

Recumbent Cyclist

NEWS

RCN #16 July-Aug '93



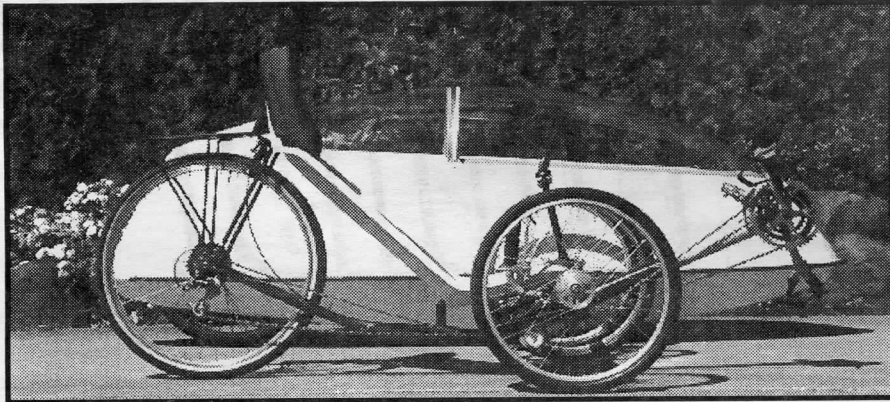
© Jon Schwartz

Turn the page to find out why the Trice-Man is smiling!

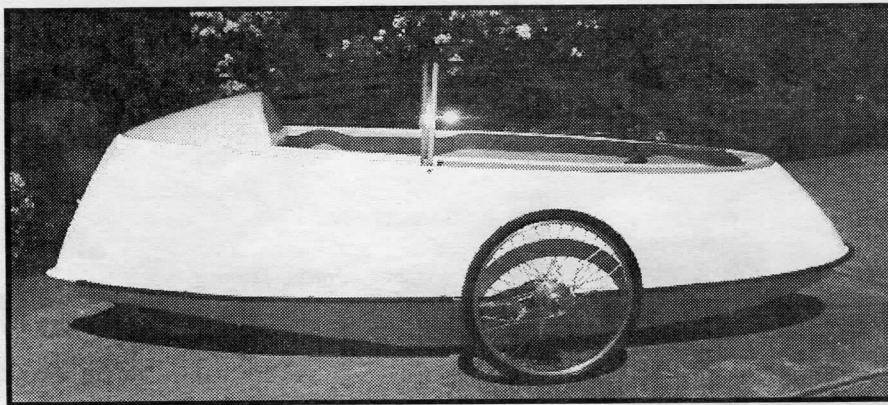
Inside:

- **News flash! Gardner Martin/Gold Rush comes out of Retirement**
 - Long awaited Trice review
 - Interview with Peter Ross

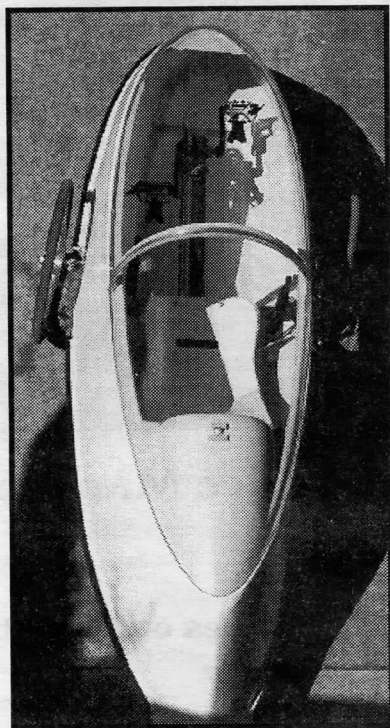
THE NEW 1994 AEROTRICE



AeroTrice and unfaired Trice



The Trice with Aerocoupe body by Mark Murphy



The inside of the Blue Sky Design Aerocoupe bodied Trice

Trice Trike by: Eco Cycles/Ken Trueba
Body by: Mark Murphy/Blue Sky Design
Special thanks to Kurt Jensen at Eugene
Bicycle Works for the Photo's.

THE TRICE RECUMBENT TRIKE

Recumbent trike tests are more difficult for us and they take longer to do. This particular test has now taken three and a half years. I first met Ken Trueba in the Portland Meadows Raceway parking lot during the spring of 1990. It was then that I took my first ride on the Trice. Like many other recumbent enthusiasts, I was captivated by Richard Ballantine's portrayal and elevation to legendary status of the Speedy Windcheetah trike. The idea of a fully streamlined recumbent tricycle is the dream of many. For most enthusiasts this remains a dream, however, this could soon change. Eco Cycle will soon offer Aerocoupe bodies for the Trice, the Speedy is now available in the USA and other trike manufacturers are coming on line with new vehicles and weather-proof offerings. It is most definitely the dawn of an exciting new era for recumbent trike enthusiasts.



Ken hard cornering the original U.K. built Trice
(Staff Photo)

HARD CORNERING DESIGN

Trikes are the most difficult recumbent vehicles to design because of the automobile-like front end & steering dynamics. A powerful side-to-side stress is caused from cornering a recumbent trike. With three wheels on the ground, something has to give, either the frame or wheels. This side-flex is not something bicycle parts were designed to do, thus recumbent trike parts should be over-built. This is why trikes heavier and can be more expensive. You never really understand how powerful the side pressure is on a trike until you experience it yourself. You can feel the wheels flex and see the tires almost roll out from under the rim during hard cornering. This is an odd sensation and a guaranteed new revelation for recumbent enthusiasts.

The goal of Trice designer, Peter Ross, was a trike that was

affordable, user serviceable and use off-the-shelf bicycle parts when possible. Whether it be in componentry, drive-system or frame design, the Trice uses the simplest solutions possible. The off-the-shelf parts idea makes repairs possible without having to mail-order across the world for a replacement part. Some replacement parts could be found in a large hardware store if absolutely necessary.

STEERING

The drawback to the Trice' relatively simple steering system is an over abundance of nuts and bolts on the front end and steering linkage. This is the difference between using many off-the-shelf type parts to create a sub-system, compared to more costly trikes that custom fabricate one piece to achieve a similar function. A Trice owner needs to pay strict attention to these nuts and bolts. The Trice manual recommends using lock-tight and checking the front end frequently. Both front wheel assemblies pivot on spherical bearings (similar to those found on underseat steering linkage, but much larger). Twin aluminum rods connect the front hub axle assemblies to the handlebars that pivot in bearings mounted on the main frame under the seat. A custom stem holds the handlebars in place. The Trice bars are wide "U" shaped with the end extensions facing upwards and forward. It is possible to custom position the bars to suit the rider.

I found the Trice to have fairly heavy steering, the "Tour" more so than the "Speed." Part of this could be the handlebar & stem that kept coming loose on our test ride. The handlebar stem has been a weak point on previous models, but Ken Trueba has solved the problem with a new stem connection on the '93 Trice. Ken has a steering geometry upgrade planned that should give the steering a lighter feel. The Trice front wheels occasionally scrub your arms when turning sharp. The 20" wheels are very close to you. I cannot imagine who would order the (now discontinued) narrow track version.

FRAMESET

The Trice frameset is built in Corvallis, Oregon. The frame is TIG welded and brazed. The metal work is nicely done, with the US version a noticeable improvement over the first UK Trice that we viewed in the Summer of 1990. The frames are powdercoated and come in red, white, blue, black and green (custom colors also available). The seat is fiberglass and connects to the main tube and seat supports to create triangulation. The seat supports are actually stays that bolt to the rear drop-outs and on top at the seat. The Trice uses bicycle chain-stays that connect to the over-sized main tube. Even with the stays and seat support triangulation, we found the rear end of the trike to be on the flexible side. This makes for a comfortable ride, but you need to be constantly aware of your upper-body sway, which will make the Trice "wag" during hard pedaling. The Trice is built by Eco Cycle under license from Peter Ross/ Crystal Engineering in the UK. Ken Trueba is continually updating the design and has more upgrades planned.

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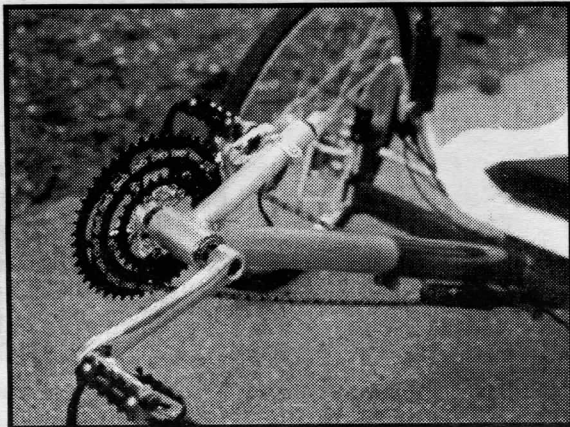
TRICE SEAT

I have always liked the Trice seat since the first time I sat in it. The light fiberglass bucket seat resembles that of a race car seat. The seat cushion is velcro-ed onto the base and up the back. It has a high back with a headrest built into the design, and a safety flag mount at the top. The headrest seems to be positioned to ride without a helmet (Oh No!). Leaning your head into the headrest, with bike helmet, is not quite as comfortable, but preferable to no headrest at all. Peter Ross has developed a sling/mesh seat for the UK version of the Trice, but retrofit is difficult. Ken Trueba says a sling seat is in the Trice' future.

