

Recumbent Cyclist News

RCN 092 A Publication by and for Recumbent Enthusiasts — Since 1990 JAN/FEB 2006



*The 2006 Bacchetta Agio LWB OSS
with disc brakes!
Photo courtesy of Zach Kaplan*



*Announced just hours before we
went to press, another big wheel
LWB from RANS — the 2006
Velocity Squared Formula dual 26"*

The 2006 Bacchetta Cafe



The 2006 Greenspeed X-5

2006 Season Preview And Recumbent Buyers' Guide

By Bob Bryant

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Welcome to our 2006 Season Preview/Buyers' Guide. We've tried to bring you the most up-to-date information from the serious players in the North American recumbent arena. If you find anybody missing, it was either an oversight, OR the builder chose not to respond. We have tried our best to list everybody selling recumbents on our continent.

ACTIONBENT: This one-of-a-kind company uses a unique business model. The bikes are built in Taiwan by China Mascot and imported by Actionbent's owner, Randy Schulman, to his company headquarters in Redmond, WA. One of their popular models is the affordable Jetstream SWB USS (from \$625), but the new affordable tadpole trike and midracer models are also doing well. We have read a few complaints on the very busy Actionbent Yahoo group; but overall,

most owners seem satisfied with these very affordable recumbents. The downside is that you'll be on your own for unpacking, set up, dial-in, and service. If you don't know much about working with bikes, you should either be willing to learn, or you'll have to find a good local mechanic, which will add to your total cost.

Actionbent also has a new folding one-wheeled cargo trailer: the TW-Trailer sells for just \$175 retail. The company has also just introduced a new fiberglass shell seat that weighs just three pounds and costs \$165 (the standard seat is five pounds and costs \$125). Actionbent offers serious internet bargains for those willing to put in some sweat equity.

ANGLETECH: Kelvin Clark's shop in Woodland Park, CO offers some of the most exotic recumbents in North America, with the Ti Angle and Quadraped (hand- and

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bryantrj@gmail.com

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2006 Bacchetta Carbonaero and inside the Isogrid tube

foot-powered) trikes, custom production recumbents and even Sun EZ trikes. The bread and butter for this custom shop is the mid-\$2,000 range production recumbents that are fitted with hand-picked and upgraded parts to suit the more serious user, whether it be a day-to-day commuter or a high-end enthusiast.

Kelvin tells me that his best selling models are the Bacchetta Giro 26/20, the RANS Stratus XP/V2 Formula, the Easy Racers (all in ST 27, HO 27 or GL81 configurations), the Bacchetta Aero (in SHO, with wide-range gearing) and finally, the RANS Screamer GLXD (with Phil Wood parts, a custom tandem Meks suspension fork, disc brakes and available IPS). Angletech has also become a serious dealer for the Challenge recumbents (most notably their fine USS models) and Greenspeed trikes.

Besides the custom spec models, Angletech also manufactures two trikes: The first is the Quadraped, which is a unique hand/foot-powered tadpole that is built in Colorado. This unique DualDrive-equipped 90-speed trike starts at \$5,000. The latest addition to the Angletech line is the Ti Angle (\$7,095+), a 29-pound titanium 20" cambered-wheel tadpole trike that is built in Woodland Park. The Ti Angle uses a fine mix of components, has many heat-treated CNC machined parts, a single lever Magura Big hydraulic disc brake set up and a delrin sleeve to allow the telescoping boom to slide easily.

BACCHETTA: Bacchetta has a new carbon fiber highracer called the Carbonaero that was a real showstopper at Interbike. This new model uses the same carbon fiber ISOGRID technology that Santana and Titus use (see www.vyatek.com). The Isogrid tube has an ultra-thin wall of carbon fiber with an internal wrap of carbon/Kevlar strands, and titanium lugs as an integral part of the carbon tube. This technology is exclusive to Bacchetta in the recumbent market and is built in the US. The Carbonaero will be priced around \$5,400 and is 3/4 pound lighter than a titanium Aero.

The aluminum frame Corsa is new for 2006. The first frames were built by Kinesis USA, but they moved their production overseas. Bacchetta is currently looking at other state-side premium builders. The Aero remains unchanged for 2006, and the Aero Basso is on hiatus while Bacchetta researches a model for shorter riders.

The Cafe is Bacchetta's entry level model (\$995). The Cafe is a unique short-boom Chromoly MWB (medium wheelbase) with a tall fork and relaxed head tube angle. The frame, ReCurve seat and steering are all Giro level, but with more entry level components. The Cafe is best suited for medium height riders. I could only ride the bike with the seat reclined way back (6' tall and 44.5" x-seam).

The new LWB OSS (over-seat steering) Agio (\$1,250) will be available in March of 2006. Bacchetta reports that this new model was a huge hit at Interbike. The Agio has a custom ovalized aluminum frame, Chromoly fork, and a 63" wheelbase.

The Bacchetta Aero, Strada, Giro 20 and Giro26 remain unchanged for 2006. Bacchetta will be introducing seat options in 2006 for models from the Giro on up. We will report more on this later in the season. Bacchetta will include proprietary fenders for the Cafe, Agio and Giro models, a redesigned BrainBox bag, and improvements to the Back Rack. A new Big Bag will also be added to the line.

BARCROFT: Bill Cook reports that adjustable booms and sliding RANS seats are now standard on the Virginia and Dakota SWB models. Barcroft also offers optional compact MTB triple cranks on request.

BURLEY: The recumbent builder from Oregon has streamlined the line a bit for 2006. For the new year, the offerings include the Koosah and Jett Creek LWB (long wheelbase) OSS low bottom bracket models; the Nasoke and Spider LWB OSS rear suspension models; the Hepcat and Django SWB models; and the Canto LWB convertible (which can be set up as a LWB or

as a SWB) with a higher bottom bracket. The good news is that the Sunrace components are gone. All in all, the 2006 specs look much improved.

All Burley recumbents currently share the same foam base/mesh back seat and OSS stem/riser. Burley frames are built in the US, and wheels are built in-house at the Eugene, OR plant. Burley has a complete line of upright bicycles, including tandems, road bikes, and a commuter as well as a full line of bicycle trailers. We own a Burley Nomad cargo trailer and I love it.

CATRIKE: Paulo Camasmie and staff introduced redesigned Pocket and Speed models for mid-year 2005. These models are unchanged for 2006. The big news for 2006 is that a new Road model with direct steering (no linkage) will be available soon. The Pocket has been updated with a wider track, 20" rear wheel and 355mm 18" front wheels. All models now have heat-treated aluminum frames.

CHALLENGE: This company makes some really slick European-style SWB with USS. We don't get much information from them, but Kelvin at Angletech is excited about these models. We hope to review a Challenge in 2006.

EASY RACERS: The folks in Watsonville, CA are working on a new stick MWB OSS recumbent code-named, "Speed Rush" or "Tomahawk." Carbon fiber forks for the Gold and TiRush models are being tested now and should be available in 2006. Easy Racers is revising their seat making process to get a considerably lighter and more easily adjustable seat. Easy Racers is also offering optional Velocity Uriel paired-spoke wheels. The bad news is a hefty price increase for 2006.

GREENSPEED: The team from Fern Gully, Australia showed a very trick performance trike prototype at the Interbike show. The bike had a non-hinged frame, a cut out BB shell, cut-away kingpin tubes and cut-out parts on the steering assembly to make a 23-pound trike!

The GT- and X- series are the most popular trikes in the line and among the most popular trikes in North America. These are now the primary production models. Greenspeed has streamlined the line-up to include only the GT-series, X-series, one production GTO (\$4,250) and the tandems (\$7,950/\$9,075).

The GT-series is Greenspeed's best seller. They have imported frames and machine-built wheels, and are the "all-rounder" folding trike. The X-series trikes have made-in-Australia frames, hand-built wheels, a more laid-back seat and canted-in front wheels, and are the more performance-oriented trike. Also of note, -3 series trike have drum brakes and -5 series trikes have Alligator hydraulic disc brakes.

GS Custom Shop: There are six more models under the heading of "Custom Shop" where the customer picks the seat recline angle (30°: GTS, X7 & GLO; 40°: GTR, GT7 & GTO), wheel size and components. The wheel size chosen

RECUMBENT GLOSSARY

BOTTOM BRACKET: (BB) pedal axle & bearings, sometimes called boom-bracket.

CF or CRANK FORWARD: Semi-recumbent cruiser.

CHAIN-IDLER: A modified skateboard wheel, derailleur pulley or custom-made wheel that carries the chain slack on SWB and some LWB models.

CHAIN MANAGEMENT: How the chain is managed via idler(s), tensioners, tubes throughout the chainpath/driveline of the bike.

CLWB: Compact Long Wheelbase, a compact LWB with a 20"/16" or 20"/20" wheelset.

CHROMOLY: Aircraft grade chrome-moly steel.

DELTA: Two-wheels in the rear trike design.

DISC: An automotive style disc brake. A disc mounts to the hub, and the brake pads grip the disc (instead of the wheel rim). Disc brakes come in mechanical (cable actuated) and hydraulic (brake fluid or mineral oil in small brake lines).

DUAL DRIVE: This is the SRAM internally geared three speed internal hub with 8/9-speeds cassette gears.

DUAL PIVOT BRAKE: A modern one-bolt mount road caliper brake that looks like a sidepull, but acts like a centerpull brake.

FWD: Front Wheel Drive.

