

RCM

RECUMBENT CYCLIST NEWS

Issue # 64
July/August
2001



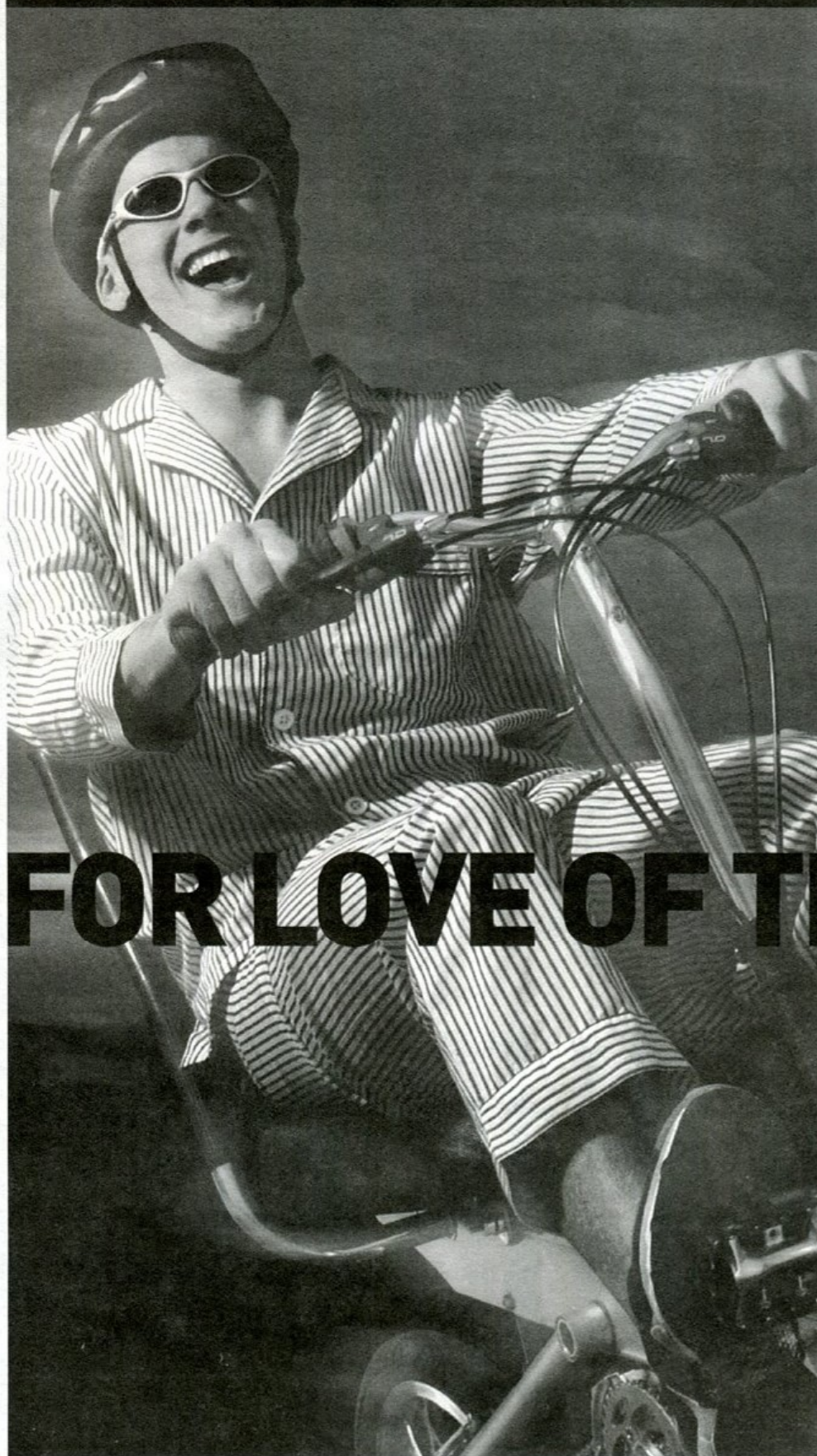
Piero Tassinari climbing the "flat" road while he tours 6-Parks

In This Issue

- | | | | |
|----|---------------------------------------|----|--|
| 3 | Editorial License | 26 | Touring Six Parks by Recumbent |
| 4 | Recumbent News | 30 | The R.A.W. Ride |
| 8 | Events Calendar | 33 | 50 Year Recumbent Quest |
| 9 | Letters | 34 | The Evolution of a FWD Recumbent |
| 14 | The BikeERX | 35 | Corrugated Plastic Construction |
| 18 | TriHauler—The Recumbent Cargo Carrier | 37 | The Development of Modern Recumbent Bicycles |
| 21 | Recumbent Evangelism | 44 | Lightfoot Cycles—Recumbents from Montana |
| 22 | V-Rex on Ice | | |

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Web: www.recumbencyclistnews.com

Schedule

Expect RCN to arrive every other month, within the first four weeks of the first calendar month of the issue.

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Welcome

by Bob Bryant

bob@recumbencyclistnews.com

Welcome Recumbent Cyclists to the 64th edition of RCN. By the time you read this, I'm hoping that you are out taking advantage of some nice Spring weather riding your recumbent. Spring is here and we're back on the road!

Spring Road Test Bikes

We're currently having fun with a BikeE E2 Tandem, an Easy Racer designed J & B EZ1 SC Lite and a Greenspeed GTO. Our foldGold is also due this Spring. A Human Powered Machines Phaser folding SWB USS is also here.

Of the bikes that are here so far, I love the SC Lite. It is an incredible little speedster and perhaps the best performance bargain we've seen in the history of RCN. The E2 is our family's favorite. There is no better tandem if you have kids. Even 12-year-old Amy captains the E2.

We have some slots open for testing, so if you have a recumbent you'd like us to review, please contact us for specifics.

RCN Future Plans

We've been streamlining and working towards having the ability to publish a monthly RCN. By monthly, we mean a bump up to 9 issues per year. In the time that we have been working on this, the state of recumbency has changed. RCN is still healthy, though the *recumbent planet* is far larger and there are many more players than there were for the past 10 years. There are a few recumbent eZines online and the prices are free. Free vs. RCN's \$30-\$40 is a wide margin. The fact that so many of you (4000-5500) pay to read RCN is a wonderful compliment.

If you have any ideas that would help us tailor a smaller, more frequent (more yearly pages, less per issue pages) RCN, please take the time to let us know. We also must ask our advertisers how this will affect their plans.

Viva Recumbency!

Bob Bryant ♦



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■ **On the Cover...**

Piero Tassinari touring. Photo by Chet Rideout

■ **In Our Last Issue...**

RCN#63 May/June 2001—This issue was mailed on time in May. It has a green cover with a Vision pace line photo.

■ **Our next issue...**

RCN#65 September/October will be out in two months—you should have your copy by the end of September.

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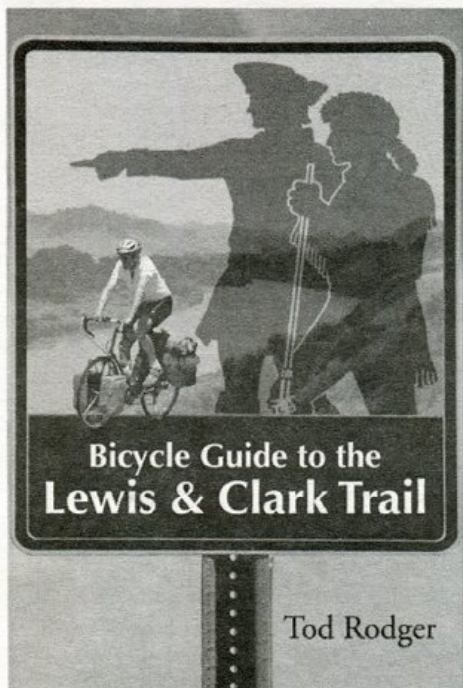
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Recumbent News



Lean Back, Relax and Enjoy— books for 'bent enthusiasts

by John Gear

Bicycle Guide to the Lewis & Clark Trail
by Tod Rodger
(2000, Deerfoot Publications, Harvard, MA,
ISBN 0-97040270-8)

One of the best parts of becoming a 'bent convert, as I recently did, was the realization that my long-held dreams of long-distance touring could become realities. Trips that once would have left me stiff and sore—if not hospitalized—are now within my reach.

When we lived alongside the Columbia River in Washington State, my wife's step-dad talked about driving the Oregon Trail but he never quite got around to it. Now, mix the 200th Anniversary of the "Corps of Discovery" and me looking for a good, long ride on my recumbent. Stir in my love of history and our recent move to the upper Midwest (near the step-dad-in-law) and you have the elements of a trip-to-be, complete with chaser van to accompany me and serve as mobile campsite if need be.

And the hardest part of the planning is all taken care of because I've got a copy of Tod Rodger's book "Bicycle Guide to the Lewis & Clark Trail," just out this year. I knew about the book because, after I mentioned my long-distance bike fantasies to the hostess of a bed and breakfast where we were staying, she mentioned Rodger, who



The Kings of Comfort 2nd Annual Bike Nik—photo courtesy of Steven E. Boggs

had apparently just left a few weeks before.

And that's a good clue to the quality of his book—it wasn't written from an armchair, but from personal experience riding the trail and many others like it. (According to the book, Rodger has ridden over 125,000 miles and led countless tours of varying lengths.)

I haven't ridden the Lewis & Clark route yet, so I can't vouch for the accuracy of every section, but I know enough about the Washington and Oregon end of things to check those sections. And in those he mostly did a great job, right down to his thumbnail maps and his tips for points of interest.

Although not a recumbent rider, Rodger starts the book off in a way that will be familiar to RCN readers: he clearly explains his philosophy about distance riding, so you will be in a better position to understand the recommendations that follow. He discusses just about everything other than whether or not you should detour off to visit Aunt Sally. This philosophy section alone would be a good introduction to any ride book, although there are some L&C Trail specific points made.

Next comes the Overview section, or The Master Plan as Rodger calls it. Experienced touring cyclists will find this dense (but readable) table very helpful for the kitchen table planning sessions, as it's "just the facts" about the whole 3,000 mile trip, in what might have once been spreadsheet form.

After you get the Master Plan comes the meat of the book, the detailed route, a long section containing route maps and descrip-

tions of nearly every little hamlet and burg on the proposed route, along with descriptions and guides to shortcuts, long cuts, and optional alternative routes. Lots of maps, along with photos and all the points of interest in the towns along the way make this a fun section to read as I look at the two and a half feet of Michigan snow outside my window today! I'm having fun dreaming about the trip already.

The next section is golden, with intertown maps and cue sheets—detailed directions from point to point—including both a thumbnail map and mileage to every landmark along the way. Rodger suggests tearing out these pages and keeping them handy for reference on the trail—a task made much easier on a recumbent! Finally the book includes a set of brief appendixes, including suggested preventive maintenance, things to bring, and a good index. All in all, a very well organized, thoughtfully arranged and clearly presented book.

Just as recumbent riders need to support local recumbent dealers if they want to have a good source for parts and repair help, I always encourage readers to support their local independently-owned bookstore. And if you have even the mildest curiosity about whether or not to ride the Lewis & Clark Trail, I can heartily recommend this book at its fair price of \$24.95. (You can also add \$4 for shipping and order it direct from Rodger at Deerfoot Publications, 16 Deerfoot Trail, Harvard, MA 01451; www.deerfootpublications.com.) ♦

John Gear is new to recumbency, enjoying his Rans Rocket in Lansing, Michigan.

2001 WizWheelz Updates

The folks at WizWheelz have a host of new upgrades, changes and accessories for their trike. Updated and Reworked Steering system. Changed

hub mounts, tie rods, steering brace, and geometry. The result is a major improvement in cornering control and stability. This is easily the best handling TerraTrike ever made.

There is a new adjustable handlebar brace so you can dial in the most comfortable hand position.

A new front derailleur boom with a built-in accessory mount—perfect for a cycle computer, light, or any other standard bicycle accessory that would mount on a handlebar.

We now offer a quick-release attachment on the rear wheel and put together an improved component package. We have upgraded the chain, bottom bracket, crankset, derailleurs, cassette, rear hub, and more. Bar-end shifters are now standard as are WizWheelz alloy drum brake hubs.

We now have a detachable boom system which will accommodate a much wider rider height range. This system allows the buyer to choose from 3 different length boom-tubes to fit his/her x-seam measurement. This system also makes it possible to package a somewhat more fully assembled trike while still conforming to UPS box size requirements.

The new "TerraTank" frame option is available for heavier riders. This thick-wall tube-set was not created to make the trike stronger (the standard model will not break under your weight), it was created for better ride characteristics. The TerraTank frame weighs 1.5 lbs more than the standard frame. There is no additional charge for the TerraTank frame.

New accessories include a rear rack, a mirror, a wind trainer, and a seat bag, which are each sold separately.

More information and photos can be found on the "New Features" page at our recently updated website: www.wizwheelz.com.



Reynolds Redundant

I have been riding a new bike that I'm very excited about. It's a 50/50, Convertible. I was intrigued by Joe Kochanoski's bike that I saw in RCN a few years back, and I thought the idea had a lot of potential. I didn't expect it to work so well, but it quickly has become my favorite ride. I have been riding it for a few months. It is set up with full fenders. It climbs better than any 'bent I have. We have some 2 mile grinding climbs around here and I find I can shave 1.5 minutes off my best bent climb. It climbs the 10% grade 1-1.5 mph faster. This averages 1+ mph faster. On the flats and rolling hills the aero 'bent advantage is significant and good for 2-3 mph. I can ride it on crappy icy roads as a wedgie. To convert from wedgie to bent takes 2-3 seconds on the fly. From 'bent to wedgie takes 3 seconds (requires a stop) to get going. When people ask me what it is I tell them it's a Redundant—a versatile bike that is the ultimate tourer/commuter/racer available. Complete Redundants start at \$3500. For more information, contact Reynolds Weld Lab, www.reynoldsweldlab.com Tel.603-432-7327

Road Warrior Update

If you would like a tour of Joe Kochanowski's bicycles, check out this website: <http://www.outsideconnection.com/gallant/joe/>

Upscale Vivo

Rans has downscaled the Vivo SWB ASS dual suspension, dual 20-inch recumbent. The bike now has Rocket spec, a coil shock and less expensive front fork. Angletech (Kelvin Clark) is doing a custom-spec version. Angle Lake Cyclery in Seattle (Dale Clark) is also doing a custom spec version which includes: AD5 Airshock, Ballistic adjustable front fork, SRAM 9.0 components (with disk compatible hubs) and custom built wheels with Bontrager rims. For more information, call Dale Clark at Angle Lake or check out their new website: www.anglelake.com, Tel. 206-878-7457.

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Do You Have Stuff For Recumbent News?

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An Event? Club News?

Have you bought or built a new bike?

Do you have shop news or new product news?

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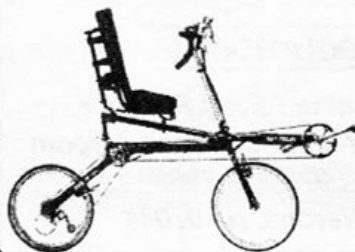
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Recumbents in Ohio

Bicycle One in Gahanna, Ohio is a regional recumbent specialty shop. Troy, Bicycle Ones resident recumbent expert reports that Easy Racers are hot. He has customers coming in from all over Ohio to check out the EZ1 and Tour Easys or one of the 35 recumbents on the floor. Give Bicycle One a call at Tel. 614-476-1664.

Recumbents in Southern Cal

EERC's Connie McAyeal recently sent me a recumbent newsletter from **Alan's Family Bike Shop in Oceanside, California** (north of San Diego). Alan's has been around since 1952, but has recently gotten very excited about recumbent bikes. I recently talked to resident experts Kevin Reed and Brandon Cariveau who were gleaming with enthusiasm over their line of Easy Racers, BikeE and Burley. They are looking at bringing in more lines as well.

Alan's is also hosting monthly recumbent bicycle rides. Give them a call for more information: Tel. 760-722-3377 or check out their website at alansfamilybikeshop.com. Tell them you read about them in RCN!

Easy Riders Recumbent Club (EERC), see www.geocities.com/toureylover

BEHEMOUTH To Microship

This new book by "Computing Across Americas" Steven K. Roberts is a spirited 110 page overview of bike and boat projects. Signed copies are \$15 + \$3 postage (USA). Email nrl@camano.net for specifics or call 360-387-1440 after 9am PST.

This book begins with a substantial overview of the computerized recumbent bicycles Winnebiko and BEHEMOUTH, then describes system design and early adventures with the Microships—amphibian pedal/solar/sail networked folding micro-trimarans that will carry Steve and his partner, Natasha through the next level of aquatic technomadness. In doing so, it serves as the introduction to the whole family of Nomadic Research Labs publications that detail every aspect of this state-of-the-art project, from engineering-level microship internal details to spirited tales of prowling the world's back waters with boatloads of gizmology.

Beyond all that, this publication is intended as a stand alone statement of what happens when passion, technology, freedom, romance, and adventure are blended into a single obsessive fantasy. It is our hope that we will continue to trigger mini-epidemics of wanderlust and mysterious outbreaks of restlessness and curiosity.

Recumbent Boat Fans

In our favorite boat 'zine—**Messing About in Boats**, publisher and friend of recumbency **Bob Hicks** has an article on the Glen-L Marine, "**Pedal It.**" The Pedal-It is a 9'4" recumbent pedal/paddle-

wheeled catamaran that you can build yourself. Plans and patterns are \$63. Glen-L Marine www.Glen-L.com. If you are a boat builder/dreamer, the Glen-L catalog is fun to browse.

If you like small boats and do not read MAIB, you are really missing out. **MAIB** publishes 24 issues per year and costs \$24 (deal of the century). MAIB, 29 Burley St., Wenham, MA 01984-1943.

WaterCycling 2000 is a state of the art video that includes eight hours of fantastic Human Powered Boat footage on four tapes. It features: hydrofoil and expedition boats, racing coverage from 1986 through 2000 showing events from the North America, Europe, and Japan, and promo videos from 18 boat manufacturers. All told, there are over 200 different boats on these tapes!

For a limited time, I'm offering the set for \$25US to I/HPVA members, \$30US for non-members, including shipping. After that, the HPVA will take over distribution, and the price will be somewhere in the \$40-\$50 range + shipping. All proceeds will be donated to the HPVA. Please visit www.HumanPoweredBoats.com/Forms/F_HH2000_VideoOrder.htm for a detailed segment listing and to order your copy.

Lightning USCF Time Trial Success

Lightning's Tim Brummer has recently been having good success competing in time trials. Lightning has a new model called the U-2 that is based upon a racing M5 lowracer frame and seat, monoblade front fork, custom gearing, shifting, wider-range gearing and a trick carbon headrest. The U-2 is a special adaptation that is legal for USCF time trials. It has a 24-inch rear wheel and a shorter frame, making the total length of the bike less than 2 meters (required by USCF rules). Lightning U-2 has already won 5 USCF time trials (4 by Tim Brummer himself). The U-2 lists for \$3500. You can check this bike out at www.lightningbikes.com/lowracers.htm. Please tell Lightning you read about the U-2 in RCN.

Lightning has also introduced an optional lockdown tilt steering column (\$100). Bolt-on rear suspension unities are also available for many models.

The Fastest Just Got Faster!

Yellowbike.com is pleased to announce that Sam Whittingham, the current world human powered land speed record holder will be joining Team Yellowbike in 2001. With the addition of Sam to the roster, Team Yellowbike is set to dominate the North American human-powered race scene and to pose a very real challenge to the European teams this August at the World Championships in Brighton, England.

Sam, who has won multiple races and held numerous records (including 10 world records) joins accomplished racer Rob English and teammate Barrett Skrypeck to round out Team Yellowbike which, since its start in 2000, is undefeated in North America. His speed (recently clocked at an amazing 72.74 miles per hour) will certainly strengthen the team. For more information contact Rob English at Yellowbike.com by calling 888-846-7386 or by email at rob@yellowbike.com.

Dealers/Builders

If you would like your new product/shop showcased in RCN F.Y.I., please send us your company brochure, catalog, outline of what you sell and a photo (print or 150 dpi grayscale JPEG*).

RCN Readers

If you have news, rumors or would like your cool picture in RCN, please mail us a snapshot size 35mm photo print or email us a 150 dpi grayscale JPEG to bob@recumbencyclistnews.com.



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Valley Bikes

A Recumbent Moment (reprinted by permission of the Valley Bikes Revisionist)

Two guys are out riding their recumbents one day and one says to the other, "Frank, why are you such a hot dog?" Frank looked him up and down and said, "Gee, I don't know."

This Recumbent Moment brought to you by Hanklin's Wholesale Meats Co., Inc.

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www.valleybikes.com *** ddoty@valleybikes.com

Events Calendar 2001

July, 2001

The Tucker 100 HPRA Races
Northbrook, IL velodrome, and
Cheddar cheese challenge at the
Kenosha, WI velodrome.
Sean Costin seancostin@aol.com

July 14-15, 2001
RARE 2001

Rochester, NY 75 mile ride/campout
Mike Brisson 716-461-5084 (eve),
mbrisson@rochester.rr.com or Hank
Walck 716-217-9450 or
cwalck@frontiernet.net

July 28-30, 2001
World HPB Champs (Boat)

Leicester, England
roger@spokesfest.freemove.co.uk

July 28-30, 2001
Sequim Ride 2001/EERC

Sequim, WA
John Larson elarson@olympen.com
or tel. 360-681-6370

July 28-29, 2001
Steve Shutt Memorial HydroBowl

Elkhart, IN
Contact: JFreeEnt@aol.com

August 3, 2001
HPB racing

Buffalo, NY
www.humanpoweredboats.com

August 4, 2001
Waterfest HPB

Buffalo, NY
ron@humanpoweredboats.com

August 2-5, 2001
**The International Human Powered
Speed Championships**

Brighton, England
www.bhpc.org.uk/

August 5, 2001
**Calhoun Cycle Anniv. Ride &
Party**

www.calhouncycle.com ("events")
or call 612-827-8000 Free t-shirt to
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August 12-19, 2001
**POWOW/Wheel & Sprocket Rally/
HPRA Sparta, WI**
www.wisconsinbicycle tours.com,

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www.wheelsprocket.com,
1-800-362-4537 (Harry)
ron@humanpoweredcoats.com

August 18-19, 2001
3rd Annual Recumbent Retreat

Fort Stevens State Park
Warrenton, Oregon
Jeff Wills—jwills@pacifier.com or Tel.
360-254-3736 or Connie McAyeal—
ohyesbent@hotmail.com or
Tel. 503-647-2438

August 25th, 2001
BAS Ride
Milwaukee, WI
http://storeyfoundation.org/ HPV

September ?, 2001
WISIL HydroBowl (Boat)
Rockford, IL
Contact: bikeguybob@aol.com

September 8, 2001
**Michigan Recumbent
Rally—West**
Western Michigan University
(Kalamazoo). www.lmb.org/wolbents,
616/353-0125 or
Paul.Pancella@WMich.edu

September 15, 2001
Fall Recumbent Rendezvous
www.lmb.org/wolbents, 734-487-9058
or bobmich@compuserve.com

Other Events/Contacts:
Seattle Area Homebuilders
Now called SeaWheels. Nick Hein is
starting up the group again. Get on
their mailing list at www.bikelist.org/
mailman/listinfo/seawheels or give
Nick a call at 425-255-7560.

HPRA Race Events: http://
recumbents.com/hpra

IHPVA (HPVA) Race Events:
www.ihpva.org

HPB (boat) events:
www.humanpoweredboats.com

Please email your event information
to: bob@recumbentcyclistnews.com
or mail to: RCN, PO Box 1825,
Poulsbo, WA 98370.