DRIVE SYSTEM

The Trice includes familiar bicycle components offered on recumbents built & sold in North America. They are predominantly SunTour, currently the underdog component manufacturer. There is less glitz and "gruppo of the month" hype with SunTour components and we support them for their commitment to the small bike builder. SunTour components also become out-dated less often than other component brands. Our test Trice had an XCE rear derailleur, an XCM front matched with a SunTour X-1 28/38/48 triple crankset. The X-1 is all black and has aluminum arms with steel chainrings. The indexed drivetrain shifted nicely with SunTour bar-end shifters. The freewheel is a SunTour 13-32, creating a 23-96 gear inch range for the Tour and a 25-103 range for the Speed. I felt that the low gear could be even lower. This would be an easy upgrade by substituting a 24T. inner chainring for the stock 28T. (This is an upgrade that most recumbents could use.) The components all work well together. The XCE/ XCM are durable, yet affordable derailleurs. The SunTour bar-end shifters are time proven and work well. Eco Cycles offers a Shimano Hyperglide Deore XT upgraded Trice which is available for \$300 extra. Trice trikes can also be custom-spec'ed to suit the customer.

The chain rolls over dual idlers that are under the forward section of the seat. The idlers on the UK and previous US built Trice were poor. For '93, Eco Cycles has machined a cartridge sealed bearing roller-blade wheel for the (upper) drive chain. One of the old style idlers is fitted to the lower chain. For a few extra bucks, Eco Cycles will mount the cartridge sealed unit on both idlers. This is recommended.



The '93 aluminum pedal tube
(Staff Photo)

TRICE SPEC'S:

Overall vehicle height:	38-1/4"
Seat height (front of seat to ground):	11.5" + 1.5" foam pad.
Bottom bracket spindle height (from ground)	18-3/8"
Track width:	31"
Handlebar width:	17.5"
Weight, ready to ride:	42 lbs.
Wheelbase:	39"
Freewheel: SunTour	13-32
Derailleur-rear:	SunTour XCE
Derailleur-front:	SunTour XCM
Shifters:	SunTour Bar-Con (bar end)
Brakes-front:	Dual Sturmey Archer Elite Hub Drum
Brake-rear:	(optional) Dia Compe Side-Pull
Wheels-front:	20" X 1-3/8" (65 psi) or a 20" X 1-1/8" IRC (100psi)
Wheels-rear:	26" X 1.5" or a 700c

SPEED & TOUR

The Trice comes in two designs, the "Speed" and the "Tour." The Speed comes with a 700c rear wheel along with 20" X 1-1/8" front wheels with IRC Roadlite EX tires. The Tour comes with a 26" rear wheel with a 20" X 1-3/8" front tire. This front tire is a Chen Shin black side wall. The tire is a good choice for commuting and is inexpensive to replace. I most definitely prefer the narrow 20" x 1-1/8" IRC Roadlite EX tires. They may not wear as well, but they make the Trice steer easier and roll faster. Both models now come with the aluminum pedal tube (boom) and in the wide-track format.

WHEELS x THREE:

I would like to see the Trice wheels upgraded, not because they are of poor quality, but because trike wheels take so much abuse. The spokes and build quality of trike front wheels should be impeccable and done by a competent wheel builder.

BRAKING

If there is a sore-spot in my Trice test, braking was it. {It's more the TESTer(me) than the TESTee (Trice), as I had never set up dual drum brakes before.} The Trice comes with Sturmey Archer Elite alloy front drum brake hubs. The right side hub is modified and turned upside down. Even though these brakes were not designed to work this way, we see no reason why they should cause any problem. With the Trice, the problem comes in the brake adjustment and lack of a simplified dual brake adjuster. I could not get these dual brakes adjusted correctly. When I set up brakes, I like them tight and "full-on-power" -no detuned brakes for this crew. Well, that was my problem. The drum brakes are connected to one dual cable brake lever. I kept trying to set-up the brakes as "tight" as possible, but I could never get them adjusted to my satisfaction. Ken came over, loosened the brakes, did a three minute test, and had them working almost perfectly.

The drum brakes on the Trice offer excellent stopping power, however, the Trice has a unique tendency to "tail wheelie" when the brakes are applied hard. This is caused by a weight shift forward, that can unexpectedly lift the rear wheel off the ground. The "tail-wheelie" tendency could be a problem in real live panic-stops in traffic. Ken Trueba does mention the rear wheel's lifting tendency in the Trice owners manual.



Joe "Road-Warrior" Kochanowski "tail-wheelies" the Trice
(Staff Photo)

FAIRINGS/ ACCESSORIES

Most standard bicycle options will fit the Trice. Eco offers a few custom options such as the mirror/ accessory mount and the locking parking/ rear wheel brake. Also available are two fairing options. The first is the Root's in the Sky accessories (ala Counterpoint Presto). The Trice uses a custom version of the Root's nose cone and body stocking. In our long term testing with the Root's accessories (on a Presto), our test nose cone developed an occasional squeak when bumps were encountered.

BLUE SKIES AHEAD

The most exciting news to come out of Corvallis, Oregon this Summer is the alliance between Mark Murphy of Blue Sky Design and his ABS trike body kit. Ken Trueba picked up our test trike and drove it down to Mark's shop in Eugene Oregon, where the mounting kit was designed and the Trice was fitted for a body. By the time you read this, Ken will be cruising around Corvallis in a full-bodied Aero Trice. The retail price for the body kit and mounting hardware should be under \$1,000!

SPEED

Ah, the kind of world famous and sometimes notorious Recumbent Cyclist writers again attempt to judge recumbent speeds, but without the luxury of electronic timers, computers, graphs or flow-charts. Oh well, here goes nuth'in. In coast down and braking, the

Trice faired well. If the brakes are set up correctly and you learn to modulate the brakes carefully, the Trice will stop on a dime. The Trice is proven to be a fast HPV. Ken Trueba was able to speed the Trice to an honorable 35.5 mph in the 200 meter time trials at IHPSC in Yreka, California. In practical testing, I have found all unfaired trikes to take more energy to propel compared with their two wheel counterparts. This is due to the increased frontal area. During this test period, I was unable to ride the Trice with the Aerocoupe body. I am very interested to see what a full body does for trike speed.

TRICE CRITIQUE

I am sure that most of our criticisms of the Trice could be satisfied if the price were increased to the level of other "enthusiast recumbent trikes." If you want a low three-wheeler and are on a budget, the Trice is the ideal vehicle. We would like to see some of the systems upgraded, but understand that the conversion from off-the-shelf simplicity to custom fabricated does not come cheap. We have seen better designed trike front ends, steering systems and brakes/ adjusters, but never at this price. It really comes down to which trade-offs are more important to you.

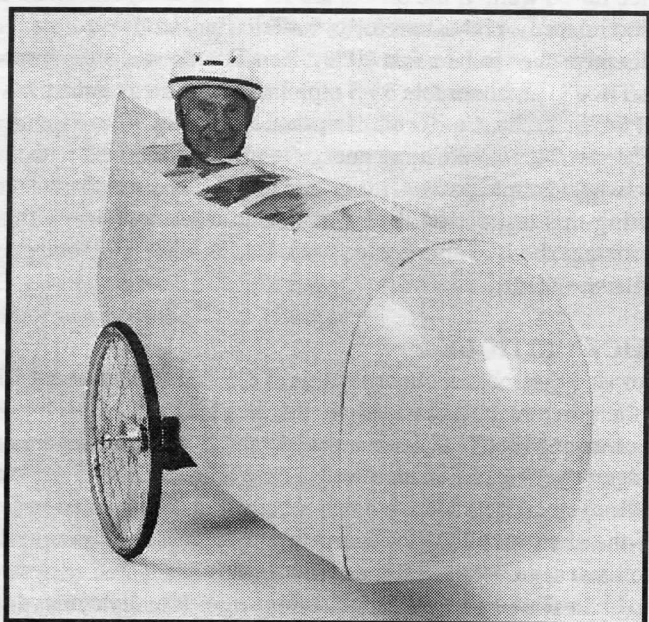
Our biggest criticism of the Trice was the way it is delivered and the stage of set up it arrives in. The Trice will ship UPS when stripped to the bare frame (plastic-bubble-wrapped without a box) and all of the components are shipped in a second package. This means a difficult assembly (compared to other recumbents in this price range) and a higher possibility of shipping damage. The cost for this is about \$60. When the Trice is shipped fully assembled by truck, which in our opinion, is the correct way it should be shipped, the freight charges can exceed \$200. When given the choice, most Trice customers have opted for the UPS shipping to save a few bucks.

Proper front end set up (including lock-tightening all nuts and bolts) along with adjusting the proper toe-in (another task we had difficulty with), and proper brake adjustment are tasks are better suited for an experienced dealer or better yet, the manufacturer. Most bicycle enthusiasts do not have the skills necessary to set one up properly, and why take chances with your \$1700+ recumbent trike. These skills are not exactly rocket science, but are better learned in person than guessing. Ideally, you could pick up your Trice in Corvallis, Oregon and have Ken set it up in your presence. The only problem is that once you visit Corvallis and ride your Trice here, you may not want to leave.

COMMUTE ON A TRICE?

If you ask recumbent enthusiasts their opinion on recumbent trikes, you will get a wide variety of answers. This can be a love or hate relationship, It's even worse than the SWB vs. LWB debate. Whether or not it is the right vehicle for you depends on your personal needs for a recumbent. The Trice handles wonderfully, it's like a racing go-cart. I haven't ridden anything quite like it before. The low stature and speedy-look of the Trice makes most test-riders want to tempt gravity, which is fine because this trike is extremely stable. Rolling it is nearly impossible. I won't say 100% impossible, because there is probably one airplane pilot or race car driver out there who will do it after I say it can't be done.