GEAR INCHES: Formula used to determine range of gears: front chainring divided by rear cog multiplied by the actual drive wheel (and tire) diameter.

HIGH RACER: A SWB with two full size wheels.

HPV: Human Powered Vehicle.

INDIRECT STEERING: Steering via a rod linkage that connects the handlebar to the fork.

LWB: Long wheelbase, recumbent with crankset low and behind front wheel.

LOW-RACER: A very low racing recumbent.

MID-DRIVE: A mid-ship mounted, wide-ratio, two-chain drive freewheel shifted by a rear derailleur.

MTB: A dated abbreviation for mountain bike.

MWB: Medium wheelbase, a SWB with a stub boom

OVER-SEAT STEERING (OSS): Handlebars over the seat, knees or frame. A standard bicycle type steering similar to that of a hot rod Stingray type bicycle of the 1960s.

SWB: Short-Wheelbase, recumbent with crankset high and in ahead of front wheel.

TADPOLE: Two-wheel in the front trike design.

UNDER-SEAT STEERING (USS): Steering via handlebars beneath the seat.

V-BRAKE: A new and strong style of cantilever brake the has high arms somewhat in a "V" formation.

X-SEAM: A measurement used for recumbent fitting. This measurement simulates the distance between the seat back/base out to the farthest reach of the pedal stroke. Measure while seated on the floor, back against a wall or door, and feet extended and toes facing the ceiling. ♦

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designates the complete model name; for instance, "GTS-16" would be a 30° seat and 16" wheels.

HEDIGER CYCLES: Jerome Hediger is the US distributor for Greenspeed (mostly to dealers). Hediger sells its own line of US-built trikes, the TriMuter and the Big Wheel. Hediger also sells custom versions of the Turner SWB USS recumbents. New for 2006 are the BionX electric-assist option for the trikes (\$1,000 upgrade) and triple cranks and 11-34 cassettes on the trikes. Disc brakes are also optional for 2006 (+\$200).

ICE: Details and prices remain largely unchanged other than the allowance for more tire clearance on the 18" rear wheeled trikes. Standard ICE models will include some new components, added features and increased availability. A modest price increase is more than covered by the great new features.

HASE: The German delta trike builder Hase has introduced a new modular design system allowing buyers to mix and match parts, like a titanium off-road Kettwiesel Ride off-road model with lowrider racks

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and lights, etc. This allows more freedom when ordering and individualizes the bikes and trikes a lot more.

HP VELO: Another buzz recumbent at the show was the new Scorpion rear-suspended aluminum tadpole trike (\$2,790). The Scorpion is a bit different from the other recumbent trike models available today. It has adjustable rear suspension, a stiff aluminum frame and weighs 36.5 pounds. A custom luggage rack is set up so that panniers ride lower. A flag holder and a protective loop for the rear light are built in. HP Velotechnik's Moonbiker banana bags are also available; if you need to carry more, you can tow one or two-wheel trailers behind the Scorpion.

The Scorpion is equipped with Avid disc brakes and SRAM DualDrive (3-speed internal hub gears + 8 derailleur gears) as standard. Options include Rohloff gears, a Streamer fairing and a parking brake. Scorpions are available now and come in orange, blue-black or custom colors.

Other model color changes include: dark blue for the Grasshopper, silver gray for the Street Machine GT and silver gray and orange for the GTe. The Grasshopper, GT and GTe each get the SRAM DualDrive as the standard drivetrain and Schwalbe Marathon tires as standard. The standard suspension fork is now the Spinner Grind2, with Meks forks as options.

The Speed Machine Randonneur (\$2,490 USD) has been redesigned for 2006. The bike now has a seat that is 2" higher, and a fork with a shorter steerer tube and aluminum rather than steel blades to save weight. (Weight now starts at 31 pounds.) The relaxed riding position and enhanced carrying capacity (it can accept four panniers) make it an ideal randonneur (long-distance/endurance) bike. The Speedmachine comes outfitted with the BodyLink seat and OSS or optional USS.

KMX KARTS: This is a new entry into the US market. According to the builder, "these three-wheelers combine the ruggedness of mountain bikes with the daring attitude and performance of BMX bikes." Quite the rage in the UK, they have now landed in the US. The entry level tadpoles come in two models: one sized for kids (K Class) and one for adults (X Class). KMX Karts offer rugged construction, disc brakes on all three wheels (X Class), responsive steering, and compatibility with BMX bicycle accessories. The wheel combinations are 24" rear and 16" front. A lighter aluminum rear fork (stays) can be fitted to lower the weight by 2.2 pounds.

LIGHTFOOT: The basis of this line is the dual 26" Ranger off-road touring LWB OSS and several trike options, including 3-wheeled trucks and pedicabs. Two new four-wheeled pedal car options are in the process of being introduced as well. The Lightfoot Duo is a side-by-side tandem (\$3,800) with optional electric assist, "by far the fastest side-by-side two-seater



Angletech's TiAngle titanium trike



Easy Racers/Sun Stick Rush/Tomahawk



Angletech's Challenge Mistral



Catrike's 2006 Pocket with 355mm 18" front wheels and a 20" rear wheel



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The Burley Koosah is an exceptional buy. The frame is built in Eugene, OR and wheels are built in-house.



The Lightfoot Duo, sort of like a side-by-side Ranger

I have ever ridden," says designer Rod Miner. The newly redesigned MicroCar (\$4750) has optional gas engine or electric assist.

Some other new models in the 2006 line include: The Verano is a 26"/20" MWB bike with a 54" wheelbase, 26" bottom bracket height, 26" seat height and 22" step-over. This provides a moderately tall and reclined seat position. The crank is over the front wheel and behind the front axle, but without toe or heel interference. Another 26"/20" MWB, the Avenida, has a high crank position (27") and 24" seat height with a more reclined and more extreme and aerodynamic position. The Avenida will be good for fast recreational road riding, touring and commuting on pavement. The 26"/26" Camino has a high bottom bracket

position and a 56" wheelbase.

The Smoothie is a LWB designed for stable, slow riding. It's a good choice for heavier riders, too. It has a medium-tall seating position with a very relaxed, low-pedal position.

The Chico is a more compact version of the Gazelle bike with a 20" rear wheel. The Rambler is a more compact version of the Explorer bike with a 20" rear wheel. The Alta is a semi-tall design, mostly for fun, but specifically designed to be very safe and easy to ride. This very tall recumbent has a 42" seat height and 62" handlebar height and shares the same LWB and ergonomic position as the Ranger. The Surefoot is a 26"/26" crank-forward upright bike which allows the feet to touch the ground when stopped.

LINEAR: This is one of just a few LWB USS recumbents sold in the USA. The Linear is made from a custom aluminum extrusion and is available in a folding and non-folding versions. Specs have been updated for 2006, including Avid V- and disc brakes, Shimano drivetrains and hand-built wheels.

MAXARYA: This Canadian recumbent builder will offer an XL-sized version of their Ray 1 CLWB and a new Ray-4S 26"/20" LWB model. We did not receive specs in time to list them in this issue.

ORGANIC ENGINES: Dan Kavanagh is a small builder in Florida. His specialty is trikes, pedal-powered trucks and recumbent pedicabs. His Triclops is a tadpole and the Troika is the tandem version of the Triclops. The basis of his SUV (Sensible Utility Vehicle) is a unique triangle frame (from the top view), front wheel drive with a pivoting drive section (forward frame) and USS which is connected to the rear frame. The SUV has 3 x 20" wheels and low gearing (14-80 gear-inches) and can carry 500 pounds of cargo and a 250-pound rider. Dan writes us with this news: "I'm phasing out the Vapor SWB, and there will be disc brakes on all trikes (no more drums). Expect a quad/sociable (side-by-side) pickup truck from us in early 2006. We are still hanging out making bikes and having a good time in Florida.

RANS: The RANS renaissance continues as we move into 2006. The most exciting new model, the big dog RANS Stratus XP with dual 26" wheels, was introduced a few months ago. Randy Schlitter reports phenomenal sales, with a constant two-week backlog of orders. The new Stratus XP seems to strike a chord with enthusiasts who think highracers are just too much for them, but want the dual big wheels and something new in LWB OSS. For 2006 the XP gets black handlebars with laser-etched adjustment guides.

If that isn't enough, look for a dual 26" Velocity Squared Formula model (available very soon). Besides the skinny tire model shown (cover), we've heard their might be a fat tire version as well (think Schwalbe Big Apples).

The RANS Stratus is sure to be a super hot

seller for 2006. Besides the new dual-big wheel XP, there is a new LE version that will retail for \$1,230 (including 3-way chopper bars). This is the same metallic black painted Chromoly steel frame that comes on the \$1,700 version. I've been riding this bike for the past few months, and despite a few entry level parts, this bike is quite tough. With the chopper bars, fabric fairing and RANS TailPack seat bag, it just can't be beat.

Also new for 2006 is a RANS Velocity Squared Formula LE model (aluminum frame). This is the same fine aluminum frame that comes on the more expensive version, but with slightly lower line components and weighs 29 pounds, and all for \$1,550.

RANS has a new SWB, the Force 5 Enduro. This model has the F5 steel-trussed frame, Mirage Orange paint, Avid disc brakes, 26" wheels (that will take fat 2.3" tires) or 700c road wheels and sells for \$1,800. This has to be the toughest highracer built to date. Another newly updated SWB model coming later in the year is a Special Edition V-Rex SWB.

