



How the STARS System and Roll control work

Worthy Winner at Worthing

ULM Blois Festival

Kent Scouts Group

The Flying Chef



## Chairmans Welcome .....

It is with some trepidation that I write this, as I am very much aware of the history and achievements of P&M Aviation. I feel it is a tremendous privilege to take the helm of the world's leading designer of manufacturer of flexwing microlights and work with the team that has achieved so much over the years.

Although I have not been actively involved in microlight aviation in recent years, I started with foot launched powered hang gliders that were interesting to fly and then owned some of the early trike designs. Needless to say today's range of P&M aircraft are a million years away from some of those badly engineered aircraft with rather dubious handling qualities and suspect flight envelopes.

This highlights to me the fact that the current level of capability within P&M did not arrive overnight but has been painstakingly built up over very many years. Therefore we have every intention of continuing to design and manufacturing world leading aircraft with envious safety records. However, we are also focussing on how we can improve customer service levels as well as value for money.

We will be making investments to help us achieve this and also establish better communications with our customers both in the UK and across the globe. We have started this by increasing our exposure on Facebook and Twitter (please do join in) and we will be re-designing the website in due course. As part of this, please do also ensure that we have your current email addresses. There will also be investments on internal processes and systems to enable us to become more cost effective in our operations while retaining the personal touch that is so important.

As you will read elsewhere, there is a lot going on with our aircraft at the moment and the ongoing development of the existing aircraft range and as well exciting projects in development. So, all in all, exciting times lie ahead.

I look forward to making contact and meeting as many of you as possible, in due course, as well as receiving feedback and ideas for the future.

In the meantime, safe and happy flying

Andrew Cranfield  
Chairman



# ULM **BLOIS** Festival France 2015



The Eagle has landed



Pipistrel Taurus Electro - self launching



DTA J'RO Gyroplane



Quik GTR



Air Creation Skypper



Savage Cub



P&M Stand

In early September Bill Brooks and Tim Jackson coasted out from Southampton towards Cherbourg in the PulsR and lime green GTR to support P&M's French dealer, Alain Hanse for the annual French ULM festival at Blois.

With favourable weather and light winds, the event was as vibrant as ever with a good turnout of Gyro's, Micro Helicopters, Paramotors, Motorised Gliders, and many new carbon fibre hot ships that sadly we will not see in the UK due to regulations. Footfall was strong all weekend with visitors taking a keen interest in our trikes with particular interest in our unique STARS and Roll Control system in the wings. Meanwhile Bill demonstrated the PulsR in front of large crowds on both days which always generated a rush of interest after landing with people wanting to have a closer look.

Once again Blois lived up to its name this year with exciting flying displays, large crowds of visitors and some beautiful light sport and microlight aircraft on show.



When you are invited by your competitors to give a talk about your products in front of their clients, you know you have something special or they want something. This is what happened to Dr Bill Brooks at the Sun'n Fun International Fly in & Expo this year in Florida when Larry Mednick of Evolution Trikes (The Revo) asked Bill if he could give an audio visual presentation on the PulsR in front of his clients at their evening BBQ. The evening was a great success and both Larry and Bill spent many hours scrutinising each other's products by comparison.

Sadly due to an incident before Sun'n Fun, P&M were unable to showcase all their trikes at this year's event, however as P&M USA had literally just taken delivery of their brand new bright Orange Quik GTR it was a perfect opportunity to display the trike in front of the crowds. Much interest was shown with lots of comments on the bright colour.



**TRIG**  
Approved Dealer



## Tony Hughes wins Worthing International Birdman Competition

At the eighth attempt Wiltshire Microlight Centre owner and ardent P&M dealer, Tony Hughes, has won the £10,000 Jackpot prize hitting the 100m buoy at the Worthing international Birdman competition this year.

This annual event which started in 1971 at the nearby resort of Selsey, attracts many flyers from around the world who take part to raise money for charities whilst other more competitive individuals along with their complex machines aim for the distance record and prizes.