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Peter Ross on his faired U.K. version Trice
(Photo courtesy of Peter Ross)

Another benefit of this low & sleek design is there are no worries that a braking miscalculation, hitting a curb or uneven pavement may cause you to roll over. The vehicle is nearly as comfortable as reclining in your Lay-Z-Boy recliner and the idea of never

taking your feet out of the the clips/ pedals is every recumbent rider's dream.

Where will you ride a recumbent trike? The Trice is perfect for bike trails and parking lot racing, however, if I owned one, I'd better buy stock in IRC to get a lifetime supply of Roadlite EX tires. On the other hand, if I were commuting here in Kent, WA., I may be better off engaging in a game of Russian roulette. Your head, while riding a low trike is about bumper height to the oh-so-common four wheel drive trucks that rule our local roads. This could make the commute a frightening concern. Admittedly, my example is a bit extreme, but ask yourself if you can handle the stress of competing against cars for a share of the lane. I want to stress the importance of thinking about where you will ride your recumbent trike. An example where commuting on a trike works perfectly, is Eco Cycle owner, Ken Trueba's daily commute to work on his Trice. He has done this almost daily for more than three years. Ken lives and rides in the beautiful small town of Corvallis, Oregon. If you answer these questions successfully (you define successfully), the Trice is an champion choice for a practical and affordable recumbent tricycle.

Eco Cycles is the North American manufacturer for Trice Trikes, which are built in Corvallis, Oregon. Suggested retail prices are as follows: 1993 Trice "Speed" or "Tour" 21 speed trike is \$1795. through dealers, \$1695 + shipping direct from the manufacturer. Plans to build one Trike are available for \$100. For more information on the Trice, write: Eco Cycle, 5755 Fair Oaks Dr., Corvallis, OR 97330. Phone:#503-753-5178.

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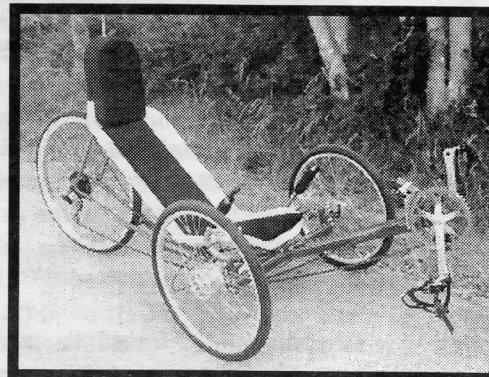
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AN INTERVIEW WITH PETER ROSS & KEN TRUEBA

Peter Ross (PR) is the Trice designer and lives in Cornwall, England. Ken Trueba (KT) became the US agent for Trice in 1990, and began US manufacturing of the Trice in 1991. Ken lives with his family in Corvallis, Oregon.

RCN: *What got you interested in recumbents?*

PR: We had a series of oil crises in the late 70's and early 80's, and on the last of these, petrol was not only very expensive, but almost unobtainable. I started to sketch out a design for a streamlined three wheeler when I saw a picture of the Vector taking part in the British HPV speed trials at Brighton. This trike had averaged 40 mph on UK public roads, and had a top speed of 59 mph. I realized that these HPV's were the way into cheap efficient transport.

The Trice was entered in the 1984 Hull, Canada HPV contest and did badly due to being completed too near the contest date. Back in the UK, I was beginning to realize that recumbent would never really take off if everyone had to build their own before they could ride one. Thus, it was that my next design was to productionize the Trice that had gone to Canada.

In 1985, I entered three pre-production Trice in the London to Brighton run, and they appeared at our BHPC (British Human Power) events. The reaction was favorable, so, in 1986, the first production Trice were offered for sale, with square tubing, 20" wheels all the way around and a weight of 45 lbs. I sent a questionnaire to all my inquirers and the message that came back was that they wanted something like Speedy, lighter with bigger wheels. Price did not appear to be important, so I redesigned the Trice to use round tubes, 700c rear wheel and narrow section front tires and sales surged ahead. The present Trice is similar to this model which we introduced in 1990.

KT: My initial interest in recumbents stemmed from my desire to develop a practical, all weather, pedal commuter. I wanted a machine that I could put a fairing on to keep the rider out of the weather. Since a bicycle is somewhat unstable with a fairing in cross winds, I reasoned that a three-wheeled vehicle with a low center of mass would be ideal. In my research, I found a chapter in Richard Ballentine's, *RICHARD'S BICYCLE BOOK*, on recumbents. He not only mentioned the Windcheetah, but had a lot of enthusiasm for it. The article also had references to several other recumbent manufacturers. The Trice had been improved since the Ballentine article and was available as a production machine. It has served me very well, is very stable, is great fun to ride and much more comfortable than a standard bicycle. I had a chance to ride it last winter in the snow. It was a lot of fun and quite predictable.

RCN: *You have mentioned that the seat is an integral part of the Trice frame. Is the lack of (steel-frame) triangulation an issue?*

PR: The frame is designed to take the rider's weight as a beam, with part of the weight going on to mid frame through the front seat mounting (two on the Trice), and the remainder (plus most of the pushing force on the seat back) going straight on to the rear axle through the seat stays. The seat frame contributes to the strength

of the Trice, where a twisting force is created on corners by the rear wheel trying to turn over relative to the front wheels. The seat does add to the torsional strength.

RCN: *Critics of your design say that the Trice lacks "Ackerman steering geometry?"*

PR: Herr Ackerman discovered a way of ensuring that the front two wheels of a vehicle would correctly follow the two different radii of a corner if the track rod ends were connected to the steered wheels at a point of a line drawn between the front wheel pivot point and the center of the rear wheel. This results in one steering arm on one wheel moving through an arc of a circle which results in relatively LESS sideways movement to the other.

Exactly the same effect can be produced by having a steering arm parallel with the center line of the vehicle and connecting it to a two part track rod via a central slave steering arm which connecting points are the same distance apart as Herr Ackerman calculated for the inward inclination of the OUTER steering arms. This is what the Trice has. If you do not believe me, just turn the wheels on full lock and measure the different wheel angles. The geometry is slightly complicated because the center "slave" arm on the Trice is longer than the steering arms to "gear up" the steering to give a good lock before the handlebars hit the side of the seat.

KT: We have a design on the drawing board that will improve the steering geometry. It should be workable within a year.

RCN: *Why is there no rear brake on the Trice?*

PR: We aimed to get one third of the weight on each wheel. In practice this has become about 25% rear and 37% front. This gives exceptionally stable cornering, being virtually impossible to turn over on a corner unless you hit a bump. It will slide before overturning. The down side is that when the powerful front drum brakes are applied there is a considerable weight transfer from the rear wheel, and if the rear brake is then applied the wheel would immediately lock and skid develops. Rear wheel locking is a notorious reason for vehicle instability, and it leads inevitably to a spin. It is much better to leave the braking to the front brakes and use the rear one for parking, and in the unlikely event of a front brake failure.

KT: We offer a Dia Compe side pull rear brake with a custom-machined brake handle that has a locking parking brake position. It is available as an option and works well for special needs, extra braking or for load carrying situations.

RCN: *Peter, you also build the "Ross" SWB. Which is faster?*

PR: The Ross is faster. A two wheeler will always be faster, everything else being equal.

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RCN: *We have noticed that some Trice riders experience "frame wagging." Can you comment on this?*

PR: This is due to the light frame twisting with side load induced by the rider, and exaggerated by the large rear wheel. The "solution" is to make the but with thicker gauge steer, reduce the size of the rear wheel or (my preference) learn to ride the Trice without moving the upper body from side to side whilst pedalling.

RCN: *What changes are you making for 1993?*

KT: The next change to the Trice is an aluminum pedal tube. It will be standard on all Trices. I have changed the idler to a custom machined inline skate wheel with bearings on the drive side. Our Trice is different from the UK version. We are continually updating the design and taking more and more of the design and fabrication in house.

RCN: *We noticed that under hard braking, the rear wheel of the Trice will lift off the ground. Can you comment?*

KT: You can go as fast as you dare as the Trice is quite stable and almost impossible to turn over unless you hit something. The brakes are quite powerful, so powerful that the rear wheel can rise resulting in a loss of control. It is wise to apply the brakes in a controlled manner. Practicing in a parking lot will give you a feeling for both braking and cornering ability.

RCN: *In brief, can you compare the Trice to other like vehicles.*

PR: TRICE vs. SPEEDY: Trice has been designed to use as many off the shelf bicycle components as possible, such as a standard

700c rear wheel on standard dropouts (contrast to Speedy offset rear wheel with special spindle and rear mech bracket.) The same remarks r.e. rim size and gearing (the Speedy uses a 24" rear wheel and a 17" Moulton fronts). As an ATB wheel may be fitted (to the Trice). Wider track gives more suitable cornering without learning. More comfortable seat. A more affordable price.

PR: TRICE vs. THEBIS: I have never ridden a Thebis, and the only one I have seen was the model entered for the 1984 Hull event. The Thebis designer seems to have set himself the task of designing a recumbent tricycle in the most difficult way possible.

The single front wheel normally steers, but on Thebis it is fixed. This means that it can easily be driven, but not on Thebis - the drive is to the back wheels. The bottom bracket is actually inside the front hub, a triumph of design for no apparent purpose. Rear wheel drive means either one or two wheel drive, the latter achieved on Thebis by two slipping clutches. Having rear wheel steering means the drive is further complicated by having to go through universal joints.