RANS has upped its commitment to the Fusion line of crank-forward flat-foot bikes. The basic Fusion is lighter thanks to new dropouts and removal of the chain idler. All models get the new RANS Deep Rise handlebars. The Fusion Cruz gets an aluminum fork, the lighter idler-free frame and a hot new metallic orange paint. The Dynamik MTB also gets the lighter frame and a 1.5" shorter wheelbase. The high end Zenetik is the Fusion hot rod. It gets a welded 7005 aluminum frame, American Classic wheels, Ritchey carbon fork, WCS crank, latex tubes, hollow pin chain and a SRAM X-9 drivetrain, and weighs just 19.8 pounds.

A new Fusion model, the Dynamik Duo tandem, is now available (\$2,895). This model has front and rear Avid disc brakes, a SRAM X7 drivetrain, Velocity wheels, FSA cranks and a US-made Chromoly frame. We've heard rumors of another new dual 26"-wheeled recumbent prototype AND a Fusion 29er single speed.

RANS has some new accessories. The first is the return of the Chopper Bar Fairing/Cargo Bag. This is a fabric fairing that fits the risers of the RANS 3-way Chopper bar perfectly, and comes on and off with ease. It mounts at the telescoping bar's clamp and has three buckles and a vertical seam of Velcro. The bag is made in the US of heavy duty black Cordura and is 15" x 12.5" with a 5" top that tapers down to 0". The fairing offers a perfect place for items you to get at quickly. The fairing retails for \$60.

A second new item is RANS' new Crescent panniers. These low-resistance, rounded, shaped panniers are 7" wide by 9" deep by 18" long and have a volume of 900 cubic inches. They are made of 1000 denier coated Cordura and come in black or yellow. They have a reflective stripe, poly-plastic liners, double pull zippers and they sell for \$115. We have yet to try these new panniers.

SUN: Sun's line will have minor component refinements and new paint schemes, as well as some new crank-forward models. The new Sun Ray semi-recumbent looks like a cross between an EZ Sport and a crank-forward. It has the curved tube long wheelbase cruiser frame, comes in 26"/20" (for x-seams of 36"-46") or 20"/16" (for x-seams of 34"-44") and retails for under \$400. The Sun Ray was Gardner Martin's last design.

Sun's very complete line includes three CLWB models, the high-tensile steel EZ1 SX, the EZ1 with a SRAM Dual Drive and the aluminum EZ1 AX (Sun's lightest recumbent at 34 pounds). All Sun CLWBs have 20"/16" wheel combinations and OSS. Sun also offers the Quadribent kit, which attaches to EZ1 recumbents to form an affordable side-by-side quad recumbent.

Sun's LWB line includes the steel EZ Sport and the aluminum EZ Sport AX Limited. These are relatively tall, curvy tube bikes with 26"/20" wheels. Sun has aluminum and steel LWB tandems based on the EZ Sport.

Sun's delta trikes are very popular. There is the EZ3 20"/20"/16" delta trike with OSS, the EZ3 AX aluminum delta OSS with three 20" wheels, and the sleeper hit of the line, the USX with center-frame suspension, USS and three 20" wheels.

The Sun tadpole trike is the new entry. The EZ-Tad SX steel and AX aluminum each have three 20" wheels, USS and low, user-friendly, bottom bracket heights.

Sun has a complete line of recumbent accessories, including a seat back bag, fenders for every model, kick stands, the affordable "Edge" fairing, a 20"-wheel training stand and more.

VELOKRAFT: Dana Lieberman of Bent Up Cycles is the US distributor for Velokraft. Here is what's going on for 2006: "This will be an exciting year for Velokraft, The VK3 UAV (Urban Assault Vehicle) will soon be available. This bike has a hand-built carbon fiber frame with adjustable boom, rear suspension, optional front suspension, and an optional large tail box. This bike will be perfect for commuting, touring, or fast day rides for riders who don't want the extreme position of a lowracer."

A Velokraft Highracer will be available in the spring. It will have a hand-built carbon fiber frame, adjustable boom, dual-650 wheels and an expected weight of less than 20 pounds

Bent Up Cycles/Velokraft will offer two component packages for each Velokraft models. The Sport package will consist of SRAM X9 components, Velocity wheels, FSA crank, and Shimano 105 brakes. The Pro package will consist of SRAM X.0 components, hand-built American Classic/Velosity wheels, FSA Carbon Crank, and Ultegra brakes. A new resin will decrease weights by 1/4-pound and all models will have replaceable rear derailleur hangers.

WIZWHEELZ: The US trike maker from Michigan has a full color catalog for 2006, and

a revamped line of seven trike models, three that are priced under \$2000. The hottest new model for WizWheelz is the new TTC or TerraTrike Cruiser model at \$1,299. The Cruiser will share the same Chromoly frame as the TerraTrike Tour (previous TT 3.6) as well as the same adjustable seat and USS steering. It will be equipped with a twist shift style 24-speed drive train, mechanical disc brakes, and can be shipped fully assembled. The TTC has an overseas built steel frame, Tektro disc brakes and a Shimano Altus/SRAM GripShift drivetrain.

The TerraTrike Access shares the Cruiser's spec and the WizWheelz aluminum frame used on the TerraTrike Race and TerraTrike Sport. This machine will include the classic WizWheelz adjustable seat and sliding boom.

The TerraTrike 3.6 has been renamed the TerraTrike Tour. It will be available with two different gearing package options and will benefit from an expanded accessory line designed for touring (see RCN 088).

The TerraTrike Race and TerraTrike Sport models now feature an updated aluminum frame to improve strength and handling.

The Edge still stands alone in the market as the only full carbon fiber trike and the TerraTrike Tandem continues to be a popular item and now comes standard with S&S couplers.

RECUMBENT ACCESSORY NEWS

SCHWALBE TIRES: A new tire called the Marathon Racer is a folding tire that is the most high performance of the Marathon line. The Qualifier compound with light side walls make the tire very flexible, light and fast, and of course this minimizes rolling resistance. The RaceGuard belt (similar to Kevlar, but lighter and more flexible, according to Schwalbe) is also a plus in the attempt to remain puncture-free. The Marathon Racer comes in 20" x 1.5, 26" x 1.5", 700c x 30, 700c x 35, and 700c x 38c. There is also an 18 x 1.5 355mm wire bead which is currently being used on the Catrike Pocket.

Another new addition is the Marathon Slick a 16" x 1.35 349mm companion for the 20" x 1.35" 406mm which has been a top seller this year. The BIG APPLE line has been expanded this year to include smaller 12", 14", 18" and 24" sizes. The long-awaited Stelvio 451mm folding tire is now available. It has been tested and perfected over the past two years. (www.schwalbetires.com)

TERRACYCLE: For 2006, TerraCycle is only making parts and accessories and is no longer making recumbent bikes.

TerraCycle is offering TailSock kits (from \$179) for many different recumbents. These are light, simple, colorful, easy on/off, and are said to offer a noticeable performance gain. A rear light kit is available as an option.

TerraCycle makes a wide range of custom idler kits that improve smoothness and efficiency of your drivetrain. The kits include all of the



The HP Velo Street Machine GTe



The new Lightfoot Verano



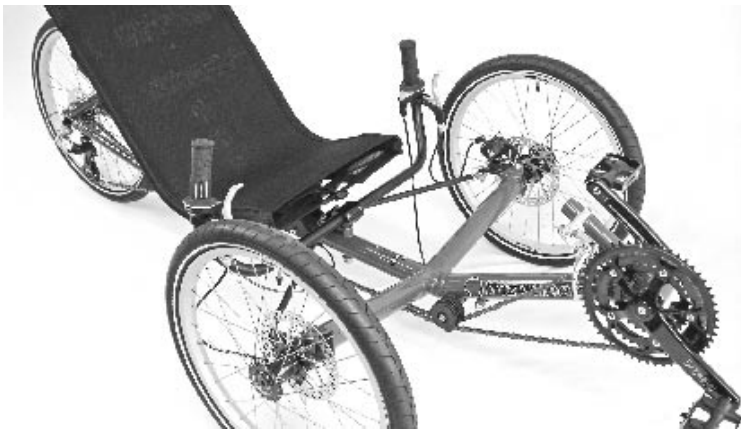
The Organic Engines SUV will haul 500 pounds of cargo and a 250 pound rider



The 2006 Actionbent Jet Stream SWB OSS



The new Sun Sunray 26"/20" has a small backrest and was the late Gardner Martin's last design



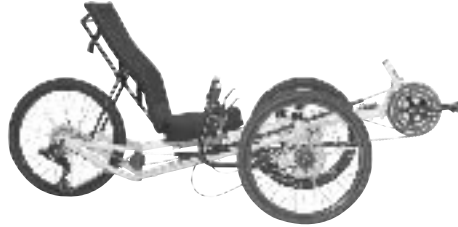
The 2006 WizWheelz TerraTrike Cruiser (TTC) retails for \$1299!



TerraCycles TailSock on a Bacchetta



The Route-X NEOC SWB



The Sun Tadpole



The new TerraCycles Easy Racers idler



The popular Sun EZ Sport

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parts necessary to install on your bike. Their latest offering is a kit to fit Easy Racers recumbents, replacing the return-side mid-tensioner. The new kit is said to make your drivetrain simpler and much quieter. Kits are available for Bacchetta, Burley, Catrike, Easy Racers, Lightning, RANS, Reynolds and WizWheelz. Experimenter kits are available, as well as Ti-cog upgrades. RANS kits are coming soon.

