HUFF

OzHPV inc.

July-August 2003 - Volume 6 - Issue 4

From the Editor

It's all seems a bit quiet in the Aus HPV front at them moment - is it just me or has winter dampened the enthusiasm?

On the weekend we had a bit of drama with my commercially made delta rowcycle recumbent trike. Riding together in downtown Devonport was fine till my friend picked up speed on a hill and rolled the machine. Steering involves leaning your body into the turn and as the hand cranks move back and forward there isn't a lot to stabilise yourself. He got into a bit of an ever increasing weave and just couldn't hold the thing together in the end.

Maybe it's the way we live/ride here in Tas but this is the first accident I've seen on a recumbent - it didn't result in anything more than some road rash though. Many find this trike fairly easy to ride (incl the crash victim) but I guess he just took it a bit too far. I can't help thinking you can't beat the tadpole design for stability and the familiarity of handlebars.

Timothy Smith - **tstrike@ihpva.org**

Coming Events

Sydney Recumbent Riders

http://sunsite.anu.edu.au/community/ozhpv/srriders.htm

August 17th: Ride and demo day. Contact **Tony_Jack@wsahs.nsw.gov.au** or **srr_ozhpv@yahoo.com.au**

HPV-friendly AUDAX event

Sunday 2nd November 2003. 50/100/200km available. 99% on the world-famous Murray to the Mountains Rail Trail - Start and finish at Beechworth, Vic, sealed surface, no traffic, facilities. The ideal way to get fit for summer benting! Contact Mick Webster Phone 0357 28142 - **websterm@netc.net.au**

Testing Your Resistance to the Ether

There has been a growing interest in faired recumbents lately in OzHPV. Whatever stage of aerodynamic refinement you are planning it would be nice to know if it works and how well it works. Generally we guess, get carried away by our own enthusiasm for a wacky concept and convince ourselves that we went faster for less energy.

I decided to build a “run-down” tester to accurately measure aerodynamic performance of an HPV at all speeds.

Run-Down Testing

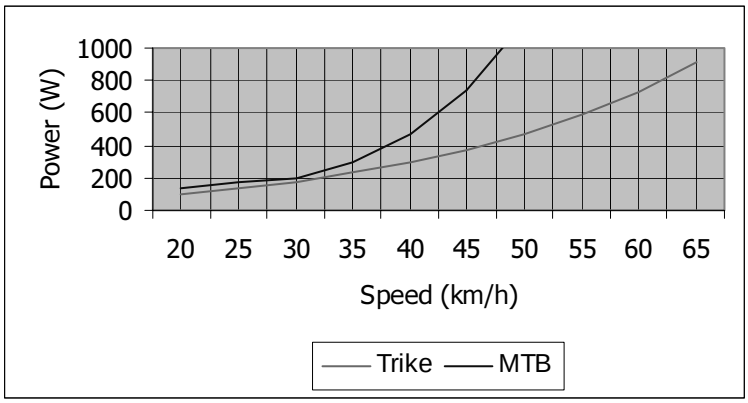
The idea behind this form of test is to accelerate the bike by any means available (generally a hill) to crazy speed, then coast on level ground until the bike stops or you fall off. Finding suitable flat, straight ground with a nice lead in hill can be difficult. The test is quite sensitive to a slope on the flat bit but if you just want to run comparisons it doesn’t really matter. A calm day is a must, generally mornings are good. A small box of electronics containing a micro-controller records the time the wheel takes for every revolution throughout the whole process and so knows your bike speed every metre or two of the test. From the change in speed one can calculate deceleration and hence drag (aero+rolling drag). So you get a profile of the HPVs resistance to motion at all speeds. The electronics cost about $50.