Port Townsend Kinetic Sculpture Race

October 6-7, 2001

This is THE human powered party event in the beautiful Victorian Seaport of Port Townsend, Washington—which also just happens to be the home of Recumbent Cyclist News. The fun starts on Friday night with a party at a local restaurant/bar. Saturday brings a parade through town (recumbent riders are encouraged to ride in the parade), as well as kinetic vehicle brake and floatation tests. Sunday is the big race. It starts in downtown PT, heads through town, over to Fort Worden State Park, to the dismal mud bog at the Jefferson County Fairgrounds and back to downtown.

The best way to see the race is to bring your bike and ride the course with the racers. We do this every year and it is a BLAST. There are lots of great accommodations in the PT area, but they book up quick. There is camping Fort Worden State Park, Jefferson County Fairgrounds and there are some RV spaces at Point Hudson Marina. If you are coming to PT, make your plans now! Recumbent For more information: E-mail: bkinetic@olympen.com or www.kineticrace.org/ (site was not up at this writing, however the event is happening) and www.ptguide.com.

Barn/Blackbent

It appears that Recumbent Barn in Southern California has gone out of business. We are hearing many reports of frame breakage of the Blackbent III designs. If you own one of these bikes, be sure to check your frame frequently for signs of fatigue.

Recumbent Rollers

Kreitler Rollers, Inc. has just completed a retooling and new product line that will allow our rollers to fit bicycles with wheelbases from 31.5 inches to 72.88 inches. This should cover most recumbents. Al Kraitler and Teresa Gorby, office manager, both bought recumbents this last fall. We created a new extension kit and added one hole in our original frame to make it possible to cover all of these wheelbases. www.kreitler.com, Tel. 800-333-5782.

RCN Back Issues For Sale

RCN#48 Easy Racer Gold Rush.
RCN#51 Trice & Greenspeed Trikes.
RCN#52 Vision R32, Lightning R84, Velocar Part 1.
RCN#59 Angletech Altitude, Boats & Rat's Homebuilt.
RCN#61 Trice trike, Sat R Day folder, Recumbent Design
RCN#62 2001 Season Preview/Buyers' Guide
RCN#63 Twike, Vision R54, electric-assist recumbents
\$7 for 1, \$18 for 3, \$30 for 6. If out of stock, we will add to your subscription. To order send a check to: RCN, PO Box 2048, Port Townsend, WA 98368

RCN INFO

Contact

RCN is run by a one man editorial department—ME...Bob Bryant. Please accept our apologies that we don't have time to yack on the phone with everyone (wish we did). The best way to get our attention is by sending email. We respond to most emails. We take action but often do not respond to call in inquiries.

RCN is a business—and we are available for on a consulting basis for \$30 per half hour.

Back Issues

We have the following issues in stock: RCN#64, 63, 62, 61, 59, 58, 52, 51, 48. They are \$7 each or \$18 for three or \$30 for six. We will also reprint certain articles on request (email for availability & costs).

When to Renew

To continue receiving your RCN subscription without interruption, please renew two issues prior to your expiration date/issue. The reason for this is that while you are reading this issue, the next issue and database information are at the printers.

On most RCN issues and renewal forms, you will have the following text on the top line of your label, "64 LAST ISSUE." This means that RCN#64 is your last issue. We will send you one renewal notice when it is time to renew.

Change of Address

If you move, don't forget to send in your new address! We actually need 60 days notice so you don't miss an issue. We have to pay the post office up to \$1 for your new address as well as the remailing of issues—which contributes directly to subscription costs.

Missed Issues

You should be receiving RCN every two months. If not, email us ASAP. DO NOT wait six months to let us know there is a problem. RCN is published six times per year. You should receive your issue by the first day of the second calendar month of the issue. Check your address on your mailing label from previous issues to see if there is a problem. If not, assume that it is a US Postal Service error and drop us an email or send us a card and we'll send a replacement.

Thank you for your support.



Recumbent Mail

If you have something to say, a differing viewpoint or experience—we want to hear from you! **Please limit letters to 300 words.** No charity ride sponsorship request letters. RCN reserves the right to edit submissions for clarity, content and space limitations. bob@recumbencyclistnews.com or RCN, PO Box 2048, Port Townsend, WA 98368

Moose of a Tailbox

I thought I'd send along some info regarding my experiences with a home-built tailbox.

I originally toured with panniers, but wanted something a bit more streamlined (and, as you can see, outspoken), since the panniers jutted down about 6-8 inches into the airstream. The tailbox seems to work in that regard, since when I tried it out (unladen) under fairly controlled conditions, it seemed to be about 1-2 kph faster.

The box is made out of 1/8" 3-ply plywood fastened together by screws to 1" by 1" basswood slats. The plywood was also reinforced toward the bottom corners and front and top edges, as well as where a 1" diameter aluminum pipe went through it. The pipe rested on the carrier, so as to hold up most of the weight of the box and cargo. Reinforcement consisted simply of other sections of plywood glued to the outer sheet. About half of what you see is 1/4" 6-ply plywood.

The box is perhaps a bit too rugged, since I can easily stand the whole fully loaded (70 pound gross weight) bike on the very point of the tail with no fear of damaging it at all. Thus, if I did it over again, I'd use even less in the way of reinforcing plywood.

I'm a shortwave radio fanatic, so I also glued about 100 feet of very thin wire to the inside of the box (back and forth in a maze-like pattern) to serve as an antenna. It worked quite well, so I was able to listen to Radio Netherlands and BBC, when their signals started booming in the late afternoon and early evening (other times of the day, I'd have to settle for VOA...ha ha).

Weight distribution was a bit of a problem, so on the front part of the boom, I rigged up various smaller containers for the high density items such as tools, etc. These smaller containers were made out of plastic rain spouts fastened together with nylon cable ties. They look like something Red Green would have pieced together (cool Canadian comedy show shown in the USA on PBS), but they adapt to any configuration and they are strong, and light.

Heavy-duty cable ties were also used as the main attachment method between the tailbox and the seat.

The Tailbox itself is probably a bit bigger than it needs to be, but I had to err on the side of more rather than less, since I'm only able to tour in Canada in the Spring and Fall. Therefore, lots of nights (and some days) are below freezing, and in turn, that means lots of insulating layers in terms of clothing and a sleeping bag.

Next time, I'll attempt to make a tailbox out of sheets of fiberglass done up in the same configuration (but significantly smaller, since I'll be gone from a bulky synthetic to a more compact down sleeping bag). I'm guessing that fiberglass will be about 1/2 the weight of plywood. The sheets will be attached and reinforced at the corners (and wherever else might need it) by using a simple fiberglass repair kit for cars. I would also work at extending the storage space attached to the forward part of the boom.

In terms of performance, the tailbox performed admirably over 800 kms (Calgary to Moose Jaw). The prairie crosswinds didn't seem to be much of a problem, and the only spill I took was prior to the trip. There was no harm to the bike or box, due to small aluminum tubing elements attached to either side of the lower forward part of the box. These were deliberately attached (again, via cable ties) in a manner than would absorb the shock if the bike fell over on its side.



And then, when I got to the bus station and Moose Jaw, I just packed the bike in a bike box, and used the tailbox as a separate packing box for most of my other stuff.

I did not have any complaints about the bike, an ATP Vision R40. Not only did it perform beautifully on that trip, but on a previous 1,000 kms (Sault Ste. Marie to Ottawa) with normal panniers, it was a perfect joy to ride.

The incendiary comments on the side of the box were both taken from lead editorials from our National newspaper, so it is possible for us Canucks to have a healthy disdain for some of the nonsense we have to put up with.

Evan Bedford

Great Mirror

A good tip for recumbent riders who want a good eyeglass mount rearview mirror is the "Take-A-Look" mirror. They are the most reliable helmet/glasses mirrors made. Once set, they stay adjusted. They do not become loose-jointed when going fast or into a headwind. I thought you might be interested to know that they also sell a mirror for the right side in addition to the left. A right side glasses mirror will be very useful for dealing with some of the nastier situations where cars are merging from the right. Ditto for travelling in countries where people drive on the "wrong" side.

The Take-A-Look mirror is around \$15 from: Bike Peddler Products in Greeley, Colorado. Tel. 970-339-2453.

Charlie Stillman

Editor Comments: REI, Aurora Cycles in Seattle and Zach Kaplan all sell this mirror (maybe others).

Slick Solution Found

First let me say that I truly enjoy RCN and support your independent views. I also agree that those recumbent manufacturers that are not onboard with RCN are extremely short sighted and should rethink

their positions. Why? More boomers coming of age and their move from wedgies to recumbents means more money! Why alienate the primary advocate for this small but growing segment of bikedom?

The real reason for this letter is to suggest at least one fix for what I have found to be a slick Rans seat on my 2000 Stratus. Don't get me wrong; I love that seat and the bike! I just get a little tired of 'scotching' myself up, especially living here in Texas where it is 'hot and humid' most of the year and a sweaty pair of shorts doesn't help much.

My wife and I love to motorhome in this beautiful state, and we both like to bring our bents along and ride in the areas where we camp. By the way, riding a recumbent (we both have Rans bents) around a large campground is definitely a good way to start a large 'kid parade' (also dogs, and in one case a rabbit!). There is no end to the questions, and it is also a great way to meet your neighbors (sometimes whether you want to or not)!

I know that most of you have not read any of the popular motorhome magazines, but if you have, you will know that they offer a plethora of merchandise for sale to us baby boomer RVers. One such item is a product named 'Scoot-Gard' (Vantage Industries, Atlanta, GA, 800.221.4329) that we all use to keep the canned goods from sliding out of the cupboards onto our feet. It is especially useful for holding one's beer can on the table (when someone else is driving, of course). Seriously, this product comes in very handy for a number of reasons when you live in a world that is moving and your are having trouble keeping things in their place. It is used for everything, essentially. You line all your shelves with it and lay it down anywhere you don't want whatever is on it to move should you need to take a sudden left turn in traffic.

In thinking about this, I asked myself, "what about my butt?" (no offense intended!). Well, I tried it, and it actually worked...

Nothing is perfect, of course, so this may not meet everyone's needs. But it sure works for me. There are some issues to consider though:

1. The Rans seat is black. So when picking out the material, those of us who like color coordinated bike stuff will definitely need to search for the correct color scheme. I use grey, but it really doesn't matter. Besides, you're sitting on it!

2. How do you secure it to the seat? Well, all I do is lay it on the seat and simply tuck it down a little between the seat back and base. This way it is also easy to remove and chuck into the washer from time to time. This fabric also comes in large rolls; so it can be cut with scissors to custom fit the seat. This material also has numerous holes in it, so it is breathable.

3. Where to find this stuff? Well, it seems to be everywhere these days. I would suggest that you stop by your local RV supply store (usually associated with a dealership) and they will have it. Also, I have seen rolls of it in the ubiquitous Wal-Mart's, Target's, etc., around the country. It is easy to find.

My suggestion is that if you are sliding down your Rans seat, give this a try. It may work for you. Enjoy!

Carl Jackson, carlbjackson@worldnet.att.net

Recumbent Defection

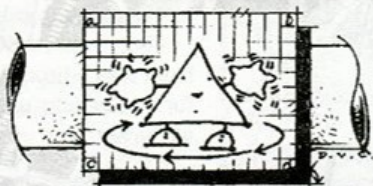
I am also concerned that I have seen several novice recumbent riders who sell their bikes after only a few hundred miles. People are not finding what they want. I don't know what can be done, but I think manufacturers should consider the problem—preferably together. I have most RCN issues and see very little evolution—especially in comfort. I know riders who stop every 8-10 miles. Most new seats (Easy Racers, Rans and BikeE) seem to be designed to impress new buyers with 2-5 mile comfort.

Butch DiLorenzo

Editor Comments: Finding the right recumbent the first time out can be very tough. When you become a better rider, what you want out of a bike may change. The sad part is that our industry does not do enough to help riders find the correct bike. There is more sales hype than ever before. Back in 1990 it was our mission to help riders find

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the right bike by offering honest reviews. This mission has become more difficult in the age of the Internet. We'll keep trying, but not every recumbent rider or potential customer reads RCN...yet.

V2 Feedback

I also purchased a new Rans V2 from Valley Bikes last August. I have found it to be very comfortable except for those flexy handlebars. Really like the seat and the slightly higher bottom bracket. I did a couple of 20 mile tests comparing it with my Gold Rush (fairings on both, but body sock removed from GRR) and the V2 was about 1.5 mph slower. I also had to fashion a couple of aluminum tubes to triangulate the bottom attachment points on the fairing to keep it from loosening and making popcorn popper sounds on the top of the fender. The only other problem has been the headset loosening, but seem to have that under control. So from my perspective, it's a comfortable, great looking bike, but if you want to go fast, get the GRR and body stocking.

Hal Barnhart
Barn12@aol.com

Slipping Rans Seat

I am writing in response to John Riley and his folding RANS Wave article in issue #61 of RCN. John mentioned that he had a problem with a slipping RANS seat. I have had the same problem. I would like to think I have come up with an elegant solution to the problem. The frame 'rail' is attached with two screws. The rear screw sits right under my seat preventing it from sitting tight on the rail. I removed that screw. I then noted where the rear of my seat sits on the rail. At that point I put in a new screw. This screw is that type used on many bikes to hold on water bottles. It has an allen head and the head is about 3/16 inch high. The seat now butts up against the screw and can't go any further to the rear. One screw does the job. Granted this means that it is only good for one seat position but that covers me just fine.

Dick Anderson
ander03@email.msn.com

Rans Sliding Seat Fix

I have a solution for correcting the slipping Rans seats. The next time you're out on a ride and see half of a dead tarp strap—sort of a black rubber bungee cord—pick it up. Cut a chunk of it to fit crosswise between the seat base frame and the frame of the bike. Use a flat-blade screwdriver to jam it in there, and you're done. It is easy, free, and uses recycled materials, too!

Warren Block
wblock@wonkity.com

Fractured legs and clipless pedals

Several editorials have focused on clipless

use with recumbents and subsequent fractures of the lower extremities. During a crash, I sustained spiral fractures of both the distal tibia and fibula, requiring 2 plates and 13 screws to correct the injuries.

The dynamics of falls on recumbents are different than on upright bicycles. When an upright cycle crashes, the momentum of the rider causes the rider to go over the handlebars and as he/she does, their heels kick out laterally causing the clipless pedals to release.

A fall on a recumbent is different. Usually, we have our inside leg at the top of the crank stroke, which is a position that prevents the clipless pedal from automatically releasing. Furthermore, the position the foot is in is most difficult to intentionally release the clipless pedal. Heel interference from mid-wheel base recumbents not only makes releasing the clipless pedal more difficult, but also adds another possible source for injury. Namely, heel contact with the front wheel with a foot that is unreleasable at that moment in time.

Ultimately, riders such as myself must take responsibility of their craft and avoid circumstances with increased risk. Specifically, disengage the clipless pedals prior to turns, slick pavement, gravel, gravel on asphalt, pace lines etc. I personally believe that pedals with more float are actually more unsafe for recumbent riders. My accident was with a V-Rex and Speedplay Frogs.

Unfortunately, the technology of clipless pedals does not ensure the recumbent rider the safety of automatic disengagement in the event of an unplanned crisis. We need a pedal that is comfortable, allows spinning as do the current clipless pedals yet automatically disengages for the types of falls recumbent riders infrequently endure.

Randall Morgan
RJMBIKE@aol.com

RCN#62

I'm finding your new issue (RCN#62) to be simply splendid. Bravo. I just finished the letters section. Even just this section is special among mags that I read. What a diverse world view! You have really hit a home run. And not just with this issue. I think what is part of what is so neat about this issue is how it shows connection to both past issues and to your community. I find it to be most admirable how you hold your temper and how you are generous and sharing about other businesses, mags and their plights. At the same time you express criticism and allow others to make their opinions and complaints known. This is very healthy and vital to the HPV scene! It has to be one-of-a-kind among cycling mags. It's the way a mag should be. It was almost moving for me to see the community you have created in your pages functioning so well.

Jeff Potter
jp@glpbooks.com

Editor Comments: I am tiring of "recumbent

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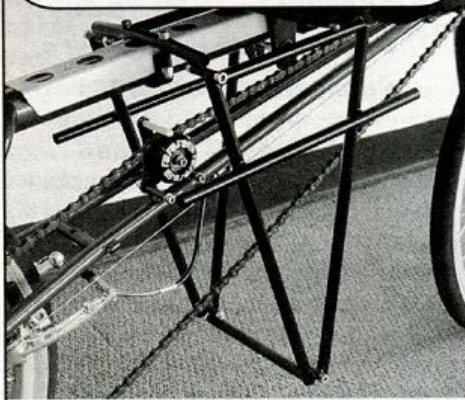
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absolutes" (opinions or generalizations that are absolutely correct for every bike and every rider). Personally, I'm for diverse opinions, and many different voices. When giving my opinions, I will try to be more thoughtful and

respectful when stating my points. It is possible to state your opinion while showing respect for those who have a differing opinion.

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John Schlitter

Mark Colliton



WizWheelz Update

RCN 62 looks great, nice job! We'd like to clear up a few things though. First and foremost is our phone number. The one you listed is a couple years outdated. It should be Tel. 616-940-1909.

Also, you refer to the TT as an "entry-level trike." We are not sure if that means it is of lesser quality or just a lower price (it kind of sounds like a negative thing). We would argue that the 3.2, though it's lower in price than our competitors, equals or surpasses them in quality, craftsmanship, and component selection.

Thirdly, you list us as a "small trike manufacturer." Though we certainly cannot be considered a large company, we did sell more tadpole style trikes in the US market in 2000 than any other manufacturer and we plan to double our sales this year. We'd like to be considered one of the "big boys" if not the "biggest!" Also, at least currently, we have the shortest lead time for delivery of any trike manufacturer.

Overall, we thought #62 was very well done and an enjoyable read. We were very happy with the ratings and comments you included about our product. The reader survey was nice! Keep up the good work and let us know if you're interested in reviewing the 3.2. We're anxious for you to ride this one - it is miles ahead of the old 2.3. We want to be considered in the running for "Best Trike" next time, and though we're probably as opinionated as anyone in this industry, we think we've done it even at this "entry level" price. Love your magazine!

Wayne Oom
WizWheelz, Inc.

Touring Articles

I read nearly every article and letter in each issue of RCN, so it's cheap at \$40 per year, based on cost per useful word and photo. My only other cycling magazine of similar value is *Adventure Cycling*. By the time I gave up on *Bicycling* magazine three years ago, I was lucky if I found one page of interesting information in an issue. However, I may start subscribing to the *Rivendell Reader* magazine, because Frank Berto, one of my favorite technical writers, tells me that he still publishes articles in it. (Frank's book,

"The Dancing Chain" [VanderPlas Publications], is a very interesting history of derailleurs. You can buy it directly from him—email <fberto@ix.netcom.com>.)

RCN has much of interest even to cyclists who may never own a recumbent. I bought a subscription for my brother whose major interest is internal-hub gearing, which RCN covers in more depth than any other U.S. publication. The road-test articles also give excellent evaluations of other components that are used on uprights, too.

I read *Adventure Cycling* for both its technical and its touring articles. By comparison, RCN's touring articles are often rather "ho-hum." Unless a touring article has something unique about it besides that the rider happened to be on a recumbent, I suggest that you not bother publishing it. On the other hand, if, for example, it was a tour to a recumbent rally, or it posed unique challenges, then print it.

A. Christopher Wilson
acwilson99@home.com

RCN#62 Comments

I have been a multiple issue subscriber to RCN since shortly after its inception. Throughout that time, RCN has served as a "voice in the wilderness" in the bicycle industry, consistently producing crisp, clear writing in a no nonsense informative style. Although the RCN audience is mainly focused on recumbents, all of us bike enthusiasts take away considerable knowledge from each issue—there's philosophy, technical data, everyday experiences, and a dose of political commentary as well. Kudos for a job extremely well done. As a recumbent rider for most of the past 20 years and the co-founder of a recumbent manufacturing company, I applaud your efforts and high quality reporting.

Paul A. Lester, President
The Ultimate Bicycle Company
(d/b/a Backsafer and Lowryder)
pl@fldlaw.com

Buzz, Gloss & Hype

First of all, thanks for the great mag. I just saw your "license" piece (63) and needed to respond. Besides RCN, I also have subscribed to *Outside* and *Escape*, Both glossy with plenty of jolt. I am letting my subscriptions lapse on these because I find it plain offensive that they support themselves on advertising dollars supplied by auto manufacturers. The cult of the internal combustion engine is unsupportable both morally and economically. Your no frills style and honest reporting are very refreshing in a country where drilling for oil in a wildlife refuge is seriously considered. I have had my Rans Rocket for one year and 3000 miles. Commuting and club rides. I have experienced all of the quirks of recumbents, steering, braking and 'bent butt. And I have learned to cope with them and have no intention of changing back to a wedgie.

Gary Jackson

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Easy Racers Hasn't Flown The Coop

First, let me say I always look forward to my next RCN and I always read it. Although you might think I would have become satiated with recumbent info long ago, I haven't. And RCN fills a very necessary niche. The www is good, but can be very unreliable as anyone gets to say whatever they like. Merely being able to pilot a keyboard does not make anyone knowledgeable about aerodynamics, suspension, handling, or any of the other related issues. I've seen some very good advice on the web, but also some very bad. Additionally, it is good to have a publication that has no agenda—except to promote recumbents in general.

Now, I'd like to reply to Roger Fuller ("I'm Back," letter in RCN#63). Although we've "flown the coop" Gardner has not changed. He still answers the phone, but it's more likely that when you call, the first voice you will hear will be Robin's or mine. Anyone that wants to speak to Gardner still gets to speak to Gardner. We only screen calls to keep pesky telemarketers (who ask for him by name) off his back. The only reason Gardner doesn't take a call immediately is if he is already with another customer or potential customer. And if he is, he will always call you back.

People often say, as you did "he seemed to have nothing in the world better to do than to help me..." This had not changed. I

don't see this ever changing. What better in the world would Gardner have to do than to help customers and potential customer/friends? Sure, he has designing and refining to do—always. Designing and refining are a part of who G. is. If it doesn't get done during work hours, he'll do it during non-work hours. Sure, he always has a ton of business decisions make, but business busyness can never be as important as our customers.

So, Rodger, don't worry, we may have

moved a little further uptown, but we'll never go Hollywood.

Sandra Sims-Martin
Easy Racers, Inc.
TOOEASY1@aol.com

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The BikeE RX

The beginning of the end for owning multiple recumbents

by Brother BJ Strass

Things change don't they????? I mean REALLY change! Look around you. WOW! If you're an old timer in recumbents you can truly relate. They are getting lower priced, better handling, and definitely more mainstream. Tinkerers became builders, builders became manufacturers and manufacturers have become industry suits. I am thrilled. I had nearly given up, feeling recumbents would never get their due respect. At the InterBike show this last September it was obvious to many, recumbents are becoming a force to reckon with and have taken their place in the cycling community.....but then enough of this preaching. What I am really here to do is talk about one of the newest recumbents, the BikeE RX. It really illustrates how things have changed.

BikeE has been an industry mover since introducing their first bike in '93. They are the largest and probably most progressive recumbent producer in the world and the RX is proving that they are not content to leave things alone. This is a good thing. The RX is a new for 2001 model. It successfully replaces the very nice, but commercially unsuccessful NX. The NX had some great points but the cutting edge 2-speed bottom bracket, Hayes hydraulic disc brakes, and \$1995.00 price tag turned away many. The handling, however did gain a following.

SYSTEMS

The FX and RX share essentially the same frame. Much of their geometry was borrowed from the NX. BikeE continues to use their excellent custom designed aluminum frame extrusion and they both utilize the excellent mid-drive system. This system has been proven under extreme conditions on the FX. The steeper headtube (60 degrees on the RX/FX, 58 degrees on the AT), shorter front end, and higher bottom bracket (1.5" higher than the AT) are from the FX also. The frame finish is no longer brushed, but bead blasted. This gives a more even flat finish. BikeE has used anodizing for their frames (except for the redesigned '01 CT which is painted) with good success. The RX is also anodized, but in a departure, it is available in clear that allows the natural look of the aluminum to come through. This along with the bead blasting and mid-drive give the RX an aggressive look, kind of like a Hummer in a movie theatre parking lot. It looks like it wants to get out and do some serious stuff, not just sit around.

