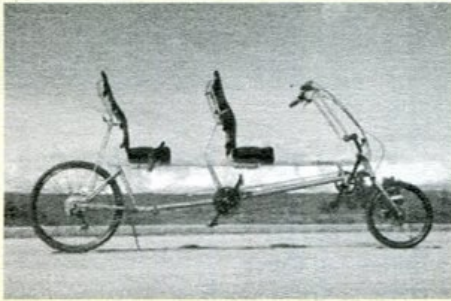


Recumbent Cyclist News

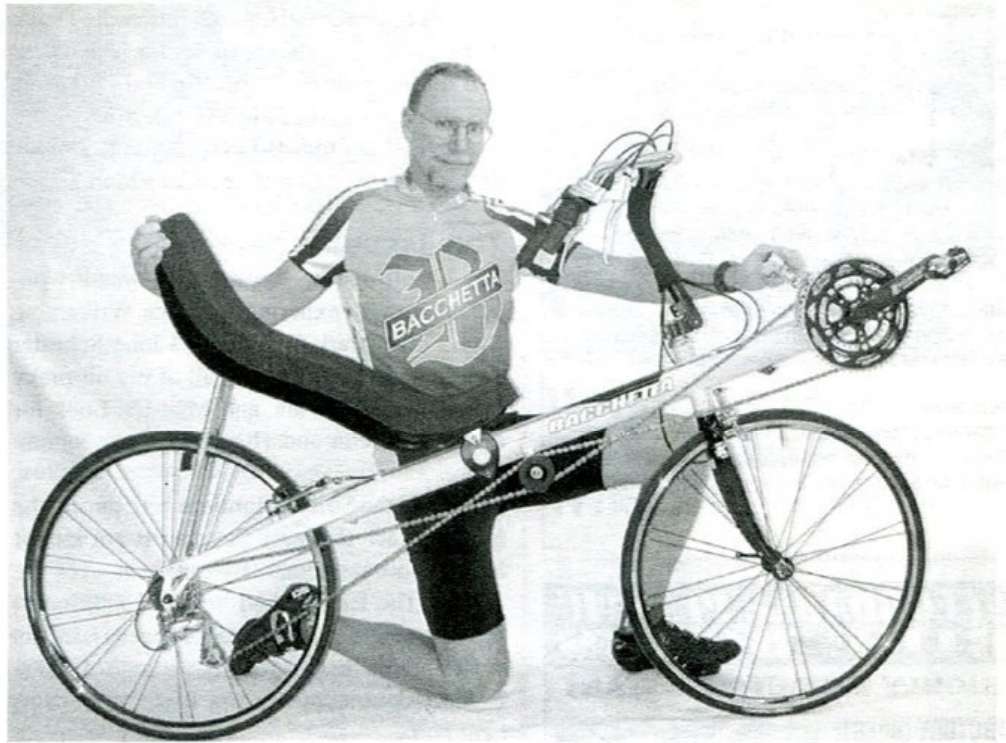
RCN 082 A Publication by and for Recumbent Enthusiasts Since 1990 May/June 2004



The Sun Tandem; see pg.14



The Stites tilting ChameleonECO delta trike; see pg. 20



Bacchetta's John Schlitter and the Corsa

The Bacchetta Corsa

By Bob Bryant

"Bacchetta's design goal was to achieve a balance of frame stiffness, drivetrain efficiency, performance and ride quality. After building several prototypes with round tubing we came to realize that there was just not enough structure to support a mono-tube design when the wheelbase is pulled out beyond 42 inches. It simply flexed and twisted too much."

"We believe that our custom tube set is the key to the design success of Bacchetta bikes. It delivers a superior ride and great performance with simple good looks. Achieving this balance with a mono-tube design also provided the additional benefit of superior aerodynamics in comparison to triangulated or space frame designs by eliminating the excess tubing. Less tubing means less frontal area and that makes for a faster bike." — Mark Colliton, Bacchetta

The Corsa is the least known of the Bacchetta line of high performance Highracer recumbents. It's hidden neatly in between the dual 26 Strada and the ultra-light Aero. The Corsa has the same frame as the Strada, but has upgraded components, dual 650c wheels, a stiff CroMo frame, M5 fiberglass shell seat, and weighs a mere 26 pounds.

SYSTEMS

Frame: The Corsa's frame is built in Bacchetta's Taiwan production facility. The frame uses Bacchetta's trademark ovalized tubing which offers many advantages including a stiffer yet simpler frame and seat attachment (self-centering), improved aerodynamics and a smooth ride for such a high performance machine. The frame is stiff

What's Inside

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Check out our website at:
www.recumbentcyclistnews.com

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Recumbent Cyclist News

"A newsletter by and for recumbent bicycle enthusiasts, since 1990."

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Editorial License: Welcome

RCN readers will notice that we've actually caught up from our being behind last fall and winter. It's been a long, gray and stormy winter up here in the NW corner of the country. As I spoke to and emailed readers around the country, I've longed for that "81 degrees and a light breeze" reported by a reader in Florida. We haven't had anything near that since last summer. Another friendly reader from Tucson invited me down for a visit. I'm still thinking about a road trip and Tucson in the off-season sounds just wonderful.

I'm looking forward to spring as I sit at my desk and write this article in late-March.

This Issue

The beautiful **Bacchetta Corsa** was a wonderful review experience. Mike Wilkerson, Rich Pinto, Mark Colliton and John Schlitter were helpful in answering all of my nit-picky questions, comments, and what-ifs. Look for more Bacchetta and Highracer stuff coming soon.

We had the **Sun EZ tandem** here during the Kinetic Race this past October. It got lots of looks and comments as we rode it over the course. The EZ Tandem is a fine addition to the recumbent tandem market because of its value-added price-point. It's also a user-friendly double, perfect for first time recumbent pairs.

We've had lots of **Velomobile** articles in the last year. In this issue David Eggleston discusses the feasibility of Velomobiles (VM) in the USA. David is hoping to build VM's in Texas.

The always fun Charles Brown writes to us about Long Wheelbase Recumbent handling. We submitted Charles' article to several RCN regulars for some feedback. This commentary will certainly make you think.

Bob Kropfli tells us about a somewhat difficult recumbent tour from a good natured perspective. I've wanted to ride the Katy Trail for

years and hope to do so someday. Stories like this also make us think more seriously about our safety on the highways and byways of the USA.

Bill Stites tells us about his unique "bar stool" **ChameleonECO** delta trike urban commuter. I have to admit to not "getting it" until Bill was so kind to write the article.

And of course, **What To Do with An Old BikeE** will make you want to look for a vintage, classic AT or CT to customize for a cheap and fun scooter.

RCN Road Tests Coming

- Greenspeed GT-3
- Burley Jett Creek
- HP Velo Street Machine
- HP Velo Grasshopper
- WizWheelz aluminum
- Crank It Quad
- RANS Force5
- Volae

Reader Participation

We are developing a new owner/rider road test template to use more of your feedback in our review process. Let us know if you'd like to participate in a review of your bike.

We're looking for **Doyle PET, Lightfoot trike, quad or Organic Engines owner:** We'd like to work with a reader on a review.

Bike Friendly Towns & Riding Spots: We'd like to do an ongoing series about recumbent and bicycle friendly towns, bike trails, and rail trails.

We'll be developing a template for this article if you'd like to write about your town or riding location. We'd like to start by covering the Florida and mid-west rail trails. If you're interested in being involved, please email me at: bob@recumbencyclistnews.com.

Viva Recumbency!
Bob Bryant

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Recumbent News



Quik-Pak Cargo Trailer Updated for 2004

In 2003 Quik-Pak trailer sales increased by more than 200% thanks to the great article by Chet Rideout in RCN. Customer feedback has been very positive, with very few suggestions for improvement. However, because we do take every suggestion seriously, every suggestion has been implemented as an upgrade in the 2004 Quik-Paks. A new 6061-T6 frame is stronger and lighter. New axles have been enlarged, doubling the strength of the previous axles. All bolts have been upgraded if

any potential stresses were identified. Now we truly can assure you that the Quik-Pak is simply the best in bicycle cargo trailers allowing you to tour or shop without dealing with the weight and balance issues of panniers, single wheeled, or heavier trailers.

For more information visit www.quik-pak.com or contact Ray Quick at 719-269-7535. Order early to get your name on the 2004 production schedule.

Source: Quik-Pak ♦

New Recumbent Shop Opens

St. Louis Recumbents has opened in Maryville, Illinois, about fifteen miles east of downtown St. Louis. It's an all recumbent shop managed by Sam Blevins, a local recumbent enthusiast. Current lines being carried are RANS, Bacchetta, Lightning, Optima, Cycle Genius and Sun. In addition they are an outlet for Hedinger Trimuter trikes, and carry Hase and Cartrike trikes as well. They are located two blocks from the extensive Madison County, Illinois bike trails.

Plans are to organize recumbent rides during the weekends. With the advent of warmer weather they plan to hold an outdoor event with manufacturers present to answer questions and provide demos. The shop also offers recumbent rentals at \$40 per day. Buy any recumbent within fourteen days of the rental and the rental fee is credited to the price.

Their website is www.stlrecumbent.com.

Source: Mike Stern, St. Louis, MO. ♦

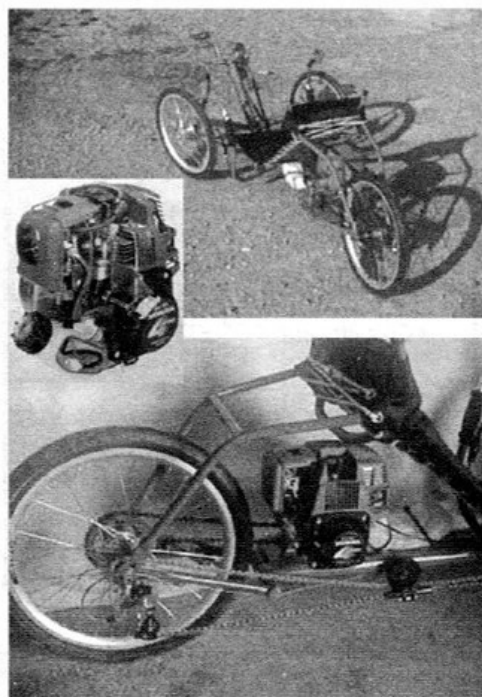
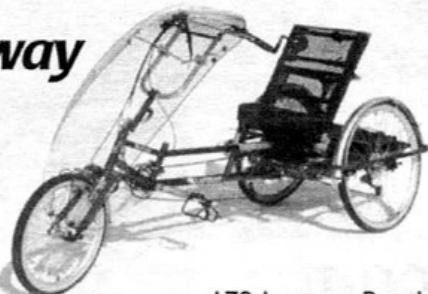
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Honda 31cc Power Assist Trike

Doyle Manufacturing is the frame builder for Hediger Cycles. Doyle now offers its own tadpole trike similar to the Hediger, but with an extension in the center section of the frame that houses an efficient Honda 31cc 4-stroke auxiliary power assist. Prices start at \$2,650. For more information, check out: www.doylecustombikes.com.



New Trike Mfr

Natalia Florence is a new trike manufacturer offering unique tadpole trikes from \$1,300. For more information, check out: www.nfcycles.com.

News & Rumors

BikeE Parts: Email: bentleycycle@rttinc.com for an up-to-date bikes, parts and prices list. www.easystreetrecumbents.com also lists BikeE parts for sale.

Calfee and Fast Freddy Markham have split. Apparently Calfee will produce the carbon fiber LWB OSS by itself.

Sun EZ Rider: The new Sun HiTen, CroMo and Aluminum rear suspension LWB OSS recumbents are now available. ♦



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RCN Calendar

Wasco Wild West 75 Mile HPV Race

May 1, 2004
The Dalles, Oregon
Contact: Clay Smith 541-296-1314 or clayrace16@yahoo.com

Michigan Recumbent Rally — East

May 8th 2004 9am-3pm
Detroit (SW area; Willow Metropark), Michigan,
Contact: 734-487-9058, www.wolverbents.org

RBR Recumbent Rally

May 21-23, 2004
State College, Pennsylvania
Contact: www.rbr.info or tel. 888-875-2508

Human Powered Challenge 2004

Memorial Day Weekend.
Portland, Oregon, PIR Race Track
Contact: www.ohpv.org

Michigan Human Powered Vehicle Rally

June 5 & 6, 2004
Waterford (Northern Detroit), Michigan
Contact: 313-884-0109, www.lmb.org/mhpva or wkiehler@comcast.net

Michigan Recumbent Rally — Central

June 26th 10am-3pm
Holt (Lansing area), Michigan
Contact: 517-694-6702, www.wolverbents.org

Hostel Shoppe Recumbent Rally

July 30, 31 and August 1 2004
Stevens Point, Wisconsin
Contact: www.hostelshoppe.com/recumbent_rally.php

Recumbent Retreat

August 20-22, 2004
Warrenton, Oregon Ft. Stevens State Park.
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Contact: www.ohpv.org for reservations.

Rose Petal Challenge

August 29, 2004
Portland, Oregon
Contact: Connie McAyeal, ohyesbent@hotmail.com

Bentrideronline Rally

August 2004
Upstate New York
Contact: www.bentrideronline.com

Michigan Recumbent Rally — West

September 11th 10am-3pm
Hastings (south of Grand Rapids), Michigan
Contact: 734-487-9058, www.wolverbents.org

Fall Recumbent Rendezvous

September 18th
North Detroit (Stoney Creek Metropark), Michigan
Contact: 734-487-9058, www.wolverbents.org

Planning an event — Please let us know:

Email: info@recumbentcyclistnews.com.

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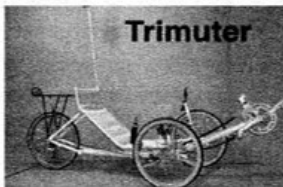
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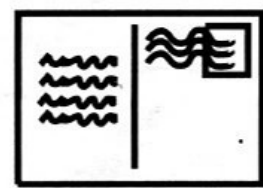
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Letters To RCN

Write RCN . . . Write Soon . . . Write Often . . .
bob@recumbentcyclistnews.com



ATP Vision

On January 7th, 2004, I spoke with Greg Bower. I told him I was surprised to reach him on the phone this time after leaving messages for a couple months. He told me that they were just winding down. I figured that meant going out of business but asked what he meant by that and he confirmed they are going out of business. Apparently, none of the wheelchair production contracts or buyouts worked out and their creditors are on them so they are in the process of selling off factory equipment. They had 26 bikes in stock but no tandems because they hadn't produced those for 6 months since the suppliers had cut them off. I asked. He confirmed that they were down to a crew of just two, him and Joel Smith. So it looks like another chapter in the world of recumbency has ended and all those Visions out there are now classics.

