecting all parts visible through the nose aperture, securely fit the nose cone upper Velcro to the wing top side Velcro and, ensuring symmetry, pull the lower part of the nose cone around the lower front rigging cables. Join the nose cone rigging cable slot edges with the Velcro's provided and attach the nose cone underside to the wing undersurface Velcro.
18. Adjust either the upper or lower wing attachment Velcro patches to give the smoothest and most symmetrical fit.



#### 13.4. PREPARING THE TRIKE

1. Rigging the trike is the relatively simple operation of lowering and raising the pylon whilst connecting the trike to the wing.
2. To erect the trike from the folded state, the pylon should be raised and locked by means of the over-centre catch.



Fit the front strut and ensure that the upper and lower securing pins and rings are fitted correctly. Now is a good time to inspect the interior of the trike including the engine mounts and fuel lines. Depress the drain valve on the underside of the fuel tank and drain off a little fuel into a container. Check for discolouration due to contamination and for water present in the fuel. If in doubt, drain off all contaminated fuel and replace it.

3. To convert the tandem seat for solo operation, it is merely necessary to secure the rear seat belt buckle and to tighten the straps so that there is no slack.

#### 13.5. CONNECTING THE WING TO THE TRIKE

For the first few times that you rig your aircraft, ensure that the weather is calm or you have an experienced helper to take charge if the wind starts to take control from you. It is much better to be set up on grass rather than hard standing, both to avoid damage and wear to the wing and scraped knuckles as you lift the wing from the ground. Ensure that the ground is level, clear of clutter, wing bags, tools, twigs and inspect the ground for holes or any other obstacles that may trip you. While rigging the aircraft, it is important to carry out continual checks to ensure correct assembly. It is important that the pilot/operator carries out these inspections to ensure that the aircraft will be fit to fly.

1. Fit the nose extension (rigging tool) to the wing and position the wing on it's control frame and nose extension facing into wind.
2. Line up the trike behind and facing the wing, but at least ten feet away to give clearance for the wing to be raised onto its control frame.
3. Remove the two safety rings and pins at the lower end of the front strut. Release the over centre lock and then lift its lugs out of engagement and lay it aside, lay the front seat back rest down by rotating forward, lay the rear seat cushion down to expose the slot in the rear seat and lower the pylon by pulling firmly down on the inner front strut tube to overcome the resistance of the optional rigging gas strut where fitted. Remove the top front strut pin and lay the front strut on the ground, ensuring that it is not likely to cause a tripping hazard.



## WARNING

Do not lean over the pylon or place any part of your body between the pylon and the wing. The gas strut (if fitted) is powerful and if the pylon inadvertently starts to raise it could cause injury.

Release the trike brake and roll the trike forward with the front wheel rolling through the A frame and over the control bar. Make sure that the trike is aligned with the centre line of the wing and the pylon top is directly under the hang bracket.

4. Take the hang bolt and remove the nut, then centre the hang bracket.



## WARNING

Keep hands and fingers out from between the hang bracket and the A frame uprights as injury could result the hang bracket swinging to either side.

Note: You may find it convenient to fashion two wooden wedges and jam them one each side of the hang bracket between the hang bracket and the uprights; these will hold the hang bracket firmly in a central position. Ensure they are removed immediately after the hang bolt has been fitted.

Keeping hands and fingers clear gently lift the pylon top to engage into the hang bracket. When the holes are aligned push the hang bolt through the hang bracket and pylon top assembly from the port (left) side. Engage and fully tighten the nut onto the hang bolt and clip the safety pin onto the hole in the toggle bar attached to the nut.

- 4.1 Connect the electric trim cord shackle to the keel at this stage or connect the trim cord shackle to the keel STARS cord at this stage. The STARS cords should be under light tension, symmetrical and correctly routed. The adjustment knots each side of the keel pocket must be secure.

5. Go to the front of the wing and lift it to a horizontal position. Remove the nose extension, inspect the nose plate and cross boom hinge areas, attach the nose cone.



## WARNING

The nose cone must be attached to the wing and fully in place on its Velcro fixing. The wing stability and flying characteristics are adversely affected by flight without the nose cone fitted and could cause injury or death through loss of control.



## WARNING

Keep fingers and hands clear of the sides of the hang bracket at all times. The hang bracket operates on an overcentre system. If inadvertently let go, particularly in windy conditions, it could trap your fingers and cause injury.

Lift the nose further while rolling the trike rearwards until the wing keel engages with its stop. The nose wheel of the trike will now be behind the control bar. Engage the trike parking brake. Check that the over centre catch on the wing top rear wire is fully home in the closed position and take a look inside the rear keel pocket to inspect the tensioning cables securing pin, correct tensioning cable run, rear keel, king post and fin tube attachment.