The RX is standard with the identical Cane Creek air shock used on the FX, E2, and AT. In standard form it uses a non suspended front fork but can be had with front suspension as well, at additional cost. Some have reported suspension bobbing on rear suspended BikeEs under acceleration. I have not had this problem and found most having this are running inadequate air in the rear shock. Air shocks are like tires and you should check the air once a week to be safe.

Drivetrain/Shifting

Like the FX (and all recent BikeEs) the RX uses SRAM 7.0 components. This goes for brakes, levers, shifters, hubs, and rear derailleurs. The mid-drive derailleur is a Shimano LX. The RX has higher road gearing (19-109 gear inches, the FX has 16-94 and the AT has 23-108 for comparison) and uses the 27-speed system as opposed to the FX's 24. I have tried very hard to dislike SRAM components. Now don't get me wrong, I'm not a Shimano fanatic, but I guess it is the thought of plastic (composite) where steel and aluminum used to be. Finally, I've given up and decided to embrace

SRAM components. They are tough, reliable and shift very well. I have beat these derailleurs up and they just come back for more. Grip Shifters have always held a place in my heart next to road rash and uncooked broccoli! This is until the "Half Pipe" units came along. These work great and eliminate the accidental shifting I came to know so well on older models. Kudos to SRAM. Also don't worry about upgrading the chains as the RX comes stock with the superior SRAM/Sachs PC-series which are loved by 'bentheads worldwide.

Being a store manager I have set up many bikes using SRAM components. I have found that occasionally shifting is poor in the smaller 2 rear cogs particularly for the 9 speed. The simple solution is to have a 1mm axle spacer installed on the rear derailleur mounting stud between the dropout and derailleur. This slight spacing gives the derailleur more room, and we do it as a matter of course. With this little mod the RX's shifting is crisp and accurate. The gear range feels more than adequate to do most anything. The lowest gear allows the RX to crawl along at a snails pace and it should almost climb a tree. The only real thing that bothered me about the drive train is the front bottom bracket. BikeE specs a 110mm width which is nice and narrow. However this places the front chain very close to the frame and I felt it could scrape the frame in some circumstances, though I haven't had it happen. A 113mm width might be a better choice.

Wheels & Tires

The RX again uses the same parts as the FX. The SRAM hubs setup well, have decent seals and roll very smoothly. The very wide Alex rims are super tough. Tires are Maxxis HookWorms. These are big tough tires. Really tough. Take one off and squeeze it, it's as firm as a Washington Apple! I have ridden these big fat donuts over about everything short of a bed of nails with nary a problem. The tread pattern sticks well allowing the bike to corner hard and their boisterous 1.95 size virtually eliminates dreaded "pinch flats" common on small tires. The HookWorm's high pressure and semi-slick surface make these very fast tires as well. Zach Kaplan, an avid recumbent contemporary, has been very vocal about the superior qualities of big, fat, high pressure tires, and the RX is a great example of their use.

Braking

Like I said, I learned to embrace SRAM and the brakes are a part of the gruppo as well. They are not plastic, however, but your basic aluminum alloy linear pull "V-style" brakes that have virtually eliminated cantilevers. I do find the fit of the brakes better than many, with no apparent slop on the mounting stud. The machined sidewalls of the Alex rims allow the brake pads to be setup with minimal toe-in. Setting up lesser brakes like this would make them squeal like an adolescent girl at an N'Synch concert. This also gives the brakes a very firm action. The brake levers are plastic (yeah, I know, composite) however. They look cheap but once again, work well. I tried under use, but couldn't break them. I would probably, eventually replace them with something like Avid or Tektro's nicer models to get adjustable leverage and just to make me feel like I changed something. For the most serious the RX comes equipped with full front and rear mounts for disc brakes. I have been toying with the idea of a Magura Julie on the back wheel. Your recumbent shop should be able to upgrade you to discs but be prepared as it will

not be cheap. Discs require different hubs, and thus wheel rebuilding, plus the cost of the brakes.

COMFORT/ERGONOMICS/FIT

Comfort has always been a mixed bag for the BikeEs. Their philosophy has pretty much been to make the seat compact and efficient for pedaling, yet as comfortable as possible. The BikeE Sweet Seat is probably the most adjustable recumbent seat on the market. Prior to its introduction I avoided very long rides (over 65 miles) on BikeEs as the seat bottom gave me some soreness, but many have not had this problem. The Sweet Seat I have found to have a break-in period, and then it is very nice. The larger base and thicker foam needs some time to shape itself to the individual posterior. BikeE seating is not the very reclined position of some recumbents and I sometimes wished for a bit more recline. But due to the RX's higher front end, this is accomplished.

The stem/handlebar system is new. The lower stem, traditionally chrome-moly steel, is now a custom carbon fiber item. It cuts weight by about .75 pounds and also has the benefit of absorbing some road vibration like a carbon fiber fork on a road bike. It looks great and besides we know "We all need our Fiber!" The upper stem is the aluminum top loader style but has an approximate 5 degree rearward bend. The handlebars are the same alloy, low-rise models on the FX. The rearward slant of the upper stem brings the handlebar pleasantly back to the rider. The only drawback to this system is that the bend placed in the stem makes a scuffed appearance in the forward area. This detracts from a very good looking bike, but should be correctable with some aluminum polish. Some riders have found it necessary, on past BikeE's, to stretch forward but not here. Also the top loader stem gives the ability to switch handlebars to the owner's liking.

I'm a big heavy rider at 6'2". I use the XL model and find that once dialed in the RX compares favorably with most good recumbents for comfort. I did find the handlebars to be a bit narrow for my preference. I have very wide shoulders and this is usually a problem with many bikes, but shouldn't be for an average rider. The comfort of the RX is pretty easy to dial in due to the Sweet Seat's adjustment range and like all BikeE's the fit range is very wide.

RIDE AND HANDLING

As recumbent enthusiasts we want to believe we don't compromise, but we do. After all for 100 years it has been a Wedgie world and Wedgie bike expectations are the norm. Whether this is mounting a computer to an under-seat steering bike, or learning to avoid slow, sharp turns on a long wheelbase, or occasionally smacking your heel on the front tire of your short wheelbase, we compro-



mise. The RX requires the least amount of compromise I have found in any recumbent. If you want to make a sharp, slow turn...just do it. If you want to jump off the sidewalk...just do it... If you need to quickly whip out of a tight situation in traffic...go for it. The RX's handling IS its best point. It's very easy for new riders to pick up and has tons of potential for advanced riders. There are few recumbents that handle well at very slow speed and high speed. The RX can be ridden at a virtual snail's pace with a bit of practice. The bike does not have the "dive" feeling as with many bents. It is great for safely picking through a crowd of pedestrians at an outdoor market. Track stands are possible as well with lots of practice. I have had an RX up to 22 mph and the handling remains solid and accurate. The steering is quick at speed however so make sure you know your bike before that big mountain descent.

The RX feels very small at first. It is very compact and takes up little room. This aids in its superior slow speed handling. I find myself looking for places to conquer. I try to see if I can get in and out without taking my feet off the pedals. I've ridden it through tight hallways and down steps (No Kids, Don't Try This At Home...disclaimer), and through narrow doorways. Sure this is fun but it isn't always real life, so I loaded up my B.O.B trailer with 50 lbs., and rode around town. Traffic, sidewalks, back alleys, dirt trails, No Problem. If I could have gotten away with it I would have ridden through the supermarket chucking tortilla chips and import beer into the B.O.B.

as I went along. Who needs a shopping cart? How about ride-through shopping?????

Performance

The RX's performance is surprising. I found the 1.5 inch higher bottom bracket to be a big performance booster over the AT. The bike accelerates very quickly and would be hard to beat in a drag race. In fact BikeE drag racing was an exhibition sport at the last InterBike show (I came in 2nd in my class, brag...). Maybe recumbent drag racing will replace WWF wrestling????? Hmm..., maybe not. If your looking for lowracer performance this isn't it, but neither are most recumbents. Sustained speed does seem to be good though. Speed comparisons are difficult for me. I find myself to be much faster on high bottom bracket (most SWB's) bikes and slow on most low bottom bracket (most LWB's) bikes. The bottom bracket height on the RX compares favorably to many SWB's so I find it pretty darn fast. The nice part is it doesn't have many of the drawbacks performance bents carry. Overall, I found myself to be at least 3-4 MPH faster than on an AT. The RX screams for a 3/4 length fairing. This should really kick it up.

ANALYSIS

Market Competition

Probably the next closest things to the RX in design are the Burley Limbo and Rans Gliss. Both the Gliss and Limbo are larger bikes and can't hold a candle to the RX's low speed handling. In acceleration the RX leaves both of them in the dust as well. The

Gliss is about the same on sustained speed, but the Limbo was less. The Gliss comes in substantially higher at about \$1999.00 and the Limbo a bit lower at \$1299.00. Neither of these bikes has front suspension as an option. I find the seating on the Gliss to be a bit nicer than the RX, but the Limbo to be less comfy. Finishes on all three bikes are roughly comparable. The rear suspension on the RX is excellent, the Gliss is good, and the Limbo too spongy, even with smaller riders.

Purchasing

BikeE is one of the easiest recumbents to buy as it has probably the largest dealer network. Just go to www.bikee.com to find a dealer.

Shipping/Assembly

BikeEs are sold through a very large and growing dealer network. First time out the bike does need to be set up by a professional shop technician, after that the bike is pretty easy to do minor disassembly for shipping. Its compact nature lends itself to touring riders that transport their bike by air, shipping or bus.

Value/Depreciation

I feel the RX is a great buy, in fact I ordered one (the shop is tired of me always hogging the demo)! It is rugged, versatile and quick. The wide fit range of the RX (as with other BikeEs) and the fact that it has been in high demand since its introduction, should help keep the resale up.

Options & Accessories

BikeE has the widest range of accessories on the market. Most all of these will fit. There are also a few accessories made for BikeEs by outside sources.

Verdict

I love this bike! The RX is to my feelings the best do it all bike on the market. In traffic it is a virtual urban assault vehicle. It can be taken on trails, tours and club rides. It is compact in size and big in performance. I still like to own 2-3 recumbents, but now find fewer ways to rationalize it. By the time you read this I will have completed a 425 mile unsupported tour on my new RX.

RATINGS/SUMMARY

Comfort B
 Design/Style A+ (Think civilian Hummer)
 Drive train A
 Chain Management A-
 Brakes/Braking B+
 Finish/Quality A
 Handling A+

Pros

Killer handling
 Best do it all bike on the market
 Big performance/Small package
 Few compromises
 Great shifting, no chain slop
 Fair price
 BikeE support and dealer network



Brother BJ Strass (on bike) at the BikeE Interbike drag races. Race official is BikeE's Lee Ecroth.

Cons

Needs wider front bottom bracket
 Plastic brake levers bug me
 Seat bottom has a break-in period
 Lessens reasons to own multiple recumbents

INFO

2001 BikeE RX CLWB ASS

Price: \$1395 (rear susp.)
 Wheelbase—52"
 Seat height—29"
 BB height—21"
 Weight—32 pounds
 Frame—Alum. extrusion with CroMo fork and swing arm.
 Shock—Can Creek AD5 air
 Fork—BikeE rigid or suspension.
 Sizes—Standard and XL

Components

Crank—BikeE; BB—N/A; Headset—Aheadset OS; Derailleurs—SRAM ESP 7.0; Gears—8/24-spd. 11-30; Chain—KMC; Gear Inch Range—19-109; Pedals—Wellgo clipless compatible; Wheels—406 mm 20" (rear)/305 mm 16" (front); Rims—Sun CR18; Tires—1.75 Maxxis Hookworm; Hubs—ESP 7.0; Brakes—ESP 7.0 V-brakes; Warranty—NA; Colors—Gun metal grey or red.

Cost

The RX lists for \$1395.00. XL size adds \$50.00. Front suspension adds \$300.00.

Access

BikeE Corporation
 5125 SW Hout St.
 Corvallis, OR 98333-9557
 1-800-231-3136
www.bikee.com



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The HPM TriHauler

A Recumbent Cargo Hauler

by Mike Librik

mllibrik@earthlink.net

The Human Powered Machines TriHauler is not a toy. It is a tool for moving large loads by human power. A deluxe version like the one I own costs around \$2900 and requires a good chunk of storage space. It has some flaws, to be discussed, but despite these, the system is worth the cost and trouble. It is a good worker.

I use the larger size TriHauler, weighing over 100 pounds and rated to carry about 600 pounds. A smaller version is available, but I am not familiar with it.

SYSTEMS

Frame/Fork

The trike's frame is CroMo steel. Most of the weight is in the aluminum and steel cargo box, which can be removed in order to mount custom cargo pallets, like a pedicab passenger couch or a tank for liquids.

The trike drives with its single front wheel and brakes on its two rear wheels. For steering, the frame pivots on a 1-1/4" headset mounted beneath the seat. A large rubber elastomer keeps the boom snapped back to center to improve tracking. An elastomer suspension isolates the drivetrain and front forks. It took me about 3 years of sporadic use to wear out my elastomer, which now bounces as I climb hills.

Handlebar Configuration

One has two choices in configuring the handlebars. HPM's pictures show the bars angled down and swept back, like on an Infinity or Linear. I set mine angled sharply up, swept forward, like a Greenspeed. This allowed for placement of two rearview mirrors, for traffic, and an easier view of my controls. Any following advice on steering is based on the upward configuration but can probably apply to the lower one.

Drivetrain/Shifting

Needing low gears, I ordered my TH with 63 speeds. I was surprised that HPM had not built one like this before. A standard drivetrain should work in flat terrain, or indoors, but not on Austin's roadways. I later added an 11-34 cassette, giving an overall range of 10-113 gear-inches. The front derailleur shifts using a thumb lever on the seat frame. I don't use bar-end shifters as (I need mirrors).

The drivetrain has a poor chainline. The bottom bracket spindle is too long and cannot, apparently, be shortened. This length is necessary to keep the chain off the front suspension's pivot bolt, but it makes for noisy gears, limited gearing combinations, and some trouble shifting.

The inability to shorten the spindle keeps me from using a mountain bike crankset to lower the gears further. I believe this problem could be handled by using a non-dish front drivewheel with the associated asymmetric forks. This would move the cogs further out from center, improving the chainline. Inquire with the dealer about this when ordering braking.

The stock system is two Magura hydraulic rim brakes actuated simultaneously by a single right-hand brake lever. A shortcoming of this system is that when the right hand is signaling a right turn it is unavailable for braking. I optimized this system by adding a left-hand brake lever. Either hand would actuate both brakes, and both hands gave better stopping power. A locking brake lever is a must for safe loading and unloading. Prior to getting a Magura locking

lever, I used a pedal toe strap to cinch a lever down. The hydraulic brakes give good stopping power, even with heavy loads.

Truthfully, I am ambivalent about the hydraulic system. There is, really, only one brake, and a problem anywhere along the nearly four meters of hydraulic line will incapacitate the whole system. This happened to me twice, requiring that I move a load of cargo home, though traffic, without brakes. (I jammed my foot between the front wheel and boom to slow it down.) When a hydraulic line goes, it takes special tools, work, and patience to fix it. It is difficult to bleed air bubbles out of this huge system.

I have since switched to a simple cable brake system, with the left hand stopping the left rear wheel, etc. There is surprisingly little tendency to veer under uneven braking, probably because the braking wheels do not steer. Should it veer, the right-hand/right-wheel arrangement helps. Right-hand braking could pull the trike right, but one can steer slightly left by simply pulling on the right handlebar.

Disc brakes were not an option a few years ago, but are probably available now. I would get a front brake as well, actuated with a shift lever, like the stoker's brake on tandems such as the Screamer, which will deliver a specified amount of continuous braking power without having to hold onto a lever.

Wheels

The rear wheels are simple bolt-on BMX hubs, with fat, eyeletted rims, and 48 fat spokes in a 3-cross pattern. Remarkably, I have never had a flat on my TH in years, but this is just luck. Changing a flat on the front wheel will be hell, as the wheel must be removed and the frame cannot be set down on the rear derailleur. One solution would be to carry a jack stand everywhere. Another would be a center-stand somehow fitted onto the front forks.

Naturally, the brakes lock up easily when the trike is unloaded. The front wheel loses traction when climbing with a load over broken ground. I am considering a knobby front tire for this reason. It might be better if the front wheel were further back, so as to carry more of the driver's weight.

SEAT

I am dissatisfied with the HPM seat. It is full mesh, strung between two contoured rails at the sides with several adjustable straps. As the seat stretches, it cannot be tightened without creating horizontal ridges in the mesh that dig in between the vertebrae. I've solved this problem with a Therma-Rest cushion set behind my lower back.

Prospective buyers should question their dealer about this prior to ordering to see what improvements are available.

Adjustability

The TriHauler adjusts for leg length via a sliding boom. I am leery of sliding booms, having both snapped boom pinch-bolts by over-tightening them and, worse, having booms rotate out of position under heavy pedaling load. This tends to occur when dashing madly across arterials, where sudden drivetrain failure is undesirable. An annoying design feature is that one of the two boom pinch bolts is inaccessible unless one removes the front derailleur. Buyers should make sure that pinch bolt heads face the non-drive side when the trike is built. If you are particularly short, be sure to warn the manufacturer.

RIDE/HANDLING

Steering with Your Body While steering a FWD articulated-frame design takes some learning, it is easy to practice since the trike doesn't fall down. With my upward-facing handlebars, the simplest way to turn, say to the right, is to use the arms to lift the upper body off the seat, set oneself down on the seat's left edge with the hips turned right and the right side toward the seat back. Pushing straight against the pedals turns the front wheel to the right while supplying steady power.

There are more subtle methods of steering. Pulling with the right hand while pedaling turns the trike slightly left, which is handy on high-crowned roads. I encourage the novice to use the lift-and-turn approach, as it keeps one from delivering power with the body twisted up. I have injured myself before by improper steering.

I recommend using foot-retention devices on the TriHauler. They greatly aid steering. Moreover, one doesn't have to unclip at a stop on a trike. When pedaling the TriHauler uphill, you want all the ergonomic advantage possible.

Tracking and Stability

The steering system is designed to snap back to center, so the trike tracks well at high speeds. Being so heavy, the TH will go fast downhill. It is easy to pedal a straight line no-handed. This feature is most useful on hard climbs when the arms can be repositioned to allow for optimum respiration. However, I always keep a hand on the bars when in the presence of other vehicles or pedestrians. We live in a social climate where HPV operators must show a burden of responsibility in traffic, as our legitimacy is questioned. I don't like to appear to be doing stunts on the public roadway. A great advantage of the TriHauler over many other cargo systems is its stability. Still, it is possible to roll a TH. Given an empty cargo box, 6 or 7 beers and a bunch of rowdy cruiser-types hot-dogging around a field, it can be done. I have never come close to such a catastrophe in regular use.

As a Hand Cart

Like a good cargo trailer, the TriHauler can be maneuvered as a hand cart. Grasp the boom or seat and roll and pivot the trike on its rear wheels. Full braking is still available, and heavy cargo loads, properly arranged, are easy to lift.

In Pedestrian Areas

On loading docks, or other pedestrian areas, the trike is capable of tight maneuvering despite its size. Going forward, one can lift oneself up and re-orient the hips far to the side. My steering system allows for an 18 foot turning radius. One must unclip and set the feet down to back up, meaning one



Portrait: The HPM TriHauler preparing for its usual duty of recycling paper and cardboard. Maybe one could pick up a new kitchen stove on the way home. It's nice to have that freedom.

cannot steer in reverse. However, one can stand up in the seat, lift the front end by the handlebars, and pivot the trike. Pushing it backward is easy due to the straight-tracking steering system on roadways.

In traffic, the TH simply takes over a lane. I have taken some pains to improve its visibility so that motorists will detect it at a greater distance. This huge trike has an inevitability to it. Someone stuck behind it may not like it, but they can't just expect it to get out of the way.

The concerns when driving such a heavy HPV are its ability to climb hills and to accelerate from a dead stop. This latter is a great concern in traffic. Despite their greater weight, trikes have an advantage in acceleration in that the driver can throw their whole body into the action. On a straight road, the TriHauler is even better due to its steering. When I'm in a steep climb I let my hands fall back to my sides to grasp the main frame, opening my chest. To really heave it up a hill, I will "stand on the pedals," lifting myself off the seat base, pressing my middle back against the seat back and unleashing the whole lower body against the cranks.

The high seating position gives good vantage in traffic. I see eye-to-eye with drivers of light trucks. The handlebars set the mirrors wide enough to see mostly past the cargo load and far enough forward to be in easy view.

Loading With Cargo

The TriHauler needs a back gate. My recommendation is to obtain a bungee net from a motorcycle shop and drill holes in the aluminum cargo box walls to mount it on. I do not recommend using bungee as a means of securing a load. Even good bungees aren't up to this job, and will let you down, spectacularly. Get nylon truck bed tie-down straps from the hardware store. It takes a bit of practice to understand tie-downs, but they are tough and versatile. Drill holes in the cargo box walls to hook the straps on.

I built a superstructure out of 1" PVC as extra security for tall loads, as well as a place to mount lights and reflectives. I recommend bolting or screwing the PVC pieces together to be extra sturdy.

The TH's cargo bed does not give one a place to store essential equipment, such as a lock, pump, spare tube, tools, spare batteries, unused tie-downs, wheel chocks, rain gear, cold weather clothes, or small items from other errands. The best way I've found to carry such secondary cargo is in panniers mounted on the front of the cargo box, in the space behind the seat. The panniers are not very easy to access, but they fit in great.

OWNING/PURCHASING

Versatility/Uses

My most frequent use of the TriHauler is to recycle paper. I have also moved an iMac

computer, 200 pounds of potting soil, bicycles, boxed bikes and trikes, a booth for festivals, furniture, garbage, a keg, many bottles of Shiner Beer (on ice), a miniature Alamo, lumber, metal, statuary, trees, and human beings, among other things. The Austin Bike Program used it briefly to install bike racks around downtown Austin. Should one be deprived of much exercise some day, even a short errand on the 100 pound TH will give you a good, low impact workout.

Locking

Locking the trike with a Kryptonite Gorgon cable or a U-lock is quite easy. The frame may be locked just ahead of the cargo box, or at either rear wheel. The front wheel can be locked to the front boom. I'll grant that the TH is not a bike that someone could throw in the back of a truck, and it would take some guts to ride it away.



FWD Drivetrain

Still, this trike is \$2900 and immensely valuable to me and my lifestyle, so I lock it up.

Ordering/Assembling

As it has been years since we bought our TriHauler, I don't remember many details about speaking with Jan VanDerTuin ("Yon Vandertyne") at HPM. Hopefully, this review will help potential buyers ask the right questions and avoid some pitfalls. If you can find a recumbent dealer in your area with actual experience with a TriHauler who will deal with the manufacturer, let them. Buyers in central Texas can call me.

The crew at Human-Powered Machines isn't very good about returning calls or emails. Be prepared to pester them if you want to buy anything. They are nice people, making an important product, but they are not a sales outfit. This bike dealer's advice is to let a bike dealer hassle with HPM and ensure that you get what you need.

ANALYSIS

Value—This trike is worth it to anyone wishing to reduce their automobile use. You might be able to find a suitable load hauler for less than \$2900, but my TriHauler has proven its worth. If I really want to do it car-free, I can do it.

Market Competition

The TriHauler outperforms any trailer I've tried for large loads. It has a much wider track, easier maneuverability, and far fewer worries about tipping. Of course it costs far more than a trailer and takes far more garage space. Lightfoot Cycles from Montana offers recumbent trucks in a LWB ASS delta configuration. The British Brox is far more sophisticated and expensive. HPM also builds the upright "Long-John" cargo bike.