The TerraCycle's GlideFlex stem has long been the industry gold standard. The GlideFlex

is now available in more sizes and combinations. And everything is now made in the US.

TerraCycles offers 12 different handlebars to choose from (3 widths x 4 angles), so you can get exactly the combination of ergonomics and performance you'd like. Quad cable guides are standard on the handlebar mast risers. These new adjustable guides keep your cables neat without adding breaks in the housing that simply let in dirt and water. The guides are available separately, as cleanup retrofits for Bacchetta bikes (so you can remove the stem wrap cover).

The Easy Reacher line of under-seat racks is steadily being improved and broadened. Racks are lighter weight. Everything is made specific for each make and model of bike, so the fit is exact. Easy Reacher Racks (\$108 and up) fit Easy Racers LWB models, most RANS, Burley, Bacchetta, Volae, Haluzak, and Barcroft models and

Easy Racers designed EZ-Series recumbents are a pleasure to ride. You sit slightly reclined, back fully-supported, arms relaxed, neck straight, in a normal sitting position. Compare this with the contorted riding position on a diamond-frame bike. Even after a long day of touring, you're still riding in comfort. No more stiff neck, aching back, numb hands or crotch. No straining either. From cross-country touring to daily commuting to world speed records, Easy Racers has been the leader in recumbent design for over 22 years. And now with the EZ-Series line of recumbents, designed by Gardner Martin, the doors have opened up for entry level riders.

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www.sunbicycles.com / www.jbimporters.com

the Challenge Seiran.” (www.terracycle.com)

WINDWRAP FAIRINGS: Windwrap now offers body socks for highracers including: Bacchetta, Volae, and the RANS F5 models. The highracer bodysock works with the Windwrap XT fairing and the TerraCycles Sock-it frame. This is a very versatile system. The rider can use the TerraCycles tail sock or the Windwrap Body sock with the same support. This system has also been fitted on a Greenspeed GT3, HP Velo Speed Machine and other bikes. The weight is kept low with the small front fairing. Windwrap’s Mark Mueller reports that, “This system offers exceptional performance advantage.”

Windwrap also offers an XT fairing that is optimized for more laid-back derailleur posts like on the WizWheelz trikes. They now have a fairing and mount to fit the popular new RANS Stratus XP with the new chopper handlebars. They are introducing hand protectors for wide handlebars that don’t fit behind a fairing. “We have considered making fairings that are really wide,” Mueller said, “but then the rider ends up pedaling a barn door down the road and with it increased wind drag.” Windwrap has also gone to the dark side and offers an upright bike fairing. (www.windwrap.com)

COMPANY CHANGES

We’re sad to report the following news: George Reynolds (Reynolds Weld Labs) is no longer producing bicycles according to his website (as of November 2005). The makers of the Mountain Quad have ceased production for the time being. Principal Robert Kay has become a local Michigan dealer for Greenspeed. There is still a chance that the Mountain Quad could come back some day.

If you don’t see a manufacturer mentioned here, it is because they do not attend the bike tradeshow, did not reply to our (multiple) information requests, or had no new product info for 2006. ♦



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The newly redesigned HP Velotechnik Speed Machine



ABOVE: 2006 Bacchetta Agio with aluminum frame and disc brakes



LEFT: The newly redesigned 2006 Catrike Road with direct USS steering (no linkage)



The Longbikes Slipstream LWB USS



The VeloKraft VK2 imported by Dana Lieberman of Bent Up Cycles



The new VeloKraft VK3 AUV imported by Dana Lieberman of Bent Up Cycles



The \$1250 Volae Tour



Cycle Genius STX Sparrow

Recumbent Trends 2006

By Bob Bryant



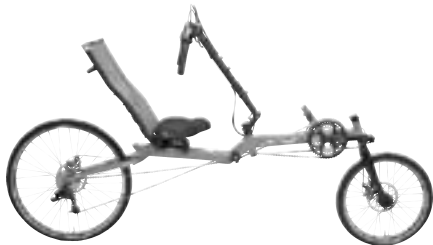
The Barcroft Columbia 20"/20" tandem



Easy Racer Tour Easy



The Burley Django SWB



The Burley Canto can be a LWB or SWB

The hottest new trends seems to be one that is not new, and one that many of us in the biz were expecting to come around gain — that of the comfort oriented touring bike. I'm happy to see this trend come back because this is what attracted me to recumbents back in the mid 1980s. What this means is that many of you are thinking about comfortable bikes over all-out performance, whether it be in a SWB, LWB or trike.

My hope is that builders would introduce models with more robust wheels, drivetrains, and lower gearing — for commuting and touring. Bicycle touring can mean a day trek into the country or on the local rail-trail, a supported ride through wine country or an unsupported fully loaded pedal powered adventure. You can use almost any recumbent for day treks or supported tours. However, for loaded touring a serious touring machine is necessary.

TREND UPDATES

Trikes are still very popular and show no sign of slowing down. Most of our requests for road tests are for recumbent trikes from trike manufacturers.

The Highracer mini-boom seems to have cooled just a bit. These skinny tire road recumbents are an important niche for those who ride organized centuries and the like. Highracer are fast and a good choice for those who want to keep up with the local roadie club.

LWB and SWB are still the most ideal recumbents for most riders. SWB remain popular because they are about the size of a road bike. ALWB would need to be dedicated, have space to store the long bike, and a vehicle to haul it. The new MWB holds some promise. CLWB are still very popular for new riders, mostly non-enthusiast types looking for a relaxed comfortable bicycle. ♦



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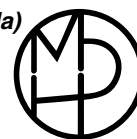
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Road Test: 2006 RANS Stratus LE

By Bob Bryant

TITLE: Best Buy LWB OSS EVER!

BIKE: The RANS Stratus LE

PRICE: \$1,230 (Standard or XL)

I must be dreaming. I've been a bit depressed lately because of the high cost of recumbency and the lack of really good affordable enthusiast recumbents. Then one day two big boxes from RANS arrived marked "2006 Stratus LE." I quickly e-mailed RANS's President for Life, Randy Schlitter, and asked, "What is this new machine?" He told me, "This is the new affordable Stratus." He went on to explain that he wanted to introduce a version of this classic LWB over-seat steering (OSS) design that was priced competitively with comparable Burley, Sun and Cycle Genius models, but that also had the refinement that only nearly 30 years of experience can provide. With the introduction of the new Stratus XP, the LE gets the new 3-way chopper bars and the optional chopper bar fabric fairing. Wow!

USE: The Stratus LE can handle anything you throw at it. I'd ride this bike across the US as it sits in our shop. I've taken it on my usual unpaved trails, etc. and it handles just fine.

SEAT/COMFORT: RANS wrote the book on the mesh back and foam base seat. This is the same classic seat found on other RANS models. It fits the bike well, and the Rad-Loc clamp holds the seat on tight. The Rad slipped on me twice when I was powering hard from a stop in too high a gear. I tightened the bolts and everything was fine. Every other similar seat was inspired by the RANS seat. The only thing that might make it better would be layered and contoured foam (à la Easy Racers Tour Easy, etc.) instead of the molded solid piece of foam. It's thick and cushy.

It's interesting to note that the RANS seat predates the Stratus design (which originally came with the RANS fiberglass bucket seat). Having just tested the slightly higher bottom bracket Stratus XP, I noticed that I need to have the LE seat in a more upright position to relieve the pressure points across the back of my buttocks in the tailbone area. (This is a familiar issue for me since I fractured my tailbone in a recumbent accident several years ago.) The upright seat may cause recumbent butt for some riders, but the classic LE position is also classic LWB OSS and has worked well for 30 years.

If you prefer less foam, or a lower seat height, go for the thin pad cover. An optional Kevlar seat base is also available.

RIDING POSITION: The seat recline does adjust, but this low bottom bracket bike begs for a more upright riding position.

RIDE: The Stratus offers the smoothest and most comfortable LWB OSS ride this side



The 2006 RANS Stratus LE with 3-way Chopper bars

of a suspension model. The compliant frame doesn't suck the power out of you either. While the Stratus is not a finesse handling bike like a Stratus XP or an Easy Racer, it has smooth and user-friendly handling, perfect for the new enthusiast. Yet, I was a bit more hesitant pushing it into corners than I would have been on the XP or the Easy Racer.

PERFORMANCE: The Stratus performs very well, better than any of the similarly priced LWB OSS machines I've tried. The Stratus XP is faster (as is the Easy Racers Tour Easy), mostly because of the fairing options and perhaps because of the large 700c rear wheel. Low- and medium-speed handling is near perfection. The Stratus LE is not really an aggressive bike, but a great tourer/commuter and all-around LWB.

FRAME: This is perhaps the best LWB frame design in the recumbent world. It certainly offers the smoothest ride and is very attractive. The materials are high quality TIG-welded Reynolds Chromoly steel, which is pretty rare in recumbents of any brand. The welding is beautiful. While XP frames are built stateside, the LE frame is imported from Taiwan. Be sure to get one with the new laser-etched black three-way chopper handlebars. The alloy-colored bars are just a bit lighter, but ours have slightly discolored at the bends.

WEIGHT: It's difficult to keep a big LWB like this light. Our XL test bike weighed 33.25 lbs. with chopper bars and no accessories.