Rear wheel steering is inherently unstable, and to overcome this Thebis has a variable steering geometry which must be varied by the rider with speed. Small wonder that all this requires the use of magnesium to keep the weight down to an acceptable level.

EDITORS NOTE: Trike design and geometry is a complex matter. Some of the best information we have read on the subject is by Gaylord Hill, from his CycloPedia '92 HPV Catalog. \$1 from CycloPedia at Ph:#517-263-5803.



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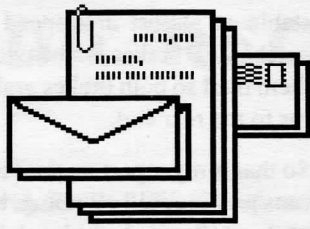
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The RECUMBENT MAIL-BOX



Dear Recumbent Cyclist,

The RCN#15 issue featuring ReBike is framed and proudly displayed on the ReBike ReWall of fame. The RCN is a world wide publication as we can testify. Numerous inquiries have been received from Europe, Asia, Africa, and So. Africa. When conscientious dealers and consumers ask for various ways to accessories ReBikes we refer them to RCN. The RCN is required reading for the ReMarkable ReCumbent riders who are ReSponsive to ReSearch ReFinement and ReAlism.

Your Ace Detectives did a resounding job. We are thankful ReGis' was not ReVealed until the debut in Vegas.

Warmest Regards,
Kathie Skewis
Ms. ReBike

Dear Robert,

Three things. First, here is my renewal, I love your magazine. For homebuilders like me the photos are an almost endless treasure of possibilities and daydreams.

Second, I think Kelvin Clark's comments in RCN#15, Editorial License, Support: Part 1 column were a bit off base, and perhaps because his business is to sell bikes, a bit self-serving. I don't think that buying recumbents is the only way to support the movement. The higher end bikes are out of my price range, and I have no interest in the cheap ones. I build my own, and I ride them - long distances. It's my hobby. My wife and I recently spent a month touring in New Zealand on our home builds. Almost daily we were stopped by people interested in the recumbents. We had similar experiences as we travelled across the USA and parts of Canada. We answer all questions, and tell people about the beautiful Tour Easy's, Opus' and Presto's. When I meet people around Puget Sound interested in recumbents, I refer them to Angle Lake Cycles. But, I also tell of the joys of building and touring on my own bikes. This is how I show my support.

Third, I want to tell anyone who may not know about Gaylord Hill at CycloPedia. Aside from being perhaps the ultimate source for recumbent parts, he's a willing resource of design facts, and a patient diagnostician. His simple explanation of castor angle is why my new bike now goes straight rather than making surprise U turns like it did the first time I brazed up the frame. Thanks Gaylord. Thanks for a terrific magazine!

Steve Sussman
Vashon Island, WA.

Steve, I think the way that you support "the movement" is fantastic, and I know you won't forget to mention RCN!

Dear Robert,

RCM gets better all the time. The ReBike review in #15 was the best review yet. Thank you for the list of specs. I love reading reviewers subjective riding impressions, but having to mark specs scattered through out an article with a yellow high-light pen or worse yet, having to scale dimensions off photo's and jot them in the margins drives techno-nerds like me to distraction. The sales figures, marketing strategies, and design history make the review priceless. The recumbent scene gossip and photo's of bikes I've never seen in HPV News keep me coming back.

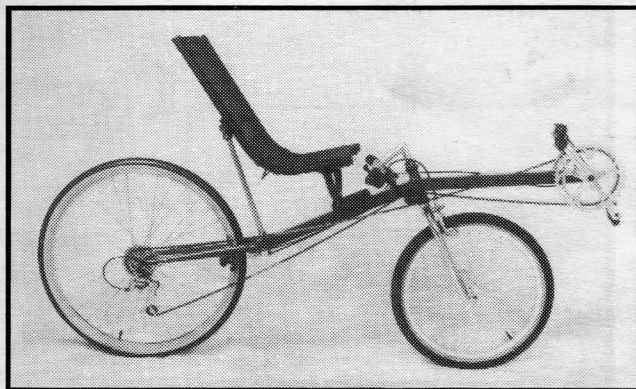
Thanks
Warren Berger

Dear Robert,

I enjoyed your last issue of the Recumbent Cyclist. As you know, I bought a new TRICE from Ken Trueba, down in Corvallis, Oregon, so I could commute to work on nice days. I have about a 13 mile ride each way, and some big hills.

▲ K . D . 4 ▲

- ▲ Open mesh seat for cool comfort
- ▲ Durable powder coat finish
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The Recumbent Cyclist

At 58 years of age I didn't feel I could make the hills and that long distance of 26 miles per day on my commute. So, I bought a Sachs 30cc gas motor/ wheel system made for a mountain bike and put it on the Trice. It was only then that I found out that Ken Trueba had done the same thing in his commute to Hewlett Packard down in Oregon. It also turns out that Peter Ross had put a Sachs motor unit on his TRICE back in England. We can all report to you that it makes hill climbing much easier. With a half a horsepower working through a centrifugal clutch and the 22 to one gear ratio in the Sachs motor, you can pedal rapidly up the best of hills. Ken Trueba showed two TRICE's at the Portland Bike Show (1992), one with the SACHS motor and one without.

So far, my best time for the 13 miles to work was only 38 minutes. That's a 20 mph average with the help of the motor all the way and hard peddling. With the motor only on for hill climbing, I average 48 minutes and feel good after each ride. The TRICE was really working well for me.

I had my first flat tire at 30 mph going down the long hill over a bump in the sidewalk. At the Bicycle shop in town, I did the first motor removal and 26 inch rear wheel change. The front wheels on the TRICE are 20" and I punctured one of them the next weekend, but they are easy compared to the motor wheel. Now, I have a big AVOCET CROSS 26" X 1.9" rear tire, just like Western Washington University used on its Solar Electric Racer.

The TRICE is a well-developed package and very high quality. It rides well and you can peddle hard without much frame flex. It is

stable at almost any speed except for the adjustment of the mechanical brakes on the two front wheels. I am careful to apply them hard so both brakes grab. The SACHS motor adds about 18 lbs to the rear end.

So that is my report on the TRICE and SACHS motor. The motor runs great for hill climbing, but the electronic unit limits the revs to about 19 mph on the level. The new model of SACHS motor will have an electric start with generator and may have enough electric power for lights. This will allow the rider to start and stop the motor with a touch of a button. You might be against the motor assist from a purist point of view, but the motor has allowed me to get much further on my rides without worrying about having enough left in my legs to get me back up the hill and home.

Thanks for getting me started on recumbents. They are great, my back doesn't hurt like it used to, and I am looking straight down the road when I travel. Recumbent Cycling is great!

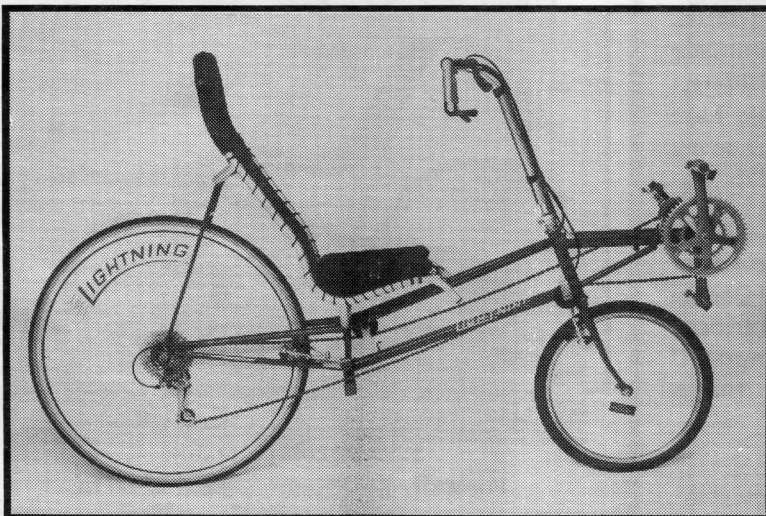
Bill Yerkes
Fall City, WA.

Since Bill sent us this letter, I have test ridden Bill's Trice. The Sachs motor kit is an excellent source of auxiliary power; however, the original US distributor of these motors has gone out of business. We are not against auxiliary power for recumbent bicycles and we will report on updates as they come along. The Trice is a perfect choice for a hybrid HPV.

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The P-38

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DR. RECUMBENT

Dear Dr. Recumbent:

I have a standard Ryan Vanguard with Fat Boy 26" X 1.25 and Haro 1.5 tires. Can you recommend a change of wheels and tires for maximum speed on smooth level roads?

Thank you for your help.

Sincerely,
Dennis J. Buchholz, Ph.D.

Dear Dennis,

Have you heard the old cycling adage, "an ounce on the wheels is better than a pound on the frame?" For the most part it is true. We have found that sometimes ultra light wheels on SWB recumbents can be less durable or dependable, thus narrowing the difference. With a LWB, there will be a difference in acceleration and effort needed to maintain top speed.

If you would like to keep and use your present rims, we recommend going to the Specialized Turbo S rear tire, a 26" X 1.0" 125 psi tire and the best rolling front tire to fit your rim is the Avocet FasGrip 20" 85 psi. Angle Lake Cycle/Counterpoint sells both tires. The Turbo S is \$24.99 and the Avocet \$24.99. Special thanks to Mike Dyakanoff at Angle Lake for his technical help.