Zach Kaplan
Zach Kaplan Cycles

LWB Over-Weight

I read RCN 079 and noticed in your review of the RANS Stratus that you listed the weight of the bike at 32.75 lbs. The RANS web site lists the bike at 30 lbs. I emailed RANS a question about the bike weight and they stated that the listed website weight is the standard frame with listed pedals. My question is was your reviewed bike weight a large frame with extra items on the bike like a bag, pump, water bottle cages etc. What exactly do you mean by the phrase "RCN weight?" I'm trying to understand why there is a difference of almost 10% from RANS' stated weight of the bike and your reviewed weight of the bike. The same difference applies to the Tour Easy you reviewed. Thank you and I enjoy reading your magazine.

Joe Beretti

Editor Comments: The RANS Stratus was a standard size weighed with pedals on our scale. The Tour Easy is a medium/large weighed with pedals on our scale. I must say that 30, 32.75 are light compared to what a LWB will weigh with rack, fenders, mirror and fairsing. 36-40 is a more accurate road-ready weight. So far no manufacturer has disputed these weights. If they do, we'll print it. We use an off-the-shelf UPS-type scale from Office Depot. It's not exact, but I believe it to be accurate within 1 pound or I wouldn't publish it. In contrast, our Bacchetta Corsa with pedals weighed 26 pounds on our scale. This is exactly what it's supposed to weigh.

RCN Future

I appreciate your Editorial License rant in RCN 080 especially since I want you to be able to continue publishing RCN. As a long-time subscriber, I can tell you that years ago I found the journal after googling the word *recumbent*. I suspect that new business probably does come your way in ways that perhaps aren't obvious. I believe that RCN and BROL aren't in direct competition since the printed page is more tangible, more permanent for me. I'd bet that I'm not the only benter that saves your work, neatly arranged and ready for frequent perusal. What I really appreciate about RCN is the depth of your reviews. Often you will go to several sources for different opinions in a way that on-line magazines can only approximate. Although I won't be separated from my beloved GTO, the BigHa review by Zach Kaplan was incredible. (That picture of John Acres reminded me of...me, BTW!) Keep up the good work, sir!

Jay Singer

RCN Future II

I read your editorial about the changes that you've had to make and I felt compelled to email and send some encouragement. No, RCN isn't perfect, but all things considered, I like it and I'm glad I've got it as a resource. Nobody but you knows how much work you put into it and how much belly-aching you get from people who wish it were different. Just keep doing what you've gotta do and follow your heart!

Dave Ihde
Minneapolis

BIGHA I

I read the terrific RCN BIGHA article by Zach Kaplan over the weekend. He apparently sort of liked, sort of, only not that much, or with caveats. Now, if the world had a lighter weight high quality all arounder/city commuter that sold for \$1000, I think we'd have a winner. Oh wait, Sun EZ makes such bikes, (though just medium quality) perhaps but they count, right?

Fred Goldfarb

BIGHA II

It wanted to thank you for the nice thank you you included to all of us in the latest issue. I thought Zach's review was completely objective and fair — it was also wonderfully thorough!

Ernest Kim, BiGHA

BiGHA III

I just wanted to send you a note of thanks for the nice review you that Zach Kaplan did of our bicycle in RCN 080. It was fun to see the bike and Zach on the cover. Zach delivered an honest review from his standpoint — which was exactly what we hoped for. We know the bike is not for everyone — but I'm pleased that they got a chance to hear that it's a pretty darn nice bike with a collection of features and benefits that many people will appreciate.

Lee Eckroth, BiGHA

LWB Crash . . . more

I've read many letters to RCN recently about people crashing and falling off their recumbents. This may come as a shock, but any vehicle with less than three wheels is inherently unstable.

Stand up any two wheeler, let go, and it will fall over. Any two wheeler can slide out from under you in slick or loose conditions.

It isn't the bike's fault you fell off. It's your fault. Like anyone who has ever ridden a bike, I have gone down, too, but I didn't blame the bike. I'd much rather fall from a 'bent than an upright bicycle. When you fall off a bent you don't land on your head. My wife and I have been riding recumbents since 1984 and wouldn't ride anything else.

Bruce Buckmaster

Booties

I'd like to know who makes bicycle shoe cover-ups. I saw them on TV one day. They look like bedroom slippers to be worn over one's shoes when bicycling. I ride a delta trike and wear biking sandals. I'd like to purchase these for off-season riding.

Constance Saunders

Editor Comments: I did some research on this topic. Most cover-ups or booties are neoprene (wet suit material) and are made to go over road shoes, not sandals. I found some folks on the Internet who were making their own. One idea is to buy shoe cover-ups or "rubbers" from Walmart and cut a hole for the cleat on your shoe. Another would be to buy over-size wool socks to go over your sandals in the same way. Another option would be to wear wool socks with your sandals. I guess the bottom line is that bike sandals weren't really made for 4-season cycling and it might be best to just buy a pair of cycling shoes. For more information, check out: www.girlbike.com, your local bike shop, REI, Campmor, Nashbar, Per-

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formance, or Walmart. Burley also makes some booties which we saw in the Adventure Cycling Cycle Source catalog (www.adventurecycling.org).

Revive!

I was shopping for a comfort bicycle, something I could ride 6-12 miles a day. I went to all the local bike shops here in St. Louis. At The Bike Center (<http://bikecenterstl.com>) I saw this very cool looking bike called the Revive. I took the bike for a test ride and was immediately sold and purchased the bike. I really like the looks and very conformable ride. I've developed a web page dedicated to the Revive: www.revivedx.com. Here you can see some photos of my Revive DX and some mods that I've made to make the bike my own. I came up with the slogan *Join The Reviveolution* because I really believe this is the way bikes will be like in the future.

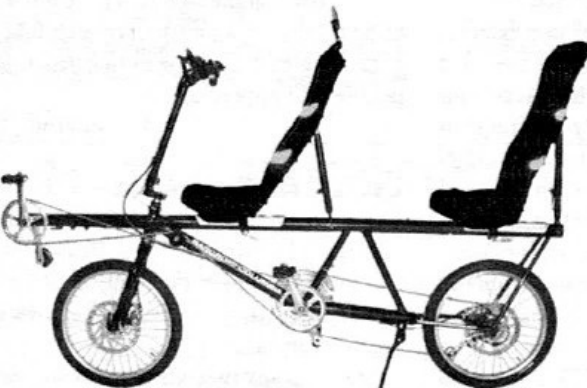
Derek Leath

Easy Reacher Rack

I just received and installed a TerraCycle Easy Reacher Underseat Rack for my RANS Stratus. The workmanship and fit of this product are simply amazing, and once again reflect Pat Franz' commitment to producing quality recumbent products. Visit: <http://rideitbent.net/stratus.htm#reacher> for the full text.

Harv.Welch@gems1.gov.bc.ca ♦

BARCROFT



COLUMBIA

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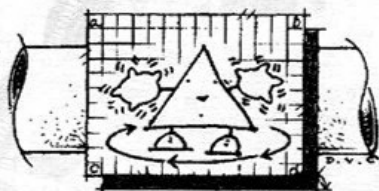
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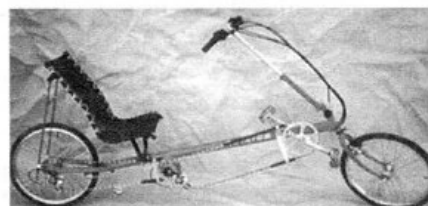


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enough — stiffer than the upline Ti Aero. The seat is firmly mounted and stiff feeling when riding. We detected no slippage in the mounting. Interestingly, the seat will flex when pushed from side to side (done while off the bike). The seat removes quickly by loosening two allen bolts (at the base) and pulling the two ball-detent pins.

The Corsa's yellow finish is stunning and the build quality is excellent. It looks as good or better than other frames in this price range, including some built in the USA.

Fork: The fork is a lightweight Kinesis carbon fiber road 650c fork. It's beautiful, stiff and reasonably lightweight. There are lighter, more expensive forks available.

Steering: The Corsa comes outfitted with a TerraCycles GlideFlex with Bacchetta top load stem and the unique "U" shaped, double bend Bacchetta aluminum bars. This set-up is the finest OSS stem/riser recumbency has to offer these days. While a tad heavier, it offers more adjustability than the lighter fixed OSS stem/riser on the Aero.

The stem has a fore/aft adjustment and the risers are top loading, which means two bolts and your handlebars are off.

Expect to spend some time adjusting the seat recline, and the stem/riser position, knee clearance and handlebar angle to suit you. The idea is to get the bars down low to just clear your knees.

Weight: The Corsa's 26 pound weight is impressive. In contrast, the Strada weighs 30 pounds, and the Aero 22.2 (these weights are fairly accurate, but may vary a bit; 22.2 was a 2004 Aero weighed on a commercial digital scale by Bacchetta). There is a frame weight difference of 3 pounds between the Corsa (CroMo) and Aero (Ti). The Aero's carbon fiber seat is .4-.5 pounds lighter than the Corsa's fiberglass.

The Corsa could lose 1-2 pounds by changing to a lighter wheel and tire set, a lighter carbon fork, and carbon fiber seat. If you're planning to make these upgrades, you may be better served by buying an Aero.

DRIVETRAIN

Components: The Corsa's parts are a carefully thought out group that all work in unison making this bike feel like a road racer. A smooth American Classic ISIS spline bottom bracket holds a gorgeous FSA CarbonPro crankset running a SRAM PC59 chain. Derailleurs are Shimano Ultegra, front and rear, shifted by SRAM Rocket twist grips. DuraAce bar-cons would be a very cool roadie-like upgrade on the Corsa.

Chain management: Bacchetta's X-path (over and under one idler in an x-formation) chain management works better than most



The screaming yellow 26-pound Bacchetta Corsa

and is quiet and smooth.

Gearing: The Corsa's gearing is quite high, with a range of 29-112. While fine for flat terrain or a really strong rider, the low gear is not low enough for my knees on NW hills.

The crankset is a 32/44/55 and the cassette is a 12-27. The 571mm 650c wheel actually measures out to a 24.5" diameter.

A wider-range gearing set up should be possible. RCN reader Bob Rogers had Angle Lake Cyclery in Seattle install a 26/42/52 crankset, 11-32 cassette and a Deore long cage derailleur on his Aero (20-116 gear inch range). Zach Kaplan has set up an 11-34 Dura Ace triple equipped Aero.

Braking: The braking on the Corsa is

For

1. Beautiful frame
2. Beautiful finish
3. Stiff enough
4. Fast
5. Less expensive than an Aero

Against

1. Front brake a bit mushy
2. No fenders on this one
3. Limited gear range
4. Very high pedal height (BB)
5. Expensive for made in Taiwan

Why Buy This Bike

Faster than a speeding Strada, less wallet burn than an Aero

Contact

Bacchetta Bicycles
Web: www.bacchettabikes.com

Specifications

Model: Bacchetta Corsa
Type: SWB Highracer
Size: One size fits most
Wheelbase: 46-inches
Seat height: 22-22.5-inches
Pedal height: 31-31.5-inches
Weight: 26 pounds (RCN/Bacchetta)
Frame: CroMo
Fork: Kinesis Carbon Road 650c
Price: \$2,600

Seat

Back: M5 Fiberglass

Components

Crank: FSA CarbonPro 32/44/55
Bottom bracket: American Classic ISIS
Headset — FSA 1" Cartridge
Drivetrain: Shimano Ultegra
Cassette: Shimano 12-27 9-speed
Shifters: SRAM Rocket
Chain — SRAM PC59
Gear inch range: 29-112
Pedals: Wellgo LU 0897
Wheels: ALEX 300 Trl 650c 24-spoke
Tires: Kenda Concept 650c 571mm 110psi
Brakes: Avid Single Digit V/Dual Pivot (ft)
Colors: Yellow

slightly improved over the Aero with the mixed V- and dual pivot sidepull brakeset. The fine quality Avid Single Digit V-brake offers exceptional stopping power. In contrast, the front Bacchetta dual pivot sidepull feels less powerful and not quite firm enough. It would be great to have a V-brake on the front of the Corsa, but then you'd need a heavier CroMo or aluminum fork. For 2004, Bacchetta has upgraded the Aero's side-pull brake pads to Koolsof Salmon pads. For riders who want to improve the Corsa front braking, this would be an affordable option.

Wheels and Tires: The Corsa comes with racey ALEX 300 TRi 650c 24-spoke wheels. The bike comes with Kenda Concept 650c 571mm 110 psi tires. The Aero comes with a bit better wheels (Velocity Spartacus Pro) and Vredestein Fortezza 145 psi tires. Upgrading to these tires would be a hot setup.

The Corsa will accept 559 mm 26" wheels with just a brake pad adjustment. A 26" fat slick version would be pretty cool.

COMFORT

The Euro style M5 fiberglass seat is surprisingly comfy once you assume the laid back position. The M5 seat comes in two sizes, medium and large, with a new small size coming (mainly for the Basso). The actual base section of this seat is fairly small, so it's a good thing that much of your weight is rested on your back. The seat foam is light and breathable, but compresses quickly.

The downside with the M5 seats (carbon and fiberglass) is that the weights can vary a bit from seat to seat. Technology does exist to produce seat shells that have a more predictable weight, but so far there is no seat maker using it.

This is not your old school "begging hampster" SWB OSS position. The riding position is laid back (22-30° seat angle), the bottom bracket height is 9 inches higher than the seat base and your arms reach out in front of you like a superhero. While it's an aggressive position, I was able to dial in a recline adjustment that worked well for me.

The shell isn't as comfy as Bacchetta's ReCurve mesh seat, but it will offer a performance increase for most riders and it is lighter in weight. I recommend that you try the M5 seat for an hour or so before you buy. If you want a ReCurve, which is one of the most comfy seats in the recumbent world, you'll have to buy a Giro or Strada.