COMPONENTS: The component mix is fine for this price. The lower-end components are still brand name parts that work well. I didn't break anything, nor did I see any junky parts on this bike. The LE has a slightly noisier and vibration-prone drivetrain than the XP because of idlers in both chain directions; however, while not ideal, the noise and vibration are barely detectable unless you've ridden

the XP. Also, the SRAM 3.0 rear derailleur and 5.0 shifters raised my eyebrows before I received the bike because I don't like cheap twist shifters. The 3.0 derailleur has an oversize and cheap-looking pulley that worked just fine. This drivetrain has run smoother, quieter and more trouble-free than other more expensive drivetrains. The SRAM 1:1 shifts quickly and efficiently. However durability, not shift quality, has always been my concern.

GEARING: The Stratus LE comes with a sweet Truvativ Elita 30/42/52 crankset that looks like a million bucks. It's a great crank. The stock gear range is rather high at 23.67-119.36 gear-inches (based on a 25.25" wheel/tire diameter). For a lower Bob-friendly low gear, I suggest changing out the 30-tooth inside chainring for a 24-tooth, which would produce a new low gear of 18.94 gear-inches. You can go even lower by replacing the 11-32 cassette and installing an 11-34 cassette, making the low gear 17.83 gear-inches. While I'm customizing the gearing, I'd also change the middle 42-tooth to a 39-tooth for a lower mid-range.

CHAIN MANAGEMENT: The Stratus LE uses double wheel power-side and return skate-wheel idlers. The power-side idler makes some noise and adds some vibration. I don't find it too objectionable, but I do notice it. It's probably best to keep a spare idler set around just in case. The Stratus XP has an improved chainline and just a return side idler, but we ran with no idlers and it worked just fine. (This won't work on the LE.)

BRAKES: The LE comes with the venerable and excellent Tektro 4.0 linear V-brakes and levers. These adjust easily, look great and are a great brake for the money, providing lots of value and fine performance.

WHEELS & TIRES: The wheels are great at this price range. The bike has Shimano Parallax hubs, Alex DA16 black-faced rims and fast

Primo Comet 1.5" tires (though my two flats this season were with Comet 1.5's).

UPGRADES/ACCESSORIES: The RANS three-way chopper bar is standard on the 2006 LE, and, together with the fabric fairing (\$60), is highly recommended. We tried the RANS Tail Pack bag (\$100). It works perfectly, though it is a bit small. The kickstand works well (\$22), but I didn't care for the fenders (\$50). The front is positioned too far rearward on the fork, and doesn't allow enough coverage over the front wheel (due to the laid back head tube angle)(Angletech sells custom wood Sykes fenders to fit the LE). A TerraCycle Easy Reacher underseat rack is also available.

VALUE/RESALE: While those who buy the standard (higher priced) 26"/20" Stratus model or who have a used Stratus may see resale value suffer as a result of this new low-priced model, those buying a 2006 LE should have fine resale value, and will know that they have purchased the best buy LWB OSS in the world today.

RECOMMENDATION: The Stratus LE is the best buy LWB OSS we've seen in years. While others are raising their prices, RANS has made the biggest push in the history of LWB OSS recumbents to gain market share. This Stratus is the most refined EVER, with the new three-way chopper bars and the return of the fabric fairing. The LE is a five-star bike and deal, and should become the best-selling LWB OSS in 2006.

COMPARABLES: RANS makes the V2 steel (\$1,349) and V2 LE aluminum frame (\$1,550), each of which has a higher bottom bracket and a stiffer ride. (The aluminum LE rides very stiffly.) Easy Racers has the Tour Easy, which has become very expensive at \$2,295. Burley has the Koosah (\$999) and the Jett Creek (\$1349), fine bikes that need some tweaking in the seat and ergonomic departments. The Cycle Genius LTX (\$1,099), which is a unique-looking machine, has slightly better components and is a great buy. The Stratus comes out in the lead because it rides the best of the bunch, is affordable and has the complete package. The Stratus XP is a better bike if you like dual big wheels, a slightly higher bottom bracket and a more recent design, but it costs a lot more. I prefer the higher bottom bracket



Our Stratus LE XL-sized test bike with RANS tail bag, fairing and fenders.

and the big wheel leading me around. The new LE is a fantastic deal at \$1,230; it's \$470 less than a standard Stratus. The main differences are the crank, the derailleurs, the shifters and the brakes. You can do a side-by-side component comparison at the RANS website.

The strongest competitor for this bike should be the Bacchetta Agio, which will be introduced in a few months. Unfortunately we were unable to get one for a preseason review.

FOR: Excellent value; mostly fine components; standard chopper bars; smooth and comfy ride; classic LWB OSS design; updated and improved for 2006.

AGAINST: Doesn't handle or ride as well as a Stratus XP; SRAM 3.0 derailleurs; imported frame (only a negative as compared to the XP's US-made frame); RANS needs to offer a 3rd frame size for shorter riders.

NUMBERS: Wheelbase: 66.625"/70.625". Seat height: 21". Weight: 31 lbs.

FIT: Standard: 37.5-48.5 X-Seam. Small/Extra Small: 32.5-43.5" X-Seam. (For definition of X-Seam measurement, check: www.sunbicycles.com/03/infopages/X-Seam.htm.) The LE fits medium-height and tall riders best. We hope RANS introduces a small size frame because the LWB OSS style

works well for shorter riders.

FRAME & SEAT DETAILS: Frame: Chromoly TIG steel. Fork: TIG Chromoly unicrown. Seat Back: Aluminum frame with mesh. Seat Base: Foam with cover. Chain idler: Power side and return RANS skate wheel type. Handlebar: 3-way chopper bar. Stem: 1-1/8" Tien Hsin. Color: Emerald black.

COMPONENTS: Rear derailleur: SRAM 3.0. Front derailleur: Microshift. Shifters: Shimano 5.0 twist. Crank: Truvativ Elita 30/42/52. Bottom bracket: ISIS Gigapipe. Cassette: SRAM 11-32 9-speed. Chain: KMC ZZ. Brakes: Tektro alloy linear. Levers: Tektro; Hubs: Shimano Alivio. Rear rim: Alex DA 16 26" 36°. Front Rim: Alex DA 16 28°. Spokes: 14g stainless steel. Wheel Build: Hand built. Tires: Primo Comet 20" x 1.50 100 psi (front); Primo Comet 26" x 1.50 100 psi (rear). Pedals: Wellgo platform.

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Road Test: 2006 Greenspeed X-Series

By Bob Bryant

TITLE: The Hottest Greenspeed Trikes

TRIKE: The Greenspeed 2006 X-SERIES

PRICE: X3: \$2,845/X5: \$3,245

The new Greenspeed X-series trikes are the latest, greatest and fastest production trikes from this respected maker. The X-series is a variation on the Greenspeed's successful folding GT-series tadpole trikes (the GT3 and the GT5), mixed with some of the attributes of the slick, low and fast SLR trike and the laid-back seat angle of the GTS. The X-series trikes have a more laid-back seat angle (30°) and the front wheels are noticeably cambered in, which make it handle like it's on rails.

Greenspeed's Mick Sims told me that he thought about 10% of the people would prefer a more laid-back seat, and that the market for the X3 is substantially smaller than for the GT3. However, the X-series seems to be very hot right now — so the market may be larger than the 10%.

USE: The X-series is meant as a sportier and better-performing version of the GT-series. The 16" wheels are more sporting, more fun and make for a lower, more stable trike that handles more quickly. Anybody interesting in that *pedal-powered Miata* feel will want one of the sportier handling trikes in the X-series, while all-arounders will appreciate the more upright seat back of the GT-series. Loaded tourists may want to consider the GTO and one of the custom models with 20" wheels. (Nevertheless, the X-series has a rear rack and will take panniers, and can be used for touring.)

SEAT/COMFORT: The X-series trikes have a full mesh seat with a lumbar bend. The seat is comfortable. The mesh is firm and doesn't give much. Softer mesh could be found but, we're told, doesn't last as long. The taught mesh and the small wheels usually make for a stiff ride, but I've been very impressed by the GT- and X-series trikes. The seat detaches from the frame with one hex bolt in less than a minute — super ingenious! The seat stays have a press fit male/female connection. The cockpit of the X-series is tighter than the GT-series due to the cambered-in wheels. The seat is in a fixed position and the boom telescopes for rider height adjustment.

RIDING POSITION: The riding position is very laid back, and I needed a headrest to get enough neck support. The Greenspeed headrest is well designed and works great. (Be sure to leave the mounting posts loose while you push into the headrest for optimum positioning). Interestingly, the new owner of our X-series test trike didn't want the headrest, which proves that everyone is different. Some riders (perhaps 10% of recumbent riders; me included) may experi-



Our Greenspeed X-3 stock with factory head-rest in the meadow

ence toe/foot numbness with a bottom bracket this high.

RIDE: According to Greenspeed, "The front end is a little different from the rest of our range; the wheels have 5 degrees of negative camber; and we have added some extra caster for better feedback through the handlebars and some more 'self centering' effect. The cambered front end also makes the tires hook up to the asphalt like never before and helps wear the tires more evenly."

I thought the GT-series was fast and performed well, but the X-series just has a more racy and sticky feel to it. The X-series tracks beautifully and steers and handles incredibly well. I felt the same way about my GT-3. The X-series is 10° more laid-back in the seat and definitely feels more extreme. Those prone to toe/foot numbness or neck fatigue will need a long test ride to make sure this trike will work for them.