For a wheel upgrade, we recommend going with a 700c X 20 (if your Ryan will accept 700c tires-dual brake mounts) mated with a Araya RB-17 20" X 1-1/8" front rim with a IRC Roadlite EX 100 psi front tire. Another source for high performance wheel-sets for LWB recumbents is Easy Racers Inc. and CycloPedia.

Dear Dr. Recumbent,

I just read Tim Brummers excellent story on the P-38 design history, Tim brought up a point I have a question on. He said when

you ride on training rides, a fairing does not help your speed much? Am I better off with no fairing in group rides? When and how much is a fairing really helpful?

Sincerely,

Bob Welter

Dear Bob,


The Doctor went straight to the sources on this one, to Gardner Martin and Tim Brummer.

"When riding in a group, and drafting conventional road bikes, a fairing does not offer much advantage. Conventional bikes churn lots of air and you can get a pretty good draft behind them. Also, if you are the only rider with a fairing and you may be looked at like a "cheater." —Tim Brummer, June 1993

"Even in a pack and in turbulent air a fairing will give you some advantage. When you want the fairing is when the uprights break away from you on a hill or when you break away from them on the flats or downhills. At 35 mph you may get a 2-3 mph gain on them, and thats enough to make a difference. Keep in mind that on a bike even 1 mph makes a huge difference. Our bike is specifically designed to work with the fairing. Since the inception of our design, we have never sold a single bike without a fairing, they look great and our customers tell us they work." - - Gardner Martin, June 1993

Gardner states in his brochure that the small Zipper adds 7% and the Super Zipper adds about 10% to speeds over 15 mph (these speeds are an increase over a stock Tour Easy with no fairing).

What does the Doctor think? Zipper makes the best fairings that we have ever tested, and I have a Super Zipper my personal bike, and have owned and tested several, therefore, the only reason to remove your fairing is to protect it when transporting your bike. —The Doctor, June 1993.

College Park
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Bicycling Magazine 1991

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EDITORIAL LICENSE: SUPPORT: PART 2

BY ROBERT J. BRYANT, RCN PUBLISHER

Readers SUPPORT of RCN

The Recumbent Cyclist was started in our spare bedroom on a cheap typewriter, lots of white-out and a neighborhood copy machine. Lay-out was done on my kitchen table with scissors and glue. The per-issue budget was about \$100. RCM#14 was the biggest undertaking ever for us. This issue was 48 pages. We went way over budget, as it was a double issue, but only had a single issues advertising. It was a financial bust for us; however, we are sure it will be a readers favorite.

RCN is now produced on a Macintosh Desktop Publishing system in the lower level of our home-office. The idea of a real office in real office space is completely out of the question; the costs are just too high. We have a phone system that attempts to answer our most commonly asked questions. This allows us to retain a skeleton office crew with no paid staff. It seems to be working well, but is very expensive to maintain.

The Recumbent Cyclist has been losing money on each issue we print for almost two years. We have always tried to produce a product that we can be proud of. In a way, I guess the Recumbent Cyclist grew too fast. The growth stage between RCN#8 through RCM#15 is the money losing part of our history. In order to get costs under control, we are planning many changes over the next six months. This will assure a long and healthy life for the world's only exclusive recumbent publication. We think readers will like the upcoming new format even better!

Our circulation growth remains fair, mostly by word of mouth from our fantastic supportive readership along with some response from our BICYCLING classified ad. Recumbent Cyclist display advertising revenue is far below break even on a per issue basis. In comparison with other similar magazines our advertising percentage is dangerously low. Most magazines have 45%-65% advertising; We have only 15%-23%.

The Recumbent Cyclist staff, along with most recumbent business owners, are on a mission. A mission to gain commercial acceptance for HPV's and recumbent bicycles. We now publish (approx.)2000 of each issue, with approximately 1500 going out to paid subscribers. In order for us to succeed long term we need even more reader support. If you enjoy the Recumbent Cyclist, here are some ways you can SUPPORT us:

- A) Subscribe to RCN or upgrade to a Jr. or SUPPORTER subscription level and give away extra issues.
- B) Photocopy our mailers/ brochure or the cover and back of an issue—carry them with you when you ride. This can be your personal mission. We now offer one issue extension to your subscription for each new subscriber you refer to us.
- C) Help to start a rider group or promote RCN within your group.

When I first became interested in recumbents in 1987, there was no Recumbent Cyclist- nothing even remotely similar. My first experience writing about recumbents was in letters to the editor and then a column in the IHPVA's HPV News. The column was called "Recumbent Ramblings." Due to the change in editorship, I left HPV News at the end of 1991. In an interesting twist, I did offer to continue doing "Recumbent Ramblings," but the IHPVA leaders of the time could not even take the time to respond.

We patterned the Recumbent Cyclist after what I would like to read about recumbents, thinking it would appeal to every HPV/ recumbent enthusiast, the jury is still out as to whether we've succeeded. There are still a whole lot of HPV'ers who are not subscribers. Heck, we even have some manufacturers who do not advertise, read or subscribe to the Recumbent Cyclist. We cannot figure this one out, as the Recumbent Cyclist gives manufacturers an open forum to a loyal recumbent following. These manufacturers definitely need a wake-up call.

THE FUTURE

The Recumbent Cyclist has devoted nearly 100% coverage to recumbent bicycles since its inception more than three years ago. We seriously need to become profitable in 1994. This means increasing the subscriber base, attracting more advertisers and changes in our publications frequency and format. In the next few issues, the Recumbent Cyclist will go through a reorganization phase. We plan to go back to a modified newsletter/ news-journal style. Readers will see new graphics and stories that start on the cover, as well as more reader written material, home-builder articles and long awaited recumbent "shootout" comparisons coming in '94. This plan may include more issues per year, whether or not we can pull this off is mainly up to our advertisers, but improved circulation will also play a part. If you have ideas along these lines, please write to us.

MUTUAL INDUSTRY SUPPORT

You as enthusiasts must support this industry. We understand that recumbent enthusiasts have different needs and interests and we try not to judge what those needs are. For some it will be a list of manufacturers so they can order a new bike, for others it may be a list of plan-sellers or parts sources. For some, parts from an abandoned old 10-speed will make their homebuilder dreams come true. Still others are ordering Titanium nuts and bolts in order to save 2 oz. on their bike while day-dreaming of a composite Lightning frame.

People are starting to see that the recumbent bicycle is a force to be reckoned with. I hope you will join with us on our mission to support and promote recumbent bicycles, independent recumbent dealers, recumbent manufacturers and THE RECUMBENT CYCLIST.

RCM INFORMATION

Recumbent Cyclist International is dedicated to promoting recumbent bicycles and providing and encouraging communications between HPV enthusiasts, home-builders, dealers and commercial manufacturers of recumbent bicycles. We ARE cycling's future.

SUBSCRIPTION INFO: The Recumbent Cyclist is published six times per year. To subscribe to the Recumbent Cyclist, please send \$22.95 (bulk-rate-USA), \$29.95 (First Class mail-USA) and \$30 Canada US funds (or \$37 Can. funds) and \$42.95 (US funds) International Subscription. The First class subscription will get you your issue 2+ weeks earlier than the standard rate. We are closing out the old RBCA patches and have a few left at \$2.50.

ARTICLE SUBMISSIONS: We want your photo's, letters, stories and recumbent information for publication. Send a story/article about your bike and please don't forget a picture. Print your name on the back of anything sent to the RCN office so we can credit the source. If you can send your submission on computer disc, we use an Apple Macintosh and MacWrite Pro and Write Now, that will read IBM 3.5" discs in ASCII format only. If you don't have a computer, we will take it in a letter form, backs of newspaper wrappers or whatever. Please send submissions to:

RCM ADDRESS: Please send everything except for UPS deliveries to this address:

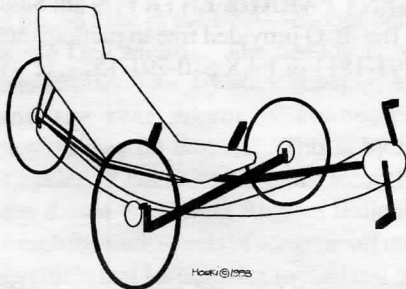
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PO BOX 58755
RENTON, WA 98058-1755

RCM#16 COVER: "The Trice" photo courtesy of Jon Schwartz, Mercer Island Wa. This photo was taken at IHPSC 1990, Portland Oregon. Cover graphics provided by Mark Colliton of Kensington Design in Kensington, MD.

RIDER GROUP INFO: If you would like a copy of the Recumbent Cyclist list of US rider groups, please send \$1 to the Recumbent Cyclist.

DEVOTED PRODUCTION STAFF: Publisher: Robert J. Bryant, Circulation/ Business Manager: Marilyn J. McKee-Bryant, Production Assistant: Jeanene Smith, Graphic Services & Printing provided by Desktop Publishing & Printing in beautiful downtown Renton, Washington. RCN is written and produced exclusively on an Apple Macintosh computer system.

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FYI: GOLD RUSH TO RACE AT COLORADO SPEED CHALLENGE! TEAM RACE RETIREMENT LASTS LESS THAN A YEAR!

In a late breaking story, Gardner Martin of Easy Racers, Inc. in Freedom, California, announced today, July 8, 1993, that he will be attending and racing at the "Colorado Speed Challenge," later this year. HPV Racing legend Martin announced his retirement from IHPVA sanctioned racing earlier this year, however, he still proclaims to be retired from IHPSC (International Human Powered Speed Championship) style racing, but an interesting series of events led to his decision to bring the Gold Rush out of the short-lived retirement.