Taking off from a wooden ramp 10m above the waves, Tony managed 106m on his modified Solar Wings Scandal XK hang glider. That is better than a 10:1 glide from a standing start



Anyone interested in entering next year should look at the Worthing Birdman website and start the application process. It's a great weekend. [www.worthingbirdman.co.uk](http://www.worthingbirdman.co.uk)

### Yatesbury..... Home of the Wiltshire Microlight Centre Tony Hughes' Field of Dreams

Built over a period of 14 years Tony Hughes's 'Field of Dreams' is open to all visitors! The flight deck cafe is open during normal flying hours and is able to serve light refreshments and hot and cold drinks. If you call Sue (Tony's better half) with a food order beforehand it can be waiting for you on arrival. Sue can also prepare Sunday lunches for groups if you wish. The landing fee is just £6 which includes a free drink for the pilot. Please PPR Tony before arrival. Safetycom is used on 135.475. A warm welcome awaits.

### THE BLACK KNIGHTS

Meanwhile Tony is looking for Quik Pilots who are interested in forming a display team to represent the BMAA and inspire new members to join and take up the sport. If you have more than 200 hrs and think you have what it takes to become a display pilot get in touch.

Contact: Tony: 07836 554554 Sue: 07513 589137. See [www.wiltsmicrolights.com](http://www.wiltsmicrolights.com).



# O-zee

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## Tech Topics

### How the Electric Trim and STARS system work

The PulsR, GTR and R wing have a patented roll augmentation system called STARS (stability and roll system). Flexwings generally have light handling at high speed but become progressively more stable and heavier to manoeuvre at lower speeds. The Stars system works with the trimmer so that the more nose-up (slow) trim is applied, the more the STARS system works to increase roll response. The way it works is shown schematically below.

#### Pitch Axis

**Fast trim:** In the fast trim condition the whole system is slack and has no effect on the wing. The wing trims fast because the hang point is set to provide the maximum hands-off trim speed (approximately 90mph). The wing is shown in the fast trim condition in figs 3 (side view) and 4 (rear view), where the sail is shown with minimum washout. The minimum washout is held in by the washout rod system so as to produce positive pitch stability. In the fast trim condition the STARS system must be set so that it becomes just taut as the control bar approaches the pilot's stomach.

**Slow Trim:** In the slow trim condition, referring to fig. 1, the trim motor 1 pulls the trim spring (bungee) 2 and tightens cord 3 which is attached to the keel by pulley 4. At pulley 4, the cord splits into two, one running to each wing around pulleys 5. The cord continues into position 6 then around pulley 7 which is attached to the outboard washout rod 9. The cord continues from pulley 7 to position 11 and is attached to the leading edge post 10. Since the washout rods are connected to the leading edge by a universal joint and are prevented from moving inboard by cord 8, tension in the trim cord 3 causes both washout rods to be pushed upwards, so increasing washout. Increased washout improves pitch stability and also prevents the possibility of tip stalling. Tension in cord 3 also applies a direct mechanical nose-up pitch relative to the trike. The combined effect is to slow the trim speed and increase pitch stability.

#### Roll Axis

Pulleys 5 are connected to a post extending upwards from the hang bracket. Considering a right roll input, with the trim cord tight (slow trim selected) then pulleys 5 are moved to the left, which causes cord 6R to tighten and 6L to slacken. The right hand washout rod is therefore pulled up relative to the left, so reducing lift on the right hand wing. The increased tension in cord 6R also causes bending of the right hand leading edge 15R. The asymmetric tension in cords 6L and 6R causes the wing keel to swing to the right, so tightening cord 13L and slackening cord 13R. This causes sail trailing edge 14L to be pulled tight and 14R to be slackened.

The overall effect is to increase washout in the right wing and reduce it in the left wing. Typically the roll rate from 30 degrees left to 30 degrees right is reduced from 5 seconds to 3.5 seconds at 50mph. The wing remains controllable in roll right down to the stalling speed.