In this issue

Head Up Feet First is the Newsletter of OzHPV Incorporated. The ever developing Web site can be found at http://sunsite.anu.edu.au/community/ozhpv/index.htm. If you want to contact OzHPV by mail the address is OzHPV Inc, P.O. Box 3, Berowra Waters NSW 2083

How the Recorder Works

The idea is that you carry a small battery powered electronic "flight recorder" on the bike through the tests and download data into a computer to crunch all the numbers after your run. Initially I used my speedo pickup as a sensor but found the results too erratic. I now use a proper magnetic gear tooth sensor and a large bolt mounted on the spokes (see picture on front page). I built a little micro controller based gizmo to record the time intervals in its memory. It has a timer resolution of 0.000006 seconds which is about the accuracy you need for high speeds and it can record up to 5km of testing for those really long hills. Finally, it needs to have a button or software command to upload the data to the PC when you're finished riding.



Running a Test

I use a thermometer to measure the ambient air temperature and record the air pressure and relative humidity from the met bureau or newspaper. You will also need to know the combined weight of you, your HPV and the recorder as run in the test.

The recorder is strapped on the bike using velcro. Grovel up to the top of your favourite hill. Power up the recorder and smoke on down until you get to the flat bit. Stop all forms of energy input from the start of the flat bit and assume your aerodynamic pose of choice. Coast till your speed has abated to about 20km/h then head back to base and load up the recordings to the waiting PC. Oh yes, you need a computer standing by. Try not to shake when using the mouse.

Processing the Recordings

I wrote an Excel program to load the numbers from the recorder into a spreadsheet, do the relevant processing and draw a picture of the power vs speed. The program compensates for air temperature, air pressure, humidity, vehicle mass and wheel diameter. At this point you have a choice:

* Hail a toast to your creative bike genius.

* Call your nerd friend to fix my unreliable program.

* Grovel back up to the top of said hill for another test. (most likely)

Interpreting the Results

Depending on how your microcontroller works, there will likely be some variability in your measured intervals. I used a moving average to filter the worst of it. While it is possible to fit a (cubic) curve to your drag data and deduce an overall drag area (CdA) coefficient, it is pretty meaningless because your drag changes dramatically with the flow regimes present at various speeds. It is much better just to know the resistance and power required to propel yourself at any speed and from this identify the effects of any changes you might make at various speeds.

It is possible (but not good science) to extrapolate rolling resistance and drag coefficients from the power at low and high speeds respectively. Ford used to measure rolling resistance by enclosing a car in a big box that scraped along the ground. That box in turn towed the test car and the rolling resistance could thus be isolated. A large dog kennel might by suitable for a HPV if you can stand the smell and explain it to the policeman.

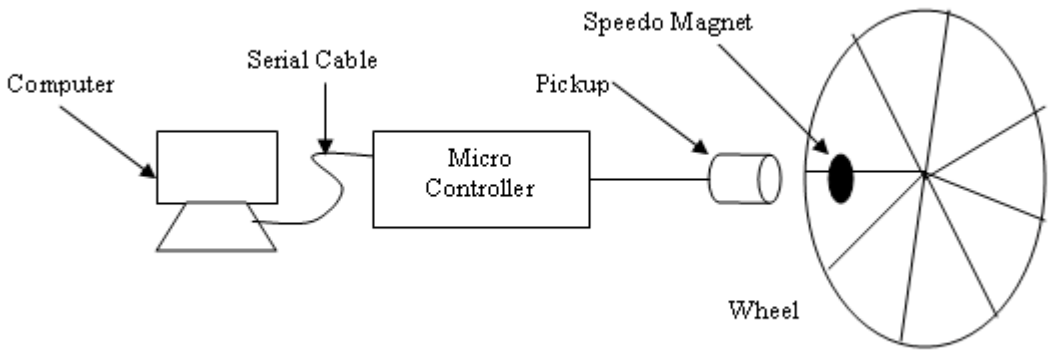
Anyway, I tested two vehicles:

Midnight Special race trike – using 3xIRC roadlites @ 75psi

Mountain bike – 2 x knobby tyres @75 psi

The graphs compare to power required to propel each vehicle at the given speeds (do I need to point out which is which?)