RIDE

Stability: As SWB recumbents go, the Corsa has a relatively long wheelbase (46"). The big wheels give the bike more gyroscopic tendency than a recumbent with a small front wheel. The recumbent roadie geometry is just right. All combined produce a very stable road feel. If there is a concern, it might be in the laid back

position, or "tweener" style bars. The reach backs of the bars could hit me on the outside of my thigh in some turns and small turning corrections. This is a high speed bike, and isn't as maneuverable as a recumbent designed for low speed, urban and city riding. Low speed maneuverability can be more challenging. Sharp turns require dropping and straightening your leg. This might be a big deal to the uninitiated, but most will get the hang of it right away. New skills like this should be practiced, as you are laid back and your feet are quite high off the ground.

The smoothness of the Corsa's ride is impressive. The bike isn't as stiff riding as you'd expect, possibly due to the monotube frame design.

Performance: The Corsa is a fast bike. It accelerates well, but really shines once you're rolling. You really feel those tall and skinny high pressure tires and the added gyroscopic tendency of the big wheels.

Climbing: Most riders will tell you that the lightweight Highracers are the best climbing recumbents out there. The Corsa fits the bill and climbs fast and strong. You'll need to acclimate and build up strength, as the low gear isn't that low. If you'd like more info on this, read my *Gear Inch Rant* from RCN 079 (I think most recumbent gearing is too high)

Riding a Highracer is a unique experience. While not as user-friendly as a LWB OSS or performance trike, the road feeling is very road-bike-like.

OWNING

Utility: The Bacchetta performance models are not utilitarian urban commuters. They are "no excuses" performance recumbents. If you need fenders, superfat tires or heavy cargo capacity this just isn't your bike. It's a simple, straightforward road bike. If you need more utility, opt for the Giro or build a dual big wheel fat tire Strada (same frameset as a Corsa).

For city riding, the laid back position and high BB do make starts and stops a bit more difficult, but this isn't really a beginner bike.

Purchase Details: Bacchetta's are sold through dealers. The company does not allow Internet sales. You actually have to visit a Bacchetta dealer and have your dealer fit the bike to you — a commendable marketing plan.

Options & Accessories: Bacchetta has a new petite size (6061-T6) aluminum Back Rack that bolts on the dropouts and seat braces.

The One For All (OFA; \$80 MSRP) is a Bacchetta seat bag that fits the M5 seat (optional adapter lets it fit mesh back seats; \$102 MSRP for bag/adapter). This is a beautiful bag that offers more utility for your speedy Corsa.

Two other bags, the small and large BrainBox, are also offered for the bike.

MARKET

Bacchetta pretty much invented the Highracer

market, in the USA. New competitors have one-upped Bacchetta in the entry level and mid-range of the Highracer market.

At RANS, a Force5 XP is just \$2,200, and is projected to weigh just under 26 pounds. Volae has the Waterford-USA built Club LX model for \$2,400, which is also projected to weigh 26 pounds, and the Volae Team model sells for \$3,000 and is also projected to weigh 24 pounds. I say "projected" because the Waterford Volae's and RANS Force5's have not been weighed or reviewed by anyone as of this writing. Volae's must be purchased mail order from the Hostel Shoppe. The RANS and Volae are built in the USA of round tubing. The Force5 has a unique trussed frame.

VERDICT

My brain went into warp-drive when trying to make sense of this sleek new Highracer. Here are my somewhat rambling thoughts about the bike:

While I'm completely infatuated with the simplicity, light weight and performance aspects of Highracers, they don't work for everyone. The ergonomics of the Bacchetta are exceptional. The bike looks extreme, and by our definition, it is. Through careful design integration of the seat position, mainframe, bottom bracket position, Flexstem stem/riser, and Bacchetta bars, the position is as user-friendly as it can be. Still, we hear from some riders who just can't handle the laid back seat, or high bottom bracket, or perhaps would just prefer a less aggressive rider position.

Oval Tubes: The design and integration of the oval tubes on a monotube sets the Bacchetta apart from the other Highracers. The Corsa's CroMo frame has a dialed in mix of stiffness with a touch of flex providing excellent power to the road. This has become a hot topic and some designers don't feel that there's any benefit to the ovalized tubes. And some riders may not notice any difference or prefer design at-

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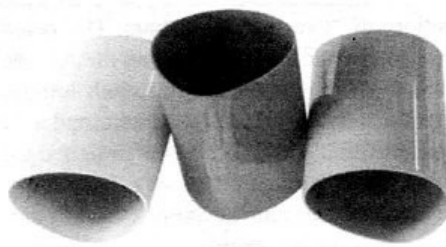


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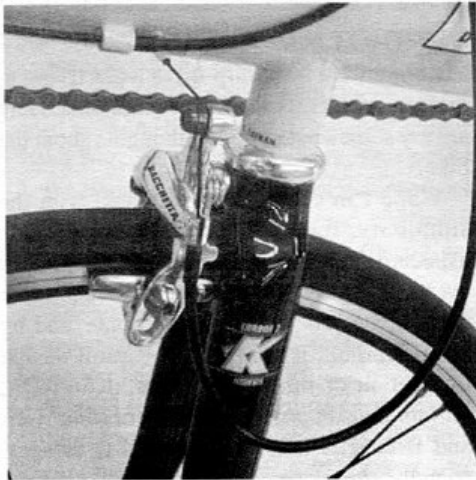
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Above/center: The ovalized Bacchetta tubing
 Top: The Corsa
 Right: Rich Pinto on the Corsa
 Photos courtesy of Bacchetta



Note the Kinesis carbon fork



Note the carbon crankset

What Kind of Performance Works Best for You?

These days there are two distinct camps in the recumbent performance crowd: those who opt for lightweight bikes, like the Corsa or Aero, and those who prefer a heavier bike with aero add-ons, such as fairings, tailboxes, and bodystockings. We can't say which is ultimately faster. It probably depends on:

- Your home terrain
- Your riding style
- Which style of bike works best for you
- How much stuff you like to carry

Highracer performance offers more acceptable performance from an upright-bicycle perspective (fairings are looked at as cheating and light weight and big wheel are good). If you trash all the roadies, you still may be considered a cheater for having an unfair aerodynamic advantage (recumbent position). It's a difficult situation.

Highracer performance is about as good as it gets in the recumbent fast crowd. The Corsa is a second tier performance Highracer (Aero being a first tier). The bikes have aero wheels, high pressure tires, roadie components and an aerodynamic riding position. They are light and fast — just like an upright road bike.

The trick will be to decide for yourself if you're into lightweight Highracer performance or if you don't care about weight so much and are into performance add-ons.

Many people have asked about Easy Racer comparisons. I'd say it's about as fast as an Easy Racer with a Super Zipper, but half the riders will be faster, and the other half slower. I think the partially faired LWB (especially with a body stocking) has the ability to be faster on flats and downhill. The Bacchetta should be faster uphill once you get accustomed to the position and taller gearing. ♦

tributes of other Highracers. Bacchetta's ovalized tubes look good — and if they stiffen the frame, that's a plus.

Tough: The Corsa seems pretty tough. The frame is rated for riders up to 275. I was a bit concerned about the lightweight performance ALEX 300 Tri 650c wheels, but we had no problems with them during our test.

Lightweight: These bikes are lightweight and are setting new standards for performance recumbent bike weights. Enthusiasts will eventually get it that they can save 5, 10 or 15 pounds over their American style SWB or LWB recumbent.

Conclusion: Bacchetta is the first manufacturer to take a chance with Highracer and has really got it right. The bikes are light, fast and feel very refined. Bacchetta also has an extremely loyal owners group (bacchetta bikes yahoo group).

The Bacchetta design has been in the minds of Mark Colliton, John Schlitter and Rich Pinto for years — it's an evolution and cumulation of their recumbent performance road experiences over the past ten or so years.

While there may be other Highracers that look similar, offer better value, better specs, or a factory with a USA address, Bacchetta has set a trend. Followers will need to work to catch up. Besides building good bikes, Bacchetta has revitalized SWB design, changed the way we look at performance recumbents and developed a new roadie recumbent market in the process. Pretty cool, huh? ♦

Corsa/Aero Brake Upgrades

The Bacchetta sidepull brake isn't as powerful or as firm feeling as a Shimano dual pivot sidepull brake. With Bacchetta's composite forks, you cannot mount the brake off the back side of the fork. So intrepid enthusiasts must find other ways to improve side-pull braking performance.

Harry Wozniak of Wheel & Sprocket in Hales Corner, Wisconsin called to chat other day. Harry says that they have improved the braking of Bacchetta Aero (and could do it on Corsa). The first thing to change is the sidepull brake pads to Koolstop Salmon (stock on the 2004 Aero). Harry then uses TerraCycles bolt on cable stops (\$25 a pair) and runs naked brake cables on the steering riser. He says this upgrade offers a noticeable improvement. For the rear brake, they fabricate bolt-on cable stops and run naked cable under the seat (the length of the Aero seat track). Wheel & Sprocket also uses a brake spring gadget called a "Travel Agent" to improve rear braking on the Aero. To purchase these parts, give Harry a call at Wheel & Sprocket: 800-362-4537.

TerraCycle parts and Koolstop Salmon pads can be purchased from your favorite recumbent specialist. ♦



Nanda Holz with his Bacchetta Giro and our tinted LC Flyer fairing. The LC Flyer fairing is 6" shorter than the Chopper fairing.



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— Nanda Holz

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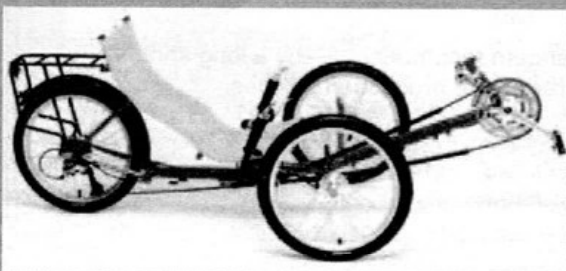
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RCN Road Test: The Sun EZ Tandem CX

By Bob Bryant

Since the demise of BikeE, Sun has quickly taken the lead position as the world's largest selling recumbent bicycle manufacturer. Sun has an aggressive plan to introduce several new models over the next few years. The EZ Tandem has been in the works for years. In fact, I can recall riding a similar prototype years ago at the Easy Racers factory in Watsonville, California. The new EZ tandem is a recreational double that has an affordable price and is high in value.

The Sun tandem is a welcome addition to the world of recumbency. It's far more affordable than any other recumbent tandem and it's more user-friendly and should be readily available at more dealers.

Systems

Frame: The EZ Tandem CX's frame and fork are TIG welded CroMo. Both are made in Taiwan for Sun/J&B under license from Easy Racers (designers). We found the build quality to be fine, on a par with the EZ Sport.

Steering: The Tandem has EZ Sport style aluminum OSS "chopper" bars connected to a quill stem. The head tube angle is a bit more upright than the Tour Easy or Gold Rush, and the handling isn't quite as *sweet*.

Finish: The CX comes in gold powder-coat. The aluminum AX comes in silver.

Weight: The EZ Tandem specs say it's supposed to weigh 59 pounds. We put it on our scale, which is what it weighed. It's no lightweight, that's for sure. Add racks and fenders and it gets worse. However, it's still lighter than a pair of EZ or Tour Easy singles.

Drivetrain

Components: While the bike is designed as an entry level recreational tandem, the components are better than expected. Highlights include:

- Deore rear derailleur
- American Classic hubs
- Sun Rims
- Tektro disc brakes

The most expensive component on a tandem is the crankset with cross-over. On the EZ Tandem CX, it's a generic alloy 30/42/52 tandem crankset 170 mm crank arms. If these are short for you, as they were for me, you're out of luck. The derailleurs are a Shimano FD 443 front and Deore rear,



The 2004 Sun EZ Tandem CX

For

1. Affordable
2. Better than expected
3. Durable
4. Decent componentry
5. EZ to ride

Against

1. Long
2. Heavy
3. Rattling seat parts
4. No drag brake
5. SRAM Verio shifters

Why Buy This Bike

This is clearly the best buy in tandem recumbency — by a long shot. It's a good utilitarian ride, despite a few minor production glitches.

Contact

Sun Recumbents
Web: www.sunbicycles.com

Specifications

Model: Sun EZ Tandem CX
Type: LWB tandem
Size: One size fits most
Wheelbase: 91-inches
Seat height: 26"
Pedal height: 19.25" (C); 13" (S)
Weight: 59 pounds
Frame: CroMo TIG
Fork: CroMo
Price: \$1,950

Seat

Back: Sun Aluminum with mesh
Base: Foam and lycra covered wood

Components

Crank: Alloy 170 mm 30/42/52
Bottom bracket: Sealed
Headset — 1-1/8" sealed
Derailleurs: Shimano Deore/443 (front)
Cassette: Shimano 11-34 9-speed
Shifters: SRAM Vario twist
Chain: N/A
Gear inch range: 22-118
Pedals: Wellgo LU 982
Wheels: 26/20 Sun rims/Am. Classic hubs
Tires: Kenda Kwest 100 spi
Brakes: Tektro disc
Colors: Gold

shifted by SRAM Verio twists with that silly little dial indicator. These shifters look a bit cheesy, but have worked fine on several of our test bikes. The rear cassette is a Shimano 11-34 9-speed.

Chain management: The CX's system is much like that of a conventional tandem. The chains may be a bit longer, but at this length, who's counting links, right? The one addition is a rear skate wheel style idler which was trouble free.

Braking: The tandem comes with Shimano Deore disc brakes controlled by Tektro levers. While the braking was fine for our recreational use, having descended rocky mountain passes, I prefer a 3rd brake for serious mountain riding. Unfortunately, a tandem drag brake cannot be added to the EZ Tandem.

Wheels and Tires: The wheels are better than you'd expect on an entry level tandem. The hubs are American Classic disc brake hubs (front and rear). The rear wheel is a tandem 48 spoke, the front is a 36 spoke. Rims are Sun SL-1 Singletracks. Our wheels were completely trouble free.

The EZ Tandem comes outfitted with Kenda Kwest 1.5 100 psi tires — a perfect choice for this double recumbent.