PERFORMANCE: The X-series Greenspeed is the best-performing and handling small-wheeled trike that I've ridden (the second is the GT-series). Both have indirect steering (the handlebar pivots and the steering rod connects the bar to front wheel spindles). Some may prefer the more "wild ride" feel of direct steering. While these trikes are fast, they do require more effort to propel than a performance two-wheeler, and they aren't as fast as a performance two-wheeler. The 16" wheels accelerate quickly, but it's more difficult to hold your speed.

FRAME: The first batch of X-series frames was MIG (gas metal arc) welded in the Greenspeed factory. Future models will

be TIG (gas tungsten arc) welded, also at the Greenspeed factory in Australia. (GT-series frames are built in Taiwan.) The frame is very similar to the folding GT-3 model, but the front wheels are noticeably cambered-in (the front tires were 24.5" apart at the top, while the bottom of the tires were 28" apart at the bottom).

This sporty trike has linkage "U" sidestick-style steering that independently telescopes (for width adjustment) and rotates forward (for angle adjustment). Ergonomic perfection is just a minute away for most riders. The turning circle is 12'.

While not a super lightweight trike, the X-series is light for a Chromoly steel trike. The frames are very durable and should last for decades with normal upkeep. As with every Greenspeed trike we've tested since the mid-90s, these tadpoles are well thought-out with incredible attention paid to even the smallest details. They are designed to be ridden seriously.

A new smaller frame size has been added for 2006, for riders with 36-44 X-Seams, and comes with shorter cranks (see below).

WEIGHT: The X3 weighs in at 36.6 lbs.; the X5 weighs 35.5 lbs.

COMPONENTS: The components on both trikes are really good. The X3 uses a Shimano Capreo/Tiagra mix with Sturmey-Archer drum brakes. The X5 has a Capreo/105 mix with Alligator hydraulic disc brakes.

GEARING: The gearing is about right for this trike, perhaps a bit low for some riders. Greenspeed is a big fan of short crank arms. We had a GT3 earlier in the year with 145mm cranks (\$31-\$300 upgrade). Standard cranks are

170mm.

Like the GT3 and GT5, the X3 relies on the Shimano Capreo cassette. This rare cassette has cogs with 9, 10, 11, 13, 15, 17, 20, 23 and 26 teeth. Most modern cassettes have cogs starting with 11 teeth, but the Capreo is designed specifically to achieve adequate higher gearing for bicycles with small drive wheels. They work great, but the downside is that they are difficult to find (unless you order them from Greenspeed) and the small cogs may wear faster. Keeping an extra cassette handy might not be a bad idea.

The shifting is precise and nearly perfect. The Shimano Dura Ace bar-end shifters are beyond reproach. They are the best shifters made, and are perfect for trikes.

CHAIN MANAGEMENT: Greenspeed's drivetrains are refined, smooth and quiet. The power side chain rolls under a large aluminum idler wheel, guided by two chain tubes. The slack side also travels through a chain tube. The system works very well, as it has on every Greenspeed trike we've tested since the mid-90s.

BRAKES (X3): Like the GT-3, the X3 comes with Sturmey-Archer drum brakes. These are easy to adjust and use. The braking power is soft, quiet and forgiving, compared to the hard, stiff and abrasive feel of discs. Despite how wonderful these brakes are, the North American market is into disc brakes; the word DISC is a huge buzz factor. Therefore, most RCN readers will probably favor the upgraded X5 model.

BRAKES (X5): The folks at Greenspeed are not fans of the mechanical single piston (pot) disc brakes. Greenspeed has worked closely with Alligator (Gator), a company I'd never heard of before Greenspeed started working with them, and the brakes have been well received. Instead of a single piston power side and a dummy side, the Gators have power from both sides. Instead of wimpy cables to take the power from the handles to the pads, the Gators use pressurized hydraulics. The downside of this is the need for maintenance, bleeding, checking fluid in the lines, etc. If you don't want to learn how to work on them yourself, or if you don't have a shop that can do it for you, stick with the drums and the X3. A minor glitch in the pad retaining pin is the only negative I've heard about the Gator brakes, and the problem was corrected.

WHEELS & TIRES: Greenspeed Scorchers are now standard on the X3 and X5. Scorchers are sticky and fast, and make the trike. This new tire was developed by Greenspeed. The Scorcher is a 16" x 1.5" 349mm 80 psi tire. They are not the most robust tires (order extras), but they are fast and fun. Another difference is in the wheel build. GT-series wheels are machine-built in Taiwan, while X-series wheels are hand-built in Australia.

UPGRADES: Schlumpf two-speed bottom bracket drivetrain upgrade (\$525) or Rohloff



*The Gator 4-pot disc brake caliper.
This is a hydraulic brake.*



*The Greenspeed Scorcher slicks — my
favorite trike tire — ed.*

14-speed upgrade (\$1380).

ACCESSORIES: The X3 comes with a rear fender (front fenders are optional, \$130), a safety flag and rearview mirror. Options include the almost necessary headrest (\$120), rear rack (\$56), and dynamo light options (\$260-\$475). The rack is perhaps the most important accessory because carrying anything is difficult without it; unfortunately, racks increase weight, sometimes unnecessarily. (A frame or seat bag would be a good idea.) The best option is the Greenspeed headrest, which works better than any other I've tried. It's simple and can be adjusted to suit even wimps like me whose neck muscles can't always handle the laid-back position. Using this headrest was enlightening for me.

VALUE/RESALE: Greenspeed GT and X-series recumbents sell very fast on the used market and are always in demand. Higher-end models depreciate faster.

RECOMMENDATION: Greenspeed builds some of the finest trikes made. Like the all-rounder GT-series, the racy new X-series is sure to be a hit. The one-bolt seat mount, the unique compact folding frame, the awesome sticky Scorcher tires and the years of experience have brought us to the point of near perfection. I prefer the GT-series for my style of riding (and I like the more upright seat angle), but if I know the RCN trike fans, the X-series will be THE model. The X-series has updated steering geometry, a lighter frame, hand-built wheels and the frames are still built in the Greenspeed factory in Australia.

The folding frame technology will continue to bring us new and better folding performance

models, but for now, the X-series is state of the art Greenspeed.

COMPARABLES: The only comparable folding trike models come from Greenspeed itself in the GT series. The folding feature is super-ingenious; the single-bolt seat mount and the super-fast fold make the trike fit into even the smallest of cars. Even if you don't own a car, they ship more affordably and stow more easily. The GT3 and GT5 are more recreational and touring-oriented, while the X3 and X5 are more performance-oriented. The GS X-series is more refined and attractive than the ICE budget series, and offers more refined handling than the US-made Catrike or WizWheelz trikes. For 2006, an X-7 model will be introduced, a Greenspeed "custom shop" trike built just for you.

FOR: Legendary Greenspeed quality, built in Australia, sportier/quicker/more fun handling, excellent stability/steering geometry/performance

AGAINST: Low ground clearance (2.6"), very laid back seat angle, more stress on canted wheels, hydraulic brake maintenance (X-5)

NUMBERS: Wheelbase: 39". Seat height: 9.5". Weight: 36.6 lbs. (X3) / 35.5 lbs. (X5). Track: 31". Seat angle: 30°.

FIT: Standard: 41-49" X-Seam; Small: 36-44" X-Seam. (For definition of X-Seam measurement, check: www.sunbicycles.com/03/infopages/X-Seam.htm.) The small size is equipped with 152mm Sugino cranks (X3 series) and 155mm TA cranks (X5 series). This is an industry first and the best sizing plan in the industry.

FRAME & SEAT DETAILS (X-3/X-5): Frame: Chromoly TIG steel. Seat Back: Chromoly 1-bolt mount with mesh back/base. Chain idler: Greenspeed over-size power-side and chain tube. Handlebar: Greenspeed adjustable aluminum. Stem: Chromoly USS pivot. Color: Yellow with blue mesh seat.

COMPONENTS (X-3): Derailleurs: Shimano Tiagra. Shifters: Shimano Dura Ace bar-end. Crank: Tiagra 30/42/52. Bottom bracket: Cartridge. Cassette: Shimano Capreo 9-26 9-speed. Chain: SRAM. Brakes: Sturmey-Archer drums. Brake levers: N/A; Rear hub: Shimano Capreo. Front hub: Sturmey-Archer. Rear rim: 349mm 16" Jalco 36°. Spokes: Stainless steel. Wheel Build: Machine. Tires: Greenspeed Scorcher 349mm 16" x 1.5" 80 psi. Pedals: N/A.

COMPONENTS (X-5): Derailleurs: Shimano Tiagra. Shifters: Shimano Dura Ace bar-end. Crank: Shimano 105 30/42/52. Bottom bracket: Shimano cartridge. Cassette: Shimano Capreo 9-26 9-speed. Chain: SRAM. Brakes: Alligator 4-pot discs. Levers: N/A. Handlebar/stem: Greenspeed USS. Rear hub: Shimano Capreo. Front hub: Greenspeed disc. Rear rim: 349mm 16". Spokes: Wheel build: Hand built. Stainless steel. Tires: Greenspeed Scorcher 349mm 16" x 1.5" 80 psi. Pedals: N/A.

CONTACT: www.greenspeed.com.au ♦

Recumbents 101

By Bob Bryant

WHY A RECUMBENT?