6. Lay the front strut within easy reach when you are stood at the nose of the trike. Stoop under the nose of the trike, facing rearwards, and if the wind is calm firmly clasp the control bar and lift it. If the wind is above 5 mph or gusting, then get a helper(s) to assist. Where a rigging gas strut is fitted, much of the weight of the wing will be almost immediately taken from you; where not fitted you will have to lever the wing up into position while supporting most of the 95 lb (43 kg) during part of the lift.



## WARNING

Do not attempt to lift the wing to its rigged position without a rigging gas strut if you have back problems or if you are slight in stature. With wind input, you could find yourself with up to 110 lb (49 kg) of dead weight to carry. If you are unfit to carry this weight in a stooped position it is essential that a gas strut be fitted, or that you get an assistant to complete this task.

7. When the pylon is fully up, while still being ready to support the wing weight if a rigging gas strut is not fitted, locate the pylon using the over centre catch, but do not overcentre lock it at this stage. Get a helper to hold the bar or strap it back using the rear seat harness; if it is at all windy it is essential to have a helper at hand. Fit the front strut, first attaching it at the top with a pin and safety ring and then at the bottom with two pins and safety rings. Secure the Overcentre Lever in its latch.



## WARNING

It is particularly important to check that the two lower pins pass through both the lower and upper sections of the front strut, and that the top connection is pinned. Failure to do so could result in structural failure.

8. For the GT450 release the parking brake and turn the trike so that one wing is facing the wind, never allowing the into wind wing to get higher than horizontal. Lower the wing to the ground and attach it to an aircraft tie down point from the outer end of the lower flying wires. Apply the parking brake. For the Quik & QuikR face the aircraft into wind and set the parking brake.. Pull the control bar back till it contacts the seat and secure it there using the rear seat belt. If thermals etc are present, the aircraft may be picketed using weights or ground anchors on the side flying cables.

## 14. DE-RIGGING THE AIRCRAFT



### WARNING

Rigging and de-rigging the aircraft is a simple and safe operation when carried out correctly. However, if you do not use the correct procedures or technique it is possible to injure yourself. It is therefore essential that you receive formal instruction on how to rig and de-rig the aircraft by an instructor, P&M dealer or other competent person before attempting the operation on your own.

### CAUTION

For the first few times that you de-rig your aircraft, ensure that the weather is calm or you have an experienced helper to take charge if the wind starts to take control from you. It is also much better to be set up on a grass than hard standing, both to avoid damage to the wing and scraped knuckles as you lower the wing to the ground. Clear the area of clutter, wing bags, tools, twigs and inspect the ground for holes or any other obstacles that may trip you.

### 14.1. DE-RIGGING QUIK & GT450

The de-rigging procedure is a direct reversal of that for rigging. As with the preparation before flight, it is also important when de-rigging that the pilot/operator carries out an inspection.



### WARNING

The aircraft may be fitted with an optional rigging gas strut. If a gas strut is not fitted, support the weight of the wing by lifting on the control bar from the moment you unhitch the front strut, or damage/personal injury could occur.

Face the aircraft into wind and apply the parking brake. Remove the windscreen extension, if fitted. Remove the 2 rings and pins holding the front strut to the front strut lower. These can be found above the panel and behind the windscreen. Undo the pylon overcentre lever. Remove the pin at the top of the front strut and remove it.

Stand in front of, and facing the trike, with both hands firmly supporting the control bar. Gently ease the control bar towards you as you walk backwards until the keel has engaged with the keel stop and the pylon starts to move towards you. If a rigging gas strut is fitted, while keeping firm control of the descent with both hands on the control bar, you can allow the gas strut to support the weight of the wing. If no gas strut is fitted, then you will be supporting the wing weight all the way to the ground.



### WARNING

Do not attempt to lower the wing to the floor without a rigging gas strut if you have back problems or if you are slight in stature. With wind input, you could find yourself with up to 97 lb (44 kg) of dead weight to carry. If you are unfit to carry this weight in a stooped position it is essential that a gas strut be fitted, or that someone else is on hand to help you.

As the control bar reaches the ground keep it level to allow both end joints to land together. This will ensure that there is no twist in the pylon that will make it difficult to remove the hang bolt later.

Release the parking brake, remove the nose cone from the wing and temporarily tuck it away between one leading edge and its Mylar, fit the rigging tool to the nose. Gently pull the nose and lower it to the ground. The trike front wheel will roll through the A frame and over the control bar as you do this. Remove the safety

pin and special nut from the hang bolt and then remove the hang bolt from the hang bracket. If electric trim is fitted, disconnect the trim cord shackle from the keel. Wheel the trike back well away from the wing.