FIG1

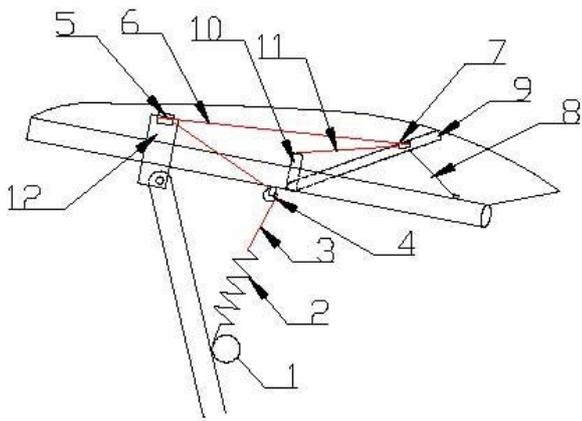


FIG2

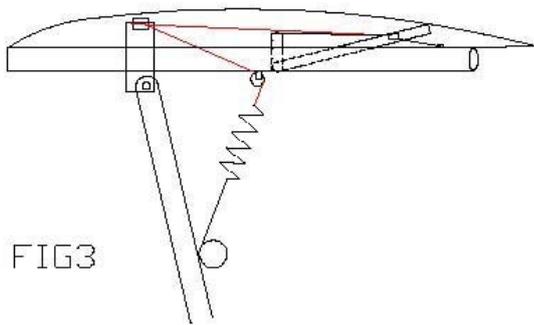
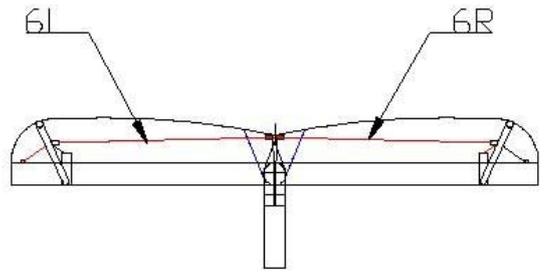