From the numbers I magically deduced some dubious estimates of CdA (Drag coefficient x Area product) and Rolling resistance.



The mountain bike has old hubs and knobbies which may explain the difference but I suspect that the test is not really sensitive enough to tell. The trike CdA seemed to settle at 0.25 as speed increased whereas the MTB CdA increased from 0.54 (speeds up to 30km/h) to around 0.9 at top speed. I think my floppy jacket had something to do with it (tucked up on my trike)

	Cd.A	Rolling Resistance
Midnight Special race trike	0.25 m^2	80W
Mountain bike with slicks	0.54 m^2	100W

The caveat for top speed designers is to remember that developing 500W to propel your creation at 100km/h is one thing, accelerating it to that point requires additional power. Damn. Also beware of extrapolating to higher speeds from these graphs as Cd does change with speed.

Things to try

1. Strap on 20kg of something and see if it adds to total resistance. With lots of tests at various weights one might be able to better extrapolate rolling resistance under normal riding.

2. Test your otherwise useless aero belly and satisfy yourself that beer drinking is indeed good for your speed.

3. Do tailboxes really work? What about wheel covers? Shaving Legs? Plugging nostrils?

4. Measure your acceleration from a standing start in various gears.

5. Confuse the recorder by getting some air over a speedhump.

Anyone with comments, queries or wanting to try out their bikes with my recorder can contact me.

Mike Dennis
Mike.Dennis@anu.edu.au
Ph 02 6255 7554 (h)

2003 Master's Games

These games allow men & women over 30 to compete against others their own age in a chosen sport and "sports" range from Darts to Dance to Dog Handling!

There have been discussions within OzHPV about having recumbents racing in the Master's games ever since OzHPV began back in 1997. The time for the games is rolling around again, and given enough enthusiasm we could be competing in the 2003 Master's Games in Canberra. We see this as a foot in the door thing: if we get to go in one games, it will be easier to participate in the next.

At the moment we are gathering a list of names of those willing to compete, and details such as your age and interest in particular races. If enough people want to take part, we go on with the next step. So far, there's been the most interest in the Time Trial & Road Race Events.

Participation in the games is not cheap: its $88 to compete in any events in the games plus $20 per cycling race and an additional $22 if a "day rider's licence" is needed.

Brief descriptions of races are as follows:

Criterium: Laps of a 1km course, greatest distance covered in a given time wins, Sunday 2/11/03

Time Trial: Timed lap of a course of 20k or so, Wednesday 5/11/03

Road Race: Race over 30 - 60k, distances vary with age group, Friday, 7/11/03

Full details are at the master's games website, **http://www.amg2003.com**

If you're interested in attending please contact Steve Nurse, Melbourne, (03) 94818290, **cesnur@austarmetro.com.au** or Glenn Druery, Sydney, **weec@bigpond.com**

OzHPV - Flag or Pennant

I've been an OzHPV member for a couple of years now and have finally got the first of 3 Greenspeed based touring Trikes on the road. I'm looking for a brightly coloured (preferably reflective for night use) flag or pennant to fly behind the trike. I thought that advertising/promoting OzHPV would be a great idea.

I've sent 2 messages to the mailing list and only received one reply (Loyd from Albury) who wrote: "Could we send in ideas or designs for best overall, and maybe a prize for the best.....Lately I've been using a eureka flag and a flouro yellow for light and dark conditions"

But the idea doesn't seem to have taken off - is OzHPV interested in the idea..?? After all, most recumbents would fly a flag wouldn't they....I certainly would like to promote the Association in this way if possible.

Robert Duncan - Adelaide

Are we interested in the following idea? It would need to be fluro and light (yellow/orange) and people would need to be able to read what was on it. Mostly they are triangular and hang down in a way such that you would not be able to decipher any message/logo.