Long time Easy Racer Gold Rush rider, Fast Freddie Markham, was slated to ride for Matt Weaver's "Cutting Edge" team, however, rumors persist that Matt may not have the Cutting Edge race-ready for the Colorado Speed Event. With the Cutting Edge attendance in question, Gardner Martin could not resist the idea of HPV racing so close to home. The veteran record holding Easy Racer Gold Rush team will be defending previous records against the hottest HPV teams in the USA. Don Barry, Doc Pearson and Terry Hreno as Team Moby Infinity, Steve Delaire "Rotator," George Georgiev, Willie Klausen and team TRA, George & Carol Leone, who are also the race sponsors.

Gardner Martin's Gold Rush with Fast Freddie at the helm is the Dupont Prize Winner for the fastest HPV to break 65 mph. This record held from May 11, 1986 until September 22, 1992, when Team Cheetah broke the record with the hotly contested speed of 68.73 mph. Easy Racers Inc. has offered a \$2,000 prize to for the fastest HPV in the 200 meter event. Easy Racers has also offered an additional \$1,000 to Team Cheetah if they can match or beat their 1992 record. Team Cheetah is not planning to attend the Colorado event. Easy Racers markets the Gold Rush Replica, which is the street version of the Dupont prize winning bike and the fastest commercially built recumbent bicycle in the world today.

The Colorado Speed Challenge will be held in Alamosa, Colorado, on September 13-17. The course is said to be "out in the middle of nowhere," near where Team Cheetah made their record run, the National Bison Range and the Colorado State Sand Dunes. The event is open to spectators, and volunteers are needed to work on the course. If you are interested in helping on out for the event, you can call TRA, George or Carol Leone at PH:#805-541-6044. Be sure to tell them you read about it in the Recumbent Cyclist.



Fast Freddie & the Gold Rush
(Photo courtesy of Easy Racers, Inc.)

THE 1993 RCN SHOW & SWAP PEOPLE CHOICE AWARDS

For the past two years, Robert & Marilyn Bryant have hosted a recumbent get-together at their home in Kent Washington. This allows us the opportunity to say "thank you" to our readers and fans. This years event consisted of a swap meet, bike show, hang'in out in the parking lot and a short bike ride down the Soo's Creek bike trail. At the end of the day, we gave out ballots for the attendees to vote on their favorite bikes and here are the results:

BEST RECUMBENT OF SHOW: Ron Schmid's custom Counterpoint Presto (metallic green). Ron came up from Portland Oregon.
BEST SWB: Ron Schmid's custom Counterpoint Presto. **BEST LWB:** Clete Eastwood's custom DH5000. Clete resides in Vancouver, WA. **BEST HOMEBUILT RECUMBENT:** Paul Carter of Philomath, Oregon. (Paul had a unique 27" X 27" monotube recumbent).
BEST MANUFACTURER/ DEALER OF SHOW: (tie) Kelvin Clark from Angle Lake Cyclery with the Opus, newly updated Ti Presto and Triad prototype trike and A.T.P., and the Bower family with their three R-40 Visions. **SHOW ATTENDEES FAVORITE RECUMBENT:** Windcheetah/ Speedy trike (the most sought after test ride in North America.....and everyone in attendance was able to preview and test ride the Speedy trike with a full body. Those of you not attending, better luck at next years Show & Swap..... whoops, had you go'in there for a minute, sorry—no, we did not have a Speedy in attendance.

WANTED: YOUR RECUMBENT PICTURES & FEEDBACK

We are working on articles on the following bikes and subjects. If you would like to be involved, We need your photo's and feedback on the following bikes: The BikeE (ASAP), Vision, Infinity, Easy Racer vs. P-38, P-38 vs. Presto, Infinity vs. Vision/ BikeE, Ryan vs. Linear vs. Infinity. Have you purchased a '93 Vision, BikeE (ASAP) or a Windcheetah? Let us know how you like it.

RECUMBENT CYCLIST CALENDAR**AUGUST 22, 1993**

NW Recumbent Riders: Sunday 10:30 am. The NW Recumbent Riders will host a series of recumbent rides through the Green River Valley. Riders will meet at the park, just south of S. 208th on the Green River Road (This is just south of Boeing Aerospace). We will ride to Algona for lunch at a leisurely pace. Drizzle, OK, but if raining hard, we will cancel. If we do not get a good turn out, these events will be short lived. We will do the same on Saturday, Sept. 4th at 10:30 am and again on Saturday Sept. 25th. For a map, please send SASE to RCN.

AUGUST 14-15 & 17, 1993: INTERNATIONAL HUMAN POWERED SPEED CHAMPIONSHIPS: Pre-Ride Tours.

AUGUST 18-22, IHPSC (Speed Championships) Minneapolis (Blaine), MN. The MnHPVA is the hosting HPV Club. Their address is MnHPVA, 4139 Brookside, St. Louis Park, MN. 55416. A check for \$5 will keep you up-to date as details for this event become available. If you get some news, please send it our way too. MnHPVA Hotline 612-929-4049.

AUGUST 20-22, 1993: EARTH SPORTS EXPO: Blaine, MN. In conjunction with IHPSC, there will be an exposition of earth friendly sports and products to be held at the main arena at the National Sports Center. Current recumbent exhibitors will include Rans Recumbents and Angle Lake Cycle.

SEPTEMBER 4, 1993

NW Recumbent Riders (see Aug. 22 listing).

SEPTEMBER 13-17, 1993, COLORADO SPEED CHALLENGE

Colorado USA. Open Invitation. Call Steve Delaire for more information Ph:#707-539-4203.

SEPTEMBER 18, 1993, SECOND ANNUAL NEWARK DAYS RECUMBENT PARADE ENTRY: 9 am Saturday.

Newark is in the east San Francisco Bay area, next to Fremont. There will be a Bar-B-Q provided free to participants after the parade. Please call Gregory Clark, D.C. of Pain Relief Center at Ph:#510-791-1811 or FAX 510-791-1527, or write to The Pain Relief Center, 34720 B Cedar Blvd., Newark, CA 94560

SEPTEMBER 25, 1993

NW Recumbent Riders (see Aug. 22 listing).

SEPTEMBER 17th-20th 1993: INTERBIKE 1993

LAS VEGAS, NEVADA-North America's Premiere bike show. Should the Recumbent Cyclist Crew have a meeting?

THE UNDERGROUND HPV'ERS GUIDE TO RECUMBENT TRIKES

The Underground HPV'er takes a quick tour through the world of recumbent trikes in a very direct fashion.

The fabulously bargain priced, bullet proof, beach cruising **ReTrike**. This one is a heavyweight, but has simplicity, class and low-tech chic at its finest. This maybe the answer for low-budget winter riders. It certainly gets the four star bang for the buck rating and deserves the top spot.

Two wheels on the back of a.....stay tuned to see if a trike rear end fits on this Bike-E.

The **R&D Tech Easy Rider-3** trike is another recumbent bargain. James thompson & Co. are busy building three and four wheel versions plus classic Bowden Spacelander reproductions. Is there a downside? Watch for strong competition from the all new ReTrike.

The futuristic, bizarre(?), nearly extinct(?), often unreliable but certainly gold plated **Thebis** rewriting the design books and bringing rear wheel drive/ rear wheel steering single front wheel trikes to market, complete with service program and BMW price tag. Besides having to convince customers of the benefits of recumbent, one must attempt to reeducate the customer that rear wheel steering, roller clutches and U-joints are viable on a bicycle..... Another full fledged road test with cover shot.....where are they now? I was glad to see that the phone is still answered, but will they call ME? Rumor is that the retail cost of a Thebis is headed down, down, down.....

The **Trice** is the working-mans "Speedy?" A bargain? Maybe, however, I have a hard time saying bargain and \$1700 in the same sentence, but this trike is definitely worth a look, and Ken Trueba has been involved the HPV scene, actively marketing, promoting, steadily improving and standing behind his product for three year and more than double that for UK Trice designer, Peter Ross.



Richard Rau & the Quadraped
(Photo courtesy of Pedalcraft)

the highest priced trike in the USA—choose between a Speedy or a one year old Geo Metro. The Speedy is built from custom castings, has airplane-like joy-stick steering, Moulton 17" front wheels and the rear wheel is connected by only one say.....how'do'they do'that.....This is by far the king of the recumbent cycles. Like so many other recumbent enthusiasts, I have had the dream of piloting Richard Ballentine's fully faired Speedy through the back streets of some far off land. This is the one recumbent vehicle that I would like to road test most. Guess what, I may get my chance.....

The **PedalCraft Quadraped** I can easily say that this trike is the most finely crafted recumbent tricycle we have ever seen. The workmanship is brilliant. Any potential trike manufacturer should see this trike. The combination of foot and hand cranks is so unique and was the most invigorating cycling experience that I've ever had. QuadraPed builder, Richard Rau, defines this as "full-body cycling." The downside? The "Quad" takes more energy to ride than any trike I've ridden and it depending upon why you ride a recumbent, with the Quad, you do not get upper body relaxation..... We keep ***SUGGESTING*** that he come out with a foot powered-only version.

The new **Counterpoint Presto Triad**: What can I say, another completely unique product from Jim Weaver, Counterpoint and the crew from Angle Lake. I have ridden the prototype on three different occasions. Quality is A-1, as usual, The fork and brake arrangement is masterpiece and exactly the way I'd do it. Look for the Triad to be a serious contender in practical commuter vehicles. The Triad is not yet on the market, but soon.....