FIG.4

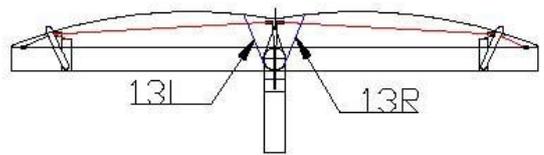


FIG.5

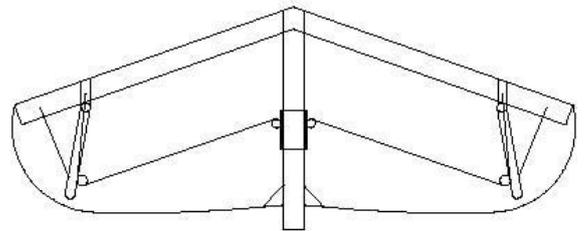


FIG.6

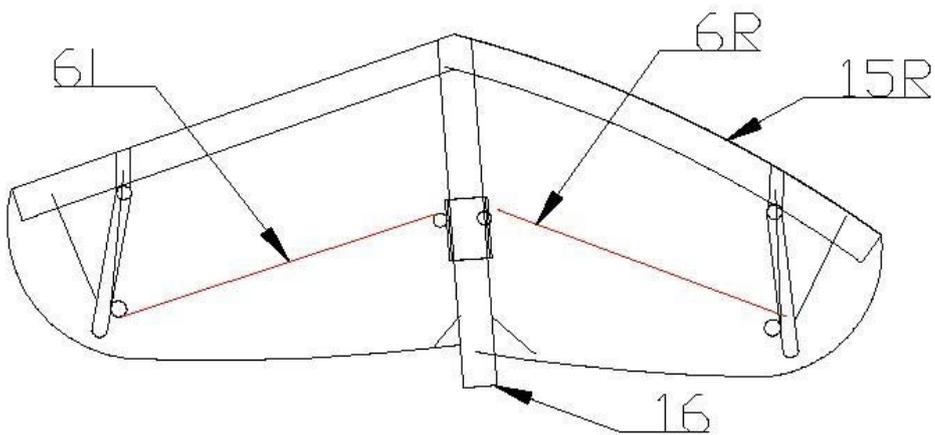
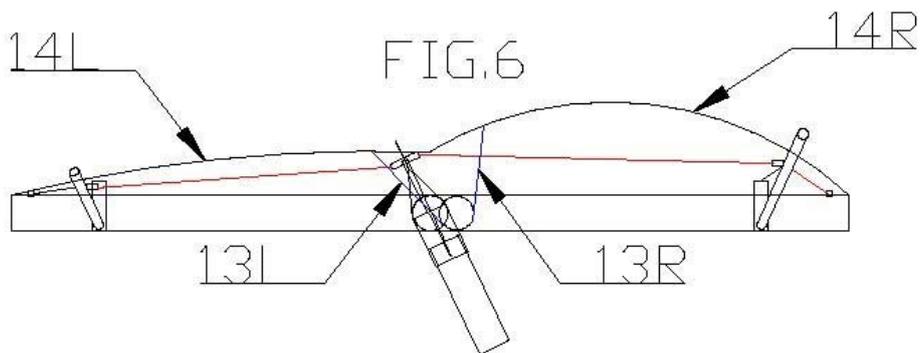


FIG.7

# How the Roll Trimmer Works with STARS equipped flexwings

## Introduction

Strutted flexwings require an internal washout rod system to ensure pitch stability in a neutral or negative G situation. Normally these washout rods are redundant in normal positive loaded flight. The STARS system is an original P&M innovation which uses the washout rods to augment roll control, pitch stability and to provide in-flight roll trim.

## General

The PulsR, QuikR and GTR use the STARS system (mod M252) which operates the outer washout rods. In roll, the washout rods are operated asymmetrically to aid roll response, and when slow pitch trim is selected, both washout rods are pulled upwards, increasing pitch stability and avoiding tip stalling.

The roll trimmer (mod. M275) works on the Right Hand (RH) STARS cord, so that tensioning it causes a RH turn by pulling up the RH washout rod, "tight for right, loose for left". Using the roll trim, any annoying hands-off turns can simply be trimmed out in flight.

## Tuning

Since the roll trimmer operates on the RH wing only, the wing is tuned to have a MILD LH turn when the RH STARS cord is slack. By tightening the RH STARS cord, a RH turn can be produced. By varying the tension in the RH STARS cord, the wing can be trimmed in flight to fly absolutely straight under all conditions of loading, speed and power. In general the QuikR and GTR tend to go left at high speed and power due to torque and P effect.

## Setting up

The wing tip adjusters need only to be adjusted symmetrically, i.e. both UP to reduce trim speed and vice versa. With no load on the roll trim cord, the roll trim wheel friction should be set by adjusting the castle nut and split pin so that a force of 4 to 5kgf applied on the knob is sufficient to move it.

If the aircraft is fully assembled and rigged for flight, Set the pitch trim on fully fast (i.e. slack trim motor cord) and the control frame basebar held central in roll. If the wing is off the trike, position the hang bracket central with the wing nose down on a level surface.

## Adjustment of the STARS cords.

There should be enough tension in the LH Stars cord to cause a steady LH turn with the RH cord slack.

Adjust by using the loop and knot on the LH side of the keel pocket.

The RH STARS cord should be set up so that with 2 turns of cord wrapped on the roll trim wheel, the tension is similar. The wheel should be set up so that clockwise rotation = tighter cord = right roll.



## How the Roll Trimmer Works with STARS equipped flexwings continued

### Check Flight

Smooth conditions are advisable. Set trim for take-off and ensure the roll trim is still set neutral ( 2 wraps on the wheel). Take off as normal, correct any turn by weight shift.