Comfort

Seat: The EZ Tandem is outfitted with a pair of Sun's aluminum framed Cool Back seats. The stoker seat has an under-seat handlebar (with bar-ends). The seat back is an adjustable mesh (straps) that is very comfortable. The base is not as comfortable as an Easy Racers seat. Foam sits on top of a wood base (updated for '05?). Heavier riders may find this isn't as comfortable as the Easy Racers seat for long rides.

The seats slide on top of the frame's rectangular top tube and each have dual quick releases underneath. The captain seat has a solo rear seat support, and the stoker is a double (a la EZ Sport). Both are adjusted with quick release pins.

One criticism we have about all of the Sun EZ bikes is that the seats are noisy due to rattling parts. A patient owner or knowledgeable dealer should be able to solve these rattles with some washers, rubber spacers and/or tape.

Riding Position: The EZ Tandem's riding position is about as user friendly and "EZ" as it could be. The upright seats and low BB's will have most anyone feeling right at home on this tandem. It's about the same riding position as an EZ-1 or EZ Sport.

Ride and Handling

The EZ Tandem is more a double EZ Sport than it is a double Tour Easy. The bike needs to be taller to fit the stoker pedals under the seat. The steering geometry isn't as fluid or graceful as a Tour Easy, but it feels good and I believe it's about as good as it can be. My ref-



Amy & Daniel Bryant test out the EZ Sport tandem

erence for this comment is riding previous Easy Racer tandem prototypes.

The EZ Tandem is stable and predictable to ride, and tracks well, again, more like an EZ Sport than a Tour Easy. Once you get accustomed to the length of the bike, you need to develop a good communication with your stoker (this is a must). Maneuverability can be difficult. However, you just need more room to turn it around. On our narrow street, we had to go to the intersection to take a big wide sweep to turn it around.

Performance: Flat land performance wasn't as fast as our Tour Easy test bike. The bike isn't as aerodynamic. However, you've got two times the power. We were impressed by our flat land and downhill performance.

Climbing: Tandems are slow climbing and the EZ Tandem's 59 pounds and 9.5 foot length complicate this even more. I rode all of my usual recumbent routes and never pushed up a hill. My kids (the stokers) said it was easier than riding their mountain bikes. I do feel the gearing (22-118 gear inches) isn't low enough for serious mountain climbing, however. This tandem could use a lower low gear.

Owning

Utility: This is a long bike. Any and all tandems are difficult to turn due to the additional rider and weight. The low bottom brackets (BBs) help to make this one user-friendly, but it's still 9.5 feet long. Carrying the tandem on your car will be difficult unless you opt for ATOC's new TT EZT rack tray designed to haul this big bike (www.atoc.com).

Options & accessories: Sun offers a rear rack, a stoker under-seat pannier rack, a rear seat basket, the EZ Messenger bag that will fit the stoker seat back, a fender set and a small Edge fairing (small; comes down to the top of

the head tube). I'm sure a Super Zzipper could be adapted as well.

Market Competition

Comparison: There is really no direct competition for the EZ Tandem. The only other competitor was the BikeE. If you don't want a LWB tandem, you can step up to the RANS Screamer Sport or Barcroft Columbia. The Columbia is the more user-friendly of the two, and weighs 13 pounds less than the EZ Tandem! There may be other tandems available, but they will take more detective work to track down and purchase.

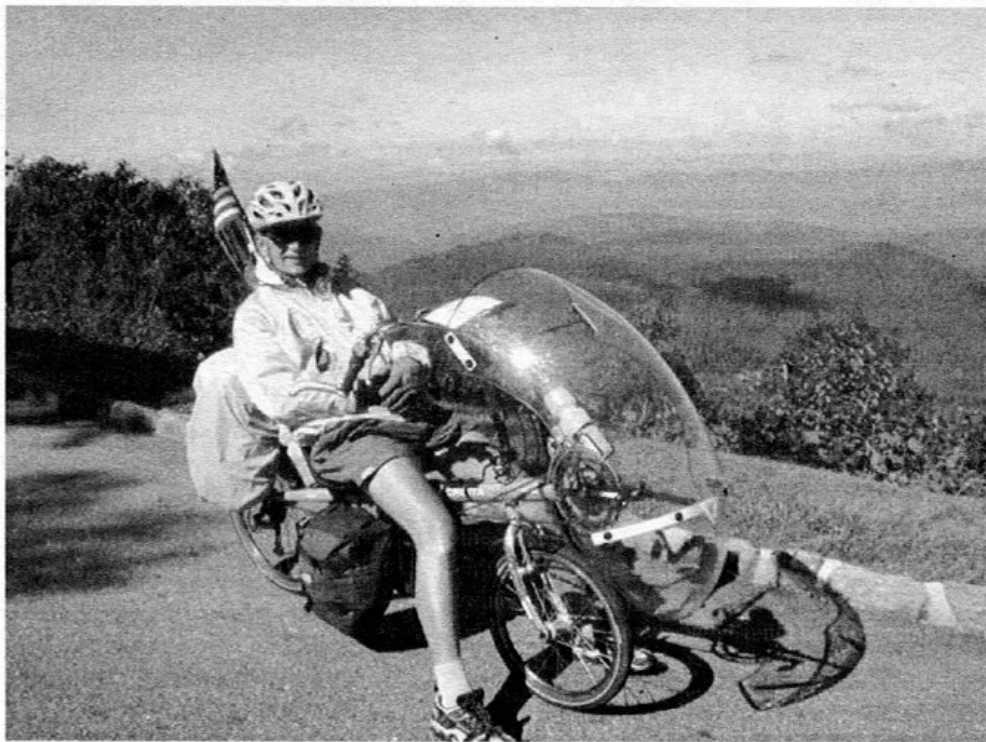
The EZ Tandem offers value like no other we've seen. Used EZ Tandems can be found in the \$1,500 range and we've seen some on eBay as well. Just keep in mind that shipping can be costly. We shipped ours down from Washington to California for \$100. We had other quotes as high as \$250. Also, assembly can be time consuming, and it could cost \$100 or so to get it assembled.

A second model aluminum EZ Tandem "AX" is due out in 2004 (\$2,695). The AX is equipped with Vision IPS (independent pedaling for captain and stoker), has SRAM X.9 derailleurs and shifters, Avid disc brakes, Speed Lever handles and weighs 6 pounds less at 53 pounds.

Verdict

While the Sun tandem is a medium quality grade recumbent, it's quite impressive for the price point. Any criticisms we have can be quickly argued away by the bargain price. Minor nit-picks like the rattling seat parts can be corrected by owners and dealers. Overall, the details of the Sun recumbents are *not* on a

Continued on page 28



The author, Bob Kropfli on his Bacchetta Giro

A Recumbent Tour

By Bob Kropfli
rkropfli@starband.net

What a concept — to travel from our home northwest of Denver to see our friends in suburban Washington DC and Baltimore by means of our own leg power. My wife, Diane, and I dreamed about doing this on our recumbents and doing it unsupported. Diane rides a Longbike Slipstream and I ride a Bacchetta Giro. Over the years we had done other long distance tours on our Trek 520s (upright touring bikes), and were always enthralled with the feeling of being self-contained and completely dependent on our own wits and creative instincts. But we thought that the comfort of our fairly new recumbents would make such a tour even more enjoyable. For the most part, that turned out to be the case. Little did we realize, however, how much we'd be challenged. Our adventure turned out to be an exercise in problem solving and perseverance. Here's our story:

A group of our biking friends were fascinated by our plans, and so about a dozen of them rode various portions of the ride with us the first day. I think they were mostly curious about whether or not we would actually do it. We weighed everything just before we left and discovered that Diane and I were carrying 30 lbs. and 42 lbs. respectively in our panniers. That made the total weight of our bikes 84 lbs. and 90 lbs. Racks, fairings, full water bottles and an oversupply of power bars can really add up. We had spent months going over what

to take and, more importantly, what not to take and were unpleasantly surprised at the weight. As expected, though, the weight didn't matter much on the flats but was a killer once we got into the hills. Although we planned to stay at motels along the way, we decided to take a lightweight tent and sleeping bags just in case. That worked on other trips, but as will be explained later, the tent wasn't necessary on this one. So on August 31, 2003 six of us headed out from our house in the foothills northwest of Denver where we met up with another group of friends at the local REI store. The Starbucks there was a great start to the trip and provided us with our last real coffee for the following two weeks.

We got into our first hills soon after leaving Parker, Colorado as we climbed over the eastern flank of the Palmer Divide. After those hills we faced three days of 10 mph head winds that kept our average speed at 12 mph and average daily distance at 59 miles for the first five days. I had hoped we would do better especially since I had replaced the Giro's 52 tooth chainring with a 56-tooth ring which I had considered my *Kansas gear*. I had visions of screaming across eastern Colorado and the Kansas plains at 125 gear-inches, but that turned out to be more wishful thinking than reality. I hardly used that combination at all during the tour. Strong side and front quarter winds kept us in the middle ring throughout

most of Kansas. Bacchetta had it figured out just about right when they chose the 52-tooth ring, and I shouldn't have messed with it. However, I also replaced the 30-tooth ring with a 26, and I was pleased with that in the hills:

Things went smoothly the first week, and we were feeling comfortable with our pace, our equipment, the road conditions and the surprisingly considerate truck drivers in central Kansas. The commercial truckers generally gave us a wide berth and resisted the temptation to impress us with their air horns as they passed.

Just east of Ness City we had our first near-death experience. We had stopped on the shoulder just off the road to exchange greetings with the first touring cyclist we had seen on the other side of the highway. Just as he started to relate how bad the riding conditions were in Missouri, I felt as though I had been hit in the back of the head with a baseball bat. I was stunned, not sure of what had happened. The first thing I noticed was Diane on the ground with a bad cut over her eye. "It was a big, green, piece of farm equipment!" according to the other biker. Apparently, a field cultivator with something hanging far out over its right side hit us and smashed our helmets. We were highly visible with bright orange pannier covers and raised flags. You would have had to be blind to not see us. The driver never stopped, and we didn't even get a glimpse of him. Undoubtedly the helmets saved our lives, and being low to the ground as we sat on our recumbents probably prevented more serious injuries. It took 30 stitches in the Ness City emergency room to patch both of us up.

We spent the next two days in Great Bend reestablishing our nerve and making the decision to push on. Fortunately, we found the well-equipped Golden Belt Bike Shop run by Doug Chambers where we were able to replace our broken helmets. While Doug doesn't sell recumbents, he knows them to a great extent, probably because of his friendship with Bacchetta's John Schlitter in neighboring Hays, Kansas. Golden Belt is near one of the best coffee shops in Kansas, so after a stop there we continued our trip with renewed energy and determination. The caffeine fix did wonders for us.

As we approached Osage City in eastern Kansas we were surprised when a school bus abruptly pulled over and the driver yelled out to us. Jim Coen, the bus driver who also serves as a high school history teacher, was an enthusiastic recumbent rider; he wanted to find out where we were from and where we were going. Jim invited us to stay overnight at his home and exchange recumbent stories. We accepted and spent hours discussing recumbent adventures with Jim and his wife Kathy.

Folks in Missouri had an interesting reaction to us. As we continued farther into Mis-

souri we began to see more and more people break out into hysterical laughter — not just curiosity, the usual reaction when seeing a recumbent for the first time, but real laughter and finger pointing. Apparently, they had never seen a recumbent before, and perhaps thought we were doing it as a stunt.

We were gaining back our confidence as we approached Clinton, Missouri. There at the western end of the Katy Trail we were joined by our two friends, Cliff and Carol Rufenach. They had driven from Lyons, Colorado to ride the Katy with us. We had a lot to talk about already, and we were only two weeks into our ride.

The Katy Trail, named after the MKT (Missouri, Kansas, Texas) railroad line, was wonderful and, most importantly in our view, safe. The Katy has no racing SUVs, trucks or farm equipment for the 225 miles from Clinton to St. Charles just outside of St. Louis, and it gave us time to consider our options. We were still considering at that point whether or not to bail out. The Katy is a railroad-grade bike path of crushed limestone that was in very good shape during our ride. Nevertheless, rolling resistance was noticeably greater than on pavement. We averaged less than 11 mph over grades that seldom exceeded 3% on the Katy. We didn't mind the slow pace at all since the ride was so scenic.

The Katy starts out through rolling farmland and soon joins the Missouri River and

Lewis and Clark country where it becomes wooded and runs along dramatic limestone cliffs. Historic towns along the way seemed to be at just the right distance apart to make things interesting. Just about everything you need to know about the Katy can be found in Brett Dufur's excellent book, *The Complete Katy Trail Guidebook*. It's a must read if you plan to ride the Katy.


We talked to bikers and bike shop owners at every opportunity as we continued along the Katy about riding conditions on the secondary roads in eastern Missouri. We certainly didn't want to be responsible for getting more blood on someone's farm equipment, if at all possible. Typical responses were "narrow hilly roads with lots of blind curves," "no shoulders," "lots of logging trucks," "I wouldn't think of riding a bike on Missouri roads" and "expect lots of profanity and occasional tossed beer cans." More than once we heard, "Just wait until you get into Kentucky!" We were still hoping for someone to say "Yes, that's a great idea. I rode down to southeast Missouri earlier this year and indeed it was safe!" Through it all, Cliff and Carol were very patient with us, even though we changed our minds several times a day about whether or not to continue.

We finally hit on an idea that salvaged the trip for us. We decided to rent a minivan from St. Louis to Roanoke, Virginia where we would get onto the Blue Ridge Parkway and then con-

tinue northeastward onto the Skyline Drive. No commercial vehicles (or farm equipment) are allowed on these parkway roads and the speed limit is 45 mph. We were there too early for fall colors and expected the traffic to be minimal. It was. So we parted company with Cliff and Carol in Hermann, Missouri and did the last 68 miles to the eastern end of the Katy at St. Charles. That turned out to be one long day on the crushed limestone surface. We were pleasantly surprised when our rather long bikes, especially Diane's, fit perfectly into the Ford Aerostar van after removing nothing more than the fairings.