## WARNING

1. Keep a firm grip on the pylon to ensure that the rigging gas strut does not shoot it into the upright position. Do not lean over the lowered pylon at any time as injury could result from it inadvertently erecting.
2. Keep hands and fingers out from between the control frame sides and the hang bracket as injury could result.

Pick the nose of the wing up until the wing is horizontal, get a helper to support the rear of the wing keel, remove the rigging tool from the nose, remove the swan catch pip-pin and unlatch it from the nose. Walk backwards as you gently lower the wing to the ground keeping the weight shared between yourself and your helper and the wing horizontal.

After detaching the wing from the trike, reverse the procedures listed in Section 13.2, 1 to 19. When preparing the wing for stowage in the bag, furl the wing fabric carefully, ensuring that the protection patches are correctly positioned at the following positions:

- a) Control frame knuckle joints.
- b) Roll bracket and upper control frame.
- c) Washout tube plugs.

Rigging cables should be stowed carefully so as to avoid kinks and tangles.

When using the pulley system to release the crossboom tension, pay out the cord steadily to avoid rope burns to your skin.

### 14.2. RIGGED WING STORAGE QUIK & GT450

If storing the wing rigged, it should be parked in a sheltered location nose-down with rigging extension inserted. Undo the wing undersurface inspection zips and pass tie-down ropes around the cross-boom or side-wires. The nose cone should be removed and stowed under the leading edge Mylar.

The basebar and nose should rest on a soft, even surface; in particular avoid sharp stones which can damage the basebar. The trimmer should be left slack (fully fast).

### 14.3. WING OVERNIGHT PARKING QUIK & GT450

For overnight parking, the wing should be laid flat on the ground, into wind. De-tension the cross-boom, remove the kingpost top and lay the washout rods flat. Use water ballast or a tie-down stake on the nose. On thermic days, water ballast on the trailing edge will stop the sail being lifted from behind.

## CAUTION

Never store a wet wing in a sealed bag. This may result in mildew on the sail or general degradation of the airframe and fittings. If possible dry the wing before de-rigging. Otherwise open the bag zip before the wing is stored.

### 14.4 DE-RIGGING THE AIRCRAFT QUIKR AND GTR

The QuikR & GTR strutted wing/trike configuration can be quickly folded to minimise hangarage space. Only configuration 3 is recommended for road transport.

### 14.5 Folding Configuration 1.

It is possible, with care, to fold the wing with the trike fully rigged as follows. 2 assistants are desirable.

- 1) Face the aircraft into wind. Insert the rigging tool into the back of the keel and connect it to the cross boom restraint tang. Secure it with a spring clip.
- 2) Secure the control frame base bar to the front strut with a tie and protection pad.
- 3) Fit propeller blade padded covers. Rotate the propeller (switches OFF) until one blade is nearly vertical, on one side of the keel.
- 4) Remove the bottom Velcro connection on the nose cone.
- 5) Open the Velcro panels behind the outer washout rods.
- 6) Unhook the cross boom restraint tang and slacken off the wing with about 0.5 metres of cord travel. Attach the rigging cord to the rigging tool cleat.



## WARNING

On top of the trike, the wings tend to fold back under gravity and damage/injury may be caused if the wing is allowed to fold freely. Keep a firm hold on the rigging cord.

- 7) Remove at least 3 top and 3 bottom surface battens nearest the keel, on each wing
- 8) Taking hold of the tensioning cord, detach it from the cleat. With an assistant each side, carefully allow the wings to fold back whilst raising both wing trailing edges.
- 9) The trailing edge tip battens may be secured together by cords or hooks.

To rig for flight from configuration 1, use the reverse procedure. It is not possible to open the wings by pulling on the cross boom cord. 2 assistants will be needed to carefully walk the wings out. Lift the trailing edges as the wings open to assist movement of the washout rods.



Fold configuration 1



## 14.6 Fold Configuration 2.

A very compact folding configuration which is possible to accomplish single handed. A nosewheel skate with basebar channel is required if the folded aircraft is to be moved.

- 1) Face the aircraft into wind. Apply the parking brake. Put the front wheel into a skate with a channel to receive the wing basebar. Strap the nosewheel down so it cannot jump out of the skate.
- 2) Remove the front strut, fold the seat backrest down and rear seat cushion. Remove the screen. Carefully lower the wing down and engage the control bar in the skate channel.



## WARNING

The aircraft may be fitted with an optional rigging gas strut. If a gas strut is not fitted, support the weight of the wing by lifting on the control bar from the moment you unhitch the front strut, or damage/personal injury could occur.