Establish a mid-range cruising speed (typically 70 – 80 mph) and trim out in pitch. Ensure the nose wheel is straight. It should be possible to produce a steady right and left roll by using the trim wheel. Remember that a LH turn can only be produced by slackening the RH cord, if the roll trim cord becomes slack and the aircraft is still not turning left, land and adjust. If more LH turn is needed, land and tighten the LH STARS cord.

Check in flight by slackening the RH STARS cord that the LH turn can still be compensated by weight shift, so that in the event of STARS cord failure, controlled flight can be continued to a safe landing.

If the aircraft turns excessively left at high speed, apply a small amount ( maximum 20mm) of reflex on the LH wing tip battens 8&9 ( GTR wing) or 7&8 ( QuikR wing). The ideal is to produce a steady LH turn at all speeds with the roll trim cord slack.

Once set up, it should be possible to apply a steady LH and RH turn at all trim speeds, powers and loadings. Normally only fine adjustments are necessary through the range, typically  $\pm 1/4$  turn.

Pilots who have previously had a Quik with the luff line pitch trimmer should resist the temptation to adjust pitch trim with the roll trim knob! A placard above the wheel (DP-086) states ROLL TRIM and L-R.

Sometimes if parked RH wing down in windy conditions, the roll trim knob can become slackened off. Therefore check roll trim before take-off.

### Emergency in the event of STARS cord failure.

In the event of a STARS cord failure, applying full fast trim and steering the nosewheel towards the turn will reduce the turn bias. It is recommended that all turns are made opposite to the hands-off turn. Much more push-out will be required to land with full fast trim and remember to centre the nosewheel prior to landing.

### Maintenance

On a daily inspection or particularly after rigging/derigging, check the STARS cords are not frayed especially at the trim wheel, at the pulleys and at the connection to the outboard washout rod post. Replace with genuine 3mm dyneema cord if there is any sign of damage. Check the STARS cords runs are straight and not twisted around either washout rod.



# Kent Scouts Group - Giving Members the Experience of Flight

A proposal was put before the KCSC, in 1989, for a microlight club to be formed within the County providing flying activities for Scouts to complement the parascending team already established.

Funding was agreed and the microlight club was formed with a Qualified Flying Instructor (QFI) providing training in the then owned Pegasus Q flexwing microlight. Members within the County holding Private Pilot Licence (PPL's) were recruited and given training to convert from fixed wing to flexwing to provide sufficient pilots in the team.



Initially flight instruction was given, by the QFI, to Scouts (over 14 years old) but it was found to be too demanding on the aircraft availability and limited the number of scouts that could be flown for air experience flights. Flight instruction was therefore discontinued so as to concentrate on providing air experience flights to the majority of members. All flights are now conducted as private flights by pilots under the privileges of their licence.

Before finding a permanent base to operate from, the aircraft was trailered around the County and flown from local farmer's fields in the location of the Scout Group to be flown. This changed when the group secured hangar space at Old Hay airfield where the group are now based.

A risk assessment has been undertaken and a safety case document issued on the operation including an airfield assessment. Pilots usually have many more hours logged than required by POR (250hrs) and far more take off and landings (four per hour) than the average pilot. Additionally a check flight is conducted before flying operations begin ensuring the aircraft is fit to fly, the weather conditions are suitable and the pilot is fit to operate the aircraft. A wind speed limit of 15mph is placed on the operation and pilots stand down if the wind exceeds this figure.

Kent County Scout Council considers that duty of care for its members has been addressed in how the KSMC operates. The aircraft is maintained to the standards required by the CAA and administered by the BMAA. The aircraft is fitted with a BRS ballistic recovery emergency parachute system.

Over the course of 26 years KSG have had two P&M 'Q's, two Quantums and until recently a P&M Quik GT450 912s, which has now been sold to make way for their new Quik GTR Explorer.