Verdict

Following the caveats given in this review, I would encourage people to get TriHaulers. There is some self interest here, as more TriHaulers could mean fewer cars, improving my world. I don't ride this thing every day, but when I need it, I'm glad it's there.

Pros

- Will let you reduce your automobile use
- Stable with large loads
- It gets you plenty of space in traffic
- Big workout, even on short trips
- Sublime

Cons

- Giant hydraulic brake system is a pain
- Drivetrain needs chainline improvements
- Adjustable boom design flaws
- Seat wears badly
- Requires lots of storage space

INFO

2001 HPM Tri-Hauler

Price—\$1700 1/6 ton; \$2200 1/3 ton

Type—SWB FWD (front-wheel drive) USS cargo

Wheelbase—58-64"

Weight—84-112 pounds

Frame—TIG CroMo

Container—1/3 ton: aluminum flatbed 3' x 4'; 1/6 ton: fiberglass container or aluminum flatbed 2' x 3'.

Drivetrain—Sachs Torpedo 7-speed internal

Access


Human Powered Machines

455 West First Ave, Eugene, OR 97401-2276

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Recumbent Evangelism

Story & photo by Bob Hicks

How To Explain?

After the ride was over, many of us who took part in Scott Chamberlain's annual fall recumbent ride in the rural countryside just beyond the Boston Metropolitan area were gathered in the small town park that served as the gathering point for the ride, enjoying an informal barbecue. The park also served local canoeists and kayakers on the adjacent Charles River as a put-in/takeout location. The two groups inevitably mixed.

As I happened to be wearing my 1994 L.L. Bean Sea Kayak Symposium tee shirt, I struck up a conversation with two women who were in a kayaker group disembarking at that time. I quickly found that the husband of one was an avid cyclist and was at that very moment wandering through the collection of some 25 recumbents scattered around the area, trying to absorb what this was all about. She suggested I talk with him so I hastened to enlighten him.

A baffling experience it was for him. And as this dawned on me, and I began to respond to his questions, I too felt somewhat baffled, how to explain all this to a dedicated upright cyclist who had never before seen such a diverse collection of two wheelers (and a few threes also). I had learned from his wife that he regularly rode 50 mile "training" rides which required follow-up back and shoulder massage to ease the built up pains despite his being a quite young man in his mid-thirties.

He eagerly accepted my offer to try to explain what he was looking at, and by way of establishing some basis for an educational effort, I commented as we looked over a Rans SWB he happened to be looking at, that while this was a fairly high performance model, it was also very comfortable. This, I thought, might open a new vista in his mindset, since pain was a harsh reality in his chosen way to play.

He agreed that he could see where the seat would be comfortable, but quickly moved on to the subject of performance. I was momentarily dismayed that I did not have my faired P38 with me on the ride (having instead ridden the route with my quadriplegic friend on our homebuilt tandem trike setup). But I spotted John Totman's fully faired (the "Flying Shoebox") Lightning Stealth and led him to it as an example of what I myself rode.

I pointed out to him that my own bike was quite similar to this and he immediately wanted to know what sort of average speed I maintained on my rides. "I usually average around 18 mph on our rolling roads, covering 25-40 miles," I explained, "and find there is a "sweet spot" right around 20-22 mph on level going, where I am in 6th gear on the big ring (54 teeth), pedaling about 50 rpm and feeling like this could go on forever."

He looked keenly at this skinny, white haired, somewhat garrulous old character who had just told him that he quite comfortably travelled at a speed, it turned out, that he himself just about achieved on his serious athletic 50 mile training rides. Disbelief was evident on his face, but as I am used to this, I did not rush to explain further, but rather just passed it off as rather ordinary. I did follow up with a caveat, "Of, course, I could never do this on a regular bicycle, at my age I need all the help I can get." Using the age gambit usually defuses overt disagreement or accusation that I am BS'ing them. They may still not believe me but respect for white hair has some usefulness.

I elaborated a bit on this "help"; the powerful recumbent body position coupled with its comfort, suspension for absorbing road shock, Magura Hydraulic brakes for assured stopping from 40 mph



Bob & friend worshipping the sun on this cool homebuilt tandem

downhill speeds, and those exhilarating speeds made possible by the fairing. He was not stupid, nor particularly biased and I could see he understood what I was telling him.

Then the real "how to explain" situation developed as we turned and began to walk amongst the bewildering array of short and long wheelbase bikes, big and small wheel bikes, faired and unfaired bikes, low rider and high rider trikes, gleaming and expensive looking fully suspended models and old spindly welded up wedge frames with sling seats. If what I had told him about my bike was to be believed, why all these other permutations? Isn't there, as in the world of wedgies, one correct layout which is then minutely and expensively detailed in quest of that last gram of weight reduction and tiny reduction of air resistance with streamlining of fork blades, wheel rims and even helmets?

I fell back on the "different strokes" rationale, most of the bikes were creations that spoke to their individual owner's preferences. Long, low cruiser types, short high performance types, homebuilt economy types, three wheelers for that go-kart experience, or handicapped rider. And so on.

He had to go, time pressed on his busy life (his wife was wondering why she ever suggested I go talk to him). He was obviously interested, that "no pain for the old guy" part sank in, coupled with the claimed level of performance. Maybe he will follow up, but where to turn? New England appears to still be a desert of recumbency, we are so thin on the roads here that we eagerly greet one another when we so rarely meet.

Well, I made this "calling card" that I hand out when I ride to those who show some real interest in my recumbent, coupled with some intelligence not totally deformed by the dogma of established wisdom. I have no axe to grind in this business, so my card suggests that the person to whom I present it contact RCN to learn more. I hope they do. ♦

Bob Hicks is a recumbent rider and fellow micropublisher of the unique boating magazine, Messing About in Boats. If you like RCN, and you like boats, MAIB is a MUST READ! Bob puts out an incredible 24 issues per year..for \$24 per year.

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V-Rex On Ice

By Bill "The Ice Man" Marsh-Sachs



Life has forced me to follow my love of bike riding into the cold—the frozen pond cold. With little spare time in the spring and summer because of our perennial farm, I have to make up for lost riding time in the fall and winter.

It all started about 14 years ago, when my friend Bob lent me one of his two homemade spiked tires. We each put one spiked tire on the front of our mountain bikes and headed off to find the nearest ice. We had a blast. Our front ends stuck like glue, as our backs would fishtail with little control. (That's why Bob had made two spike tires so he would have total control. Luckily for me he was nice enough to share). After getting home I started looking through my used tire pile and screw collection. Before long we were two guys in total control on glare ice! Back then total control was 10-11 mph into a turn and staying upright, playing the slide.

Let's move ahead to the present. Presto—20-22 mph into the turn and no slip. You come out heart pounding, grinning and grimacing, depending on how in shape you are.

Our farm pond is about 125 feet long and 70 feet wide. The speed limit is set by how fast you can jump out of the turn and into the straight away, building speed along the short straight, before the turn. And on this small track, there is always a turn. My highest speeds have been set on a rigid mountain bike. My best rides and average speeds have been on my Rans V-Rex recumbent.

In my early days of tire experiments, I'd go out onto virgin ice, make a few passes, leaning as far and hard as I dare. Then sweep the ice and look at the screw patterns left on the pond surface. Three screws digging in is a good bite. More can be better. Less and look out! Ice screws need to be sharp—pinpoint sharp! I only use my ice tires on ice. Trail tires are a whole other story. Screws don't need to be as numerous or as sharp, because they won't stay that way on the trail. I should say, that the trails I'm talking about are snowmobile trails that have been packed and are nice and hard.

The V-Rex is an ice biker's dream come true. When out on the ice, the spikes dig in and make you feel as if you are riding on a rail. You point into a turn, and it tracks perfectly. You have more traction on ice with spikes than you ever will on pavement, no matter how sticky a compound tire companies come out with. On the V-Rex, its near 50/50 weight distribution to the tires makes control great. Avoid a light front end. It's not a fun way to fall.

As you approach the turn on the V-Rex just keep that nice

cadence. Wah lah—no coasting—no fear of the pedal hitting the ice as you get on a wedge. I love my medium-high SWB foot position—no loss of speed. A steady graceful power all the way around the pond. I happen to have a Zzipper fairing on the bike. It makes all the difference in the world when it comes to winter riding. The fairing allows me to ride with fewer clothes than anyone else on the ice. No more newspaper stuffed around my knees or over one's privates to keep the plumbing from freezing. No wind down the neck openings or fingers going numb from too much weight on the hands. No death grip on the handlebars. It's great sitting pretty behind the Zzipper, letting all of that ice cold air flow around me onto whom-ever is drafting behind.

Spike tires are also heavier than you might think. I've just weighed mine. With the screws, silicone (to cover the heads), a slit innertube (in case screw works through the silicone) we are talking about 3 pounds for a 26 x 1.5-inch tire. That's a lot to try and bring up to speed. The V-Rex does it in style. Once rolling, the effort to keep a constant speed is smooth.

Twenty laps around the pond is a mile. If you do figure-eights, it's about fifteen. We only do figure-eights if we agree to play follow the leader, for obvious reasons. To date, no one has been spiked when on the bike. That's not to say that spikes haven't drawn blood! One of the most common mistakes is, after a mesmerizing 10-13 miles of close, heated riding with no falls, people come to a stop, put their feet down and wham! The foot slides into the front tire because, we are on ice and the leg looks like a cat used it for a scratching post!

We have had falls on the ice when someone didn't spike their tires well. In this case the rider drafting behind has a few choices: Ride over him, try to go to the inside, or head for the outside of the turn. That would have worked, but we were going way too fast to make a line change in the turn. So my last move was to fall using Greg's back to keep my handlebars from hitting the ice. It worked great. He wore a bruise on his back for a few weeks.

One downside to spikes on the V-Rex is front tire/heel interference. It's not for beginners. The low speed turn will rip through shoes and flesh if you're not careful. At our farm's employee Christmas party last year, we had the V-Rex, a mountain bike, and a mountain tandem on the ice as party fun. We were all taking turns. Well, along comes a college freshman who picks up the V-Rex and takes a seat. I hear my wife Rachel speak up asking him if I know

he's on the 'Rex. He insists on trying it because we made it look like so much fun. So after stressing to him about the heel clearance concern and trying to dissuade him, he says, "I'm a teenager," I can do anything." I held the bike while he found the pedals. Well, like I said, a V-Rex on ice with spikes is not a good training situation for a novice. His leather shoes will never be the same. When I know other people will be riding the bike, I put on some old bear-trap pedals. I like Speedplay Frogs.

Some of the do's and don'ts of spike tires: Mounting a tire can be like potting cactus. I've had my share of poke holes, but as with most things in life, practice has made it better. Gloves can help but aren't a must. Don't mount your tires on a nice hardwood floor.

The front tire on my V-Rex is a 20 x 1.75 GT 60 psi tire with about 290 screws in it. The back tire is an IRC All Terrain 26 x 1.4-inch 85 psi tire. It has about 340 screws in it. For pressure, I go over the maximum by 5-10 psi. With the tires rock hard, the screw tips dig into the ice which keeps them from wobbling. I've yet to have a flat tire due to tire over-inflation. All of my flats have been due to screw heads working a hole into the tube. That is where the silicone sealer comes in. GE 100% silicone is the best. For screws I use 7/16-inch metal fabrication screws—Phillips head, needle sharp. I use a lightweight Black & Decker electric screwdriver to place the screws. I have placed screws in a tire in one hour, though some people have taken up to four hours.

Gearing on ice is—find your cadence then keep shifting until it's too much—then back off a gear. That will give you super strong legs to hit spring rides with. Since this all takes place on a small pond with lots of turns, when you hit the pavement you dive into corners with confidence.

Ice biking is not an extreme sport. Fear not. You will have a fantastic time. When your friends see you and give it a try, you'll have double the fun and fitness. ♦

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Touring Six Parks by Recumbent

By Piero Tassinari and Chet Rideout

NUMANA, ITALY 8/7/2000

Now I'm lying on a sunny Italian beach, and the Adriatic Sea is rippling and caressing my feet. If I look behind me I see the cozy town of Numana, its colored houses fringing a sandstone hill overlooking the sea. Only eleven days ago I was in Berthoud, Colorado, where my dear friends Chet and Lynn Rideout live. We have experienced some glorious cycling adventures together and I recall the memories of the last one very vividly.

As I lie before the sea I can still picture the amazing peaks of the Canadian Rockies, covered with snow and ice fields...

We drove north from Colorado for three days, most of it through the monotonous Wyoming and Montana prairies. On our way we stopped in Cody, Wyoming, an interesting western town where I enjoyed my first rodeo. It was quaint and amusing, but obviously run as a modern business!

From Cody we headed for Yellowstone National Park and the landscape changed dramatically. This forested park is as large as a region of Italy! We continued on to Mountain View, Alberta, where Chet's Canadian relatives have a very nice cabin. From this home base we spent a day in Waterton National Park, a small but beautiful park filled with mountains on the U.S./Canada border.

After another day's drive through the green hilly prairie of Alberta we drove into the Canadian Rockies, heading north into Banff and Jasper. We stayed at the Wapiti Campground in Jasper, and it was now time to get out our recumbents, and time to put our legs to work! Yes, we both rode these weird machines, each towing a BOB (Beast of Burden) Trailer. They were very comfortable, efficient, and safe, but the steep terrain we faced made climbing difficult with this load. Soon we realized how difficult it would be, even with our triple chain rings and low gears!

I rode a Speed Ross with short wheelbase, which worked very well for me, having no mechanical problems. I did take it easy on the downhills, however, since the trailer seemed to affect my stability. This was the first time I hooked a trailer on the Speed Ross, so perhaps I just wasn't used to it. Chet felt, however, that the load might have been better if I had attached my panniers amidships, under my seat, instead of on my rear rack.

Chet rode his Infinity, the trusted companion of many miles. He is sturdy, tough, and tall, but both of us were overloaded, starting the trip hauling more than 70 pounds. I was worried about cold weather in Canada, so I brought heavy jackets, trousers, and sweaters; all in all too many items! We actually found the weather quite mild, with only one serious rainstorm, so this was mostly unnecessary. I think we picked the right time to start, since some of Chet's friends found day after day of rain two weeks earlier.

We left on June 28th, and in the afternoon we wondered if and when that long first stage would end. From Jasper, it seems that Chet had scheduled more of a ride than he should have; 51 miles of riding to Beauty Creek Hostel, where we had reservations. We had been climbing slowly and steadily all day, making it a long one, and we were definitely overloaded. I tended to be in better shape, having biked thousands of miles in Italy already this year, but I was feeling the pain too. Although there was a lot to see, we weren't enjoying it, focusing instead on the fact that we were really tired and sore. When we reached our goal we found the scenery spectacular, but the hostel was a small cramped affair with no running water. That night, we found ourselves questioning our overall approach to this adventure!

This was our third major tour together, since I wrote a letter in the "Companions Wanted" column in *Adventure Cyclist Magazine*. On

the first tour we biked from the Grand Canyon to Rocky Mountain National Park (*Adventure Cyclist*, April 1996; *RCN*, June/July 1996), and more recently we toured in my native Italy from Venice to Rome with Chet's wife and son (*RCN*, May/June 1999). Chet and I are both public schoolteachers. He teaches high school science in Colorado, whereas I teach elementary school in Italy, so we can find the time for extended bike tours in the summer. Chet was very familiar with the northern Rockies, having visited all of these national parks, and he hoped to introduce me to their wonders.

On the morning of our second day our Wyoming destination to the south through 1200 miles of tough mountain roads seemed impossibly far away. Chet and I decided that weight reduction was a must. When Lynn and her friend Cindy, who joined her in Jasper, overtook us on the climb to Sunwapta Pass, we gladly deposited 25 pounds of unneeded gear in the car. After saying our good-byes we continued the climb, feeling like we could now face the long climbs ahead.

Jasper and Banff are connected by the Icefield Parkway, and this is a truly magnificent ride. There are hundreds of snow capped peaks, more spectacular this far north because of the low tree line and abundant glaciers and snowfields, wildlife everywhere, and amazing turquoise lakes. We were surprised by the steep climbs, however. On both sides of Sunwapta Pass cyclists must climb at least 8% grades, and we found one half mile stretch to be at 10%. They are long climbs, and they're often quite steep as well. Also, unlike American parks such as Glacier, you seem to climb and fall only to climb and fall again instead of having a continuous climb to the pass, so this increases your total effort. It seemed to us that the winds were almost always from the south; if we did this tour again I would definitely depart from the Grand Tetons and head north. We reduced our daily distances for a few days by giving up a rest day, and the wonders of the Canadian parks returned to us. Now we noticed the beautiful songs that Chet identified as those of Swainson's thrushes, white crowned sparrows and chipping sparrows, and the spectacular waterfalls and even the rustle of the wind grabbed our attention.

The Waterfowl Lakes were spectacular, and we stayed at the beautiful campground there. Man has a very limited impact in Jasper and Banff, but the campgrounds were well organized, including a common kitchen where you can cook out of the rain. We stayed mostly at campgrounds, but also used hostels at Beauty Creek, Rampart Creek, and Banff. Hostels are great places to meet people, and Chet led a singalong with his mandolin when we met up with an international group at Rampart Creek. Food stores were few and far between in these parks, so we had to stockpile some food—the pickings were slim!

The climb to Bow Pass was more gradual than that of Sunwapta Pass. The crevasses and layers of sedimentary rock in the mountains were loaded with snow, with beautiful contrasts between the snow and rock. The layered rocks sported beautiful waterfalls, which are seen at every turn. At the top of the pass we rode up to the parking lot so we could hike up to the Peyto Lake viewpoint. The turquoise splendor of this lake simply takes your breath away, and I could hardly believe it. A string of snowcapped peaks were reflected in its amazingly blue water, and a latticework of streams entered the end of the lake, fed by glaciers high above. What a magical scene!

At Lake Louise we camped, enjoying a great pizza at Peyto's, a restaurant in the Lake Louise Hostel. We were joined by Larry, a school principal we had biked with on and off for several days.

He then stayed in Lake Louise and did some hiking, while we rode on to overnight at Banff. We rode the old two lane road, Bow Parkway, finding this a truly fantastic biking route. The Hostel at Banff is very ritzy, with nice rooms, showers, and even a restaurant, definitely worth a try. Banff, like Jasper and Lake Louise, is a delightful town.

Adventure Cycling's Great Parks North Bicycle Route through these parks suggests turning west into British Columbia to Radium Hot Springs, and heading south to cross back into Alberta at Crow's Nest Pass. Chet and I, following advice of his Canadian cousins who said the traffic was a little too much that way, rode instead down past Canmore, and took Highway 40 into Kananaskis Country. This area, recently developed for tourism with the financial backing of the Alberta government, is simply spectacular, and has wide bike lanes and little traffic. In 120 miles we didn't come across even the tiniest village, and we came to only two gas stations, luckily with some food supplies. We tented at the SunDance Lodges and, after a morning of heavy rains and hail, called a rest day and treated ourselves to one of their spacious Trapper Tents, complete with a Kerosene heater. We spent the day "refueling;" reading, studying maps, and making plans. We really needed a rest day after all that up, up, and down!

The next day, just beyond magnificent Peter Lougheed Provincial Park, we tackled Highwood Pass (7244 feet), reportedly the highest pass with a paved highway in Alberta. During the climb a pair of cycle tourists told us about wildlife ahead, including a grizzly they saw by the road. This news riveted my attention. Since the beginning of the car trip north I had read everything I could get my hands on about grizzlies, and Chet said that I was exhibiting signs of "bearanoia." To rub it in, he told me I was the perfect size for a grizzly bear snack! Since we seldom see a free-roaming mammal larger than a hedgehog in Italy, or perhaps a deer in a preserve behind a fence, this shouldn't be surprising. You don't have to look far for grizzly information here—in all the National Parks along our ride bear warnings graced each picnic table, rest room, and bulletin board. We saw no bears during this stage, but we did see a large bachelor herd of bighorns on our descent. This area is truly a vast wilderness, and the pass, only recently paved, sees only occasional visitors. From the top of the pass the landscape changes. Losing altitude we left the alpine region behind, passing through gentler slopes covered with Aspens, then finally to rangeland spotted with horses and cattle. Chet would blow his horn, and horses would gallop along with us on the other side of the fence. We saw few campgrounds or other signs of civilization, but blessed by a tailwind and slight downhill, we



Chet tops another pass—Piero Tassinari

rode swiftly to Longview and camped in town. This was a stage of 78 miles, our longest of the trip.

We had a demonstration in Longview that the average car driver knows little about the road to come. Mileages given are always less than actual distances, and hilly roads are always described as flat. Chet explained to me, trying to broaden my English vocabulary that, "When it comes to road conditions, people who drive cars don't know shit from Shinola." When we left town, we passed an ominous sign that said "Next services 84 km." This was one tough day, with several long steep climbs and often heavy winds and rain. It had been described the night before, however, as being flat by a Longview local! We stayed overnight at the Oldman Creek store, an oasis in the endless miles of the prairie. The couple running the store let us stay in their tipi for free, and even invited us to use their barbeque and to watch their TV. It was an interesting place, sort of a mixture of a gas station, bar, store, flea market, and folk museum. Here we met Ken, a cycle tourist from Edmonton, who was heading for Waterton. We had a long talk before he moved on, and we enjoyed his energy and sense of humor. We then tackled another tough, windy metric century past Pincher Creek to Waterton. We biked past a black bear which crossed the road ten miles before the park entrance, and then we battled the legendary Waterton Park winds to the campground in town.

We took our second (and last) rest day at Waterton, and Chet and I agreed that this is a gem of a park. Bighorns and deer wander through town, and Columbian Ground Squirrels scamper throughout the campground. In the clear waters of Waterton Lake the Prince of Wales Hotel is mirrored in regal splendor. Ken had camped right near us, and we joined him for a super

dinner at the Italian Café in town. On the next day Chet and I played tourist, taking the launch to Goat Haunt, at the south end of Waterton Lake, seeing bighorns and bald eagles near the shore.

Climbing through the Chief Mountain Customs from Waterton to Glacier proved to be a tough day. The climbs were long, but scenery fantastic, and this stage also had more wildflowers than any other on the tour. On the way we kept taking turns passing and being passed by four girls from Vancouver. We first met them near Lundgren, and they were circling Glacier Park. Two had lawnchairs above their panniers, so Chet referred to them as "The Lawnchair Ladies." We all camped in the Hiker/Biker sites at Rising Sun Campground. These sites, common in the American National Parks, are perfect for cyclists. Because they have no parking facilities they are more compact, and the parks will not turn a tired cyclist away. They are also inexpensive—\$3.00/person! Rising Sun is even equipped with a restaurant, and Chet and I joined Ken for supper.

The next day over the Going-to-the-Sun Road was a much easier climb, and the scenery was incredible. At every turn we had a different view of lakes, forests, valleys, and waterfalls. On the climb the traffic seemed to be less than I expected, and drivers were very courteous. We hiked briefly on the pass, enjoying the glacier lilies and watching the antics of the Rocky Mountain goats. The downhill from Logan Pass was the dizziest of the tour, and we had to be careful because of the traffic and the narrow road. For Chet, it seemed to go on forever, partly because the climb is a longer one from the west side of the park, and partly because he had a broken spoke in his rear wheel giving it a nasty wobble. We again used the Hiker/Biker sites at MacDonald Lake Campground, and we



The tipi at Oldman Creek—Chet Rideout

planned to make a stop the next day at Columbia Falls to have his bike repaired.