Please reply ASAP with any comment.

Jeannie Davidson - Secretary OzHpv Inc.
jdavo21@hotmail.com

Viva La Bent – Confessions of a Convert

Confession 2

It was a bit awkward and time consuming to assemble and separate my newly built prototype tandem recumbent on our weekly rides. The bent was also very heavy, as it was built from 40x80x2thk tube. The new improved tandem is identical to the prototype I have described in my first confession, but I have decided to use 11/2" dia. chromoly tube even though it costs $60/m. I have redesigned the frame layout to be more aesthetic in appearance. I have used one S&S coupling for connection on the bottom tube and sleeve type connection on the top one upon advice from very helpful Greenspeed R&D man Paul Sims. He also welded the frame and gave me further hints about rear shock absorber mountings etc. The front forks are recycled chromoly ones from 26" bike and cut to suit 20" wheel. The rear forks are also from chromoly ex-26" bike but left intact except for the vertical stays that I have bent and welded together for strength to withstand my partner Jana's weight.

As it is a well known fact to many builders of recumbents, the seats are always a tricky business. This time I have used already bent ex-garden chair 1" dia. steel tubing for the seat and the ex-backpack aluminium frame for the back rest with the trampoline fabric and the two belts on each side, so the seat unfolds for storage. Like on the prototype tandem, I have recycled as many parts as possible. But this time I have used better 2nd hand components acquired from Darren Jensen the owner of Bicycle Recycle shop. His shop is another gold mine for used parts and Darren is one of the best customer relations men in small business I have ever encountered. I got bottom bracket cassettes and 7 speed derailleur cassettes with 34 teeth sprockets for up-hill climbing. The handle bar stems are aluminium ex-scooter extendable stems with aluminium handlebars. I have made swivel joints with QRs for ease of folding the whole bike. Initially, I installed a Cane Creek air rear shock, but on one weekend ride in Castlemaine it just lost air under Jana's weight. I was advised by the manufacturer that the shock is not designed for a tandem, so I had to change it for a spring type shock.

I had difficulty finding a speedometer with a long cable from amongst a pile of used speedos at Darren's shop. Someone told me that extending the cable will affect the computer functions. It was not the case as after resoldering a longer cable my used speedo worked perfectly. The tandem wheelbase is 1300, it weights in total 26kg and the seat height is 650 so it makes it visible on the road. The total cost is $1400, much more than the tandem prototype but it is much lighter and better in construction. We enjoy riding it so much that we look forward to weekly rides in anticipation. The evenings are dedicated to building FWD SWB folder bents. But this is going to be another confession.

Robert Waryszak, Email**: Robert.Waryszak@vu.edu.au**

World Solar Challenge

Ceduna to Adelaide

October 19th - 26th 2003

The WSCC is advertised in the Bicycle SA web page - **http://www.bikesa.asn.au** The usual information is contained on the web page - race information, regulations and technical information.

The events are amazing adventures and have to be experienced at least once in your life.

To compete successfully (which does not necessarily mean winning) one must be very organized. My team - ***Southern Alliance*** - won the 1999 WSCC from Alice Springs to Adelaide, which fielded 22 teams from 9 countries. The win was quite convincing - of the 7 days racing we came 1st on six of the days and 2nd to the Swiss on Day 6 from Port Augusta to Clare.

Southern Alliance Race History:

Sunrace 1997	2nd
AIPP 1997	1st Open HPV Class
AIPP 1998	1st Hybrid 24hr Endurance Race Section
RACV 1998	1st HPV 24hr Endurance Race Section
Solar Boats 1999	3rd International Class
WSCC 1999	1st Outright

Some Tips for Getting Good Results:

1. Plan - detailed planning is as important as building the vehicle.

2. Team - get the team structure organised early, avoid overlapping duties.

3. Vehicle design - unless you have a lot of time use off-the-shelf components.

4. Training - a bicycle rider needs about 6 weeks to "dial" in their muscles to suit recumbents. We trained solidly for 3 months, averaging 200km per week before the race.