I expected we'd be in such great shape by the time we reached Virginia that the hills would be no problem in spite of the weight of our loaded recumbents. That was more wishful thinking on my part. Even though we had mailed home some items at various times, the loaded bikes still weighed over 75 lbs when we had our most difficult day of the trip. We logged an accumulated vertical gain of 6,000 feet on our last day on the Skyline Drive. Who says recumbents don't climb? All one needs is a low, low gear and strong legs.


As expected, the views along the parkway were spectacular. What was unexpected was the perfect weather we had. More often than not it's foggy and drizzly on the ridge, but we hit it just right. The scenic pullouts were always fun, not only for the views but also to hear the reactions from people asking how far



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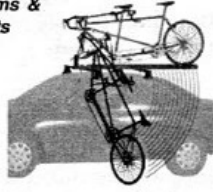
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Bob and Diane on the tour

we had come and what these strange contraptions were that we were riding. When we told them Denver to St. Louis and Roanoke to wherever we were, most often that just didn't compute. Most folks could not even comprehend such a ride and a few were convinced we had motors concealed somewhere. However, it was even more fun talking to those that did understand.

We met two such folks on the Parkway near Lynchburg, and they fully understood what we were doing. They invited us to their home to have dinner and discuss the pros and cons of recumbents, which we were always happy to do. Of course we accepted this invitation since that night would have been the first (and only) time we would have needed to use the tent. These were two very serious touring cyclists and, in fact, Becky Hawkins and Jo Todd were tour guides for WomenTours. Becky was even one of the founders of that organization. By the end of the evening I think they were ready to trade their wedgies for recumbents in spite of living in very hilly terrain. Their great hot tub is something we will not soon forget.

One of the most unusual bike failures I have ever experienced happened when climbing a moderate hill on the Parkway. It felt to me like

the chain had slipped between the cassette and the spokes, but it turned out to be far worse. A link in the chain had come apart and pulled the derailleur back into the cassette. Both the derailleur and its hanger were bent. I had just *fixed* the link five minutes earlier, but apparently not well enough.

So I sat with the bike for nearly two hours while Diane went back to the Peaks of Otter resort to find help. She succeeded admirably. Two wonderful people, Bob and Nancy Linky, gave up most of their day to take us to the nearest bike shop 35 miles away. With the right tool the hanger was easily realigned, a new derailleur was installed, the bad link removed, and the bike was ready to go. Bob waited the hour it took and drove me back up to Peaks of Otter where the four of us had a great dinner. We met such wonderful people along the way, the Linkys, Jo, Becky and the Coens. Meetings like these always make a trip something to remember.

The range of experiences we had over the last 10 days of our tour was no less than the first month. As we progressed closer to the DC metropolitan area, the traffic got worse. What used to be a relaxing ride through the scenic Virginia and Maryland farmland and horse

country when I lived near there long ago is still beautiful, but now the roads are speedways clogged with racing SUVs, cars and trucks. Roads are narrow with no shoulders and lots of blind turns. We had many close calls even though we rode single file to the far right side, almost always on secondary roads. The day before we were to ride Highway 15 northward out of Leesburg VA, four riders were hit from behind and two of them were critically hurt. Needless to say, it was a white-knuckle ride from Front Royal Virginia all the way to suburban Maryland some 40 miles from DC.

In spite of the accident in Kansas and the maddening NASCAR-style traffic we encountered in Virginia and Maryland, overall we had more positive experiences than negative. It's hard to explain the wonderful feeling of being totally self-contained and self-powered and having the goal of transporting ourselves over a good portion of the continent. I've mentioned the wonderful people we met along the way — that probably was the biggest thrill.

We learned a lot about ourselves on this trip. We learned that we weren't quite as tough as we had thought, since we decided to drive a portion of our intended bike route after hearing horror stories about road conditions and drivers in Missouri and Kentucky.

We are both very happy to have done this trip, but we don't expect to ever do another one like it without getting first hand, up-to-date information about traffic and road conditions. Simply relying on maps and selecting secondary roads did not work well for us. Of course there are always group tours and that does take some of the danger out of a tour, but it also takes away some of the adventure. Maybe we'll try one next time. ♦

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LWB Skidding What Can Be Done

By Charles Brown

There have been a few letters in recent RCN issues about the front wheels of long wheelbase (LWB) recumbents slipping out. I've done lots of experiments on this subject, and would like to offer my views on the matter. The skidding would be worst, at a given speed, on LWB's with the same size wheels on both ends, and bikes like the compact long-wheelbase variety which have very little weight on the front end.

The inertial forces due to cornering vary with the square of the speed; go around the same corner twice as fast and you put four times the sideways force on the tires. Note that most letters are complaining about Easy Racer Tour Easy's. This bike is actually less prone to this problem at a given speed than most LWB's. The problem is that this 25-year old design still blows the pedals off of almost any LWB out there. Faster speeds means more likelihood of skidding.

The ideal amount of weight to put on each wheel varies with its diameter. With the 700c/20 wheel combination, my own testing shows that about 40-45% of the weight on the front wheel would be optimal. Within this range, assuming wheelbase and rider height were constant, and no suspension, the 40% would give a little bit smoother ride, the 45% would give a little bit better road holding. In real world riding, you'd barely notice the difference.

Just try to design a good, practical 700c/20 LWB with 40 to 45% weight on the front. I hope you have better luck than I've had. The front wheel and pedals tend to interfere with each other. I've built several long- and mid-wheelbase bikes with 16" front wheels in an attempt to solve this. They steered beautifully at low speeds, but at high speeds and for long cruises, I missed the steadying, gyroscopic effect of the bigger wheels. It took more attention than I would like to hold a straight course. I tried many changes with the fork rake and handlebars, but was unable to cure it. Steering feel is highly subjective, so it is possible the fault lies with the tester. These tests were with the low steering angles usually found on over-seat steering recumbents., 16" front wheels with steering angles of about 70 degrees or more track much better.

What Can Be Done?

It would be best if the rear wheel would start to slide just a bit before the front wheel does, thus the wheel which does the steering still has a bit of control and it's possible for the rider to

steer into the slide and recover without going down. I suggest that the front tire be the skinniest highest pressure tire that will fit, and the back be significantly wider.

Secondly, the rear brake should be vastly stronger than the front one. Save money and put a wimpy brake on the front. In my years I've come across numerous examples. Put a real boat anchor on the back. Perhaps one of those disc brakes that RCN's Bobby B. is so enamored with. For most purposes, this would be the only brake you would use.

Editor Comments

by Bob Bryant, RCN

I've been riding LWB recumbents since 1987, and haven't experienced front wheel skidding to the extreme. I agree with much of what Mr. Brown says, but I've done no high speed skid tests to back up my own conclusions. Here are some additional thoughts:

1. Bicycles and other wheeled vehicles being propelled on city streets, roads and traffic should be considered dangerous and safety should be of the utmost consideration for all riders. Additionally, bicycles are not really meant to safely travel at over bike trail speeds (15 mph). Their systems are not designed to handle high speeds, and there is little documented information for riders who want to ride bicycles at high speed. Perhaps this is why so few manufacturers want to comment on this topic. It makes sense to me.

2. My first LWB over-seat steering (OSS) recumbents had either weak sidepull brakes or marginal cantilevers. Modern LWB OSS recumbents come outfitted with modern V- and disc brakes that are vastly superior to these old brakes. It's a valid point that perhaps these brakes do offer too much braking power. This is something to think about the next time

LWB Front Wheel Skidding

by Kelvin Clark, Angletech

This is a subject that comes up from time to time, but doesn't happen on every LWB test ride. I have no bar graph studies, just experience with several bikes.

In Colorado we have crushed granite that is sometimes on the road surface, especially on corners. I caution people with LWB's to watch for this type of situation as the front wheel can

On LWB bikes, the front wheel tends to slip out first. Our natural reaction when you feel it start to slide is to slow down. The reason you want virtually all of the braking on the rear is that along with the sideways forces acting on the rear tire, you add all the braking forces, increasing the tendency for the rear wheel to skid, not the front. The practical benefit of this is it stabilizes the vehicle, reducing your speed in a stable, controlled manner.

In this country, the rear brake lever should be on the right (not on the left) so you can signal for your turn and slow down at the same time.

In conclusion, during this study, I've ridden a number of production recumbent bicycles. If I ever quit tinkering and just buy one, it would be an Easy Racer Gold Rush Replica.

you're heading into a fast turn on your LWB and thinking about grabbing your front brake.

And sorry to disappoint you Charles, but if I were building my own bikes, I'd look for some good old fashioned 70s style center pull brakes or dual pivot sidepull brakes!

3. I received two calls from Wheel & Sprocket's Harry Wozniak about these LWB skidding letters. His response was that the owners should consider wider tires with better traction, which makes for more connection to the road. I thought this made good sense. What constitutes a *fat tire* will vary by rider. In my testing I found that too fat (1.95"+) could make the tire roll off the rim more (slip angle).

Harry Wozniak also mentioned proper tire pressure. Riders who are willing to push their bikes to performance levels such as this should pay constant attention to their tires, air pressure levels and what air pressure works best for them.

4. I feel that Mr. Brown offered an excellent description of why 16" front wheels don't work as well on recumbents. In the extreme, this could also be why we're seeing more interest in dual full size wheels. I know every time I ride a LWB OSS recumbent, my first thought is how would it ride with dual 26's.

break traction. This is most likely to be a problem if the turn is off camber or the road is crowned. There is no issue if you're going fast and the road is banked correctly. It's typically not a 50 mph descent issue.

I call this *understeer*, as in when you want to turn left, the front wheel breaks traction and you continue straight. When interviewing clients about a bike purchase I try to factor in whether this would be a likely scenario for them.

I've found this is more likely to occur on USS LWB or high tiller OSS designs where the weight bias is more rearward. Mounting panniers on the front fork is a good way to apply weight to the front wheel on these bikes. I also suggest a wider tire with some tread, like a 20 x 1.75 Tioga Comp ST, which rolls easily, yet has some surface traction for banking into a corner, and is not so fat that it has the *slip angle* effect that Bob mentions in his comments.

Easy Racers tend to be okay in this area most of the time due to a wide variety of frame sizes, so you're rarely at the rear most posi-

tion, and the low tiller situation does put your body weight more forward. One of the most dramatic changes I witnessed was when RANS came out with the T-Bar Tailwind and lengthened the wheelbase to 60." There was a huge difference in front wheel grip. It's a very fine handling bike. The V2 became much improved in '03, and I expect the '04 Stratus will also benefit from the low tiller arrangement.

I've not experienced a small front wheel helping to load the front wheel. I did have an enlightening ride on a 26/26 format Lightfoot Ranger at Interbike this past year. There was a single-track dirt course available, so I checked

it out. I only dabbed my foot one time on an off camber left turn. Otherwise, the bike was impressive, with good traction at both ends and tracked well enough for me to get a little air twice on the down hill, landing in a confident straight line.

With braking, most riders get used to their bike's brakes and adapt. Disc brakes generally don't stop faster and are not grabbier than V brakes.

Consider all factors when choosing a recumbent. This particular trade off is either adaptable to you or not. Your world of circumstances should be fresh in your mind. ♦

LWB Front Wheel Skidding

by Gardner Martin, Easy Racers, Inc.

Nobody likes to crash on a bike, but any two-wheeler can skid out under certain conditions. There have probably been more crashes reported by owners of Easy Racer brand recumbents than other brands because they get ridden in the real world much more than any other brand. At RAGBRAI, Cycle Oregon, Cross Florida, Hostel Shop's and Mt. Airy's annual bent events and many other tours and rides the numbers of our bikes dominate the recumbent ranks. More Gold Rushes and Tour Easys have crossed the USA than any other brand. Most riders have had no problems.

When going around a corner the front wheel of a bike will hit a slippery spot before the rear wheel hits it. So it stands to reason that the front wheel should skid out first, whether it is on an upright or on a recumbent bike. However, this is not always the case.

We estimate that total miles on Gold Rushes and Tour Easys are right around the 150 million mile mark. And we do hear from and we do listen to our customers who have crashed. One rider will say his front wheel skidded out first and another will say his rear wheel skidded first. Sometimes the front wheel will ride over the bad spot on the road and then the rear wheel slips. Our reports indicate approximately half front and half rear wheel skids (if we don't include hitting railroad tracks, curbs, or driveway lips).

I agree with most of Charles Brown's comments about the design and performance of LWB bents. I'm honored that if he ever bought a production bike it would be a Gold Rush. Charles is also probably correct in his statement that Easy Racers are faster and "faster speeds mean more likelihood of skidding."

Regarding Compact LWB bikes like the EZ-1 or Bike E with 20" rear and 16" front wheels with a high percentage of weight on the rear wheel: All Easy Racer designed bikes, including the EZ-1, have the front wheel close to the pedals to keep the overall length down and to put as much weight on the front wheel as pos-

sible. A 20" front wheel on an EZ-1 would make for a longer bike with less weight on the front wheel, as the axle must be moved forward to accommodate the larger wheel. The smaller 16" front wheel is better for the speeds most people ride on the EZ-1. The same thing applies to our 20" front wheel Easy Racer bikes. If we changed to a 26" or 27" front wheel, the bike necessarily gets longer with less weight on the front wheel.

Some years ago when testing our early prototype EZ-1 on a 40'-60' diameter asphalt skid pad, we discovered that the rear wheel skidded first, even though the weight distribution is very light on the front and heavy on the rear wheel.

I disagree with Mr. Brown about one thing; I believe a wider, fatter, front tire ridden at a lower pressure will give more traction than a narrow, high-pressure tire. It won't slow you down a tenth of a mile per hour to reduce the front tire pressure from 100 psi to 75 or 80 psi, yet the lower pressure won't hurt the lightly loaded front tire.

I agree again with Mr. Brown that overly powerful front brakes can cause front wheel skidding. However, it should be noted that the EZ-1 and EZ Sport bikes have a special spring-loaded device in the front brake cable that reduces force to the brake pads. This helps to modulate braking and makes the bike safer.

Long wheelbase recumbents have the best

straight line braking performance of any kind of recumbent because under hard braking, the back wheel stays firmly on the ground unlike most short wheelbase (SWB) recumbents and upright bikes. In a panic stop on a DF bike, all of the weight of the rider and bike transfers to the front wheel resulting in no traction on the rear tire, often flipping the bike over. Many SWB recumbents exhibit this same characteristic.