In the morning Ken, who planned another route, said his good-byes. When Chet and I reached Columbia Falls, our ride powered by fresh Bing cherries, we were surprised to find that the Bike Easy store specialized in recumbents. Because of mechanical problems Chet had with his tired old bike (with ten years and about 10,000 miles on it) he decided to trade it in for a new Vision VR40 long wheelbase recumbent with above seat steering! The owner, Jeff Long, got this bike set up to ride in about three hours. During this time he showed an interest in my Speed Ross. Since I couldn't remember the address of Crystal Engineering, the British Company which made my bike, I asked if he had a copy of RCN where we could look it up. He fished out an issue, and there was the article Chet wrote on our tour from Venice to Rome, with me on the cover! We were promptly asked to autograph the article, having become instant heroes! We now continued on to Bigfork on Flathead Lake. Chet immediately noticed the improved shifting and braking on his new Vision, and the bike was considerably faster than his old one, pressing me a little harder to keep up my speed! He thought this was probably due to sealed bearings and to less wind resistance found in the above seat steered models. We camped at Wayfarer's Park near Bigfork, and we were warned by the campground host not to ride on the east side of the lake, since it is narrow, has no shoulders, and is well supplied with high speed logging trucks.

Chet had spent a lot of time near Flathead Lake years earlier, getting his Master's degree at the University of Montana Biology Station at Yellow Bay, so he had hoped to stray from the Adventure Cycling route by heading down along the lake and then down highway 93. We decided, however, that

biking to the biology station, south of us on the lake's east side, would be suicide, so we rode the west shore. Flathead Lake is a huge and beautiful natural lake, with waters you can swim in, but I found it a little cold for my warm Italian blood! While riding down the west side of Flathead we were lucky to meet Darryl, a businessman from California who owned a lakeshore house with a cherry orchard near Big Arm. He invited us to stay overnight at his home, along with his son and his son's friend, and we enjoyed the chance to enjoy his beach and dock and even did some boating with him. We set up our tent in the yard, and were treated that night to a delicious spaghetti dinner, and a beautiful starlit night near the water.

The next day we rode to Polson, and then headed south on Hwy 93. The traffic was frantic, with lots of big trucks, and we watched approaching traffic nervously in our rear view mirrors. It was apparently much worse than Chet remembered from his earlier time there, and the shoulders were narrow and partially covered with gravel. We found a few quiet alternate routes during our two days to Missoula, one from Pablo to Ronan, and another through Charlo which passed west of the National Bison Range, which had rugged prairie scenery. At Ravalli we were again back on Hwy. 93, and when we were just past Arlee I commented that at least I appreciated the wide shoulders. Unfortunately, the lines on the highway were soon repainted, changing the two auto lanes to three lanes with no bike shoulder at all! The double lane was on our side as a passing lane on the uphill grade, and this climb, perhaps six miles long, was steep enough that we were able to average no better than six to eight miles per hour. Meanwhile the traffic roared by, often using both lanes as they passed. At long last we topped the hill, regaining a bike lane and

some of our sanity. In Missoula we ended a long day's ride at the Adventure Cycling offices, where we were treated like kings for the day (they commented that they had seen very few Italian bike tourists), and we further pampered ourselves with an oriental dinner and a motel complete with hot tub.

Luckily Hwy 93 is much better to the south, and we took it and the old 93 south to Hamilton where we stayed with Chet's friends, the Macleans. It was great to enjoy the atmosphere of the old times in their home with its beautiful hardwood floors and antique American furniture, and to enjoy their warm hospitality. We visited the local fair going on downtown and went out for a great dinner, and the next day rode south to camp just below Lost Trail Pass. This was not the Bitterroot Valley Chet remembered from years before, since the smoke from a number of wildfires hid the beautiful mountains to the west in the haze. Our next stage involved climbing Lost Trail (7014 feet) and Chief Joseph (7264 feet) passes. We then rolled down through the valley beyond, which is wonderfully scenic, stopping to visit the Big Hole Battlefield. After this the forest faded to be replaced by dry prairie, and we rode through Wisdom and camped (and, of course, soaked) at the Hot Springs Lodge at Jackson. These towns spotting the prairie are really funny, consisting of perhaps ten houses, a church, a grocery, a car garage, and campground or lodge with a bar. This was the genuine wild west. On the next day we crossed the Big Hole and Badger passes, seeing the resident badger on the way.

In Dillon we met Mary, who was transporting her baby son Tory in a neatly designed sidecar attached to her bike. She invited us to a barbecue at her house that evening, so we rode over from the campground. We enjoyed talking with Mary and her husband, along with their guests, and when the food was offered Chet and I did our best to make sure that as little as possible went to waste! We asked for information about the next stage, but as usual, we found the "45 miles" to Virginia City was really 60 miles. We were also warned about 10 miles of construction, none of which could be found the next day.

What we did find were the delightful towns of Nevada City and Virginia City, which are well restored western towns which bring to mind the old times of the gold rush. Because the campground in Virginia City was about a mile past town up a steep grade we decided to stay in town at the historic Bennet's bed and breakfast. We got a great room, rolled our bikes into the basement, and even got to soak our pains away in a hot tub on the balcony. Later we went to see "The Follies" at the historic Gilbert Brewery. Everybody was bursting with laughter, but since the actors spoke and sang very rapidly,

sometimes inverting words in what Chet called "Spoonerisms," I couldn't understand many of the jokes!

After a delicious and ample breakfast at Bennet's, we climbed the three miles to Virginia Pass and enjoyed a long downhill to Ennis. Just north of town there was about six miles of busy construction, involving every type of enormous equipment. We were luckily able to hitch a ride in a Montana Highways worker's pickup truck to the start of the pavement. What followed were two days of scenic but strenuous climbing up the Madison Valley. We climbed through the Gallatin National Forest to Quake Lake, where there had been a powerful earthquake which had blocked the river. Dead trees still stood in the waters, and there was a display to relate the events. Above this area was Hegben Lake, where the road, which had climbed continually for two days, leveled out. We rolled into West Yellowstone, where Chet had his bike adjusted, and then we rode into Yellowstone Park and stayed at a hiker/biker site at Madison Junction. Since Chet's wife said she might join us at Grant Campground with the car, we reserved a regular campsite for the following night.

Our next day and night in Yellowstone, although we enjoyed stops to look at various thermal features, was disappointing in that we saw no wildlife, as we had on the other side of the park on our drive north. The climbs were tough, since we crossed the Continental Divide two times on Craig Pass (8261 feet), and a second unnamed pass (8391 feet). What we also got was a education in the present state of camping culture in America, and the demonstration of a national park run by supply and demand instead of logic. Every fourth vehicle seemed to be either an enormous recreational vehicle (roughly the size of a Greyhound bus) or a dual-wheeled pickup with an immense fifth wheel trailer. The RV's in turn towed vehicles, usually full sized SUV's, and sometimes these even had boat trailers attached to their rear bumpers! The drivers of these vehicles probably have not been schooled on driving big rigs, and most likely don't really NEED a two bedroom home along to fully enjoy their camping experience. Instead of simply limiting the size of vehicles in the park, or at the least not allowing towed vehicles, the park simply accommodates them, providing pull-through parking spaces long enough for four or five normal vehicles, electric hookups, sanitary disposal sites, gigantic parking lots throughout the park, and more. The pickup trucks pulling the huge trailers all seem to be equipped with huge engines, so to us tent dwellers it sounded as if we were camping at a truck stop, surrounded by commercial truckers who are constantly starting their engines and cruising by. So much for the



Chet takes a breather on the Going-to-the-Sun Road—Piero Tassinari



Chet and Piero pose by a snowbank in Glacier National Park

peace of the great out-of-doors! I would say the park management should find some kind of solution to this unpleasant (and unnatural) situation!

From Grant Village Campground Chet and I crossed the continental divide one last time (7988 feet) and rolled down to Flag Ranch in the John D. Rockefeller Memorial Parkway for breakfast. After one more steep climb we finally saw the magnificent spectacle of the Grand Tetons. These dramatic mountains seem to rise from the crystal waters of Jackson Lake, and are doubly amazing because of their reflections! Stopping for a beer and the great view at Jackson Lake Lodge, we then rode south to Jenny Lake Campground where we met Chet's wife after 26 days of riding. Chet and I finally got a chance to unwind with Lynn and another of her friends, Kathy, as we rode

over Togwotee Pass and later the next day over the Snowy Range of Wyoming. We told them about our tour, laying out some of the experiences on the way. We had crossed twelve passes, several of which (Sunwapta, Bow, Highwood, Going-to-the-Sun, Lost Trail, and Craig) were major climbs. We had ridden through some of the most spectacular mountains of the west in six national parks; Jasper, Banff, Waterton, Glacier, Yellowstone, and Grand Teton. Our experiences included vivid memories of so many super people in Canada and the United States. Just before we reached his home in Colorado, Chet turned to me and asked, "How do you suppose we're going to top this one?" ♦

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The R.A.W. Ride

by Terry Parker

The cold Pacific Northwest winter rain is pelting on my roof, and I'm having some difficulty finding the willpower to follow through with my resolution to ride my recumbent each day this year. The fact is, the pounding rain makes my mind retreat into warm memories of last summer. One of my favorite recumbent adventures is doing a week-long supported ride during the toasty days of August. Typically, you get prepared meals, prearranged camping sites, and often mobile shower facilities (infinitely warmer than the deluge outside right now). Most rides of this type also provide bike mechanics, on-road emergency help, and gracious, helpful staffs. I love to tour over long distances without the added hassles involved in going self-contained. As a recumbent rider, there were tours in the past where I've felt like the lonely oddity, but, in recent years, I've run into an increasing number of fellow 'benters who show up for these rides. Part of the fun for me is hooking up with the other recumbent riders to compare bikes and the various journeys that brought them to recumbency.

Here in Washington State, the Cascade Bicycle Club out of Seattle sponsors a ride each summer called R.A.W. (Ride Around Washington). The club is a huge bicycle club with an active group of dedicated volunteers who put together amazing rides and events including a wonderful bike expo (show) and the famous Seattle-to-Portland (STP) ride. The RAW ride happens in late August. They have chosen different routes each of the last two years this ride has been offered. The summer before last it crossed Washington over the beautiful North Cascades Highway. This past summer their choice was a route following the Washington-Oregon segment of the Lewis and Clark Expedition from the mouth of the Columbia River east to the historic farming town of Walla Walla, Washington. I signed up for RAW early in the spring to help me break out of my usual winter funk. Knowing I'd committed to nearly 500 miles of touring, I had all the incentive I needed to train and ride regularly. I also recently purchased a new Rans V2 and was anxious to give it a long distance touring test. Most of my local recumbent buddies are not particularly interested in week-long rides because of family obligations or time constraints. As a public school teacher whose own children are now out and about, I'm blessed with the time to do rides like this, and every time I meet wonderful bicyclists, upright and recumbent, who make the experience all the more enjoyable.

As I arrived at Fort Canby State Park at the mouth of the Columbia River near Illwaco, Washington, I looked forward to seeing how many recumbent riders would show up. We were departing that very Sunday around noon. It wasn't very long before I ran into a bevy of 'benters. In fact, out of the 160 riders signed up for the trip, seven were recumbents. I met the staff, an extraordinary group of light-hearted mildly mischievous bike enthusiasts, as I prepared for departure. My first surprise was that one of the staff was going to be riding his new, dark green Rans Vivo. David Smith drove in with the Vivo attached to one of the support vehicles. I met David on the past year's RAW ride, and if he expressed any curiosity about recumbents then, I did not recall it. I talked to him that sunny Sunday before we rolled out to begin the five-day odyssey.

David told me he lived in Olympia, Washington, our state capitol. He beamed with pride as he positively gushed about the Vivo. He'd been a bicycle commuter and had many years of touring experience with road bikes. I was curious as to why he'd made this amazing conversion. He said it was prompted at first because of medical reasons. He'd broken a wrist and was in pain because of the jarring ride on his road bike. Bursitis had become a problem. Dale Clark of Angle Lake Cyclery in South Seattle took him through a thorough hands-on trial of various models of recumbents. David's choice was

the Vivo. As he rode it, his enthusiasm for his 'bent grew well beyond just the medical necessities. He smiled broadly as he extolled the virtues of the Vivo. We swapped bikes, and he tried my V2 while I pedaled his around the state park. He was running Continental Grand Prix 20 x 1's on his bike. The suspension made the ride sinfully comfortable. Later on the trip, I often saw David in pacelines with the most rapid road bikes on the ride. He was always fast, comfortable and smiling.

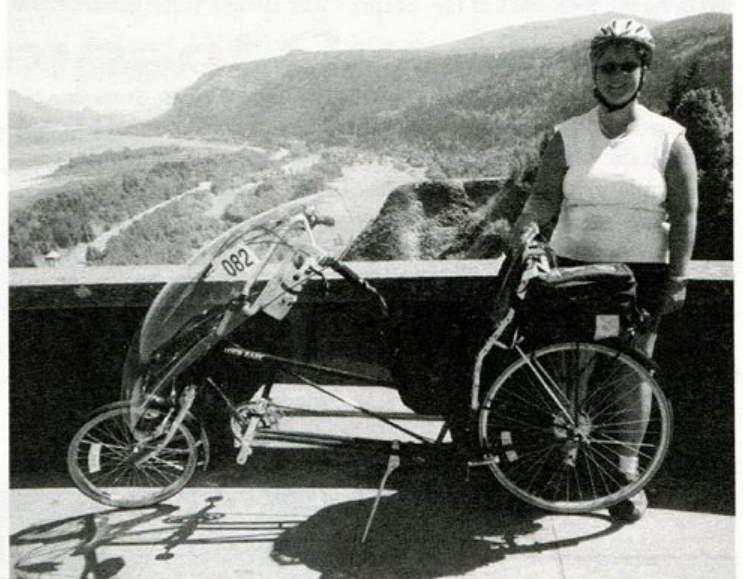
Because I arrived early, I helped unload the bikes that had been trucked down from Seattle to Fort Canby. It was my chance to see how many other recumbent riders were doing the trip. As we unloaded, three more recumbents were lifted from the bowels of the moving van: a yellow Vision R45, a shiny black Tour Easy with Zzipper fairing and a Rans Rocket. The busses carrying the riders were scheduled to arrive shortly, and I was anxious to meet and talk to these kindred spirits of bentdom. What paths had led them to recumbent bikes and this cross-state ride?

After I finished helping unload the bicycles, a van pulled up with two more recumbents on the roof. One was a metallic green Rans Tailwind, and the other was a new Rans V2, Cosmic black just like mine. They began preparing their bikes for departure, and I sidled on over. They were a father and son team. The father was Steven Hopkins from Bainbridge Island in our state's Puget Sound. He'd also recently purchased his V2 and was taking it on his first long distance tour. Steve had been biking since he was a kid, mostly on road bikes. Steve had begun doing research on recumbents about three years before. He finally settled on a Vision SWB R40. After a few years, he felt what he called, "a need for speed." After having tried Tour Easys and Gold Rush Replicas, he chose the new V2. The fit for his 6'2" frame was sublime on the Rans, and he'd found the V2 fast, comfortable, and aesthetically pleasing. He'd put nearly 700 miles on his new bent and was obviously itching to add another 500 miles on the RAW. Steve's son, Michael, turned out to be an eleven-year old recumbent marvel. I have to tell you that I had a few doubts about whether the kid had the endurance for the six days of the ride. Although we'd encounter no mountain passes, the route had more than its share of monster hills, hot weather, and notoriously fickle winds. I asked Steve how Michael had gotten into recumbents. Apparently, Michael had lots of dirt bicycle experience. The turning point came one year when Michael watched his dad do the STP ride on his R40. His son asked him if there was a recumbent made to fit him. They began their search. They eventually chose a Tailwind equipped with a Mueller Windwrap fairing. When Michael learned that his father was considering riding the RAW, Michael wanted to go as well. Steve insisted that Michael train for and ride the grueling Chilly Hilly, another Cascade event. Steve let Michael know that he would need to put in hundreds of training miles before they would commit to the cross-state ride. Michael rose to the challenge. My initial doubts about Michael's endurance proved unfounded. Steve and Michael rode every mile of RAW with a fast, steady pace. I remember being in camp several days into the trip. The location of the campground allowed us to watch the other riders moving toward camp riding on the other side of a small river channel as they approached the finish line for that day. I was pitching my tent and looked across that channel. There were Michael and Steve in their own family mini-paceline pushing a 16 mph average on that day of the trip. The picture was perfect. This eleven-year-old was a rider of steady composure, and his father was a strong, fast, and I might add, very proud companion. I spent many happy hours talking to the Hopkins during the evenings of the ride.

So, who was the rider on the Tour Easy? I knew Easy Racers were



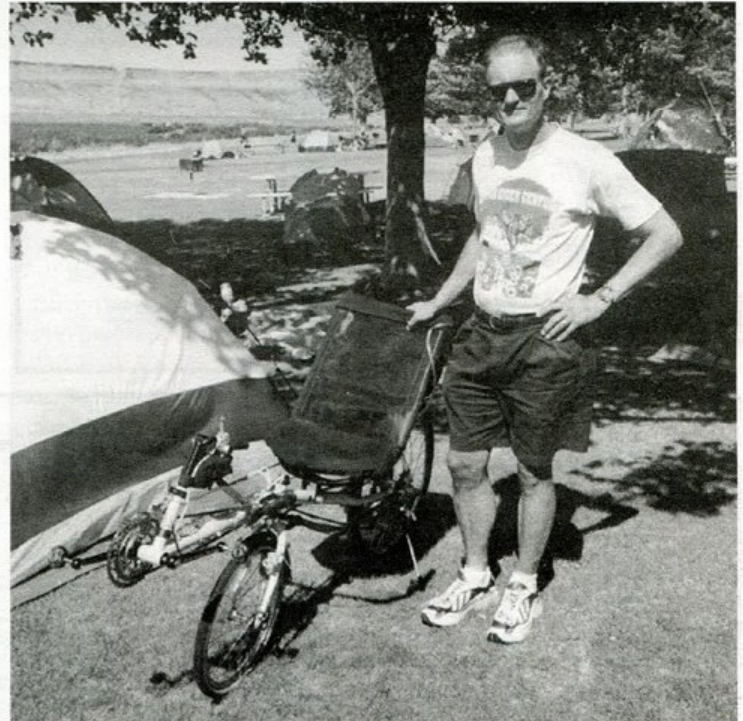
Author Terry Parker on his V2. Terry is from Gig Harbor, WA



Cindy Williams from Bellingham, WA



Felix Lee from Seattle, WA



Terry Perdue from Kenmore, WA

great bikes with a very vocal and loyal ownership. The Tour Easy was one of the models I was considering before I bought the V2. I didn't meet the Tour Easy rider until day two of RAW. Our paths just didn't cross until then. I saw the rider, Cindy Williams, on most days. She was a steady rider, and we would often leapfrog each other. She always started very early, and I'd eventually catch her at a rest stop or she would roll past me as I was downing a bagel and cream cheese at a wide spot in the road. In our passings we'd chirp a friendly hello to each other. One late afternoon, Cindy and I had a chance to talk.

Cindy was from Bellingham, Washington. She'd had nine years of serious biking experience, most of it on a Cannondale hybrid and a Mongoose mountain bike. She came to recumbents in the all too familiar search for a fast, comfortable ride. She was vacationing in Oregon and stopped by Coventry Cycles in Portland on a whim. She found the Tour Easy fit her needs perfectly. The rest is, as they say, history. On the RAW ride, Cindy learned a lot about spinning up hills. She had a constant smile on the road. It was obviously the expression of a satisfied recumbent rider.

Felix Lee was the owner of the Rans Rocket that I unloaded from the truck. Felix lives in Seattle. He doesn't own a car, so bicycles are an essential part of his life. For Felix, it is a question of the bus, the bike, or the bus and the bike because he commutes to work. Previously, Felix had owned a Brompton folder which was fine for grocery shopping. He found long distances uncomfortable on his bikes, and a year ago he'd purchased his Rans Rocket. He chose the

Rocket because it was available in the area, it had the same wheel size front and back, and was adjustable to accommodate his shorter stature. During the RAW ride he experimented with the more upright, closed position and with an open, more laid back position. Felix concluded that the open position was faster and more efficient. Felix rolled in every day looking fresh and rested. The miles didn't take a toll on him. He inspired me to leave my car in the driveway and to commute to work on my bike throughout this year.

Terry Perdue from Kenmore, Washington was the pilot of the yellow Vision R45. He was clearly the fastest recumbent rider on the trip. I passed him a few times, but Terry was always set up in camp when I rolled in. For me, Terry will always be the tiny recumbent dot in the distance. He started his riding on a Univega cross bike which he had used for commuting and for doing the STP twice. Terry estimates that he's had fifteen years of biking experience, and was a veteran of a number of centuries in Michigan. In 1998, he vowed he would never do another STP on an upright bike. A sore butt, wrists and neck sent him on his recumbent search. He tried a Vision at Aurora Cycle in Seattle. Later, he found an R45 hanging from the ceiling of REI in Seattle. He purchased it and hasn't looked back.

(Well, he did look back at me. Seems I was always some distance behind him on RAW.)

I look forward to future tours and meeting more people going the recumbent route. I'm no longer the rarity on these rides. Something else wonderful is happening also. The riders of conventional bikes have become very accepting and are beginning to see recumbents as commonplace. The lingering myths of slow speeds on hills and misconception about the necessity of standing on your pedals are dying out with more real exposure to recumbents on rides like RAW. I look forward to next year's tour. Oooh! The rain on the roof's not quite so monsoonal now, and my rain gear is pretty good. I think I'll immerse myself in this rainy day. David, Steve, Michael, Cindy, Felix, Terry? You out there somewhere? ♦

Terry Parker is a fifty-four-year-old recumbent riding high school teacher from Gig Harbor, Washington. He writes occasionally about recumbents and his wife is an avid 'bent rider herself.

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50 Year Recumbent Quest

by Bernie Rosen
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I don't remember if it was before or just after VE day that our troop carrier squadron flew the mission to liberate Denmark. The way Manny explained it, the Germans evacuated the field in the morning, and the Americans landed in the afternoon.

We were based near Crapeaumesnil, a tiny farming village, about sixty miles south of Paris. When our C-46's returned, it was soon evident that what we had liberated was the enemy's PX.

All the flight crews were carrying, pushing or riding their spoils of war. Manny beamed on his new German bicycle.

About a week later the war in Europe was completely over. Our squadron was allotted a few three day passes, and I lucked out. Manny asked me to take his bike along and sell it in Paris.

"Use it to see Paris," he said. "On the last day, before boarding the truck to return, sell it for what you can get."

Great idea? I had never ridden a bike. My parents were poor and over-protective. Biking was not part of my childhood. Years later I realized that it wasn't the danger of ordinary biking they shielded me from, but drafting behind delivery trucks, which my friends were into.

In Paris, I walked the bike around for an hour until I found a bike shop. There were no new bikes for sale. Not much of any merchandise. I was lucky to find a security lock and pants clips (today called Velcro straps).

Dressed in my Class A Khaki uniform, I mounted the bike and shakily pedaled off to see the sights. By the end of the third day, I thought I was an expert biker.

Fifty years later my doctor suggested I ride a bike for fitness and cholesterol control. I bought a single speed \$89 special at Target, and thought I would pedal it home. Mind you, I hadn't been on a bike since Paris in 1945.

After a few pedal strokes in the parking lot I gave up. I loaded the bike half in, half out of the trunk and drove home.

We don't have hills in southwest Florida, but we do have winds. When the wind was in my face, I dismounted and walked the bike. Soon I learned about gears. I bought a Trek hybrid which was much better than the one-speed, but uncomfortable.

Several upgraded wedgies later, I still suffered from sore arms, sore neck and most of all a sore crotch. And that was after filling my shorts with gobs of Vaseline.

Sometime in 1995 I began considering the daunting prospect of riding a recumbent. Even the word, "recumbent" scared me. Recumbent means laid back, and laid back in my mind meant vulnerable. I procrastinated until 1997.

In the meanwhile my semiannual PSA test results were rising. My urologist, who is also a wedgie biker, attributed my elevated PSA in part to biking. Small comfort, indeed.