5. Diet - during the race diet is very important, there is plenty of information/books especially written for triathletes on the subject with is relevant to providing the best fuel in versus output.

6. Race Strategy - select your riders who can adapt to certain conditions e.g. hill climbing sprinting and endurance. Study the topographical maps of the terrain carefully. Races have been won and lost with pit stops. Support teams play a major role in smooth rider changeovers.

7. Communication - don't leave people in the dark; everybody has got to know what is going on so that preparations are efficient. Regular team newsletters and meetings are very necessary.

8. Reliability - the best team can fail because of unreliable components. Lots of testing is a critical factor for success.

9. The Race - whilst competing is a major reason for attending the WSCC, you are ambassadors for your team and country. Good sportsmanship promotes good will among the competitors.

Don Elliott - Team Manager - Southern Alliance - Designer - Reflex Fairings. Email: **dhe@dhenterprises.com.au**

OzHPV Recumbent Rally

The OzHPV Canberra Mob are pleased to advise that they are organising an OzHPV Recumbent Rally in Canberra on 17, 18 & 19th October 2003.

The weekend will include various rides and activities aimed at all levels of fitness and interest. There will be long rides, fast rides, sightseeing rides, come and try rides, bakery rides, night rides, you name it....

As well as rides, there will be workshops on aspects like frame design, carbon fibre and corflute construction methods. It is hoped that some of the major bent builders and suppliers will be able to come along and display their wares.

A visit to the Canberra Bike Museum warehouse is a possibility also. There is a variety of accommodation available in Canberra ranging from camping to Youth Hostel to Hotels. It is hoped that the OzHPV AGM for 2003 will be held over the weekend.

The dates were picked to fit in with other major events taking place in Canberra such as Masters Games, World Cup Rugby and The Canberra Festival of Cycling.

The dates do clash with Bicycle Victoria's Around The Bay Ride, but Tuff! The Rally will be more fun anyway.

More information will be circulated as the program takes shape.

Lock the dates in now though.

Peter Heal - **heal@cyberone.com.au**

For Sale

* Top of the line Logo VFT 16\20 for sale travelled less than 400km, S&S Couplers for easy packing, Rack, Sclumph Speed Drive, Cateye Computer, Rechargeable Smart frontlights, rear cateye lights, dual mirrors, Ultegra bar end and derailleur, hydraulic disc brakes. Reflective Scwhalbe Marathon front tyres, Vredstein rear tyre, Black seat with Silver pearl frame. Would suit someone up to 5"10. I'm selling it as my husband and I have decided to get a Logo Tandem. Email for some more pics **cem@iinet.net.au** $4250 includes shipping to anywhere in Australia unless you are in Perth metro then I can drop it off, will also ship overseas.

* I have decided to sell ye olde steele Flying Furniture recumbent racer as seen racing and sometimes even winning at a few previous OzHPV Challenges - priced to sell at $1400 with adjustable boom and seat length custom fitted/ adjusted to you. A 451mm front wheel and 622mm (700c) rear wheel are currently fitted to this bike but you can also fit the 406 and 559mm combination with fatter tyres for general street / road use. If you supply your own wheels (either 451/622mm or 406/559mm) the bike is only $1100. A custom made corflute tail fairing is included. Wide range gearing can be fitted if necessary too. It is still a very fast and competitive recumbent racer!!
Ian Humphries - **ian@flyingfurniture.com.au**

* MR Components Swift. Touring Model. Excellent condition. $1700. Updating to new fully suspended model. Contact Joe Astbury: **joea@vicnet.net.au**

* I have several HPV's for sale, plus the ingredients for several more. Bikes designed & made by me.