The legendary Burrow's **Speedy Wind Cheetah**. In a surprise announcement late last year, Steve Hansel's Linear Mfg. Inc. became the US distributor for this rolling legend. As of this writing, every Speedy entering the country thus far has been sold, at a hefty price tag I might add,

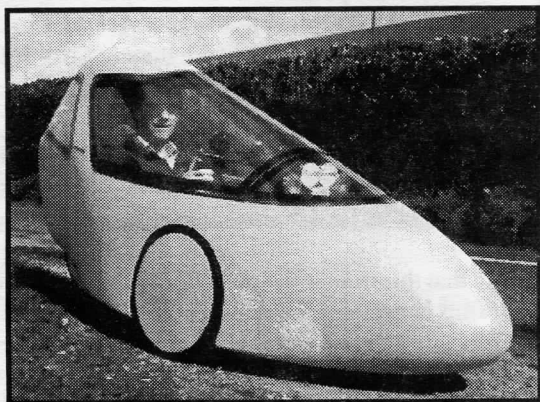
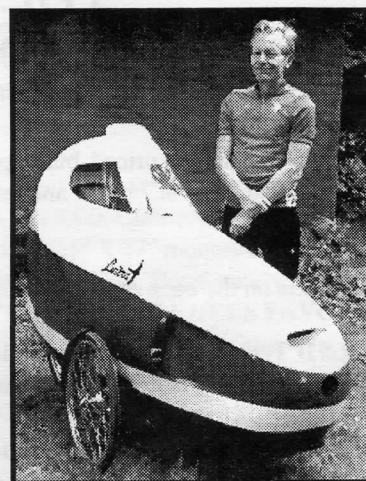


The Wind Cheetah
(Photo courtesy of Linear Mfg. Inc.)

News From Europe: The **Leitra**, a rare sight in the USA. I know of one....unfaired, unassuming and looking pretty shabby sitting in the corner by an old ambulance camper on the tarmac at Yreka IHPSC. As you can see from the photo's, designer George Rasmussen has the right idea. He is a pioneer in three wheel HPV design the Leitra is has been very successful in Europe. The folks from Kingcycle have come up with perhaps the most futuristic trike, the "**Kingcycle K-3**" made its debut recently. This trike has linear drive and is designed for practical uses rather than racing. The Flevo company, manufacturers of the only FWD production recumbent in the world have unveiled the "**Alleweder**." It has been called a "tin-Speedy." The look is similar to that of a Speedy, and it is sold as a kit and has metal uni-body type panels that rivet together. This trike won first place in the Fiets design contest. More on this later.

Until next time (unless I am run out of town),
The Underground HPV'er

The Leitra
(Photo courtesy of G. Rasmussen)

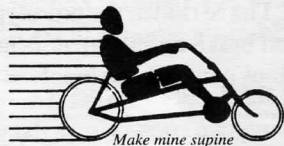


The Kingcycle K-3 linear drive trike
(Photo courtesy of Kingcycle)

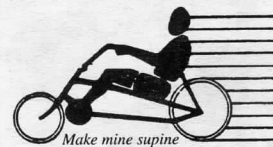


Flevo bike
(Alleweder Aluminum trike kit)

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ZACH TECH: HIGHER GEARS FOR SMALL WHEELED RECUMBENTS

ZACH KAPLAN

Many of the newer recumbent designs are using 20 inch wheels front and rear. The advantages include a more compact size, less rotating weight, more room for cargo, and being able to carry just one spare tube/tire for both wheels; however, a significant drawback of small rear wheels is the reduction in top end gearing. Several methods exist for dealing with gearing problems on small-wheeled recumbents, including using larger than normal chainrings, smaller than normal rear cogs, and two-stage intermediate drive systems.

Large Chainrings

Perhaps the most readily available, affordable oversized chainrings are the 61 tooth chainrings made by Specialized. These are available in both the 110 mm mountain bike bolt pattern and the 130 mm road bike bolt pattern. Paragon Machine Works also makes 60 tooth plus chainrings for mountain bike cranksets. T.A. makes a 68 tooth chainring which fits the T.A. Cyclo-Tourist and Bullseye cranksets. Boone Technologies will custom CNC machine chainrings up to 180 teeth. Magic Motorcycle also does custom CNC machined oversized chainrings for their own unique cranksets. One drawback of using oversized chainrings is that commercially available front derailleurs were designed to be used with smaller rings and shifting may suffer on the larger rings. Large chainrings also create added weight, require more chain, and can compromise the low gears by limiting how small the inner

chainring can be. For these reasons, it is more desirable to use smaller rear cogs before going to larger chainrings.

Small Cogs

There are an increasing number of 11 tooth cog systems available. Suntour offers three levels of Microdrive mountain groups, in 7 speed 11-24 and 8 speed 11-28 varieties. Additionally, the Microdrive cassette body can be obtained separately and retrofitted to the hub bodies of existing Suntour cassette hub systems.

Another stock system is the Campagnolo 8 speed cassette hub system which can accommodate cogs ranging from 11 to 34 teeth. Shimano recently introduced the 700CX hybrid group which uses a 7 speed 11-19 cassette. This is a lower performance group and is less suitable to recumbents due to its narrow gear range.

For existing Shimano Hyperglide systems, there are a number of 11 tooth cog conversion systems available. Only one is truly up to Hyperglide shifting standards and that is the 8 speed conversion from OHO Designs. A standard 7 speed Shimano cassette hub is converted to take 8 cogs ranging from 11 to 34 teeth. The smallest cog can be either a modified Suntour Microdrive cog or a Shimano 700CX cog. A lubrication injection system can also be incorporated into the hub at the time of the conversion.

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TNT Performance makes an outboard 11 tooth cog in either steel or titanium which replaces the lockring on a 7 speed Shimano hub, making it an 8 speed. Unfortunately, the TNT cog requires the rear wheel to be redished, creating excessive dish. It also shifts poorly.

The Action Tec Titanium cog also replaces the lockring on a Shimano hub, but the actual cog is directly in line with where the 12 tooth cog would have been, so spacing is unaffected. This makes the Action Tec cog useful on both 7 and 8 speed systems. The Action Tec teeth have a saw tooth profile and shift fairly well, but not as well as Hyperglide. Action Tec makes titanium cogs up to 32 teeth, including an inboard 12 tooth cog allowing 11 to 12 progression.

For freewheels, TNT makes an 8 speed conversion of a Dura Ace freewheel using an 11 tooth cog.

Many recumbent riders have asked about using Moulton 9-10-11 tooth cogs to solve their gearing problems. These cogs were designed only to be used with Alex Moulton bicycles and Alex Moulton will only sell them as replacements to people who already own Alex Moulton bicycles. A revolutionary new wheel system has just been introduced by Magic Motorcycle which uses special aluminum cogs anodized in various colors in sizes down to 9 teeth. Unfortunately, the cogs are only compatible with their hubs, which are only compatible with their spokes, which are only compatible with their rims. The complete system is extremely expensive and also extremely light and technically advanced. If it catches on, lower priced versions may become available.

Intermediate Drive Systems

Intermediate Drive systems are capable of supplying the widest gearing range. These drivetrains use two chains. One runs from the front chainring to a gear mounted on a shaft in the middle of the bike. On the same shaft is a larger gear. The second chain runs from this gear to the rear cluster. Additional advantages of this type of drive are that higher gears are possible using standard gears and the rear derailleur doesn't have to support long lengths of chain. The drawbacks of intermediate drives include increased weight, friction, and complexity. Nevertheless, they have been used with great success on competition HPVs. Most intermediate

drives have been custom made from crankset parts or freewheel parts,

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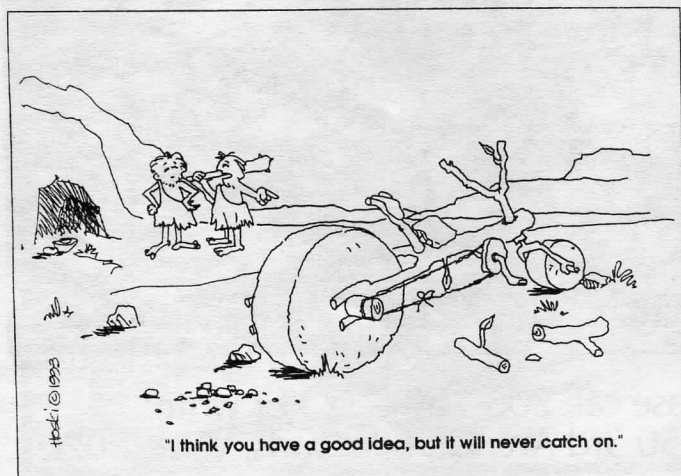
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TNT Performance Products
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Phoenix, Az 85021
602-944-5253

Zach Kaplan is a Counterpoint Presto rider who relies on his bike for daily transportation, has toured extensively. He is probably the most high-tech recumbent guy we know. If you would like to have your High Tech questions answered by "Zach," write to RCN, Zach-Tech, PO Box 58755, Renton, WA 98058.

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The 1993 BikeE. See RCN #17 for a full report.
(Photo courtesy of BikeE Corp.)

RECUMBENT SUSPENSION NEWS:

SUSPENSION RYAN: BIG NEWS! Ryan has just been licensed to build rear suspension recumbents using the "Trek T4C" rear frame section. This Ryan will be the finest model ever produced as components will also be upgraded. Prices should be in the \$1800-\$2,000 range for a ready-to-ride suspension model. **SUSPENSION PRESTO:** Just as we were going to press Angle Lake Cycle announced the availability of the 1993 full suspension Presto. The new bike will have a modified RST 20" suspension fork on the front and the excellent Offroad Pro-Flex rear seat suspension on the rear. The suspension Presto SE will be priced at \$1899. The upgrade is retrofitable, and will cost only \$150.