A LWB recumbent also transfers weight to the front wheel under hard braking with over 50% of the effective weight on the front wheel. This allows for shorter stops as both tires are getting traction. In our tests, our bents stopped somewhat faster using front brake only versus rear brake only. In an emergency, to achieve the shortest stopping distance, we recommend all riders use both brakes. Practice braking, since your life may depend on it. Stay safe out there.

Editor Comments: I'd like to offer a special thank you to Charles Brown, Kelvin Clark, Harry Wozniak Randy Schlitter and John Riley who offered input on this topic, and to all of the RCN readers who've written letters about their crashes and thoughts on the topic. ♦

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Genesis of a New Design

The ChameleonECO Trike: A Tilting Delta

By Bill Stites

More people are living in cities today than ever before. There's a real problem with recumbents in dense city traffic as their seats are generally low, and safety is largely contingent upon visibility. One must see and be seen in order to properly interact with motorists. Trucks and SUV's present a hazard that must be taken very seriously by any city cyclist. But if we can create a recumbent that is suitable for the unique requirements of dense cities, then we can make a genuine contribution to transportation there.

Cities and Safety

Limited space is one of the safety issues that is specific to cities. One must learn to take space on the street that is appropriate for interaction with even the biggest vehicles. The power of being at or near eye-level with motorists should not be underestimated. The issues of urban travel including close interaction, visibility, and small living spaces, present the setting for the development of an all new human powered vehicle (HPV) concept: the ChameleonECO trike.

Chameleon Design

Any given HPV is designed for a particular set of circumstances. LWB bikes are known for touring; lowracers are most suited to closed track racing. The ChameleonECO was designed to be a *city* recumbent. The small footprint is based on a short wheelbase (SWB) layout, and is suitable for small apartments, elevators, alleys, etc. The high seat provides visibility and therefore safety.

Four simple design parameters were set right from the beginning. The new vehicle design would have:

- Three wheels
- A recumbent rider position
- A high seat
- A narrow track

The high seat and narrow track are at odds with each other, which leads to the secondary design parameter of Tilting. Shifting the *center of gravity* (c.o.g.) by leaning can restore stability by maintaining balance. The other secondary design parameter is Front Wheel Drive. It was decided to pursue the challenge of improving on FWD systems, rather than deal with the complications of the tilting articulation for a rear wheel drive system.

A U.S. patent was filed in August of 1996, issued in May 2000. The engineering principle is to have a tilting vehicle where all three main systems (drive, steer, lean) operate fully independent of each other. Combining the agility of a bike with the practicality of a trike yields the chameleon namesake — where the ride dynamically changes between bicycle-like and tricycle-like.

The following dimensions show the historic progression of the chameleon prototypes:

- ChameleonECO, 2004
Wheelbase = 38.5"
Rear wheel track = 21.5"
Seat height = 31.5"
- ChameleonLX prototype, 2001
Wheelbase = 36"
Rear wheel track = 22"
Seat height = 34"
- Original metal Chameleon, 1996
Wheelbase = 32"
Rear wheel track = 23"
Seat height = 34"

Why a Trike?

The issue of carrying cargo is an essential part of many vehicle trips. A trike can be very practical in the city as one can carry more cargo than on a bike. If we can carry what we need on a trike, we are not forced to take a car.

Also, you don't have to put your feet down in such a stop-and-go riding environment. This is a good point, in that those who use clipless pedals can avoid all that clipping in and out, with the intrinsic instability that the *launch* from stop can entail. The trike is perfect for grocery shopping, post office runs, and the like.

High Seat

Visibility is a primary feature of the ChameleonECO trike. Its seat height is 31.5", appropriate to be able to see all that is happening on the lively city street scene. One must be able to see over parked vehicles, around vehicles travelling on the street, behind groups of pedestrians, etc. Equally vital is *to be seen* by motorists, so as to avoid contact.

Narrow Track

Much of the time in a dense city, there is traffic that is stopped or moving slowly. It's great to be able to pass traffic on a bike, so the ChameleonECO was designed to be about as narrow as a bicycle, being very close to the width of typical bike handlebars. This trike can squeeze through traffic as safely as a bike. Also, the overall narrow width of the Chameleon allows it to pass through standard doorways easily.

Stability by Leaning

Common sense tells us that a high seat and a narrow track are bad news on a trike . . . hence the lean capabilities. The dynamics of the Chameleon *duplicate that of a bicycle*. The stability that a human rider can bring to a bicycle is impressive. Note that the *center of gravity* (c.o.g.) on a standard upright bike is of similar height to that on the Chameleon. We assess bicycles as safe with their high c.o.g.'s because we can ride them *in balance*. When cruising a Chameleon trike, one easily forgets that there are two wheels in the rear, as it feels balanced like a bicycle. The seat is mounted within the front sub-frame, which is the tilting portion, and keeps the rider aligned over the



front wheel in all maneuvers.

Balance is really a key point here. You could be twice as tall, but as long as you are in balance, it is fine.

Riding like a Bicycle

This vehicle was intended to take advantage of ordinary peoples amazing ability to ride bicycles. Do you remember learning to ride a bike as a kid? It wasn't easy for most of us, but we worked through it. The Chameleon takes advantage of a riding program that most of us already have. Have you noticed that even rather un-athletic folks get very good at riding bicycles? That's because there's an intrinsic ability. When learning to ride the Chameleon, the mantra is the same, "whichever way you're falling, turn that way." If you know how to ride a bicycle, the Chameleon is easy to ride after a short "getting acquainted" period.

Radial Arc Suspension

There has been a pleasant surprise of suspension effect from the lean articulation actions. It is not a typical suspension, but then again, not much on this vehicle is typical. We call it *Radial Arc Suspension*. When the road surface presents irregularities, the rear wheels can follow rises and falls of the road without pulling the front sub-frame up or down. This means that the rider can remain vertical and balanced even when a rear wheel is dropping into a pot-hole, for example. Indeed, one learns to *read* the road and anticipate how the rear wheels will be moving — with sensory feedback through the handlebars, and motor control outward through the same handlebars. Note that the handlebars remain parallel to the rear wheels so that one can *feel* the road through the hand grips, and know the orientation of the rear sub-frame. The weight of the front sub-frame plus rider provides momentum and inertia, and renders the rear sub-frame relatively light and controllable by the rider's hands through the handlebars fixed in the rear sub-frame.

The suspension is apparent when compensating for road irregularities or crowns. Most streets are crowned for rainwater runoff, and many trikes will be pulled toward the curb. This presents a constant fight just to go straight. However, radial arc suspension allows the rear frame to match the road angle, and maintain the rider in a neutral and balanced orientation. This was an unexpected positive result.

StitesHub FWD

Front Wheel Drive (FWD) was incorporated for several reasons. Firstly, there is increased riding control when steering the same wheel that is driven. The front wheel on the Chameleon provides a direct propulsion in the direction one wishes to move. Further, the front wheel actually *pulls* the vehicle along, which



Bill Stites on the ChameleonECO



The author and his trike in downtown Portland traffic

is an intrinsically superior way to control the vehicle — it is always easier to pull something along than to push it from behind. Another reason for FWD is the compactness of the drive system itself. Logically, it makes sense to consider driving a front wheel on a recumbent that, by definition, has the pedal crank out in front of the rider. Of course, rear wheel drive works fine in many applications.

The StitesHub FWD system addresses the primary issue for FWD systems, namely, separating the drive from the steer forces. The obvious pitfall of many FWD systems is the leak of drive force causing some steering effect where pedalling causes the fork to rotate. The StitesHub solves many of the classic problems of existing FWD systems by incorporating a universal joint into an intermediate drive hub. A universal joint shaft connects the left and right elements, and is centered over the steer tube. The center of the U-joint must be aligned with the steer axis so that it flexes during real-time steering. As long as the shaft is perpendicular to, and intersects with, the

steer axis, the drive power is transferred as torque through the u-joint shaft without causing any steering effects.

One of the drawbacks to FWD in general is reduced traction upon hill climbing. The physics of any FWD vehicle is such that wheel slip increases as the angle of hill climbing increases. When the FWD vehicle angles upward, the rider's weight shifts back so that it loads more upon the rear wheels, and less upon the front drive wheel. Maintaining the center of gravity near or over the drive wheel is key to keeping traction, this is why the vast majority of FWD designs are of short wheelbase.

Riding technique is also important. Where a progressive increase in pedalling power helps maintain traction, a sudden pedal force can yield a *peel out* which can be fun. Today's tire choices also help considerably as there are several good choices for street traction.

Not for Icy Roads

This trike requires constant attention to balance, unlike rigid-framed trikes. The benefits of leaning into turns and irregular road compensations come at a price. The Chameleon is not much better suited to slippery road conditions than a bicycle. If one loses traction on the front wheel while in a turn, the result is similar to a bicycle and you'll get dumped to the inside. If one needs a trike for slippery road conditions, bad enough to prohibit bicycle riding, then one should use a rigid framed trike that can slide like a hockey puck. There is a lean-lock feature where the Chameleon can be rendered to be a rigid framed trike. However, great caution must be exercised because all the benefits of leaning are lost, so tipovers will more readily occur.

Specifications

The ChameleonECO trikes are TIG welded and brazed CroMo steel tubing. This makes for a stout frame, able to easily handle a 250 pound rider.

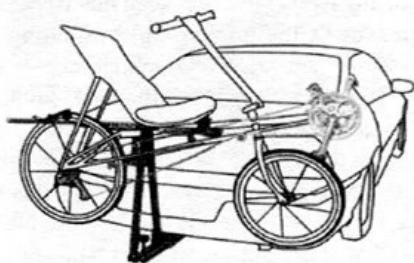
The specifications will vary. Steep hills will require a wider gear range, so opt for the Rohloff 14-speed hub. I'm already seriously considering disc brakes for the rear wheels.

Current Spec List

Crank: Sugino XD tandem crankset: 170mm
Bottom Bracket: Shimano UN-73 with sealed cartridge bearings with eccentric BB shell.
Chains: SRAM PC-58
Cogs: 3-spline pattern 16 - 22 teeth.
Drive Hub: Shimano Nexus-7 Internal hub; gear inch range of 32-77
Front wheel: Sun 36-hole, Nexus-7 hub with built-in roller brake.
Rear wheels: Sun 36-hole, Comp Pool tires.
Rear Brakes: Avid Single Digit V-brakes
Lean Lock: Quick-release actuated lean lock.
Seat: X-seam 36" - 48"
Frame: 4130 CroMo

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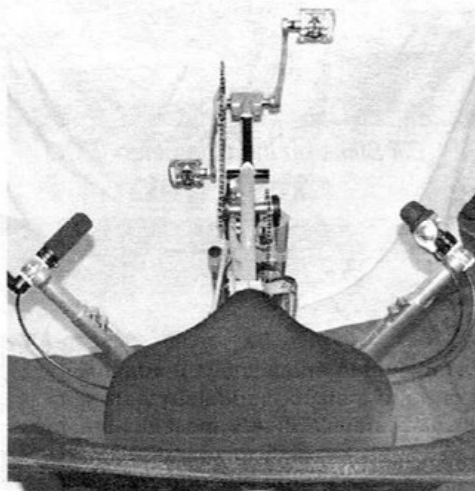
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Mission Statement

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About the Author

Bill Stites is presently an industrial designer living in Portland, OR. He holds a doctorate degree in chiropractic, which he practiced for ten years before turning to design full-time. Bill brings a unique perspective to HPV design, having a strong biomechanical background. He advocates incorporating human

factors, including ergonomic analysis. Bill has extensive experience with city cycling. He conducted house calls by bike for seven years in New York City. His HPV experience includes pedicab operations, service and driving as well as newspaper bundle delivery by tricycle, all on the bustling streets of Manhattan. Bill taught an HPV design course to graduate students at the Pratt Institute in Brooklyn, N.Y.

The Quotes

"I really liked the high seating position. It gave me a feeling of confidence in heavy traffic and I could look over the roofs of all the cars much like an upright bike. The leaning part felt natural like a bike." — Zach Kaplan

"The Chameleon is a very well made machine with many of the best features of both trikes and bikes. It's a stable three wheeler at stoplights, where you can stay clipped in, and it's a nice underseat steered bike when you're swooping through corners. A compact, versatile urban hpv that can go anywhere, including your apartment. Very practical. Very functional." — Pat Franz (TerraCycle)

"I've watched the ChameleonECO evolve over several years, and while the initial concept has stayed true, many of the details have changed. Steering hardware, chain management and wheels have all changed in ways that make this latest machine a far better machine than the original prototype. Not only that, but it fills the needs of urban riders by being simultaneously comfortable, visible and maneuverable — qualities that are impossible to combine in a rigid trike."

It's quite amazing to watch in person. Even though the maneuvers look quite natural to a bike rider, when it comes to a stop it's like it hovers in place - no wiggling, no frantic balancing act. It's as if George Jetson built an HPV." — Jeff Wills (OHPV). ♦



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What To Do With An Old BikeE

Introducing the BikeE LT "Low Technology"

By Norm Reuss

With the demise of BikeE, gone are frame warranty concerns. Creativity can run rampant. I took one old school BikeE CT, stripped it of all its components and popped out the rivets that held the rear wheel stay to the frame. I then cut 13 inches off the tail with a carbide blade circular saw¹.

The rough edges were smoothed with a decent metal file. I then mounted the rear wheel stay horizontally onto the aluminum frame by aligning as many of the original holes in the frame and the wheel stay, drilling new holes where existing holes did not align. The two pieces are permanently affixed using stainless steel bolts, lock washers and nuts. I had already swapped out the old school CT's front fork, stem and handlebars, a toploader stem and handlebars from a BikeE AT. I then slapped it onto the LT (Low Technology).

Next, I had to do something easy. I bought a set of high pressure Kenda Kwest tires from the Hostel Shoppe and mounted them onto the original BikeE wheels. I broke the SRAM grip shifter, which I never cared for anyway, so I replaced it with a thumbshifter from an old mountain bike I had in the garage. I bought a new Shimano Deore rear derailleur and upgraded to SRAM 5.0 brakes. To get this setup to work I had to install cable extenders from my local recumbent shop.