1. "**Bike Chameleon Tandem**" (See photo of upright tandem at **http://home.vicnet.net.au/~vichpv/Rides/Rides.html**)

This is a modular bike currently set up as a "steers from behind tandem" with the smaller rider seated at the front where they can see what's going on. Suit adult It is easy to convert the bike from its current form to a load carrying bike and I am selling a large (1100 X 550 X 300mm) box with the bike. The bike converts to a single bike and can be fitted up as a recumbent. Last year Struan Little & rode it as a recumbent tandem in the 210km "Round the bay" in a day ride. Rear Suspension. Velocity aero rims, Shimano 7 speed 11-34 cluster, Shimano V brakes, Custom removable rear rack, $1100 as is. See also **http://members.austarmetro.com.au/~cesnur/** , click on bike chameleon, bike chameleon 2.

2. **Folding tandem**. See photos down the bottom of **http:// members.austarmetro.com.au/%7ecesnur/p003/**

This is another steers from behind tandem, very good for an adult and 6 - 10 year old child. As a single bike it has lots of attitude and can easily be ridden no hands. $200 as is. One word review by Ewan Nurse, age 12: "fun".
Parts.
1. Wheels & Tyres, Suit Raleigh 20, includes SA 3 speed AW hub. $30.00.
2. Malvern Star folding bike frames, make yourself a good folding bike or the start of an hpv project.
$20.00 each.

Stephen Nurse - Ph: 61 03 9481 8290 - email: **cesnur@austarmetro.com.au**

* Recumbent tandem bike as described in the previous issue of HUFF in the 'Viva la bent' article. It separates in two and fits neatly in the car boot. Independent front and rear drives with gears and with very comfortable seats. $1250 ONO. Robert W. Phone: 03-95781539. e-mail: **robert.waryszak@vu.edu.au**

* Recumbent Trike - Designed and built by Graham Steele in Townsville, September 2001. Total weight approx. 25 kg. Aluminium frame, 21 speed, Shimano Mega-Range shifter, alloy v-brakes, 26" rear wheel, 3-piece alloy cranks, rack space for two pairs of pannier bags. Nearly all parts can be bought in an average bike shop. Well used but well maintained – regularly serviced. Backrest straps adjustable for different leg lengths. Reason for selling: 2-wheeler is more suitable for the type of riding I do. Asking $900. Contact Karen Tutt in Townsville on (07)4779 1378 / 0407 124 084 - Email: **tutto71@hotmail.com**

Maryborough Technology Challenge

I'm the webmaster for the Maryborough Technology Challenge (Qld) and want to let you know that the MTC is alive and well. It was held for the first time last year and was a great success. A free interactive CD-ROM featuring photos, videos and entry info is available now. **http://www.mtcqld.com.au**

The contact details for the event are:
Ross Humphries
Industrial Technology Dept, Maryborough State High School, Kent Street Maryborough QLD 4650, Phone: 07 4120 9333, **ross.humphries@maryboroshs.qld.edu.au**

Greenspeed tests new Lighting System

I guess that most of you are aware that in Europe the legal dynamo lighting standard for bikes has been 6 volts and 3 watts. Thus lighting systems in Europe have been restricted to only 3 watts output.

Well recently a new standard has been approved which allows 12 volts and 6 watts, and last week we got our 1st shipment of 12 volt systems, designed for this new standard :-)

This is the Busch & Muller 12 volt system, comprising the S12, 12 volt, 6 watt dynamo, the Oval Plus 12 volt, 5 watt headlight, and the 12 volt two LED Toplight Plus tail light.

For more details please see :- **http://www.bumm.de**

I've used a large number of different lighting systems on my trikes, and although the battery systems offer more light than the dynamo systems, (typically 10 or 20 watts) I find I can never remember to charge the rotten things up! I also find that after a time the batteries deteriorate, and will not hold charge, which led to me having a nasty accident, one dark night, hundreds of miles from home....