By August 1997, I had checked as many recumbents as I could find. At bedtime I fell asleep reading RCN. Recumbent riders in our club contributed advice. What I learned was that no matter how uncomfortable, unsafe or radical in design a recumbent might have appeared to me, there were people out there who were riding them and evidently liked them.



I eliminated from my consideration any recumbent that didn't permit me to sit flat-footed at a stop. Some of the USS models fell into that category. I ruled out the SWB's because you had to be careful not get a heel caught in the front spokes when turning. I also thought keeping my legs in the straight out pedaling position would strain my heart and retard circulation.

Comfort was my main goal in choosing a recumbent. I had my eye on a BikeE. It seemed like a sensible entry level bike but the

seat was skimpy beyond belief. The Rans seat was supposed to be the bellwether for the industry. I was given one of their pedestal-mounted seats for a week of testing.

The seat was wide enough, but about four inches too shallow for me. I confirmed that finding by sitting on a club member's Rans Stratus. I was told by Randy Schlitter in March 2000 that they make all of their seats alike.

However, one of my friends has a BikeE and a Rans V-Rex. He has no problem with either of the seats.

The Easy Racers EZ1 and Tour Easy came with seats that were generous in size by industry standards. Perhaps there were other ASS recumbents available in 1997 that would have satisfied me—I don't know. I admit I was hooked by the Gardner Martin (Easy Racers) promotional video.

When I told him that I was seventy-three, Gardner suggested the EZ1 for me. I opted for the Tour Easy. With the benefit of hindsight, he was right.

What sealed the deal for me was that Gardner agreed to make the Tour Easy seat deeper and wider than stock. I've been tickled with it ever since.

Second thoughts about the EZ1 are based on my lack of maneuverability with the longer wheelbase Tour Easy. I don't think that would be a problem for an experienced rider. The tradeoff is that the LWB soaks up bumps nicely.

Considering my age and level of riding skill, a recumbent trike was inevitable. I received my Greenspeed GTR in December of 1999. It is a very well made maneuverable trike. Having three wheels on the ground, you do give up something in speed to the two-wheelers, but the safety and comfort dividends offset that.

I do my triking in a semi-private low-traffic area. Still, there are some speeding cars, but they always yield a full lane to me. Bikers don't get such a wide berth. In a sense the trike has become a mobile trainer. I'm out on it every day. I have increased my stamina, strengthened my legs and in conjunction with a sensible diet, have lost unwanted pounds.

When people stop to talk to me on the road there are three questions they usually ask about the trike: Where does it come from; how much does it cost; and am I comfortable on it?

Comfort has largely to do with the seat back angle. The more erect it is, the less strain on your neck. But a too erect angle will put more pressure on our posterior. Greenspeed offered me a choice of three

Continued on page 36
July/August 2001 33

The Evolution of a FWD

(front-wheel drive)

By Gary Dinsmore



November 10th in Scappoose, Oregon is rather chilly. My ride home this evening had a few hitches. I left my helmet under my desk so I had to don all of my safety gear to return to my office at the paper mill. Finally all of my gear is secure inside the tail cone of Dinsey Mark 4 and I turn on my "winkey" lights, stomp in and roll out of the parking lot. I have a ten-mile commute from St. Helens to home along Highway 30. I have a good shoulder bikeway for the full length of my commute, but the traffic is always heavy. I am soon into the rhythm of the ride, and by the time I reach the highway, the earlier frustration has evaporated. I am dressed in several layers for the temperature is 39 degrees Fahrenheit, up a whole 8 degrees since my pre-dawn ride this morning.

Riding on cold days is better this year. I have recently completed a front and rear fairing for my front-wheel-drive recumbent. I cut panels of corrugated plastic board in orange shaped wedges and then shaped them with a heat gun. I was able to create a very smooth and rounded design. The combination front and rear fairing have cut a full five minutes off my average ride time. I like to compare the boost to having a 15 mph tailwind. Of course there is not much extra help if you do have a tailwind, but when the wind is on your nose, it really helps.

Tonight the wind is calm and the sunset is going to be beautiful. I spot Venus in the Southwest and it seems to almost be hovering over my home a few miles away. The sky shades from the purest blue overhead to brilliant salmon silhouetting the

foothills to our valley. One reason I enjoy the ride so much is being able to enjoy the little things along the route. Tonight I get to watch a large flock of Canadian Geese in a huge vee formation. One lone goose is struggling to catch up from back in the empty space between the wings of the vee. I keep tabs on him over the next half-mile and watch the left wing of the formation open up as he catches up. It must be about like sprinting and catching up with the peloton on a fast ride. The sky is starting to fade and I plug the battery into my headlight. A bit further I pass a cemetery. I instinctively check the lighted flag for it is my visual wind reference. Tonight with the observance of Veterans' day the sight is particularly stunning for the full moon is just the width of the fat finger of my outstretched lobster mitten above the horizon and slips so majestically behind the flag.

The only thing I miss tonight is the pair of red-tailed hawks that usually survey my ride from the security of two power poles near the cemetery. Now I ride into Scappoose from the North and I ratchet my concentration up a couple notches. There are lots of cars waiting to enter the commuter rush. Here is a double cab dually pickup waiting at a feeder street. The driver is intent on the stream of cars. I bob my mitten over the headlight twice to try to catch his attention and wave. Here is a wave in return and I roll in front of him without breaking cadence. I like to think of myself as the friendliest cyclist in town. I wave at everyone. It is my way to make sure the drivers see me. Besides I have a reputation to keep up.

One day at the bicycle shop I was talking to one of the younger riders in our town and found out that I was known as the "Goofy Bike Guy." Ever since I have wondered if that is they mean the goofy bike or the goofy guy?

Over the past four years my front-wheel-drive recumbent has taken on many personalities. In December of 1996 I built it as a prototype for the front end of a recumbent tandem bicycle. Many parts of the front frame were able to slide in and out to change the position of the bottom bracket. It started with under-seat steering. Most of the components were scrounged from yard sale 10-speed bicycles. It has Suntour cranks with a huge 58 tooth chainring and a two dollar bargain table Suntour hub with a six cog cassette. Bar end shifters, cantilever brakes and 20x1.75 tires complete the running gear. It was as heavy as a lead brick. I changed positions of the BB several times. I finally settled on a height of 24 inches—the same height as the seat.

In 1997 I followed the instructions in RCN to create a rear fairing. That same year I installed above-seat steering. No I didn't take off the under-seat components for a month or so. I rode with both and finally decided I like the above-seat configuration better. By now everything had settled down for position. I cut the various sliding fit assemblies and removed several pounds of surplus steel. Over the next couple years I played with different seats and different laid back angles. I finally settled in on a seat angle of about 50 degrees from the horizontal. This year I started constructing a sleek full fairing based on an ellipsoidal shape. The back of the elliptically shaped seat became the basis for the shape of the tail cone. The seat tips forward for access. The rear wheel is tightly encased in more corrugated plastic board. This keeps the tail cone totally dry. It literally becomes like a cars trunk. My messenger bag, tool pouch, pump, spare coat, lights, batteries and lunch are all carried loose inside.

The front fairing was a little trickier. It has a lightweight laminated wood frame and mounts to hard points on the handlebars and near the BB. The mounts are tygon tubing pieces that slide over 6mm bolts mounted on the frame. I can remove the fairing in about a minute. This allows me to cheat occasion-

Continued on page 36

Corrugated Plastic Construction

By Gary Dinsmore

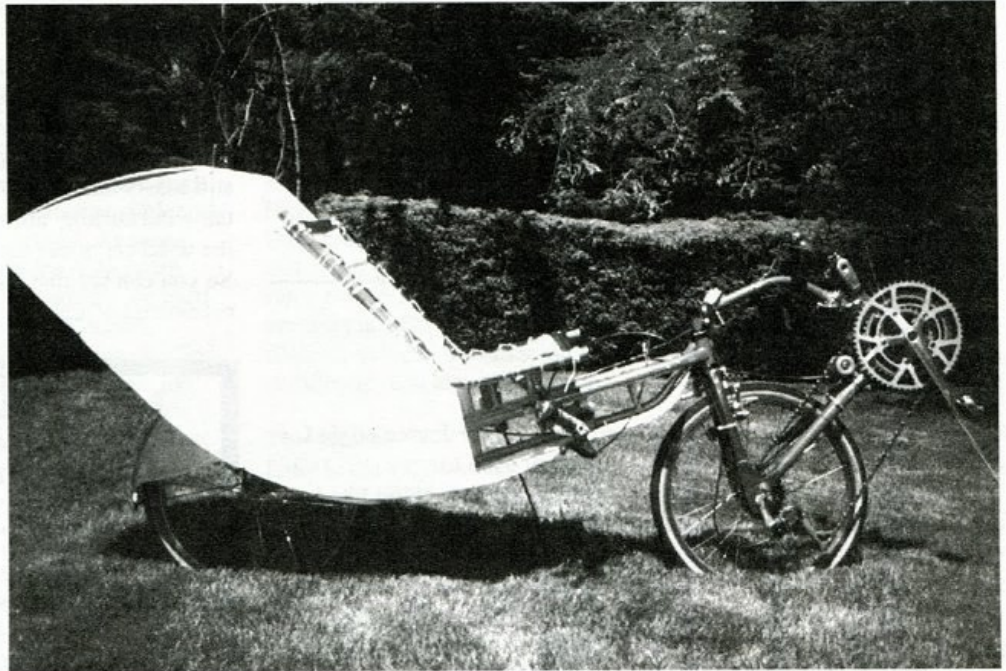
I have built fairings out of the corrugated plastic board material popular for political signs. The original RCN article by Kent Peterson appeared in RCN issue #44 (reprint \$4, sequel coming soon), March/April 1998. My first attempt used the tie-wraps connecting procedure and works fine if you are willing to accept square corners. For my second fairing I wanted a very slippery ellipsoidal shape and I wanted both front and rear fairings. There are three issues you must deal with to produce rounded shapes. First is cutting the corrugated plastic in accurate curves. My experience suggests that the best solution is to mark carefully and cut with a very sharp Stanley knife, and cut layer by layer. Curves are tricky to shape but the best way is to cut the orange peel shapes in the cross direction to the fluted board.

The curves can be easily set into the plastic with a heat gun. Heat until the inside surface becomes too hot to touch and the plastic board begins to dimple between the flutes as you pull it into the curve desired. Hold until it cools and will hold its shape.

The third issue is bonding the individual gores into a unitized whole. Duct tape creeps and eventually slides apart. I like the aluminum foil tape that is used on air conditioning ducts, but it eventually hardens and splits across the seams. I am now using a composite system. I use lightweight fiberglass reinforced tape across the seam. I cut dozens of strips an inch and a half long and place them crossways across the seam. For seams with considerable stress I place them side by side. For lightly stressed seams I place them at twice their width. I then overlay this with the aluminum foil tape. I am careful to cover all of the reinforced tape strips. This keeps water and air out, and preserves the adhesives. When you tape both the inside and outside of each seam an ellipsoid has a surprising rigidity.

I developed the shape of my ellipsoid by creating elliptical ribs from lightweight laminated wooden strips. I bought a couple of clear fir boards with no knots. I looked for the softest boards I could find. You should be able to dent the wood with your thumbnail. I used a fine tooth veneer blade on my table saw and ripped the thinnest strips I could manage. They must be 1/16 of an inch or slightly less, because they must be quite limber.

On a sheet of 3/8-inch plywood I laid out an ellipse using two nails and a piece of string. Just keep adjusting the length of the string and the spacing of the two nails until



you get an ellipse that will enclose your frame and yourself. Moving the nails further apart makes the ellipse longer and narrower. Lengthening the string makes the ellipse wider. I only used half of the elliptical curve to build elliptical arches. To make a full ellipse I overlapped and glued two arches together. Once you have the ellipse drawn cut scraps of four-inch lumber to fit in segments over this curve. The scraps should be centered over the curve and tacked in place. Now draw the ellipse again on this group of scraps. Number and mark around each scrap in the group and then remove them. Cut the curves with a saber saw. Now return the scraps to the plywood base and tack down the inside half of each scrap. Check your thin wooden strips to see if they will pull around the curve without splitting. You can soak them if necessary, but if the wood is soft and supple it should curve around your form easily. It is easiest to work with full length strips, but you can taper the ends of shorter pieces and lay them together so ends of adjacent strips never come at the same position. To glue up the laminate you need to assemble a collection of clamps. Develop a plan that will allow you to clamp the form almost continuously around the ellipse. To keep the glue from oozing out and gluing the laminate to the form, cut open some plastic bread bags and drape them over the form. The plastic must enclose the laminate inside the form. I glued three layers together with yellow construction glue. I coat one side of two of the strips. Lay the three pieces together and press them

down into the plastic bags near the apex of the ellipse. Clamp the form pieces in place behind the bag material and the enclosed wood strips. Work from the middle to the ends and make sure the clamps are tight enough to squeeze glue from the layers all along the strip. You can use a small wooden block and a hammer to even up the edges of the strips. You may need to loosen groups of clamps as you do this. After about a day you can remove your new laminated beam. Use a chisel to remove the glue beads.

Attaching the fairing to your frame can lead to some interesting problems. I developed a method that allows me to pop the fairing off when I want to transport the bicycle. I created what I call hard-points at key locations. I have a pair near the grips on my handlebars. I drilled and brazed in a pair of water bottle bosses. I then picked up some 30 mm long 6mm pan head bolts and some 3/8-inch aluminum tubing. Cut the tubing about an inch long and pass the bolt through the tubing and mount it on the water bottle boss.

Duct tape can keep the bolt centered in the tubing. Devise a way to tape a piece of the aluminum tubing inside the fairing where it will mate with the hard-points on the frame. Use two-inch pieces of Tygon tubing to connect the fairing to the hard-points. Use a thin-walled tubing that fits tightly for a more permanent attachment. You slit the tubing to remove the fairing. For a slide fit that you can pop off, use thick-walled tubing. In another area I have a length of hardwood doweling that just fits between the two sides

of the laminated elliptical wooden arch and it is screwed in place with pan head sheet metal screws and so called fender washers protecting the corrugated plastic fairing. I slapped a short piece of aluminum tape over the outside of the plastic fairing to hide the screw.

This wooden dowel is in turn tie-wrapped directly to a luggage carrier. I decided that I did not like the aluminum tape look, so I purchased a quart of a good quality enamel and a good brush and painted the outside of the fairing. I also placed some vinyl tape racing stripes over the top to improve the visibility a little. Reflective tape can be placed in any pattern you desire for nighttime visibility. ♦

Continued from page 33

50 Year Recumbent Quest

angles, 35, 40 or 45 degrees. I'm happy with the 40 degree angle I chose, but it did take a good few weeks to get used to.

The seat itself is surprisingly comfortable. It's something like half a hammock, only there's no headrest. The support for the seat is the frame of the trike. Very neatly designed. The wide-mesh seat material is grommeted on the left and right edges, folded over and under the frame, and then laced with elastic cord in a crisscross pattern.

The GTR comes with 63 speeds (7 derailleur gears + 3 internal gears + triple crank = 63). I didn't think I would use the hub gears but have found that the middle one serves to smooth out my stroke in certain situations.

Yes, 63 speeds, but every one of them requires pedaling! ♦

Continued from page 34

The Evolution of a FWD

ally when the rains pour: It still can be fit in the back of my suburban assault vehicle. I don't mind the rain so much as the gravel and spray from the 18 wheelers.

Now I am through the city of Scappoose, it takes about 5 minutes to ride from city limit to city limit. I have a short stiff hill to climb as I once again turn toward Venus. When I reach home Venus loses herself in the grove of ninety-foot Douglas Fir trees that surround my house. The full moon, however, is high enough to light my way from behind. It has been a good ride and I reach home refreshed and still toasty almost all toasty warm, my fingers still get chilled from the wind curling around the front fairing. I still need a way to keep the wind off of my hands so Dinsey will likely evolve even more. So you can see that the wonderful part of riding a home built recumbent is that it never has to be complete. ♦

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The Development of Modern Recumbent Bicycles

By David Gordon Wilson

Adapted from the Book *Human Powered Vehicles*. Updated for RCN 2001.

A recumbent pedaling position is one having the pedaling axis substantially in front of the rider. Further recumbents of the type where the rider is in a sitting position may be designated as semirecumbent and those where the rider is lying down, as fully recumbent. The boundary between semirecumbent and fully recumbent is set as a seat-back angle of 45 degrees with the horizontal. Alan Abbott defines four possible fully recumbent positions: the supine position with face upward; the prone position with face down; and on the right or left side, the right or left decubitus positions (Abbott 1988). In general, full recumbents are used only for speed-record attempts, because of the position's inherent problems for both seeing and being seen. Technically speaking, the first pedaled bicycles were "recumbents," but this article briefly traces the development just of geared recumbent bicycles, from the first known examples that appeared in 1895 to the Varna "Mephisto" of 2000. Case studies of the Avatar 2000 and Tour Easy and Easy Racer bicycles are covered in greater depth. Variations such as front-wheel-drive, front-steering recumbents are introduced.

Recumbent bicycles have had many revivals. A recumbent called the Velocar disturbed the conventional bicycling world in the 1933 and 1935 period because it was used to topple most existing bicycle records, and it was ruled "not a bicycle." The latest revival of interest in recumbents has come about because of the formation of the IHPVA. Faired recumbent bicycles currently hold most of the world HPV records. Moreover, often the same recumbent bicycles that have won the speed championships have also been awarded practical-vehicle prizes. The recumbent bicycle could, therefore, have very wide application.

The evolution of safety bicycles and the upright riding position Karl von Drais designed the first known bicycle (circa 1817) simply as a running aid, so it is difficult to define it as having a recumbent or upright sitting position. However, the designers of the first pedaled bicycles, Pierre Michaux and/or Pierre Lallement in about 1865, used the recumbent position, probably because riders of what were then unusual machines wanted to start with their feet on the ground. However, the direct coupling of the pedals to the wheels meant that the effective gear ratio was, in modern terms, super low. Gears and chains were not developed to the point where they could be used to improve the gear ratio (the impedance match). Accordingly, the pedaled front wheels of the Lallement/Michaux bicycles were steadily increased in diameter until they were as large as they could be comfortably ridden: the machine became the high-wheeler. The only way in which the high-wheeler could be both pedaled and steered was for the rider to be almost vertically over the front wheel. Riders were exhorted to "get over the work," that is, the pedals. When the development of improved chains and sprockets (circa 1884) allowed the development of the geared safety bicycle—so called because the high, precariously balanced riding position of the high-wheeler was extremely unsafe—the upright pedaling position, regarded as normal, was retained. Accordingly, when the recumbent bicycle reappeared in geared form, it was regarded as an aberration.

The geared recumbent's first 30 years, 1895-1925

The modern safety bicycle had evolved almost to its present configuration by soon after 1890. The geared recumbent made by C. Challand in Geneva Switzerland, around 1896 (Salvisburg 1897) was very close in design to one form of modern recumbent. In Challand's recumbent the rider sat high, directly over the rear wheel, so that starting off from rest may have been difficult. A recumbent patented by Wales in the U.S. in 1896, incorporating hand-and-foot drive, positioned the back of the seat forward of the rear-wheel center, but still over the wheel. Another American recumbent was that produced by Brown (Dolnar 1902), in which the rider's seat was entirely forward of the rear wheel and the front wheel was forward of the cranks, an arrangement now characterized as long wheelbase or LWB. It was received rather scathingly by the

British bicycling press, although its virtues were grudgingly acknowledged.

Peugeot produced a recumbent bicycle in France at an unfortunate time: 1914, the start of World War I. Perhaps this machine had the greatest possibility of success of all unorthodox bicycles, because Peugeot, a significant company, had a great chance of influencing the French-dominated Union Cycliste International (UCI). However, the war ended this effort. After the war Swiss engineer Paul Jaray, whose fame came from his work on the Zeppelins, made the J-Rad recumbents in Stuttgart in 1921, with limited success. They used a swinging-lever constant-velocity transmission having three ratios given by using pedals at different radii along the levers.

The Velocar

Later in the 1920s a class of cyclecar racing became very popular in Germany, with the American-German sailboat researcher Manfred Curry taking a prominent part. In France a self-taught engineer, Charles Mochet, was making small motorized cycle cars (Schmitz 1990). He also made a one-seat, four-wheeled pedal car for his son, Georges, who would "amuse himself by pedaling fast and passing ordinary bicycles with ease." Charles switched his production entirely to a two-seat, four-wheeled HPV that he called the Velocar. According to Schmitz it had freewheels, a differential, and a three-speed gear and was fast enough to pace bicycle racers on the track. Its instability on turns gave Mochet the idea of "cutting the Velocar in half, figuratively" by building a recumbent bicycle for racing. The front wheel was steered "through a bevel gear connected to flat handlebars by a long horizontal tube." After it was finished in 1932 the champion professional, Henri Lemoine, rode it and found it comfortable and easy to pedal, but he did not want to switch to it.

One who did take to the Velocar was Francis Faure, a second-rank racing cyclist, who defeated the champion, Lemoine, in a 4-km pursuit race. He also broke track records. A professional road racer, Paul Morand, won the Paris-Limoges race "going away" on the Velocar in 1933 (Schmitz, 1990). Mochet had written to the UCI in October 1932 to verify that the Velocar accorded with the UCI's racing rules. The then-existing UCI rules required that the crank axis be between 240 and 300 mm from the ground; that the vertical through the crank axis be no more than 120 mm from the nose of the saddle, between 580 and 750 mm from the vertical through the front-wheel axis, and no more than 550 mm from the vertical through the rear-wheel axis; that no power be obtained from hand motion; and that no means of reducing air resistance be used. The UCI met in some disarray in 1934, after much controversy, passed rules that disallowed recumbent bicycles for officially sanctioned racing, therefore, the records that Faure and others had set (Abbott, 1988; Barrett, 1972).

The Velocar inspired several commercially produced recumbents, especially those built in Great Britain by Grubb. These had handlebars beneath the seat, an excellent design introduced in the last century for high-wheelers and known as Whatton bars, after their inventor. Neither the Whatton bars nor the Velocar-inspired recumbents became established. Nor did an interesting variation known as the Ravat Cycloratio, in which the pedals and cranks were over the front wheel. The present author would later unwittingly borrow this design idea. As the seat was partly over the rear wheel, this style could be called the high, short wheelbase. Another variation of this style was the 1939 Velocino in Italy and the Donkey Bike, built by Emil Friedman in Frankfurt, West Germany in 1965. The front wheel had a diameter of only about 310 mm. A high, long-wheelbase recumbent using a steering wheel but otherwise constructed of conventional bicycle components was the Moller Triumph.

Oscar Egg, the renowned Swiss bicyclist who competed with Marcel Berthet for the 1-hour record from 1907 to 1914, when he set a record



David Gordon Wilson on his Avatar 2000—Richard Howard

which was to last until 1933, built a streamlined recumbent bicycle, propelled by levers, with the intention of becoming the first bicyclist to exceed 50 km in 1 hour. Berthet had reached 49.992 km in November 1933 in a streamlined, regular (pacer) bicycle. But it was Faure and a streamlined Velocar who reached 50.537 km in 1 hour, in March 1939 (Schmitz, 1990).