I think this model could be used by other youth organisations to start their own "in house" operation with volunteer pilots giving their time freely to encourage young people to take up aviation for fun, or as a career option, as some of our Scouts have done.

To date KSG have flown over 4000 scouts as well as attended various events including the Scouts International Jamborees, Kent County Show, Biggin Hill Air Show, and more recently an air display at Leeds castle in front of several thousand concert goers.

Tony Prentice. Kent Scouts Air Activities Manager.

*(Images below showing delivery of KSG's new GTR)*



## Anti Bug Device



Gordon Douglas of East of Scotland Microlights has come up with a clever idea to stop bugs crawling up the vent pipe of his Rotax 912's fuel pump. Told about it by a French engineer at Montpezat, Gordon uses a standard nylon mesh fuel filter cut open at one end to stop large bugs crawling up the pipe to block it. Gordon wasn't sure if Scotland has big enough bugs to do that, but thought it was a good option for flying in France.



P&M USA GT450 and Catalina - Gulf Shores

## UVC Light Testing on Sail Cloth



P&M are currently undergoing tests using high power UVC test equipment on various different sail cloths. As our wings are regarded by many as the best in the world, P&M are keen to research new materials as they become available so as to provide customers with the very best.

## Flying a Quik in Australia

Kev MacNally purchased his Quik 912S directly from P&M back in 2007. At the time he arranged to have it air freighted directly to Sydney, when he and his wife, Carole lived in New South Wales. After Kev picked it up he put it together at home, flew it and then sent back his own test flight results to P&M for assurance purposes. P&M had already arranged for it to be test flown in the UK, prior to delivery.

Kev then moved to Maryborough, Queensland and has been flying there ever since. Here are some images of their flying in the local area off Fraser Island and the Sandy Straits (an area between Fraser Island and the Mainland).



# The Flying Chef.

What do you do when you have a passion for flying and cooking?

Dan Subhani who is a network engineer and runs his own Internet ISP business has been flying for the past 20 years most of which were on Paragliders. After gaining his Microlight license three years ago, he decided to combine his passion for food and cookery with his flying skills and has never looked back.

Dan has been fascinated with food since he was 8 years old. He doesn't believe in recipe books and as a result doesn't own one. Like many of us he would spend a long time in Supermarkets but never really understood where his food came from apart from in pretty packets. As a result Dan has become creative, finds what is locally available and marry's up these flavours to create wonderfully tasty dishes.

As the UK has over 800 Farms with Strips, he combines his two passions, flying his GTR into some of them and cooking what they have on offer. Dan says "Its such a good excuse to visit new places and meet new people. I think friends who follow me on Facebook must hate me as all they ever see is flying and food."

Dans says "Whilst I was at Spamfield on the Isle of Wight in September, we had 12 of our Plaistows Club Members watching a movie, eating curry and drinking wine, while others were shivering in little tents with the rain beating down on them."

Dan can be contacted at [dan@pro-net.co.uk](mailto:dan@pro-net.co.uk)

The UK has over 800 farms with strips



Can you get all this in a 3-axis Microlight? .....

# The Flying Chef's Pop-Up Club House Inventory

What is more amazing is that Dan carries everything in his Quik GTR as he travels across the country.

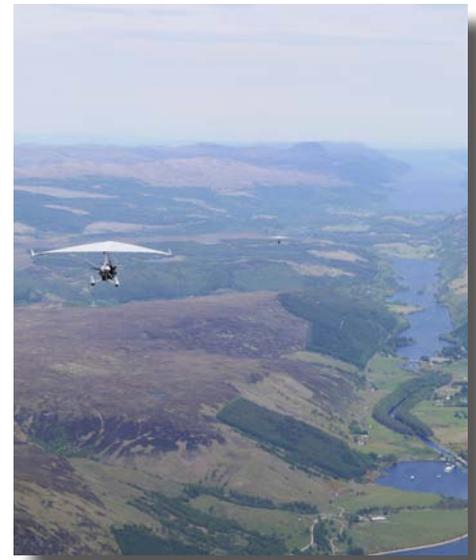
This is a list of what Dan carries on his trike. Can you get all this in a 3-Axis machine? You can on a GTR!