Routing the chain is next. The rear wheel stay gets in the way of a chain running a direct path from the front chain ring to the 3 speed hub. An 8 inch steel bracket shaped like the

letter "J" with a Burley double idler pulley from Power On Cycling did the trick².

I mounted this gizmo to the frame with two self tapping metal screws. That and a whole lot of chain make up the drive train. With no tail for a slippery seat to slide on, I had to improvise a seat stop by drilling a hole in the top of the frame just behind the forward seat quick release. A bolt with a large head into this hole became my seat stop. Because the welds on the BikeE seat stays are very fragile, I fabricated a set of seat struts out of hollow aluminum tubing. I screwed the bottom end onto the rear wheel stays and affixed the top end to the seat cross bar with hose clamps. Finally, I mounted a bike computer, water bottle cage, fenders from an EZ-1, a mirror and went for a ride.

The Ride

My LT doesn't qualify as a low racer but its 16 inch seat height makes for an exciting ride³. As I buzz around Vermont I'm eye level with most RFD mailboxes. The steering geometry is something I had to get used to. For the first few rides wheel flop was a problem at low speed. With time and practice I became accustomed to this steering dynamic. It's no longer a problem. I can easily do a slow speed u-turn within the width of a two lane road, with room to spare. The LT has always been very stable at high speed, up to 50 mph. Uphill is still dependent on the engine (that's me) and on a good day I crest the steepest hill on my daily route at 6 mph!

The Fairing

Some time ago, I purchased a BikeE fairing from Zzipper designs. It lived happily on my BikeE AT for several years. For this project, the AT had become a parts donor and the fairing was collecting dust. When I first attempted to fit the fairing to the LT it was a disaster. The bar end mounts refused to work with the wider handle bars and the angles were all wrong. When I did get it to balance in place it looked more like a UFO about to beam up captives than anything designed to enhance the speed of an HPV.

First, I cut out a notch for the front wheel. Using the same aluminum tube I used for the seat stays I fabricated two bottom braces. With the bottom of the fairing secured I propped the top up on the handlebars. The height of the fairing was well above my line of sight. With a pair of shears I sculpted the top to allow for unobscured vision. Mounting the top was a bit more complicated. I turned to a RANS V2 for inspiration. Using 14 inch mounting brackets from a Zzipper MTB fairing and more hollow aluminum tubing I was able to duplicate the V2 system on the LT using the water bottle cage fastening hole as an anchor point. Everything worked.

The final step was to dress the fairing up by applying new edge strip all around. With the fairing mounted on the LT stability is affected by crosswinds. I definitely must stay focused to remain out of harm's way. A trip down my speed test hill gave me a 4 mph advantage over the unfaired LT. The top end was now a white knuckle 54 mph. ♦

Footnotes

1. I could have saved more of the frame and still had enough clearance for the rear wheel and fender. I recommend marking the rear most position of the seat on the frame and making the cut with that as a reference point.

2. This bracket was my second attempt at chain routing. The first attempt was a flat steel bar with an upper and lower idler pulley. This system failed after a few 10 mile rides when the upward force of power pedal strokes distorted the upper idler bolt causing it to rub on the steel bracket.

3. The basic definition of a lowracer is a bike with a seat height of 12" or less, one that allows the rider to support himself/herself at a stop with a handstand (from RCN 054). By comparison, the seat height of my Rans V2 is 19 inches. The captain's seat on my BikeE E2 and/or a standard CT is 25 inches.

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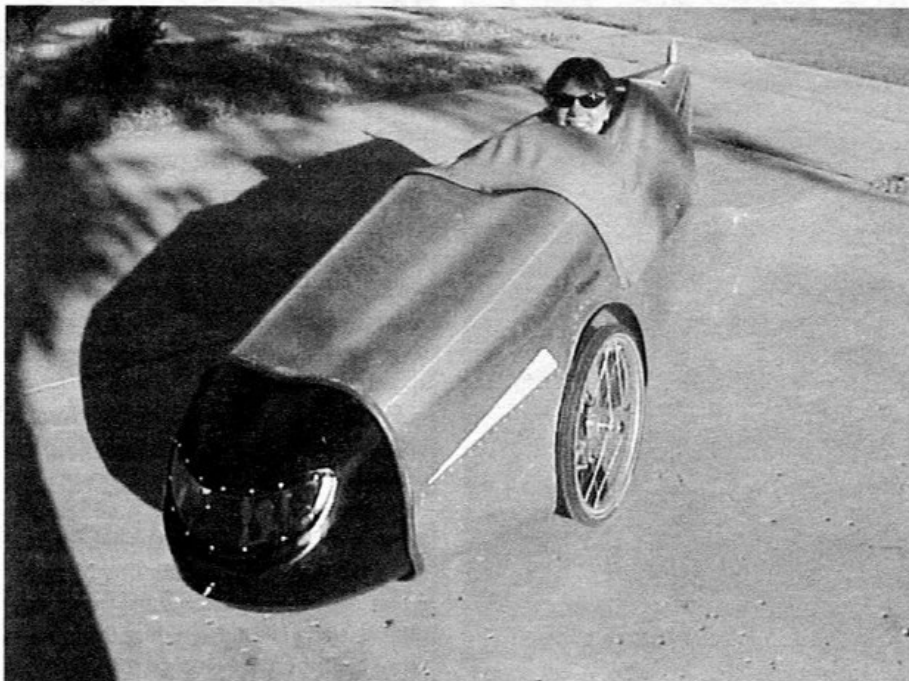
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Velomobile Market Prospects In the USA

By David M. Eggleston
Midland, Texas

This article will address the market prospects for velomobiles in the USA, including market surveys, government regulations, USA riding conditions, and velomobile specifications.

What are the characteristics and limitations for marketing velomobiles (VM's) in the USA?

- Low gasoline prices, currently in the range of \$1.60 per gallon (regular).
- Low adult bicycle ridership, only perhaps 5% ride a bike regularly. Americans are in poor physical condition, with 62% overweight and 33% obese.
- Very little in the way of special bike paths or bike parking facilities
- Some regions have very hot weather.
- Many very wide, low traffic streets, and wide highways with wide shoulders.
- Many very large cars and trucks on roads
- Increasing traffic congestion in cities leading to aggressive driving and decreased safety.

All of these conditions have significant effects on marketing velomobiles in the USA. Still, there is substantial interest from the general public, as well as from bicycle aficionados.

Riding Conditions

In such a very large country there is a great variety of riding conditions, so it is hard to gen-

eralize. However, we ride on the right side of the road, and in many locations the roads are very wide, with adequate room for bicycles. In almost any city there are streets and times of the day when riding a bike gets more difficult. On some busy thoroughfares experienced bicyclists refuse to ride at all, even though there are no legal restrictions. There are also areas where you can ride mostly in light traffic and on side streets, but you have to cross very busy intersections with inadequate provision for bicycle traffic. There are also areas where the development has completely ignored bicycles and pedestrians so transport by bicycle is really not possible.

Community Awareness

Giving a small child a trike is almost universal, and giving an older child a bicycle as soon as they have the motor skills to learn to ride one is very common.

Americans still have the feeling that children should get a bicycle and learn to ride, but most teenagers give up riding a bike just as soon as they get near the age when a license to drive a car can be obtained.

The attitudes of motorists toward bicyclists varies by locale, but bicyclists can ride safely in most locales.

Still, hardy riders do pedal from coast to coast, and the *Adventure Cycling Association* has developed special bike touring maps to

guide riders. Many people can find bike routes in their local area that are suitable for velomobiles.

Design Features

Since almost all VM riding in the USA has to be done on streets and highways, Americans have to ride almost entirely in traffic, sharing the roads with motor vehicles. When riding in auto traffic, visibility in all directions is critical to survival, especially in a very low vehicle. Direct viewing of traffic without transparent windshields is the most reliable and safest for perfect visibility. Rain, frost, and other possible impediments to seeing cannot be allowed to obscure the vision of a VM rider.

Vision to the rear is also critical. The very reclined position on many velomobiles restricts the ability of the rider to see to the rear by turning one's head. Changing lanes and making left turns in traffic must be accomplished safely. Rear view mirrors can provide adequate information, but they must give a satisfactory field of view and they cannot be obstructed. This becomes a problem in completely enclosed cockpits. The overhead mirror is an innovative and possible solution.

For those that intend to use their VM as a substitute for a car, adequate baggage space is important. Some VM's offer only very limited baggage space, as if they were designed only for recreational use. I feel that only a small number of buyers would choose a VM to be used for recreation only. Of course trailers can be attached to VM's, but towing a trailer adds weight, aerodynamic drag, and additional rolling friction.

Government Regulations

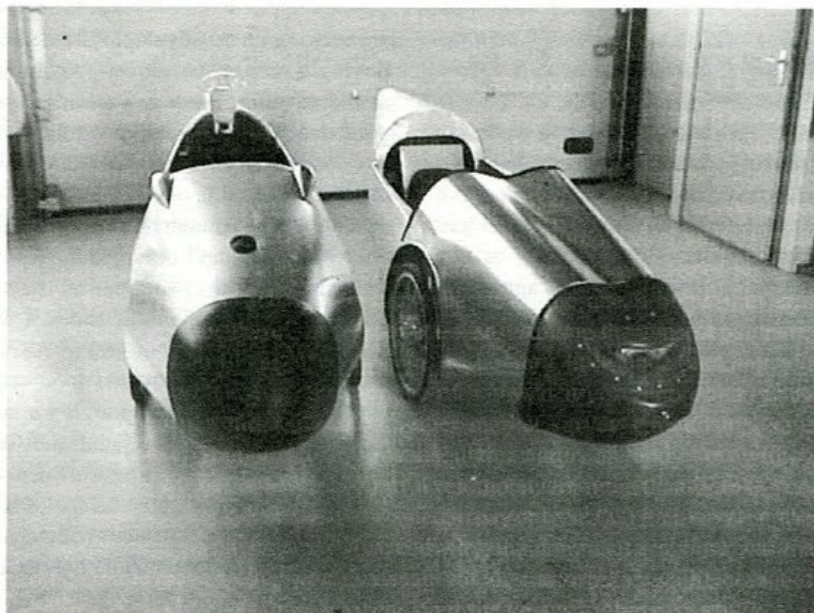
The USA has both national and state regulations for bicycles. For example, a bicycle can have a power assist system with no special licensing if it is not capable of speeds above 20 mph (32 km/hr) under the power assist system. Texas regulations prohibit sale of power assist bicycles if it is possible to start and drive them without exerting force on the pedals.

We will provide information on the general import of bicycle regulations toward VM's in the other states of the USA.

Market Survey

North American VM web site operator Ethan Davis and I conducted a small market survey at a recent renewable energy conference. Of the perhaps 150 attendees who visited the booth and rode the velomobiles, 25 were willing to fill in the questionnaire, and 23 signed up for our mailing list. The ages of respondents distributed close to normally about 40 years.

Salaries ranged from those of students to professionals earning above \$100k per year. 72% of the respondents were bicyclists. Types



Two Alleweder VM's

of cycling included MTB, commuting, touring, road, recreation, and recumbents. 40% did MTB riding, while 56% did road riding. Of the types of bicycles owned, 64% were MTB's, 32% road bikes, and 16% recumbents. With respect to the query about buying an Alleweder (AW) velomobile, 24% said they would, 36% said they might, 16% said they weren't sure, 4% said they wouldn't, and 12% said they would consider it for the future.

We asked respondents about the choice between \$2,500 for a kit and \$4,500 for a completed machine. With regard to purchasing a kit, 44% said yes, 40% said no, and 12% were not sure. For buying a completed machine,

15% said yes, 52% said no, 12% were not sure. With respect to the desired price of a kit, 45% omitted the question, but 20% wanted a kit for \$1,500.

When asked their desired price for a completed AW, 48% omitted answering, prices wished for had responses at \$400, \$1,500, \$2,500, and \$3,000.

With regard to being willing to put down a 50% deposit on an AW purchase, 68% omitted answering. For those considering a kit, 36% would make a deposit, 24% would not, and 12% thought they might. For those considering a deposit toward purchase of a completed machine, 12% said yes, 12% said no.

Discussion

The survey indicated a substantial interest in these AW velomobiles, with the great preponderance of respondents more interested in a kit than in a finished machine. On the other hand, the least knowledgeable had no idea what a good bicycle costs, and live in a dream world wherein velomobiles could be obtained for a pittance. Their knowledge of bicycles is likely based on the cheap bikes sold at discount houses. Among the general public there seems to be very little understanding of the value of a VM if it costs more than \$3,000. Another market survey I found had similar results, in that hardly anybody was willing to buy a velomobile for more than \$2,000. People wanted to pay only \$2,000 for a Go-One. When asked why, the dominant response was that a cheap car or motorbike would be a better choice if the cost was above \$2,000.

Among dedicated bicyclists who know what a good bike costs, there was much more willingness to consider a velomobile, but even they didn't want to spend more than \$2,500 for a kit. Their willingness to pay for a completed velomobile at \$4,500 was limited, with only 16% saying yes. Of course for some people \$4,500 is no problem, while others have no confidence in their ability to build from a kit.

Design Choices

There is not room to discuss design choices in this abstract, and those details will be reserved for the full paper. However, as an example of problems to be avoided, only Presta (French) and Schreader valves and pumps are available in the USA. Selling a VM with Dunlop valves to a buyer in the USA is likely to cause consternation and frustration.

Conclusions

There is a promising market for VM's in the USA. Discovering and understanding the characteristics of this market can produce dividends and avoid losses for manufacturers wishing to sell VM's in the USA.

For More Information

VelomobileUSA, LLC is tooling up to manufacture Alleweders in the USA. Kits should be available mid-year, 2004. The Alleweder VM was originally designed in the Netherlands to sell for a reasonable price. AW kits can be assembled with hand tools by anyone with some mechanical ability in 80 to 100 hours. We're currently writing new manuals with detailed photos to make assembly as trouble-free and convenient as possible. Our first production will be completely assembled AW which should be available soon. For more information consult our web site, www.VelomobileUSA.com. ♦



Maya van Leemput takes her Street Machine Gt for a spin in the African desert. Read *Agence Future's* story at www.hpvelotechnik.com.