So I've been using the LightSPIN dynamo with a B&M headlight and 3 watt bulb, for some time. I found it was plenty to be legal at night, but not really enough for any speed in the dark. Plus because the LightSPINs have a tendency to stay on, I've found it a nuisance to tie it off the tyre, and put it back on when I want to use it.

So I've now been busy testing the new system against the other dynamos, and have fitted one to the GS trike I've been currently riding for my daily transport. These are the results I got testing the systems on our tyre testing rig. The dynamos were carefully lined up on a Comp Pool tyre, and the power inputs measured with an accurate multimeter. One of the most interesting things was the drag from the dynamos when there was no lighting load on them, as I found this was an indication of their efficiency. In other words, the freer the dynamo felt when you span the roller with the your fingers, the more efficient it was at generating electricity.

B&M "6" Dynamo

No load drag: 14 watts
3 w H/L drag: 14 watts
H/L watts: 3.88
E: 28%

B&M "S6"

No load drag: 5.5 watts
3 w H/L drag: 9.5 watts
H/L watts: 3.51
E: 37%

B&M "S12"

No load drag: 4 watts
5 w H/L drag: 12 watts
H/L watts: 5.89
E: 49%

LightSPIN

No load drag: 2 watts
3 w H/L drag: 6 watts
H/L watts: 3.17
E: 51%
4 w H/L drag: 7.5 watts
H/L watts: 4.11
E: 55%

It is interesting to note that the tighter voltage regulation on the LightSPIN reduces the "3 w" output compared to the "6" or even the "S6". However, unlike the "6" or the "S6" it will provide enough power to run a 4 watt bulb, giving slightly more light on the road.

I noticed that the B&M 12 volt head light has a new reflector, giving a wider beam pattern than the 3 watt headlight. This was most noticeable on the road at night, where I found the amount of light on the road was a BIG improvement on the 3 watt system. In fact the light was so good that I don't think I will bother with the battery systems any more.

The drag is less than the cheaper B&M "6" dynamo of which we sell quite a number, and I was not able to detect it in riding on the road.

I also found the standby capacitor LED back up in the headlight better than I expected, in that it provided enough light to get through the gate at home, and to be able to lock my trike up in the dark under the car port. Both the head light and the tail light run for about 5 minutes on the capacitors, after the dynamo stops running.

The only drawback I could find with the new system was the price of the S12 was more than twice that of the S6. Never the less, for me the improvement in performance is more than

worthwhile, so we are now offering these systems on our trikes, and the price will be $500 AUD for the complete system. Component prices are on our 10 page parts price list - available by email, fax or post.

Ian Sims, Greenspeed, 69 Mountain Gate Drive, Ferntree Gully, VIC 3156 Phone +61 3 9758 5541
Email **ian@greenspeed.com.au**
Web pages **http://www.greenspeed.com.au**

Greenspeed Suspension Trike

We have had a rear suspension option on our trikes for many years.

However I have not advertised it, as I don't find I need it for my own use. I've ridden with other trike riders who have been riding full suspension trikes of other makes, and noticed them slowing for bumps like railways crossings, which I normally take at full speed. In fact I find that our elastic seat cord, Comp Pool tyres, and CroMo frame seem to give more than adequate road shock absorption for all the roads that I ride, including potholed dirt roads.

On the other hand, I understand that some riders have special requirements, and for these riders, we have made a large number of special trikes. So for those who need a softer ride than our standard trikes.

Ian Sims, Greenspeed Email **ian@greenspeed.com.au**

http://www.greenspeed.com.au

Here are some pictures of the rear suspension GTO-E model. Note this is our latest GTO-E model with the new Ergo seats, and anti brake steer steering. Unlike some RS systems, the luggage is also suspended. Other options on this trike are the disc brakes, lightweight wheels, and 12 volt B&M lighting system.

If this Newsletter cannot be delivered please return to:
OzHPV Inc
P.O. Box 3, Berowra Waters NSW 2083