If you're reading this magazine, the odds are good that you're interested in buying and riding a recumbent bicycle. There are many reasons to ride a recumbent. Here are just a few:

- Superior comfort
- No neck pain
- No wrist pain
- No numbness or chafing
- Easier breathing
- Less fatigue
- Better view of the road

There are a few downsides to recumbent bicycles as well, such as:

- They are more expensive
- Dealers and specialists are difficult to find
- Some models are sold only factory direct
- They are heavier than upright bicycles
- They are generally slower than upright bicycles (with some exceptions)
- Some mechanics don't like working on them
- They use more proprietary parts

Recumbents work best for bike trail cruising, rides of a dozen miles or more and touring. Recumbents also work well for non-competitive rides such as Cycle Oregon and STP (Seattle To Portland). While some recumbents are fast, they don't always mix well with competitive road groups due to their different power curve (slower up hills, faster down). Recumbents are also not as easy to maneuver in town (long wheelbases, reclined seats, high bottom brackets, it's more difficult to see behind you, and many recumbents are lower to the ground (can be more difficult for motorists to see you).

CHOOSING A RECUMBENT

Selecting a recumbent can be an ominous task — and our industry doesn't make it easy. Recumbents come in all shapes and sizes, with multiple variations, for many different purposes. Education and research are vital in finding information about recumbents.

RECUMBENT TYPES

Here are the different types of recumbents:

LONG WHEELBASE (LWB): LWBs are the original and classic style of recumbent bicycle. They are long and low chopper-like bikes that offer a luxurious ride. This design usually places pedals low and behind the front wheel (a few mono-tube models have the pedals placed high and behind the head tube). These limo-like models have wheelsets of 26"/20" or 700c/20",



Long Wheelbase: The RANS Stratus XP is a hot new LWB model



Compact Long Wheelbase: Cannondale Bent 1 dual suspension CLWB

with a few 26"/26" models. LWBs are the best-selling style of recumbent because of ease of use and affordability. The LWB style is best for touring, sport riding, commuting, and is a great all-around model. LWBs are popular for new cyclists, more casual riders or those looking for a more forgiving all-around bicycle.

For: Easy to ride, easy to buy, unmatched high-speed handling, affordable, comfortable, and an excellent all-around bikes.

Against: Long, heavier, tiller steering effect (some models), difficult to store/haul/maneuver in tight spaces.

Fit: LWBs work best for shorter to tall riders. Very tall riders may have a difficult time finding a bike large (long) enough. Some models come in sizes, which is great for folks who are not of average height.

Cost: Entry level: \$800. Enthusiast: \$1,500-\$2,000. Top of the line: \$2,500-\$5,500.

Available models: Sun EZ Sport, Easy Racers, RANS Stratus/V2, Linear & Lightfoot.

COMPACT LONG WHEELBASE

(CLWB): This type fits in between the LWB and SWB. This is a more compact version of the LWB. They are generally more affordable for the entry level. The *compact* utilizes a smaller 20"/16" or sometimes a 20"/20" wheel set. The bikes are made more compact by plac-



Short Wheelbase: The popular Bacchetta Giro 20 SWB

ing the seat rearward, just above and forward of the rear wheel. Compacts have been popular in recent years as beginner or recreational bikes, but they also make good short-hop commuters.

For: Compact size, affordable and easy to ride/master.

Against: Small wheels (less bicycle-like feel), heavier, poor weight distribution, rougher ride, slower and less aerodynamic.

Fit: This model works best for medium or average height riders. Very short riders may have a difficult time holding the bikes up at a stop, and most models don't fit riders over 6'.

Examples: Cannondale, Giant Revive, HP Velo Spirit Sun EZ1 & RANS Tailwind.

SHORT WHEELBASE (SWB):

The SWB has about the same wheelbase as a road bike with the pedals high and over the front wheel. Wheelset is 26"/26", 650c/650c, 26"/20" or 20"/20". SWBs are the enthusiast recumbent models, for speed, racing, sport, recreation, club rides and touring (some models). SWB models can be lighter in weight and more responsive handling and have more extreme riding positions (laid back seats + high pedals). Highracers are the skinny tire road bike recumbents. They can utilize road bike components, thus making them the lightest and most aggressive recum-

bent style. The 26"/20" or 20"/20" models are the more all-rounder models. SWB are popular with bicycle enthusiasts who are transitioning from lightweight road bikes to recumbents — and anyone concerned about the size of their bike (storage, etc.).

For: Lighter, quicker handling, sportier, good commuter (fits on bus racks), easy to store and transport, and often better climbing.

Against: Possibility of heel/front wheel interference, knee/handlebar interference, high pedals, more complex design (tighter clearances) and longer reach to the ground.

Fit: SWBs fit medium-tall riders best. Highracers are best for tall riders.

Cost: Entry level: \$1,000. Enthusiast: to \$2,000. Top of the line: \$4,000.

Available models (SWB): RANS V-Rex, RANS Rocket, Bacchetta Giro, Barcroft & Sun Speedster; (Highracer): Bacchetta Strada/Aero, Volae, RANS Force 5 and Challenge.

MWB Note: Another sub category of the SWB is the medium wheelbase (MWB), which has appears similar, but has the bottom bracket at or just in front of the head tube.

Examples: Bacchetta Cafe & BiGHA.

TADPOLE TRIKE: This design has two wheels in front and one in back. These trikes come with three 16" wheels (sport models) or three 20" wheels (touring models). There are also a few 26"/20" trikes. They can have linkage (slower, more stable) or direct steering (lighter, sportier), mesh (touring) or shell (racing) seats and the pedals are high. Tadpoles are the enthusiast trikes, with models available for racing, sport, touring, recreational riding and touring. Commuting will depend on whether you feel comfortable riding such a low vehicle in traffic, and/or how much traffic you have in your locale.

For: Performance-oriented, lighter, and most popular

Against: Low (safety concerns), high-speed handling concerns, and direct-steered models can be very quick handling.

Fit: Tadpole trikes can be fit to nearly any size rider. Heavier riders will want to go with 20" wheels and triangulated frames.

Price: Entry level: \$1,100 to \$2,000. Enthusiast: \$2,000 to \$4,000. Top of the line: \$4,000+.

Available models: WizWheelz, Catrike, Greenspeed, Sun & ICE.

DELTA TRIKE: This design has two wheels in back, most commonly three 20" wheels and the pedals are low-medium height. They look like LWB recumbents with two rear wheels. Delta trikes are mostly entry level, recreational and work trikes.

For: Easy to ride, comfortable and affordable.

Against: Rare (higher end models), heavier, high-speed handling concerns, and some mod-



Tadpole trike: The budget series ICE S



Delta trike: The affordable Sun USX

els have light front ends, which can lead to traction issues on one-wheel drive models.

Fits: Medium to medium-tall riders. Most models are one-size, with some limitations.

Price: Entry level \$900. Enthusiast \$2,500+.

Available models: Sun USX, Lightfoot & Hase (Germany)

CRANK FORWARD: This new style of bicycle is a mating of the popular beach cruiser bicycle and a LWB recumbent. Imagine a dual 26" wheeled beach cruiser with a stretched wheelbase with the seat lowered and moved rearward on the bike. Essentially what you have is a long wheelbase style recumbent with no back rest. The key to the success of this design is all in the seat comfort. A comfortable cruiser saddle or a seat custom designed by the builder is essential. These bikes are best suited for casual riders and bike trail cruisers for fun and fitness, though we are hearing of more serious usage. See RCN 091 for more info.

For: Flat footed at stops, simple, easy to ride/master, easy to find and buy and more affordable as compared to recumbents.

Against: Very upright seated position, heavier, and no back rest (don't really need them), some seat bases are smaller or lack foam.

Fit: Shorter to medium/tall riders. Riders much over 6' may find the bikes are too small. Giant & Electra offer kids models.

Prices: Entry level: \$300. Enthusiast: \$800. Top of the line \$2,000+.

Available models: Electra (Townie), Giant (Suede), Sun Drifter, RANS Fusion (enthusiast models & tandem) and new models from Cannondale and K2.

TANDEM: Recumbent tandems come in LWB (Sun), SWB (RANS & Barcroft) and

trikes (WizWheelz, Greenspeed, Organic Engines & ICE).

Prices: Entry level: \$2,000 to \$2,800. Enthusiast: \$3,500+. Top of the line: \$4,400+.

PRE-PURCHASE CONSIDERATIONS

Here are some things to consider before buying a recumbent:

- Your size and weight
- Bike size and weight
- Ergonomics/Physical limitations
- Where you will ride
- Do you want skinny or fat tires
- Do you want large or small wheels
- Do you want under-seat or over-seat steering
- Low or high pedals/BB
- Mesh seat or hard shell seat
- Storage/Transport (bike size)

RIDER SIZE & WEIGHT

Large riders need a strong frame, large wheels and fatter tires. Light riders can ride bikes with a lighter, smaller frame. There are a lot of bikes for average-size riders (one size fits all recumbents) and some models come in sizes (this is good). Very tall riders may not fit LWB recumbents (bikes are too long), and very short riders may not fit SWB recumbents (bikes are too tall).

Recumbent Sizing: Many recumbents are one-size-fits-most, while some come in sizes. They adjust either by a sliding boom (crank) or a sliding seat. Sliding seats are easier to deal with. Once set, sliding booms are manageable, but finding the proper fit requires cutting the chain to the proper length. For this reason, changing settings for different sized riders can be a hassle.