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Hot Weather Cycling

By Aaron Heilbrun

applejuice@global.t-bird.edu

My first introduction to warm weather riding occurred while living in South America. I spent several years in Santiago, Chile where I did not have a motor vehicle. Aside from occasional trips on public transportation, I utilized my bike to go everywhere. Beyond the myriad of changes that come with time abroad, the climate was one

more different than the southern hemisphere, Chile experiences summer during the months of December, January and February. Typical summer temperatures are 86 – 95 degrees. While these temperatures are not exceptional, the intensity of the Chilean sun is. The difference in the thermal sensation between sun and shade is tremendous.

Soon after returning to the states, I moved from Michigan to Arizona. The day I arrived in Phoenix it was 112 degrees. Forget what anyone tells you about it being a *dry heat*, it was oppressive! Daytime athletic activities are simply not possible in such intense heat. However, many people opt for either rising very early or training late in the evening.

Athletic endeavors in the summer, especially in places such as Arizona, can present quite a challenge. Dressing appropriately is essential to comfort and safety. In this article, I attempt to outline some products that I have utilized over the years — I'm no expert, just another recumbent lover. Moreover, I don't have any financial investments or professional relationships with these companies. Finally, all prices are quoted in US dollars.

Product Survey

Shorts: Ex-Officio: This company makes apparel primarily aimed at travelers who desire practical, comfortable and functional clothing. I discovered this product line while working in a soft goods retail store some years ago. However, it was not until after I had left the store that I began to view their products through the lens of recumbent cycling.

I was new to recumbents and trying to figure out what I could wear. Padded shorts were very uncomfortable. However, conventional shorts slid down my legs and were indecent. Reflecting upon the situation and cycling through my knowledge of outdoor soft goods, I suddenly realized that the Ex-Officio Amphi Shorts would be an outstanding candidate.

These shorts are nylon with a black mesh support. As in the case of conventional padded shorts, I recommend their use without underwear. The support is much more comfort-

able and breathable.

It's strange but it would almost appear that these shorts have been designed specifically for recumbent use:

First, the nylon material makes them very utilitarian. I can dunk them in water and they dry quickly with few wrinkles.

Second, the legs include a small drawstring that you can tighten to secure them while biking. This will avoid compromising situations as well as unaero-dynamic effects.

Third, the shorts have several pockets. There are two conventional main pockets for your hands, but also a very convenient small zippered pocket on the left leg.

Fourth, there is a nylon belt to adjust the fit.

Fifth, while not statements of fashion, they look quite 'normal' and can easily be worn inside without appearing out of place.

Overall, I have been extremely pleased with the Amphi Short. I did try the Mt. Borah recumbent short, but did not like its fit; the combination of an inside liner with the outside short was too warm for me.

The Ex-Officio Amphi Shorts are about \$50 and can be purchased online though I recommend trying them on in a store.

It's also worth mentioning that there is an Amphi Pant. I used it for several years as a mainstay in my commuting wardrobe. It has all of the above mentioned features except that instead of leg cinches there are elastic loops and buttons to secure the leg openings at your ankles. This is wonderful to avoid their sliding up your legs as well as the possibility of the pants catching on a chainring.

Shirts: Patagonia: Patagonia is one of the largest outdoor soft goods companies. They produce some of the finest athletic apparel in the world, but there is also a premium associated with their line.

In particular, I wish to detail the extraordinary performance of their Silkweight shirts. These shirts are bar none the best high intensity garments I have ever encountered. Over the last ten years, I have used them in over a dozen sports on several continents — everything from mountain climbing to cyclotouring.

Silkweight is a synthetic fabric that feels like silk yet dries much faster than organic fabrics. It's very comfortable and performs very well in hot weather. The shirt does not stick to your skin and will dry quickly. The latest incarnation removes the tag and uses a special sticker that provides a cleaner fit. In addition, the material gives strong sun protection.

Silkweight T-shirts retail for \$30-\$40. If you

are seeking an aerodynamic fit, then consider buying a size or two down. Again, they are available online but if you are uncertain about your size, a trip to a retailer would be in order.

Footwear: Shimano: There are advantages to wearing cycling shoes, but in hot weather sandals can be a much more appealing option. For commuters and other riders, this type of footwear is ideal in summer as it avoids the need to carry two pairs of shoes. I wore the SH-SD60 sandal for four years with excellent results. The sandals provided good ventilation yet were still flexible enough for walking. Compared to a normal sandal, they are stiff, but this is the compromise between walking and riding. There is some scrape of the pedal clips, but it is to be expected. Moving the clips back seems to reduce this bother, though you quickly forget about it.

I'm very pleased with these sandals. They are comfortable and perform very well. Still, I am also curious about the Lake LX SDL as it provides a couple features that I like. First, there is an ankle loop to make it easier to put them on. Second, there is a lip in front of the toes. I stubbed my toes a few times while wearing the Shimanos, so this feature would be welcome.

I recommend sandals for hot weather riding. Though they will not deliver maximum performance because of the tradeoff in stiffness, they will provide comfort by helping to regulate your temperature better.

The Hostel Shoppe lists the Shimano sandal for \$75. Lake shoes can be purchased direct for about the same price.

Sunscreen: Bullfrog: BullFrog sunscreen is well known. I remember that my mom used it when she worked as a lifeguard in Hawaii. That was many years ago, but I clearly recall her saying how effective it was, though a small bottle was pricey.

I wanted to take her advice as I was planning the first of a series of cyclotours. I knew that I would be exposed to the intense sun for up to twelve hours a day. I would sweat considerably and was not interested in re-applying the sunscreen. I eventually choose BullFrog Quick Gel. It was alcohol based so it would not leave me feeling greasy. Moreover, there was no twenty to thirty minute wait for it to become effective.

During several tours that lasted up to three weeks each, I applied Quick Gel every day. It protected me very well. The gel is rated at SPF 36, though I understand there is also an SPF 18 available now. I highly recommend Bullfrog. Hours of sweating did not diminish its effectiveness and it never required reapplication. It never felt greasy or oily. In short, this product was outstanding. The stuff is expensive, but it performed better than any similar product that I have ever tried. One 5 oz. bottle lasted two weeks, which was a great invest

ment given the importance of sun protection. **Hydration Systems: CamelBak:** This line has come a long ways from the days of IV bags in socks with straps. The current range is very refined and many work well for recumbents. I simply hang them off the seat. I usually prefer models with additional cargo capacity such as the Mule. This space is convenient for tools, personal items and any other useful amenities such as a lightweight jacket. While on cyclotours, I also store frequently used items such as maps, tour books and cash.

Hydration is especially critical in warm weather. I have been told that insensible perspiration is approximately 0.25 liters per hour (8.5 oz.). Sensible perspiration or sweat, can vary considerably according to a wide range of factors – physical effort, physical condition, gender, body composition, temperature, humidity, wind, etc. How much does a person sweat in an hour? It could be as little as 0.5 liters per hour to as much 2 liters or more. As general rule of thumb, cyclists should aim to replenish their bodies at a rate of 1 liters per hour.

Camelbaks allow us to achieve two critical ends – hydration and cooling. Camelbak fluid capacities range from 40 to 100 ounces (1.2 to 3.0 liters). While on tour, I have ridden as long as ten hours in a day. Under the 1.0 liters per hour heuristic, that required a whopping 10 liters of water! In order to meet this requirement, I have also utilized a relatively new product of their called the UnBottle. It's essentially a large insulated pouch available in 70 and 100 oz. sizes. They are easy to use and work very well.

The second end is cooling. The availability of cold water on a hot day does a couple things. First, it is generally considered more appealing to drink cold water than warm water. If the water is more appealing, you are more likely to drink it and stay hydrated. However, cold water also does a better job of cooling your body than warm water. This will reduce your level of perspiration and therefore your water loss. It also improves your comfort and minimizes the risk of serious heat related problems.

Specific to the CamelBak brand, I can also recommend a few other features:

Cleaning brush (\$10): Now before all of you brand me as a lazy suburban yuppie for purchasing this item (and the next), I have found them to be extremely useful and well designed. Moreover, having them has encouraged me to clean my CamelBaks on a regular basis and this is important for obvious sanitary reasons.

Reservoir Dryer (\$9): Again, not essential but very useful. Those who are more thrifty might achieve a similar and very economical solution by bending a coat hanger to suit.

Thermal Control Kit (\$16): Outstanding! Often the first few sips are very warm since

sible off road. Moreover, I moved to a full face helmet (Giro Switchblade) about four years ago, so a conventional bottle was nearly impossible to drink without simply spraying myself. The CamelBak drinking tube, especially with the Tube Trap, is far easier and more convenient.

For these and other reasons, many of us have transitioned to hydration systems for enjoyable liquid replenishment. If you haven't, I strongly recommend considering the investment. Visit your local bike store to see the different models and inquire about what would be appropriate.

Artificial Cooling Systems: This is a rather uncharted territory. To the best of my knowledge, I don't know of any cyclist who has donned one of these special vests. They are generally utilized by law enforcement, fire fighters, emergency medical personnel and other such individuals who are exposed to extreme temperatures as part of their professional responsibilities. The concept sounds like an intriguing idea and I would be very curious to hear someone's experience. It's also worth mentioning that certain vests can be used for both cooling and heating, so perhaps there is a cold weather application as well.

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Tube Trap (\$2): Are you tired of fumbling around for the drinking tube while trying not to crash? This little clip goes on one of the shoulder straps and helps to keep the tube near you. You also might consider this important because it isn't impossible for the tube to become tangled in the spokes of the rear wheel.

Omega Valve: This was long overdue. CamelBak finally designed an intelligent valve to open and close the pouch while filling and emptying it. I'm certain that many of you know the struggles of previous designs. You had to somehow fill the pouch, hold up all that water and screw in the tiny cap without spilling it everywhere. The large valve also makes it easier to clean and hang the pouches.

Big Bite Valve (\$6): I believe these are now coming standard on most models, but if not, they greatly improve the flow rate. Less time drinking means more time breathing.

Once upon a time, I did have water bottles and was always struggling to add more of them. It quickly became apparent that they had major disadvantages. Within a short time, perhaps as little as twenty minutes in hot weather and direct sun, they turned lukewarm despite ice cubes. The appeal to drink water faded and aside from being convenient to ward off the occasional four legged assailant, they really were ineffective. I even tried insulated water bottles. While these did extend the time that the water remained cool, it was never more than an hour. Moreover, the insulation sacrificed some of the fluid storage volume.

Beyond these drawbacks, I've also had great difficulty locating a water bottle, drinking and then replacing it, all while on a bicycle moving at high speed. This was virtually impos-

sible off road. Moreover, I moved to a full face helmet (Giro Switchblade) about four years ago, so a conventional bottle was nearly impossible to drink without simply spraying myself. The CamelBak drinking tube, especially with the Tube Trap, is far easier and more convenient.

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Concluding Thoughts

While hot weather presents some challenges, there are ways to continue riding under these conditions in such a fashion as to minimize risk and discomfort. The aforementioned products are a small, but significant sample. Moreover, personal preferences, local availability, budget limitations, etc., will certainly affect anyone's final decisions. I hope that this brief article has provided a reasonable introduction and will stimulate further discussion on this topic. Good luck and good riding. ♦



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EZ Tandem . . . Cont'd from page 13

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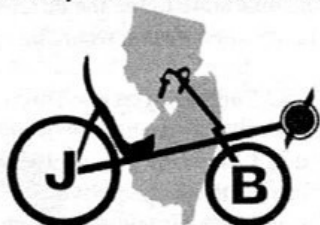
Availability is quite good, perhaps too good. J&B Importers ships from several warehouses around the USA to your local dealer. Nearly any bicycle dealer can sell Sun Recumbents (they are listed in the J&B Importers wholesale parts catalog). Sun bikes have previously been discounted on the Internet (eBay). Sun recently announced that the warranty of any "mail ordered" recumbent that is not set up by a bicycle dealer will be void.

Sun doesn't act like a recumbent manufacturer as we've come to expect. There is really nobody to call with questions, or to be convinced to buy one — other than your local selling dealer. This could be good if you have a knowledgeable recumbent dealer. If not, you might get the shrug of the shoulders, and be asked to pay in advance because they've never seen one before, but would be happy to order one for you.

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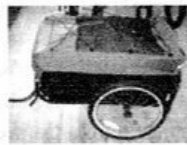
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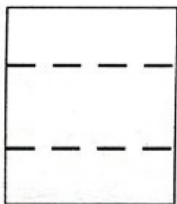
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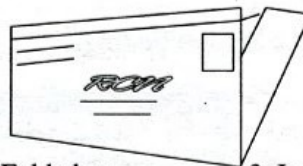
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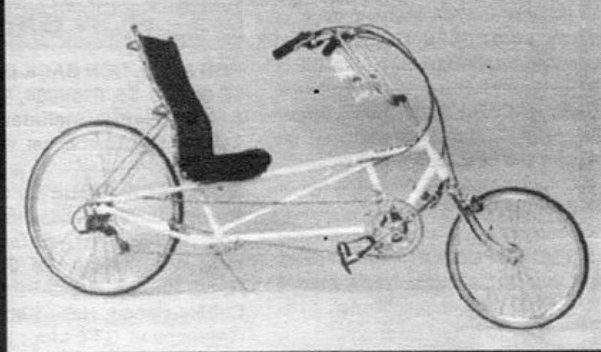
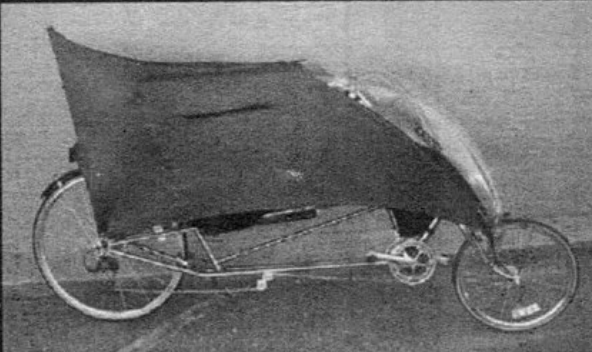
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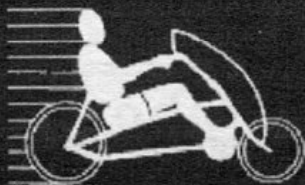
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