- 1 x 2 man tent
- 1 x 14ft marquee (with 4 side panels)
- 1 x ground sheet
- 2 x Inflatable Sofa Beds
- 1 x Blanket
- 1 x Sleeping Bag
- 1 x Duck Feather Pillow
- 1 x 100" projector screen and stand
- 1 x Pico HD Projector and Sound System
- 2 x Folding Tables
- 1 x iPad and Various Chargers
- 1 x Cobb outdoor cooker (and fuel blocks) – which doubles up as an excellent heater.
- Many Kitchen/Cooking Accessories (real ones not plastic)
- Food
- Wine
- .....and a folding electric e-scooter with a 22mile range

*This is adventure flying in style*



.....You can in a P&M Quik Flexwing



## The Flying For Freedom Project

Formed in 2010, the Flying for Freedom (FFF) project teaches wounded, injured and sick veterans to fly ultralight aircraft. Supported by The Royal Foundation of the Duke and Duchess of Cambridge and Prince Harry, via their Endeavour Fund, FFF is a self-sustaining project that provides a post-injury focus, support for post-traumatic stress and provides employment opportunities. Run for and by wounded and injured veterans, FFF has become a national flying club for veterans and a chain of local flying schools. Wounded and injured flying instructors teach wounded and injured pilots to fly...Replacing lost and broken limbs with wings.

In June FFF pilots completed a Round Britain Expedition, flying the UK coastline in just 9 days. (It was planned to take 20 days, but the pilots exceeded all expectations). The adventure was so successful that the Endeavour fund has requested that it takes place for the next 3 years

The route included military airfields not normally accessible to private aircraft. These included RAF Scampton, Lincs, home of the Red Arrows, and RAF Brize Norton, the point of repatriation for wounded and fallen UK service personnel. The final day saw the microlights fly over Headley Court rehabilitation centre in Surrey and Help for Heroes Tedworth House, Tidworth, Wiltshire. The next adventure will be Antarctica in 2016





## Quik GTR -The Ultimate All-Rounder

The Quik GTR is a development from the world record beating QuikR with a larger strutted wing of 13sqm and the first wing to introduce STARS system which is a unique stability and roll mechanism that automatically adjusts the washout rods and leading edge tension in flight for optimum roll and trim authority. Developed from the popular GT450 wing, the Quik GTR was the first trike to incorporate under surface vents enabling it to be flown with or without wing tips due to the effective use of under surface venting. This enables faster roll handling and easier ground handling in stronger winds.

The GTR is the ultimate trike for all round performance from good precise slow speed handling to fast high speed cruise and comes with the Tundra Explorer wheels and tyres as standard.

### Specification

Max Straight & Level Speed: 100mph

Stall Speed: 39mph

Cruise Speed: 55 – 90 mph

Climb Rate: 1000 ft/min

Typical Empty Weight: 235kg

Max speed VNE: 120mph

Tank Capacity: 65 litres

Max All Up Weight: 450kg

Overall Length: 4.15m

Overall Height: 2.96m

Wing Span: 9.26m

Wing Area: 13 sqm



### Basic Aircraft Specification Standard Features

Analogue Instruments, including ASI, Altimeter, VSI, Compass, Aviasport Tacho, VDO Oil Temperature, VDO Oil Pressure, VDO CHT, VDO Fuel Gauge, Trim Indicator, Battery State Monitor. Explorer Tundra Wheels & Tyres, Electric Trim System, Electric Starter, Engine Covers, Twin Exhaust System, Rigging Gas Strut, 65 Litre Fuel Tank. Aerial. Trike Cover, Prop Cover, Cockpit Bag, Wing Bags and Pads. **UK aircraft registration not included.**

See us at the Flying Show at Telford on 28th - 29th November 2015



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