The postwar doldrums

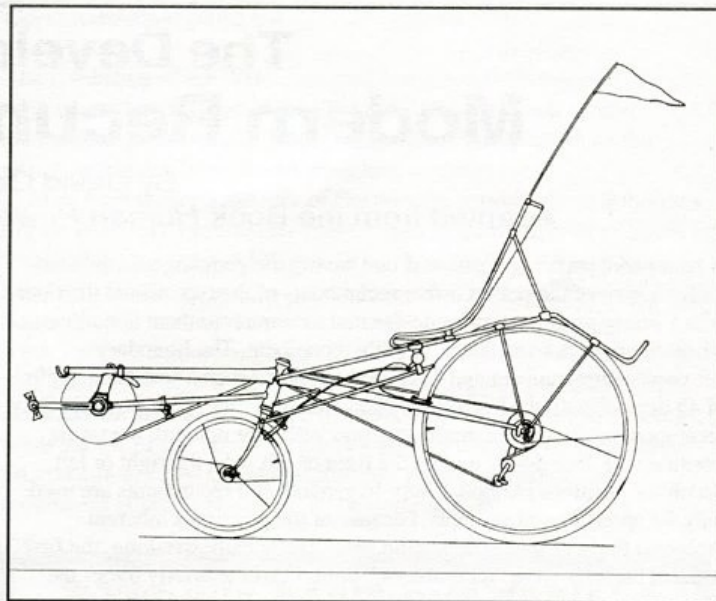
After World War II, the principal users of recumbents who received any notice were some in Britain still riding Grubbs and Dan Henry in the U. S., who designed and built a long-wheelbase (LWB) for his own use. The LWB design positions the rider entirely between the wheels. Henry used standard 27-in. wheels and designed very effective springing on both. Most previous recumbents were built with small front wheels, because in the long-wheelbase machines little of the total weight is carried by the front wheel, so that the small increase in rolling resistance (which is inversely proportional to wheel diameter and proportional to the normal load) is probably outweighed by a reduction in air drag at normal speeds. At the same time the bicycle mass and length are decreased and the steering is likely to be more precise. In the short-wheelbase recumbent, the front wheel is made small because it is located under the legs or feet, which must be able to reach the ground.

The evolution of the Avatar 2000

The Avatar 2000 was developed largely in ignorance of the foregoing history. To some extent we (Dave Wilson and Richard Forrestall) repeated what had been done before. However, had we known of the existence of previous recumbents, we might well have taken the same course, because little had been reported of either their deficiencies or their advantages.

The design evolved from many initial sketches and careful layouts on the drawing board. There was even some simple analysis. But progress mostly came from old-fashioned trial and effort. This was not through laziness or lack of rigor. Any device that interacts closely with human beings—a nuclear-power-station control room, for instance—should be designed with great attention to detail and overall logic, but even so some major deficiencies become apparent only after a device is in use. A review of the stages we went through and the conceptual errors we uncovered may help others to avoid similar mistakes.

The first two recumbent bicycles in the series were made by H. Frederick Willkie II, who had been inspired by a design contest I organized. He requested a sketch of what he thought would be an advanced bicycle that he could build. Willkie called the first (1972) of the two bicycles Green Planet Special I (GPS I) and, unknown at the time to the designer and builder, it bore a strong resemblance to the Ravat. Willkie used the GPS I around Berkeley, California, reportedly achieving high speeds, but he found the rather crude seat jarring to his spine. It also seemed hazardous to have the handlebars and stem almost



The Avatar 1000 that was never put into production

directly in front of his face, because of the risk of injury in an accident. Willkie asked the author to sketch a revised design.

The result was the 1973 Green Planet Special II (GPS II), in which the cranks were lowered as far as possible and the steering-head tube was brought back so that the front-wheel rim would clear the heels. This also permitted the handlebars, while fastened directly to the fork-steerer tube, to be under the thighs. Although Willkie used a hard, molded-plastic seat, he found that this machine was far more comfortable than GPS I, partly because it had a far more open angle between the torso and line connecting the hips to the crank axis, allowing better breathing, and partly because he was now sitting more on his buttocks and less on his coccyx.

The 16 x 1-in. tubular front tire was, however, heavily loaded, with a typical life of less than 160 km (100 miles). The author bought the GPS II from Willkie and brought the rear wheel about 300 mm (12 in.) forward to reduce the load carried by the front wheel, fitted a robust 16 x 1-3/8-in. wheel and wired-on tire, and experimented with many seat types and angles until he arrived at the approximate configurations shown and a seat construction using 19-mm (3/4") O. D. aluminum-alloy tube from which was slung stretchable-canvas.

A large fiberglass trunk was also fitted. On this much-modified version of the GPS II, renamed the Wilson-Willkie (WW), many thousands of miles were covered in great comfort and enjoyment, in summer heat and winter cold.

The sight of an obviously relaxed and cheerful rider on this unusual machine attracted media attention, and the bike was the subject of many newspaper articles and photographs, TV interviews, talks, two school movies, and a nationally shown Mobil television commercial. It may have inspired a commercial recumbent of similar appearance but dissimilar details, known as the Hyper-Cycle, that was produced after this publicity.

The WW did have flaws, despite its delightful features. It was still heavy on the front wheel, causing even the wired-on heavy-duty tires to last only 1,000-2,000 miles (1,600 to 3,200 km). Spokes in the front wheel regularly broke. Snow at a depth of more than 3 in. caused front-wheel sliding. Heavy braking on the front wheel could cause the rear wheel to lift, and after an emergency stop the rider could end up standing in front of the now-vertical bicycle. On two occasions there were more dramatic stops when, in one case, the front-brake retaining nut shook itself off, and the brake fell out onto the tire, rotated around the rim, and became entangled in the spokes. The front wheel locked, the forks bent back, and the rider, travelling at about 12 m/s (27 mph), tumbled forward, feet over hands. Nothing more than abrasions and bruises resulted. This and other spills confirmed the outstanding safety features of the recumbent design with below-seat handlebars.

Serendipity

One of the many pleasures of design and development is encountering

serendipitous advantages. My initial interest in designing recumbents had been purely for safety: I had been saddened to read of many deaths and serious injuries to riders of regular bicycles who had been thrown over the handlebars by encounters with dogs, potholes, and anything that could jam the front wheel. I had expected that the result would be a compromised machine, with safety advantages, but with many other disadvantages. Yet, unexpected advantages kept appearing. I had not expected, for instance, that it would be possible to pedal around corners without any danger of the pedals hitting the ground. The great sense of relief coming from a relaxed upper body and the ability to breathe deeply using the diaphragm was another pleasant surprise. When the brakes failed during a downpour on a high-speed descent down a hill with a sharp bend and a dangerous intersection at the bottom, it was an even greater relief to learn that one tennis shoe put flat on the road provided rapid and safe deceleration under full control.

Another unexpected finding was that the canvas seat acting over the full area of the back gave the stiffness against pedaling thrusts, and relieved the hands and upper torso of any need to exert a reaction force, but the weight acting against the small area of the pelvic bones and buttocks was resiliently and comfortably sprung. The safety flag, easily installed on a recumbent bicycle, together with the brightly painted surfaces of the large trunk, made the vehicle far more visible to other road users than is a conventional bike not so equipped. The relaxed seating position at a level with that of the drivers of most private automobiles seemed to promote instant communication, and there resulted a higher degree of courtesy from other Massachusetts road users than I had thought possible. There was a remarkable absence of neck and eye strain, of nerve damage in the hands and crotch, and of back pain, compared with what is generally accepted in the conventional bicycle racing position.

Front-wheel loading and rolling resistance

Through the interest of a potential manufacturer in an improved version of the Wilson-Willkie, the author met Richard Forrestall in his search for builders willing to work on what may have seemed the somewhat strange designs he was drawing. Forrestall and his partner, Harald Maciejewski, first built the Avatar 1000 (A1K), an improved version of the WW, in 1978. In this design the front wheel was moved forward about 250 mm (10 in.) from that in the WW to further reduce the load on the front wheel. This was done despite the potential interference between the heels and front-wheel rim, because this could occur only at speeds below 2.5 m/s (6 mph); at higher speeds, the maximum amplitude of front-wheel steering movements was too small for interference to take place. To retain the previously convenient and comfortable placement of the handlebars below the seat, a ball-jointed steering rod was used to connect the handlebars to the fork crown.

The A1K was a considerable improvement on the WW, and gave longer front-tire and front-wheel life. The learning period needed to become used to keeping the heels out of the way of the front tire at very low speeds was short. Only in extremely heavy braking did the rear wheel show any tendency to lift. Comfort, already impressive on the WW, was further enhanced with the reduction in front-wheel loading.

The rolling resistance is formally given as the force resisting forward motion divided by the vertical force, or load, on the wheel; it is termed the coefficient of rolling resistance (Cr). The Cr for bicycle tires on normal roads is between 0.0025 and 0.015. It is a function of the wheel diameter, being lower for larger diameters. It is also affected by tire suppleness, tubular tires being formerly more supple than clinchers. However, improved reinforcing materials, synthetic rubbers, and construction have brought lightweight clinchers in the 1990s almost to the Cr range of tubulars. Rolling resistance is also greatly affected by tire pressure. Approximate values taken from tests by Whitt (1982) for 27 x 1-1/4-in. pre-1980 tires for pressures of 2, 4, and 6 bar (30, 60 and 90 psi) are 0.008, 0.005, and 0.004, respectively. At 4 bar the Cr for a tire of 16 x 1-3/8-in. (and similar vintage) was approximately twice the value for the larger tire on a similar (in this case, "medium-rough") surface.

Thus, although rolling resistance is usually small compared with aerodynamic drag, it is far from negligible. Suppose, for instance, that the weight of the sprint-record machine, like the Cheetah or Gold Rush, plus the rider were 1,000 N (224.7 lb) and that it were travelling at 30 m/s (67.1 mph). If the tires have a Cr of 0.005, the power lost to rolling resistance would be $1,000 \times 30 \times 0.005 = 150$ W, more than 0.2 hp.

Reducing this Cr to 0.0025 through better tires and a smoother road surface could make a major difference when the rider's output at that point in a record run is probably well below 1 hp (746 W). Having most of the weight of the rider and vehicle over a large-diameter rear wheel also reduces rolling resistance. The small-diameter lightly loaded front wheel, although having a higher coefficient of rolling resistance, probably allows a much greater reduction of aerodynamic drag.

However, with the load on the front wheel, Cr was still higher than on a conventional bicycle. The table below shows approximate percentages of front-wheel and rear-wheel loading for conventional and some recumbent bicycles.

Front-Rear Loading Distributions

Bike	Front	Rear
Three-speed (roadster)	36%	64%
Ten-speed (sports)	40%	60%
GPS II (estimated) (SWB)	70%	30%
Wilson-Willkie (WW) (SWB)	65%	35%
Avatar 1000 (A1K) (SWB)	62%	38%
Avatar 2000 (A2K) (LWB USS)	31%	69%
RCN Estimations (not part of orig. article)		
Easy Racer LWB	65%	35%
Lightning SWB	55%	45%
Compact (CLWB)	70-80%	20-30%

The higher loading on the smaller front wheel of the A1K, compared with the conventional bicycles (three speed or ten speed), inevitably leads to higher rolling resistance. There was no reluctance to load up the rear wheel, and interstate trips were confidently and comfortably undertaken loaded with camping and hiking gear. However, the performance on soft ground, in snow, and with a soft or flat front tire was poor: having so great a proportion of the weight over the front wheel meant that its tracking needed to be precise to give the rider good control. This weight distribution gave good slow-speed balancing on hard surfaces with compensation for the alarming loss of control when the front tire deflated or when snow or mud was encountered. (Other experimenters have reported improved performance using large-diameter mountain-bike tires.)

We felt that to improve the A1K we should further decrease the loading on the front wheel. The weight distribution of conventional bicycles, with 35 to 40% of the weight on the front wheel, combined with the lower center of gravity given by the recumbent position, seemed desirable, giving good traction, excellent and safe braking, and easy balancing. For this the ideal front-wheel location would seem to be for the wheel to have a common vertical tangent with the front of the pedaling circle. To avoid the high pedaling position of the Ravat and GPS I, a "squashed" pedaling path, for instance an elongated elliptical or linear motion, would have to be used. We built and tested several lever transmissions that seemed in prospect to have many advantages over rotary cranking, but when tried out they had unforeseen disadvantages.

The lever drives included a simple piston-crank mechanism, with the pedals taking the place of pistons. The line of action of the pedals did not pass through the crank axis, giving a quick-return motion that seemed to have advantages. But the mechanism, designed as it must be to withstand high pedaling forces, weighed far more and had far more friction than the pedals it replaced. Reluctantly, we put the search for a lightweight, efficient mechanism to produce a linear or elongated elliptical motion (possibly having ergonomic advantages) on a lower priority basis, and in 1979 we solved the nose heaviness of the short-wheelbase recumbents by going to a long-wheelbase design. We called this the Avatar 2000.

Avatar 2000

Again, serendipity rewarded us. The sole "cost" to moving the front wheel forward appeared to be that the Avatar 2000 (A2K) became longer than the A1K, which was almost identical in length to a conventional bicycle. There was not necessarily any increase in mass, because although two frame tubes, the steering rod, and the brake cable become longer than in the A1K, the frame is much simplified, stresses are greatly reduced, and two idlers cogs needed to route the chain over the front wheel in the A1K are no longer needed. In addition, the following

advantages over the short-wheelbase A1K were found, some of them unexpectedly, to be added to the already listed advantages of the recumbent bicycle over conventional bicycles:

1. Tracking accuracy became very precise. Although all bicycles should go where the rider steers them, the outstanding ability of the A2K in this respect extended to ice and snow conditions, in which the light loading on the front wheel allowed it to climb over ice and snow ridges that would cause the short-wheelbase versions to skid. (It is not claimed, however, that recumbent tracking ability in ice and snow is better than that of the conventional bicycle, which is very good in this respect.)
2. Full braking on both wheels could be used at all times except on slippery surfaces. In normal circumstances a front-wheel skid cannot be induced. An early abnormal circumstance was when an improperly mounted tire pump broke loose from the top tube, fell onto the rider's right foot, and went through the spokes of the front wheel during a turn onto a busy street. The front wheel locked and skidded, but the feet could be immediately put on the ground and the rider remained seated on the bicycle. This type of accident on a conventional bicycle can result in a very severe injury, often including skull or spinal fracture. In the case mentioned here, the pump was ruined, one front-wheel spoke was slightly bent, and the front-fork paint was chipped, but no other damage occurred, and the 35-mile run continued.
3. The high proportion of the weight distribution on the rear wheel gives outstanding rear traction in snow and ice and outstanding rear-wheel braking in all conditions.
4. Although the seat frame undergoes almost the same vertical accelerations as the rear wheel, the resilience of a fabric seat (in the case of the A2K it is nylon mesh with leather border and straps) in the vertical direction gives the effect of springing.
5. At speeds of 2 or 3 m/s the combination of rolling and air drag for the wheels alone is lower than for two large wheels, because of the low forces on the small front wheel. The rear wheel runs partly in the lee of the rider's body, reducing air drag. The semirecumbent position gives a lower frontal area, of course, than does the conventional bicycle, because having the legs out in front more than compensates for the somewhat more exposed attitude of the torso and head.
6. A small but appreciated advantage of the long-wheelbase recumbent is that it can be carried around almost like a briefcase by holding the top tube just in front of the seat.
7. Another unexpected advantage was the ease in dealing with aggressive dogs, which are responsible for many deaths and injuries among bicyclists each year. When such a dog attacks, it has to do so by running alongside in easy reach of the rider, who can easily discourage it by hitting it on or near the nose. Trying to do this from a conventional bicycle often leads to a loss of control and a dangerous fall.

The racing Avatar and modern machines

The Avatar 2000 gained publicity in Europe when the author took it to Velo-City, an HPV congress in Bremen in 1980, and appeared on television. Richard Ballantine, a prominent author and publisher of bicycling books and magazines, later purchased an Avatar 2000, tested it, and gave it outstanding reviews. Derek Henden, a British amateur constructor employed by Xerox, borrowed it to find its performance would be improved by a fairing. He used a narrower seat to reduce the frontal area and increased the gear ratio with a crossover drive (the chainwheel on the pedaled shaft is on the left and drives a smaller sprocket on the left side of the parallel shaft; the regular chainwheel(s) is (are) on the right side and drives the rear wheel) in the normally unused bottom bracket tube beneath the seat. HPV racing in Britain had started, with Ballantine's encouragement, and the new vehicle, named Bluebell from the color of its fairing and running for the Nosey Ferret Racing Team, named for its sharp-nosed appearance, began winning (Wilson, Forrestall, & Henden, 1984). Henden borrowed ticket money from Ballantine to compete in the IHPVA International Human-Powered Speed Championships in Irvine, California, in October 1982.

For 2 years, 1980 and 1981, the Vector tricycles won all major HPV races, setting records for the 200-m flying start as well as over many other distances. On its first appearance in 1982 at the International Human-Powered Speed Championships (IHPSC), the Bluebell beat not only the Vector but also the Easy Racer recumbent bicycle in the 200-m top-speed event. The speed was not a record, but the course and conditions were different from those at which the previous records were set. The rider, Tim Gartside, was an Australian lawyer touring Britain who had raced only once previously.

In road racing also the three-wheeled Vector and its clone lost their dominance at the 1982 IHPSC. The two-wheelers reasserted their superiority as the Easy Racer recumbent bicycle pulled away from tricycles for a solid win. The Bluebell was competitive in this event, but crashed in a fast corner. (This was a notable demonstration of the high level of safety of the recumbent design. Gartside ran into the chain-link fence at a speed approaching 22 m/s [50 mph] after the wind load on the banked fairing lifted the front wheel. He was strapped into the seat solely to allow him to push harder on the pedals. The combination of the feet-forward position, the fairing, and the straps enabled him to walk away from this spectacular crash with no more than bruises from the shoulder straps.) The battle continued on the velodrome for both rider and vehicle. Two weeks later Gartside in the Bluebell won over Vector and Easy Racer when both crashed. After the 1982 racing season, the Vector retired from racing. Two-wheeled recumbents have gone on to win almost all events.

One shouldn't try to make too much of individual wins. However, in HPV racing as in rowing, fashions followed winners. In 1981 and 1982 most challengers were building low tricycles inspired by the Vectors. Afterwards, there was a switch to short-and long-wheelbase recumbent bicycles. As Australian writer and racer Doug Adamson wrote in the December 1983 issue of *Bicycle Magazine*: "An interesting aspect of the [1983] speed trials was that half of the vehicles in the top ten were bicycles. Most previous thinking had concluded that low frontal area and increased stability of three wheels was the way to go for speed." Presumably as a result of the Bluebell IHPSC and European-circuit wins and of exposure of the Avatar 2000, on European television, several small companies in Europe and the U.S. began making machines that seemed to be inspired by the Avatar 2000—indeed, a few were almost indistinguishable from the Avatar 2000, even to its builders.

The dominance of Gardner Martin's Easy Racer team

Gardner Martin is a former automobile and motorcycle racer who was inspired to design improved bicycles by a 1974 *Bicycle Magazine* article by Chester Kyle, "Are Streamlined Bicycles in Your Future?" Martin entered the 1975 IHPSC with a very-low-frontal-area, flat-on-the-belly (prone recumbent) bicycle that earned the distinction of being the first vehicle to crash at an HPV speed meet. But by 1979 Martin had combined a refined vehicle with Olympic-class "Fast Freddy" Markham as rider to drive the vehicle, Jaws, over the 22 m/s (50 mph) mark, a first ever for a single-rider HPV.

In 1976 Martin started work on the laid-back Easy Racer design, partly because his wife, Sandra, objected to the impracticality and the hazard of the head-first prone recumbent for everyday use. Martin started by modifying an old tandem bicycle, removing the front seat, the rear pedals, and extending the handlebars. Gradually refined, this prototype became the Easy Racer and began winning road races and criteriums. Sandra and Gardner Martin proceeded to develop the Easy Racer into a vehicle that proved to be the world's fastest HPV bicycle, and yet, with minor changes, could be used for shopping and commuting. The Martin's began marketing their everyday version under the name Tour Easy. In addition, with an openness that has been emulated by few others, they sold plans with which amateur builders could make their own Tour Easies, using two diamond-frames and standard parts.

Surprisingly, for some, even the "everyday" Tour Easies began winning races after fairings were installed, for example, setting a new record in the 4,000-m race at the Major Taylor velodrome and winning many road-race events. In 1982 and 1983 the first practical-vehicle contests were won by stock Tour Easies with partial fairings added. Beginning in 1983, Easy Racers' dominance was continually challenged, at times successfully, by Tim Brummer's beautiful Lightnings.

The Easy Racer-Lightning rivalry intensified in January 1984 when the Du Pont Company offered \$15,000 (plus interest) to the first single-

rider HPV team to exceed 65 mph (29 m/s) over a 200-m run with a flying start. At least three vehicles comfortably exceeded 60 mph on several occasions, but the Gold Rush, an Easy Racer, was the first vehicle to achieve that goal. On a late evening in May 1986 the Gold Rush reached 65.484 mph on a state highway near Yosemite National Park. Now housed in the Smithsonian Institution, the original Gold Rush never raced again, but a regular production aluminum-frame Gold Rush Replica went on to dominate IHPS racing from 1986 through 1991, winning all top speed events, three times breaking the world 1-hour record.

In a dramatic 5-day race in the 1989 Race Across America, the Easy Racer and Lightning teams continued their competition. The Easy Racer team led for most of the way across the country in a street-modified Gold Rush Replica, only to have the Lightning team forge ahead decisively in Pennsylvania, where confusion over the route lost the Easy Racer team a great deal of time and poise.

Gardner Martin's success owes a great deal to dogged persistence, a drive for excellence, and a remarkable rider: "Fast Freddy" Markham. Markham has raced and won titles on Easy Racer designs since 1978 and as late as summer 1994 was the only bicyclist to win two gold medals in the Los Angeles Olympic Sports Festival on standard frames. Marham is the exception among world-class bicycle racers: most racers are reluctant to lose some undocumented degree of muscle training by pedaling a recumbent. Freddy Markham's three world 1-hour runs on Gold Rush serve notice that when more of the world's top racing cyclists switch to recumbents, single-rider speeds will continue to push the envelope.

Two points of coincidence between Martin and Brummer teams are worth noting. One is that both teams used forward rather than under-the-seat handlebars to reduce frontal area and to suit riders who feel more comfortable pulling on something in front of them rather than on something underneath. The second point of coincidence: both shaped their fairings by eye, at least at first. The 2-year supremacy of the Vector design was earlier attributed to extensive aerodynamic analysis by computer and wind-tunnel testing, at a time when the backyard mechanic was considered out of date.

As the speed competitions heated up in the early 1980s, designers agreed on the overriding importance of aerodynamically optimized fairings. However, some unpredicted aerodynamic benefits of the free-form Avatar Bluebell fairing contributed to its defeat of the Vector. The Bluebell was in turn beaten by the Lightnings and Easy Racers. The Lightning used a free-form fairing, whereas the Easy Racer combined underwater-torpedo laminar-flow analysis with free-form canopy, fins and contours. Will the next big increase in speed be made by the team that rigorously optimizes the fairing, perhaps including boundary-layer suction to induce low-drag laminar flow?

Front-wheel-drive-steered recumbents

The types of recumbent bicycles that have been made and raced since the earliest versions have

been predominantly rear-wheel and front-wheel steered. There has been a perception that the long chain that results from this configuration is heavy, attracts dirt and deposits some on the rider's legs, and adds too much weight. Whether or not reality accords with perception is a matter of debate.

A frequently tried alternative configuration is to use front-wheel-drive with front-wheel steering. This involves either the cranks turning with the front wheel and the leg thrusts affecting steering, or the chain, or other transmission element, twisting from a fixed pedaling position to the steered wheel. This technology is at present in a state of interesting flux. Eliasohn (1991) assembled and edited a review of several different variations of the front-wheel-drive recumbents in the summer 1991 issue of *Human Power*. Front-wheel drive could be part of machines with all-wheel drive, considered to be highly desirable for off-road vehicles. Recumbent bicycles are, however, completely unsuitable as all-terrain vehicles, which rely to a large extent on the agility conveyed by a highly independent rider.

Conclusion

Recumbent bicycles, in the form of the Varna Mephisto, the Lightning, hold, at the time of this writing (early 2001) HPV records for the flying start 200-m event (over 32.5 m/s, 72.7 mph) the HPV Race Across America (5 days 1 hour) and the one-hour distance (over 79 km, over 49 miles).