- 3) Insert the crossboom rigging tool in the rear of the keel and connect it to the restraint tang, securing it with a spring clip.
- 4) Fit padded propeller blade covers and rotate the propeller so one blade is vertically downwards.
- 5) Open the Velcro panels behind the outer washout rods.
- 6) Disengage the restraint tang and slacken the cord by approximately 0.5 metres, secure it to the cleat on the rigging tool.
- 7) Remove at least 3 top and 3 bottom battens on each wing nearest the keel.
- 8) Carefully fold the wings in, lifting both trailing edges if any battens are left in.
- 9) Secure the trailing edges with ties, or if all battens are removed, roll up each wing and secure it with sail ties.
- 10) Protect the sail with UV light proof covers.



Fold configuration 2 – side view. The nosewheel skate allows movement in the hangar.





Fold configuration 2 – rear view.

To rig for flight from configuration 2, use the reverse procedure. It is possible to open the wings by pulling on the cross boom cord in this position, though assistance may help. Lift the trailing edges as the wings open to assist correct deployment of the washout rods.

#### **14.7 Fold configuration 3 – de-rigged into a bag for transport/storage.**

The de-rigging procedure is a direct reversal of that for rigging. As with the preparation before flight, it is also important when de-rigging that the pilot/operator carries out an inspection.

Face the aircraft into wind and apply the parking brake. Remove the windscreen. Remove the 2 rings and pins holding the front strut to the front strut lower. These can be found above the panel and behind the windscreen. Undo the pylon overcentre lever. Remove the pin at the top of the front strut and remove it.

Stand in front of, and facing the trike, with both hands firmly supporting the control bar. Gently ease the control bar towards you as you walk backwards until the keel has engaged with the keel stop and the pylon starts to move towards you. If a rigging gas strut is fitted, while keeping firm control of the descent with both hands on the control bar, you can allow the gas strut to support the weight of the wing. If no gas strut is fitted, then you will be supporting the wing weight all the way to the ground.



## **WARNING**

Do not attempt to lower the wing to the floor without a rigging gas strut if you have back problems or if you are slight in stature. With wind input, you could find yourself with up to 97 lb (44 kg) of dead weight to carry. If you are unfit to carry this weight in a stooped position it is essential that a gas strut be fitted, or that someone else is on hand to help you.

As the control bar reaches the ground keep it level to allow both end joints to land together. This will ensure that there is no twist in the pylon that will make it difficult to remove the hang bolt later. Release the parking brake, remove the nose cone from the wing and temporarily tuck it away between one leading edge and its Mylar, fit the rigging tool to the nose. Gently pull the nose and lower it to the ground. The trike front wheel will roll through the A frame and over the control bar as you do this. Remove the safety pin and special nut from the hang bolt and then remove the hang bolt from the hang bracket. If electric trim is fitted, disconnect the trim cord shackle from the keel. Wheel the trike back well away from the wing.



## WARNING

Keep a firm grip on the pylon to ensure that the rigging gas strut does not shoot it into the upright position. Do not lean over the lowered pylon at any time as injury could result from it inadvertently erecting.

Keep hands and fingers out from between the control frame sides and the hang bracket as injury could result.

After detaching the wing from the trike, reverse the procedures listed in Section 5.2. When preparing the wing for stowage in the bag, furl the wing fabric carefully, ensuring that the protection patches are correctly positioned at the following positions:

- a) Control frame knuckle joints and rigging cable connections.
- b) Roll bracket and upper control frame.
- c) Keel restraint stud area.

Rigging cables should be stowed carefully so as to avoid kinks and tangles.

When using the pulley system to release the crossboom tension, pay out the cord steadily to avoid rope burns to your skin.

### 14.8. RIGGED WING STORAGE QUIKR & GTR

If storing the wing alone rigged, it should be parked in a sheltered location nose-down with rigging extension inserted. Undo the wing undersurface inspection zips and pass tie-down ropes around the cross-boom or side-wires. The nose cone should be removed and stowed under the leading edge Mylar.

The basebar and nose should rest on a soft, even surface; in particular avoid sharp stones which can damage the basebar.



## WARNING

Never disconnect the nose shackle when the lift struts are attached. Never attempt to fold the control frame back when the lift struts are attached.

### 14.9. WING OVERNIGHT PARKING QUIKR & GTR

For overnight parking, unless winds are forecast to be very light, the wing should be positioned into wind and folded down as in configuration 2 but with the control bar on the ground.

## CAUTION

Never store a wet wing in a sealed bag. This may result in mildew on the sail or general degradation of the airframe and fittings. If possible dry the wing before de-rigging. Otherwise open the bag zip before the wing is stored.