RECUMBENT NEWS:

THE BIKEE: is a new recumbent manufacturer that is concentrating its efforts on producing quality, comfortable, user-friendly bicycles for entry level as well as experienced riders. The designers have succeeded in manufacturing a bicycle that is very easy to ride. We have had a chance to ride a new 16 speed BikeE over the past month and you can look forward to a complete write-up in the next issue. **COUNTERPOINT-TRIAD:** The final Presto "Triad" trike prototype is expected any day with production starting and deliveries beginning soon. Pricing is expected to start around \$2400. Magura Hydraulic brakes on the front wheels are standard equipment, with a mechanical drag brake on the rear are standard equipment. The "Triad" is completely retrofitable which means you can convert your stock Presto to a trike this winter. **EASY RACER:** Gardner Martin & Co. are still riding the seemingly unending wave of popularity. They report a great summer season. The Gold Rush Replica is another one of this summers hottest bikes. Easy Racer fans will be pleased to note that frame production has been brought back to the Freedom California Easy Racer world headquarters. **INFINITY:** The original entry level "enthusiast recumbent" is having another banner year in sales. The Infinity is still the best bargain available in enthusiast level recumbent cycling. No other manufacturers seem to be able to offer so much value for the money. So far, there is no enthusiast recumbent within \$200 dollars of the "21st Century" Infinity. Watch for "Bulldog" building plans to be available within 45 days. **LIGHTNING CYCLE DYNAMICS:** This is the one of the summers hottest bikes. Lightning currently has a 6-8 week wait for delivery. They have introduced a new model of the P-38 called the "SS." This model comes with SunTour XC Pro components. Tim Brummer also mentioned a new F-40 frame geometry that is better suited for use with the suspended fork. Production could begin as

early as this summer. **REBIKE:** Kathie & Co. still riding the wave of publicity, as of this writing, both the 818's & ReTrikes are in shops. There have been many more newspaper & magazine write-ups since we last visited ReBike, including one a cover shot for the "818" on the AMERICAN BICYCLIST recumbent issue. Other ReBike news is just too hot to print.....**RYAN RECUMBENTS:** Ryan is expanding their market to Europe and they are actively looking for European Agents. For any of you who haven't seen a Ryan lately, we feel this is one of the finest recumbents available today. The frame workmanship, by brilliant frame builder, Tim Vaughn, is among the finest TIG welding in the industry. The best in the industry powdercoat is done by Briteworks of Eugene, OR. This powdercoat is so rich and bright it looks like wet-spray. Custom colors are also available. At \$1395, the Ryan is up as much as \$500 less expensive than other similarly priced bikes. **WINDCHEETAH/ SPEEDY:** Linear Mfg. Inc., is now distributing the Wind Cheetah (Speedy) tricycle. The Speedy has consistently won practical vehicle competitions in the U.S., Canada, and Europe. This world famous HPV will be distributed through Linear's regular dealer network. Suggested retail price for the Speedy is \$5,700 for a ready to ride trike. **LINEAR** has announced a limited number of "Black Special Edition" Linears that are available now. There are only a few so call your Linear dealer quickly! Linear Mfg. Inc. Ph:#319-252-1637. **BLUE SKY DESIGN:** builders of the ABS plastic Aerocoupe trike body shell kit has moved operation to Oregon. You can now reach them at PO Box 26154, Eugene, OR 97402, or phone:#503-345-8376.

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WANTED: USED RECUMBENTS: We buy used Prestos, Ryans, Tour Easys and what have you. Call us first. If we don't buy it, we may know somebody who will. Write: Recumbents, PO Box 58755, Renton, WA. 98058 or call 206-639-2347, be sure to mention that you have a bike to sell. (WA)

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ELLIPTIC RECUMBENT BICYCLES. Full service recumbent dealer for the San Francisco and Northern California. Custom selection and special orders to suit YOU. Try before you buy. New, Used, Accessories, Repairs, Rentals. Current used bikes: '86 large Tour Easy \$950. and a Custom suspended LWB. Call Stephen @ Ph: #510-782-4566 for showroom hours. (CA)

EUGENE BICYCLE WORKS: Recumbent Sales and Rentals. Test ride your next recumbent on Eugene's Willamette River Bicycle Path. Oregon's best selection. 455 W. 1st Avenue, Eugene, OR. 97401. Phone 503-683-3397. (OR)

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PEOPLEMOVERS: We specialize in Ryan, Linear, Rans, Infinity, A.T.P. Vision, Haluzak, BikeE, Rotator, Land Rower & ReBike recumbent bicycles. Drop-ship anywhere in the USA. People Movers, 811- So. Tustin Ave. (At 22 Fwy. in Orange) Phone# 714-633-3663. Your full service recumbent shop. (CA)

THE WHISTLE STOP: Northern Colorado recumbent specialists. We stock Rans, Infinity, Ryan, Linear, Turner, and ReBike recumbents and framesets. Rentals, sales, plus new and used parts for buildups. Phone#303-224-5499. (CO/16)

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FOR SALE: REAR WHEEL, 48-spoke Wolber "Super Champion" model 58 Rim on 140-mm Phil Wood Hub with Disc Brake, Complete, \$295 OBO, or trade for T.A. Tandem Crankset. Cornel Ormsby, Ph:#916-373-0039, P.O. Box 1867, West Sacramento, CA 95691.

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PEOPLE MOVERS Now carries the new SWB Haluzak recumbent in addition to the all new Rotator "Pursuit." The introductory special for these two bikes for Recumbent Cyclist subscribers is free shipping within the USA. People Movers, 811- So. Tustin Ave. (At 22 Fwy. in Orange) Phone# 714-633-3663. Your full service recumbent shop. (CA)

FOR SALE: 1993 Linear \$999, 1993 Ryan Vanguard \$1299 Both are New! Call the Recumbent Cyclist (Hotline)206-630-7200 & 206-639-2347 (Office). (WA)

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FOR SALE: INFINITY, 18 speed. 27" X 1-1/8" rear, 20" X 1-1/8" IRC front, computer mount, 2- bottle cages, rear rack, \$400 + UPS (shipping). Chicago area-will deliver. Call Matt Ph:#708-534-1344 8 pm-12 am EST. (IL/16)

FOR SALE: 1993 RYAN VANGUARD DEMO: One months old, red Shimano Deore LX components, 21 speed, Deore XT thumbshifters, **SOLD** 20" X 1-1/8" front wheel with Deore XT hub. and rear luggage rack New cost \$1595 one month ago, Sell for \$1349 + shipping. We also have a 1991 Ryan, Blue triple crank for \$999. Call quick! The Recumbent Cyclist, Phone:# 206-639-2347. (WA/16)

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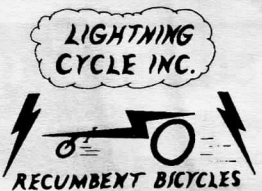
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RECUMBENT CYCLIST Reprint Announcement The following articles will no longer be available after September 30, 1993: HPV News Road Test Reprints including Infinity & Presto (\$2), Lightning Tailwind (\$2), Laid Back Bicycle (\$2), Leitra Package (\$4), Speedy package (\$4), Crystal Trice (\$2) and Dan Henry article (\$2). We are also planning to discontinue handling the "BAT" LWB Recumbent building plans (similar to a Tour Easy) and the '92-'93 Recumbent Market Report (discontinued Aug. 1). This will be your last chance to order any of the above article reprints separately. Send to: RCN, PO Box 58755, Renton, WA 98058.

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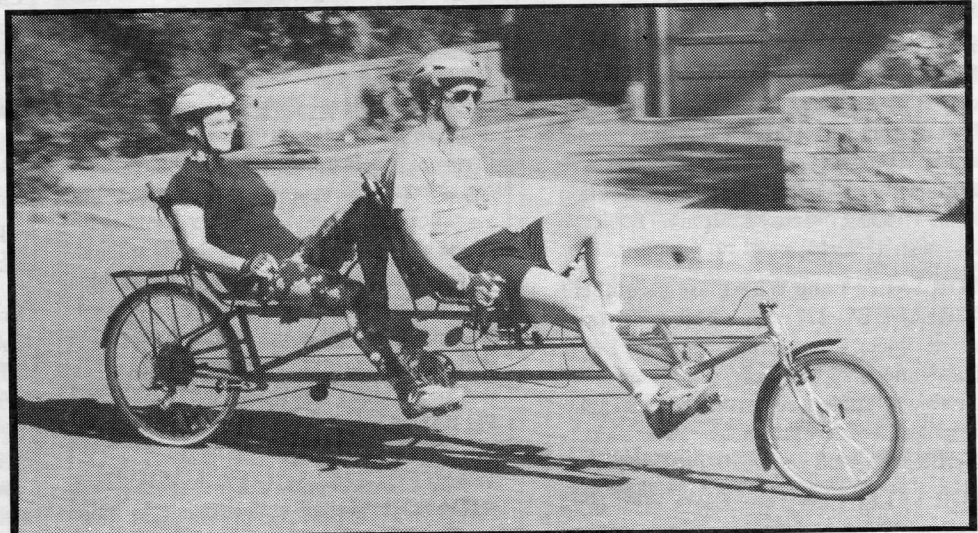
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Danny Ray Burdick pictured at the helm of "Sasquatch," his Zzipper Fairing equipped Ryan Vanguard Recumbent:



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