Recumbent bicycles are therefore currently the leaders in the HPV racing world. Through the awards they have received as practical vehicles they are to some extent front-runners for commuting and touring. Their users almost universally are extremely enthusiastic about their favorite attributes. Recumbents have attracted, however, nothing like the astonishing explosion of enthusiasm that has greeted the mountain bike. The recumbent's time could come. The increasing frequency of total traffic standstills in many of the world's major cities, coupled with increasing environmental concern, could result in increased support for human-powered travel. A vehicle that is far more comfortable, easier to pedal, and faster than the alternatives will achieve considerable success, if mass-produced (and mass-advertised) so that the costs come down and options increase. The recumbent bicycle awaits its hour.

Acknowledgments

I would like to thank Sandra and Gardner Martin for generously supplying me with material on the Easy Racer bicycles. This short review has omitted many contributions to recumbent development from Britain and Europe, for which I apologize.

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The Tour Easy and Easy Racer

As I've said before, any advice that interacts closely with human beings should be designed with great attention to detail and overall logic. The Easy Racers team offers the following pair of anecdotes to support its claim that its recumbent is a truly practical, primary focused mode of transportation. Elisse Ghitelman commutes year-around to her Massachusetts high-school teaching duties. She rides a 1983 Tour Easy, repainted bright red following the November 1990 birth of Jacob Allen, with whom she "cocycled" 2,129 miles during their first three trimesters together. Elisse's total distance travelled on the Tour Easy now exceeds 30,000 miles.

Don Gray started riding bicycles in 1988. In 1991, at the age of 50, he was the first-ever recumbent rider to complete the Markleeville Tour of the California Alps, covering 206.8 km (128.5 miles) and climbing 4,627 m (15,180 vertical ft.) in just under 14 hours. There is a general belief that recumbents are no good on hills, which seems to be a generalization from the poor hill-climbing performance of one or two particularly poorly designed and poorly geared recumbents. But obviously, a stock Easy Racer without fairings can climb hills! Challenged by the loss of an arm as the result of a motorcycle accident, Gray chose recumbent cycling for his fitness program. Gardner Martin stresses the personal satisfaction he derives from the human dimension of Easy Racer riding: an ergonomically kind vehicle that fits the practical needs of a wide range of riders with few barriers of age, sex, or physical limitation.

Born To Be Wild:

The Easy Racer Tour Easy

In an early road test article in *Recumbent Cyclist News*, the editor, Bob Bryant, had this to say about the Tour Easy:

"Born to be Wild!" This is the tune I hear in my head every time I climb aboard the Tour Easy. The upright handlebar steering is a confidence builder for first-time riders. It is also among the easiest of all recumbents to learn to ride. By "learn" we are only talking about a matter of a few minutes and almost anyone can be cruising in comfort. The lower bottom-bracket height is also easier to handle in traffic and for starts and stops. The low-slung trademark Tour Easy design is also among the fastest. I'm sure there are SWB riders who may beg to differ, but when riding the Tour Easy equipped with a Super Zipper fairing, I found it significantly faster than any

other stock recumbent. As a general rule recumbents with upright handlebar steering are faster due to less air drag from your arms, shoulders and handlebars sticking out the sides, as on an underseat-steering recumbent. The acceleration is excellent, as is the high-speed stability. My test bike and I went up to 52-mph down a local hill together. (Please, for you at home, do not try this.) The LWB design does not offer the perfect weight distribution: the front wheel can be lightly loaded. In my many miles on LWBs, especially the Tour Easy, this has never been a problem. The Tour Easy has perfect road manners. The LWB makes up for its lightly loaded front wheel with great stability in all situations. Many people ask about the steering with those long forks and handlebars. It is a bit tiller-like but nowhere what you'd expect. After a few rides on the bike, you don't even notice. A real plus for the steering is that it is direct, with no rods, cables or linkages; this keeps the bike simple. This long-wheelbase glides along almost effortlessly. It also takes much less attention to the road than its SWB counterparts. Some like this and others do not. In all my Tour Easy miles

the only real drawback is not the bike itself, but in how to transport a LWB recumbent...To sum it all up, a fellow rider described the Tour Easy to me as "the recumbent from which all others are judged." Now it is up to you to decide.

*David Gordon Wilson is a semiretired MIT professor of mechanical engineering, coauthor of *Bicycling Science* and coeditor of *Human Powered Vehicles*, both excellent books for the hpv enthusiast. He has been the editor of the IHPVA's technical journal, *Human Power* (www.ihpva.org) since 1984. *Human Power* recently celebrated its 50th issue.*

He is the co-designer of the Avatar 1000 and 2000 recumbent bicycles. The Avatar 2000, on which the world bicycle speed record for 1982-1983 was set, became the archetype for recumbent bicycle design. Wilson organized and sponsored the first modern design contest for human powered vehicles from 1967 to 1969, an event that led to the modern interest in recumbent bicycles. He was a founding board member of the International Human Powered Vehicle Association (IHPVA).

He is also known in recumbent and HPV circles as the father of modern recumbency. The Avatar 2000 design led the way for many LWB USS recumbents that were 'inspired' by the work of the Avatar design team. Among them was Dick Ryan, who worked as a metal fabricator for the short lived Avatar company. After the demise of Avatar, Dick Ryan built and

marketed his Ryan Vanguard recumbent bicycle from 1986-1998. 1400 were built. The Ryan had a higher center of gravity and used a 20-in. front wheel.

140 Avatar Recumbents were built. This bike remains the single most collectible recumbent bicycle in modern recumbent history. Many are still being ridden today. The direct descendants of the Avatar LWB USS are the: Fateba, Infinity, Linear, Lemle Lightning, Ryan Vanguard and Slipstream, Pichlerrad, Radius and Via.



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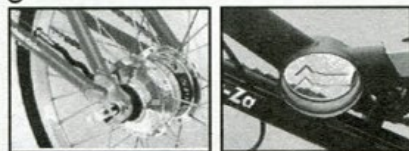
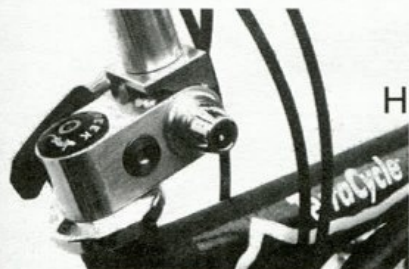
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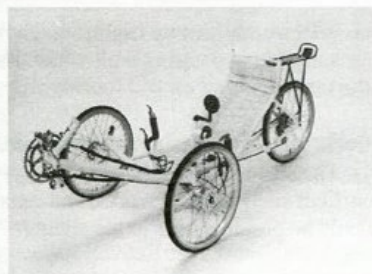
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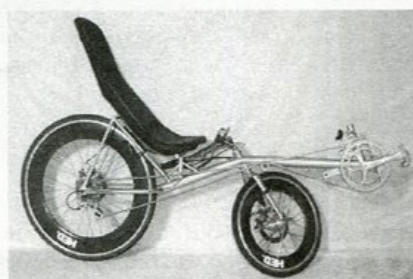


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Lightfoot Cycles

Recumbents from Montana

by Bob Bryant

Let's face it, Montana is not a hotbed for recumbency, though it sure looks like it would be a nice place to ride. Lightfoot Cycles has been quietly building and selling recumbents in Montana for many years. We were always intrigued by what we saw at their website, though our paths never crossed until a few months ago.

If you go visit Lightfoot's website, you may note that many photos have snow in the background. This part of the USA also has their share of rough roads, fire roads and trails. The Lightfoot recumbents have a sturdy look about them which makes them suited for their home terrain. The keyword here may be toughness. These bikes are built tough, out of high quality materials and components so that they won't leave you stranded and are field serviceable. We had the opportunity to meet Lightfoot's Rod Miner and his significant other, Martha Stromberg (co-manager and commissioner of common sense) at the Seattle Bike Expo this past March.

The line consists of several variations of a fairly basic LWB ASS design. There are trikes and quads built from this same premise. The models that we'll take a look at here are the Explorer LWB ASS, the Roadrunner, a delta trike version of the Explorer, and the Transporter, a very durable LWB ASS delta trike truck.

MODELS

Explorer LWB ASS—A long, smooth bike for all-around use. This bike is a super durable LWB ASS fat tire recumbent built for recreation, touring and work. It was originally designed for dirt roads and off roads, though performs equally well for touring, performance or commuting. It looks similar to a Tour Easy or Rans Stratus, but appears to be more robust than either. This is truly a "jack-of-all-bents." Don't get the idea that these recumbents are all utility and no performance. Lightfoot owner Rod Miner is considering riding Cannonball (Seattle-Spokane via I-90) on an Explorer with fairing/body stocking. There is also a low Explorer with linkage steering (Saluki) that has the ability to be a faired commuter, as well as a dual 26" wheeled version.

WB: 72"; **Seat Height:** 24"; **Capacity:** 300#; **Weight:** 35#
Components: SRAM 9.0/Quarz/Centera; **Wheels:** 26/20 1.75
Gearing: 24-speed, 20-100 gear inches.
Price: \$900 frameset/ \$1677 complete

RoadRunner—LWB ASS Delta Trike—A fast, steady road trike based on the Explorer LWB ASS two-wheeler. This trike is suitable for all types of riding, touring, commuting or light cargo hauling. The cargo platform will accept a tote box, cooler or waterproof duffel bag.

WB: 72"; **Rear Track:** 35"; **Length:** 66"; **Seat Height:** 24"; **Capacity:** 300#; **Weight:** 58#; **Turning Radius:** 4"; **Other features:** 3-piece modular frame; **Components:** SRAM 9.0/Quarz/Centera; **Wheels:** 26/20 1.75; **Gearing:** 24-speed, 9-127 gear inches; **Price:** \$1300 frameset/ \$2191 complete.

A similar model to the RoadRunner is the Greenway. The Greenway is for people who ride on narrow bike paths, and need to get their trike through doorways. The design configuration is similar to the Explorer and RoadRunner, but has a seat height of 20" instead of 22". Its width is 32". The Greenway performs just as well as the RoadRunner, though its narrow width makes it a bit less stable.

The Transporter—LWB ASS Delta Trike/Truck—A stout, do-almost-everything, all-season cycle. This is a heavy duty recumbent/work trike that can be the basis of many unique configurations from a basic truck, people hauler, specialized cargo-carrier, garden cart, and even a recumbent pedicab. This trike will climb steady with its low gear of 8-gear inches

WB: 72"; **Rear Track:** 35"; **Length:** 108"; **Seat Height:** 24"; **Capacity:** 500#; **Weight:** 75# **Turning Radius:** 6'; **Other features:** 3-piece modular frame; **Components:** SRAM 9.0/Quarz/Centera; **Wheels:** 26/20 1.75
Gearing: 24-speed, 9-127 gear inches; **Price:** \$1700 frameset/\$2811 complete.

Note: There is also a MicroCar 4-wheeler, recumbent pedicab and a tadpole trike.

LIGHTFOOT DESIGN

Steering Geometry: The design has been optimized for stable and user-friendly handling, while providing excellent off-road or rough road control. These bikes are regularly ridden in the snow and fire roads.

Frames: Very sturdy and stiff oversize TIG welded CroMo frames, built in Darby, Montana, USA.

Handlebars: The aluminum bars are custom bent by Lightfoot. They are visually similar to an Easy Racer bar, though possibly a bit wider. There is a bar-stiffener that connects the two bars.

Seat: The seat slides on a seat track. The seat frame is stock structural aluminum that is bolted together. The seat is adjustable and was very comfortable. An optional carbon-fiber shell is in the works, and certainly adapting another type of seat would be possible (due to the sliding frame/seat mount).

Braking: All three of the Lightfoot recumbents have powerful V-brakes. The three-wheelers have dual rear V-brakes (3-total). A simple cable splitter places the two rear V-brakes on one handle. This system eats drum brakes for breakfast, and is far less expensive than disk brakes.

Trike Drives: A posi-traction can be custom built, as pedal driven or electric assist. The one-wheel drive rear end is made by Lightfoot. It is a simple jack shaft assembly connects the main freewheel to the secondary chain that drives the left rear wheel. It is both simple and very sturdily built. It is made from 5/8" 4130 CroMo, with threaded mounting for standard freewheels. Jack shaft bearings are sealed flange bearings. The idea was to make it tough enough to send to 3rd world countries, and make it field serviceable with no special tools. I figured out how it worked just by looking at it (I can't tell you how rare this is!).

Trike Rear-Frames: Another aspect of the Roadrunner and Transporter that adds to its toughness is the way the rear wheels are mounted. They are held from other sides of the frame with a standard quick release (and standard 135mm MTB wheels!). There are no special one-sided hubs, brakes or axles required.

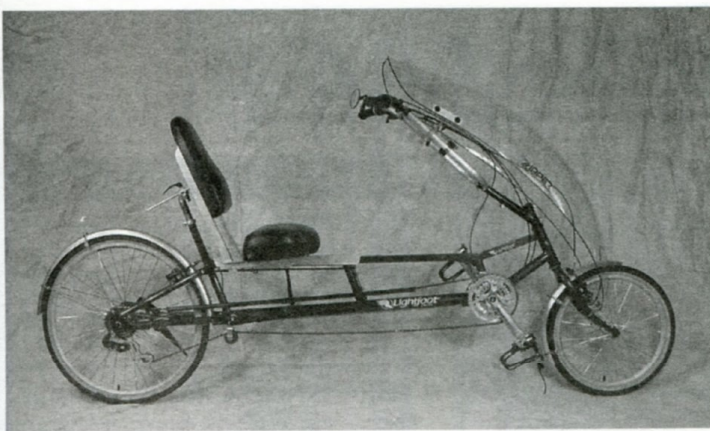
Options: Canopy; Electric assist (Heinzmann hub motor); Fenders; Zzip Designs Fairings and body stockings; Racks, Cargo box lid or seat (pedicab); transporter trailer, studded tires; removable seats (trikes).

Sizing: One-size-fits most, or custom for shorter or taller folks.

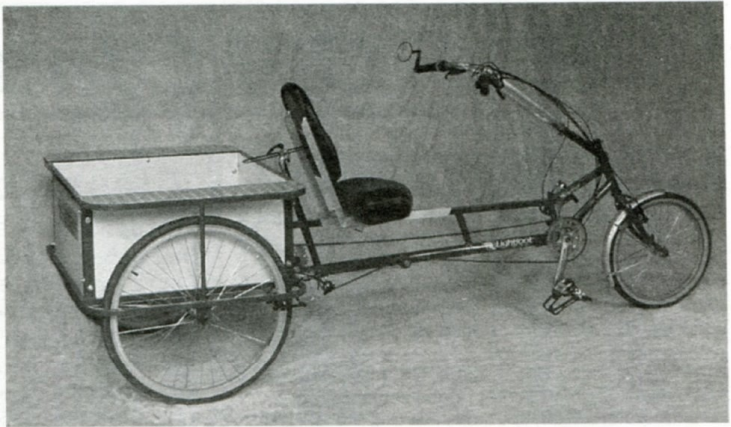
Shipping: Lightfoot Cycles disassemble for shipping. The time frame from order to delivery is about six weeks.

Dealers: Lightfoot sells mainly direct to the customer, though there is a dealer program. The goal is to be able to sell to more dealers, however, the limited production, high level of customization dictates the personal direct approach.

Video: A 7-minute video showing the Lightfoot recumbents in action is \$15 (good for \$50 off your purchase).



The Lightfoot Explorer



ABOVE: The Lightfoot Transporter
BELOW: The Greenway trike with its narrow track

History

Rod Miner has been building recumbents since 1983. He worked with his father, Earl Miner building TRAG (a simple IC-powered 1/4 tone tricycle truck/tractor for developing nations) through the 1980s. They set up factories in both Zimbabwe and Peru. Earl Miner built a streamline recumbent trike back in 1985. Rod returned to building recumbents in 1995, after almost a decade of photovoltaic system design and construction technology and innovation. In 1994, Earl Miner designed the PET, a simple, sturdy, cargo-capable hand trike. From the early days of the PET project, Lightfoot Cycles has helped refine and manufacture the PET.

Lightfoot has sold about 100 cycles of more modern models, and about 500 total (including PET). Lightfoot Cycles have been shipped to the Marshall Islands, Europe, Africa, Central America and SE Asia.

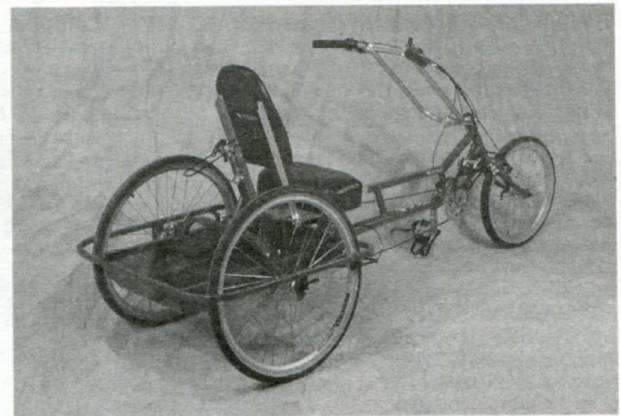
Conclusion

Admittedly, I haven't even ridden the Lightfoot vehicles yet. The company's mission towards comfort, utility and safety is admirable. Also, I have a lot of respect for small shops and builders that fabricate all of their own stuff. Lightfoot does just that. If you appreciate durability, serviceability and utility in designs, you may have noticed that there aren't many recumbent builders who cater to this market. Well Lightfoot does and we're happy to report about it.

Contact:

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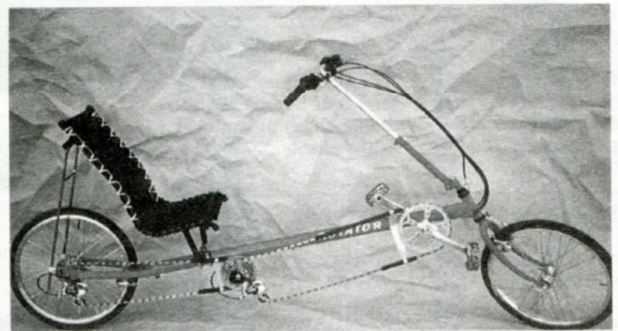
Note: There are several other Lightfoot models including a four wheeled pedal car.



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FOR SALE: 1998 Angletech Altitude SWB ASS, less than 1000 miles. Lots of extras included. This is a really fine bike (see RCN#59 RCN test). Original cost \$4000 plus accessories. Call John at 641-581-5756. Or e-mail at morrisjr99@earthlink.net (IA/64)

For Sale: 1998 Angletech/Rans classic Vivo, excellent condition, Angletech enhancements: Sachs quartz hubs with Bontrager Mack rims, Phil Wood BB, King headset, Angletech trunk and fenders, I switched to Easy Racer GRR, \$1500 + shipping, contact Gary 512-255-5603.(65)

FOR SALE: 1998 Trice, yellow, excellent condition, only 100 miles! 3-wheel recumbent, electric assist; 24 speeds; setup by Fools Crow; sweet deal at \$1700, pics available; contact Ray at rholan@cronosys.com or tel. 440-446-0003 (64)

FOR SALE 1997 R82 Double Vision \$3000 Red. Less than 500 miles. Upgraded with bar end shifters. USS. 21 speed. Independent Pedaling System so riders do not have to pedal in sync. Pictures at <http://www.donsdonuts.com/bike/bikeindex.html> Tel. 415-897-1960 (64)

FOR SALE: VISION R40 SWB USS, green, 26" R, 16" F with conversion kit for LWB. Lombard seat cushion, Cyclometer, water bottle cage, pump, seat bag, extra tires, 700 miles. \$800 + shipping. Tel. 631-727-2907 (64)

FOR SALE: '95 Counterpoint Presto SWB, ASS, red 63-speed, suspension fork, new front wheel, thumb-shifters, good condition, \$895. Can meet on RAGBRAI. Randy 712-277-2095 (IA/64)

FOR SALE: RANS Gliss, factory stock, EC, 200 miles, Magura brakes \$1350 Tel. 773-989-0115, gsample999@aol.com Also for sale Maxam LWB OSS \$175 (65)

FOR SALE: 2000 Haluzak Leprechaun, green, 800 miles, exc. cond. Terrific bike for rider 5'2" to 5'10" (I'm 5'0", which is why I'm selling). \$1350. Tel. 513-232-1864 or mjwmurphy@hotmail.com (OH/65)

FOR SALE: Tour Easy EZ RACER LWB ASS, med-large frame (6' rider) low mileage, two years old, black, crono frame, luggage rack, bottle cages, \$1,300 call Kevin Berman days at 516-872-3300 or Bermkev@aol.com Nassau County, NY (66)

FOR SALE: 2001 Linear Mach III, USS, aluminum finish with adjustable seat rods and water bosses. Less than 50 miles. \$750 or best offer, + shipping. Email: Garyks@attglobal.net Tel. 317-843-2887 (65)

FOR SALE: 1993 Tour Easy, large, black \$1000; **1992 Tour Easy**, medium, blue \$1000. Both in good condition, both with Super Zipper fairings. Call Bob 631-698-5939 (NY/65)

FOR SALE: RANS TAILWIND 1998, Exc. cond., high back seat, last year made in KS. Too many bikes — need to sell this one. \$650 or best offer. Call John at 508-879-3002 or jgmyerson@post.harvard.edu (65)

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Wanted: Recumbent

WANTED: BikeE CT for HPV design project. Early model O.K. Any condition. Seat and rear wheel unneeded. Let's make a deal. Tel. 505-982-3568 (66)

Publications

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Easy Racers: Our Customers Speak

SUBJECT: How Does That Thing Climb? April 4, 2001

Just a quick update on the Gold Rush Replica that I purchased about two months ago. Great!!! The weather in Cincinnati is just starting to break. I have over 900 miles on my trainer since February, and about 120 miles on the GRR. With the weather breaking the GRR should see about 150 miles a week.

The GRR becomes more of a blast the more I ride it. I did my first climb out of the river valley where our major bike path is located. Everyone warned me that I would be in trouble on a climb. So I was somewhat apprehensive as I started the 1.5 mile climb out of the valley.

First, I never got out of the middle chainring. I think I could have stayed in the large (53). I held between 13 and 17 mph for most of the climb. I never dropped below 11 mph. I was very impressed. I have climbed this hill hundreds of times on my Trek OCLV and felt far worse at the top of the climb than on the GRR.

As a matter of fact, I felt great on the GRR!!! No back pain; nothing. The ride back down was a hoot. I had a friend with me (about 5 minutes behind me up the hill) as I descended down into the valley. I was hitting 40 mph without moving my legs, and using the brakes into the turns because I was not sure what to expect from the GRR at speed around the turns. My friend had to peddle like a mad man and he still couldn't keep up. The



The Gold Rush Replica Black Gold—RCN#45

GRR felt like a sports car going down the hill. What fun!!! I wish I had started this 30 years ago instead of my mid fifties!!!!

Best regards,
Doug Pendery

**SUBJECT: GRR Update
April 25, 2001**

This past Saturday I rode with a few friends that have conventional racing bikes (Wedgies; I think you call them). We climbed out of the valley up the Route 48 hill. This climb goes for about 1.5 miles. I pulled my friends up the hill at about 18 miles per hour and crested at over 20 mph. Needless to say they were out of their saddles trying to stay up. I must say I was winded, but so were they. Their comment was, "I guess your recumbent doesn't have a problem going uphill."

In my younger days (about 8 years ago)

I would have pushed myself to my limit to go 18 miles per hour up this hill on my Trek OCLV. My point is the GRR is a great recumbent. I enjoy going up hills on it more than my OCLV. I am more relaxed, my back doesn't hurt, and my legs aren't killing me from being out of the saddle trying to lever the OCLV up a hill.

By the way, we had a tail wind on one stretch of the ride. I managed to get up to 36 mph in the flats. Nobody passed me....It was a real hoot!!!

Best regards,
Doug Pendery

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