All recumbents are sized by using a measurement called X-seam. To find this measurement, sit on the floor with your back against the wall, legs flat on the floor, extended outward and toes towards the sky. Measure from the floor/wall out to the heel of your foot. This measurement simulates the same measurement on a recumbent bicycle. When setting this measurement on a recumbent bicycle, you should place your heel on the pedal and have your leg fully extended to find the proper seat/pedal extension.

Be forewarned, one-size bikes don't fit everyone, or at least they don't fit everyone well. I'm 6' tall (44.5" x-seam) and barely fit on several LWB models: Sun EZ Sport and Burley models. I can only ride the new Bacchetta Cafe with the seat very reclined. I ride a XL sized RANS LWB. With most CLWB, I am concerned about too much weight on the rear wheel.

BIKE SIZE & WEIGHT

Be sure to consider bike size *before* you buy. Consider where you will store your new bike and how you will transport it.

Recumbents are heavier than upright bicy-

cles. Bicycles with skinnier tires and lighter wheels are easier to propel. Heavier bicycles are faster downhill. The biggest benefit to having a lightweight bike is when climbing hills or when lifting your bike onto your cars roof rack.

ERGONOMICS/COMFORT CONCERNS

LOW BB (BB=bottom bracket): Imagine a human sitting in the same position that you do when you drive an automobile: back slightly reclined, feet low and out in front of you. This is the most normal riding position for recumbent bicycles and is found on most long wheelbase models.

For: Normal seating position, user friendly.

Against: Possible recumbent butt (pain caused from sitting upright), some say less power, possible knee interference with some handlebars

Works Best For: More casual or touring cyclists, heavier riders, and some say the low bottom bracket is easier on the knees. This is not to say that it can't be a good position for the serious enthusiast. A few recumbents have a BB that is higher than a "low BB" but lower than a "level BB." These work particularly well for me and are the RANS Stratus XP and V2.

Recumbent Butt Note: I experience it on some bikes, and others do not. Some riders get over it (break-in) and others do not. I experience it more on Sun bikes (because of the thinner seat base foam) than I do on Easy Racers bikes (layered foam). I experience it more on the RANS Stratus LE than I do on the XP and V2 (higher BB).

Examples (low BB): Burley Koosah, Sun EZ Sport, Cycle Genius LTX/RDX/Sparrow, Easy Racers Tour Easy/GRR, and RANS Stratus. Examples (medium low BB): RANS Stratus XP, & Bacchetta Agio. The XP and Agio actually have a BB that is in between a *low* and *level*, making these unique bikes.

LEVEL BB: Now take this same position, recline the seat back, and raise the pedals up to seat height for a BB that is at about seat height.

For: Relatively normal seating position, can be user friendly, recline seat more.

Against: Still possible recumbent butt, possible foot/toe numbness, possible heel/front wheel interference, possible knee interference with some handlebars

Works Best For: This position works well for most riders, second only to "low BB". I've been told that the position works well for those having had hip replacements or other similar issues.

Examples: RANS V-Rex, Bacchetta Giro & RANS V2.

BB Height Note: Perhaps 10% of recumbent riders experience foot/toe numbness on bikes with bottom brackets from level-high. I am one of these 10%. I can ride for 90 minutes or so, and then I need to get off to regain circulation. This is the way it's been since 1987 and I just live with it.

HIGH BB: Now recline the seat even more and raise the pedals even higher. This would be a position similar to many recumbent trikes, lowracers and highracers. This position takes most of the weight off your

bottom and places it on your back.

For: Aerodynamic position, great for power generation, aggressive.

Against: Not quite normal seating position, less user friendly, possible toe/foot numbness, possible neck fatigue, possible knee interference with the handlebars (highracers).

Works Best For: Serious athletic types, club riders, racer types who want a light, fast bike. For longer rides and touring, make sure that you don't experience foot/toe numbness.

Examples: Highracers, lowracers, and most performance trikes.

Somewhere within these three riding position scenarios you will most likely find one that works for you. I can't tell you which ergonomic style will work best for you. Models with low pedals are very user-friendly. Models with higher pedals are for more advanced enthusiasts, though there are many riders of low-pedal bikes who've been riding them for decades. You may hear a generalization that all low pedal recumbents are slow. This is not true. There are many riders of performance LWB OSS machines who will argue this point.

LARGE OR SMALL WHEELS

Recumbent bicycles are unique in their use of smaller wheels. While full-size wheels (26" or 700c) are best, it isn't always possible to use them with some recumbent designs. The most popular wheel choice for a recumbent is the 26" (mountain bike size) rear wheel matched with a 20" (BMX sized) front wheel. This works on LWB and SWB two-wheelers. Two 650c or 26" wheels offers upright bicycle-like road feel, but the bikes can be too high (highracers) or extra long (LWB). Bigger wheels generally roll faster, roll over road obstacles better, and are generally more comfortable (not skinny racing tires). They also provide more gyroscopic feel, like an upright bicycle (some dual 20" SWB models have this as well).

The larger size 700c road/touring wheels are faster, but not quite as durable as the 26" size. 700c can only be found on a few brands these days, notably the Easy Racers LWB.

Small (16") wheels are lighter and faster to accelerate, but don't hold their speed as well. Tires and rims are more difficult to find and wear out more quickly — and they offer a very rough ride in comparison to larger wheels. The primary reason to use 16" wheels is compatibility with a small bike. The 16" wheel works particularly well on tadpole trikes and the front of CLWB to keep the BB low.

STEERING

There are two main types of recumbent steering: over-seat steering (OSS) and under-seat steering (USS).

OVER-SEAT STEERING (OSS): There are three types of OSS:

T-bar: Like a mountain bike handlebar on a long stem. Examples: Burley, RANS Rocket & V-Rex (called *begging hamster* position on a SWB).

Chopper bar: Modern aluminum bars that look like they are from a

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chopper motorcycle or a Stingray bicycle. Example: Easy Racers & Sun and RANS Stratus (2006 option).

Tweener: This means your legs go “in BETWEEN” the double bend “U” shaped bars. This keeps your hands stretched forward and low. It can be more difficult to maneuver in low speed turns.

UNDER-SEAT STEERING (USS): There are a few under-seat steering two-wheeled recumbents made and they aren't as popular as they were a decade ago (perhaps due to user-friendliness issues). Current examples are available from Linear, Hase and HP Velo.

On three-wheeled recumbents, under-seat steering (USS) is the ideal choice because balance related user-friendliness concerns are not an issue, nor is frontal area. Three wheelers can have direct USS, where independent bars are connected to each kingpin, or indirect which has “U” shaped bars pivoting on a bushing/headset under the seat, connecting to the wheel kingpins by linkage. Indirect offers more refined and stable handling, direct can be quick and sporty. Each type has its fans.

SEATS

The majority of recumbent bicycles these days have a composite (or wood on the cheapies) seat base covered with foam and Lycra. The seat backs are a breathable mesh. This is by far the most popular style of recumbent seat. Some excellent recumbent bike seats are available from: Bacchetta ReCurve, RANS

Easy Racers Koolback and others.

High performance and racing recumbents have lightweight composite shell seats with minimal padding. They offer a more firm base to push against, though may be less comfortable. Euro molded seats have a distinct lumbar curve and are designed to for a very laid-back position. They are best suited for performance bikes where speed is the number one goal.

Composite shell seats haven't always been strictly for performance bikes, for many years Easy Racers and RANS used only shell seats. They are lighter, simpler and you can generate more power. Most would agree that the shell seats are less comfortable than the mesh back and foam base seats.

A few recumbents have full mesh seats. These can be very comfortable, and work especially well on trikes where stand-over height is not a concern.

Recumbent trikes have the benefit of being low and can utilize a full mesh seat (seat back + seat base). Many trike riders prefer the mesh base. Some excellent recumbent trike seats are available from: WizWheelz, ICE, Greenspeed, HP Velo and others.

Seat selection is a personal choice and should be taken very seriously. You should take into consideration what the bike will be used for and how long you will be in the saddle. One seat might not feel good, another might be perfect. Yet another might offer better performance, but less comfort, or visa versa.

STORING

SWB are the easiest types of recumbents to store, as they are the size of a conventional bicycle. LWB, tandems, trikes, and even heavier MWB and CLWB models can be difficult to haul and store. A garage bike hoist can be helpful to solve the storage problem.

Folding recumbents are rare; the two that are made today are the Greenspeed GT- and X-series trikes and the new Bike Friday SatRDay Mk II SWB (newly updated for 2006).

TRANSPORTING

Do not underestimate how difficult it may be to lift a heavy recumbent onto a roof rack. Be sure to look into hauling options before you buy a recumbent bicycle. Most SWBs will fit on bumper racks. Larger recumbents may require special racks or even a larger vehicle. If you transport your bike, do this research BEFORE you buy. The following companies offer specialty racks for recumbents: Alpaca, ATOC, Hitchrider, Thule, Davert (Recumbent Bike Riders) and Yakima.

A truck or van is the most ideal recumbent carrying vehicle. Other vehicles may work, but may require some careful planning in advance of your bike purchase.

PERFORMANCE

Though streamlined recumbents hold most of the human-powered speed records, recumbents are often a bit slower than their upright counterparts.

You must be a strong recumbent rider on a

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fast bike to hang in on a fast road bike club ride. Recumbents have different power curves. They tend to be faster on the flats and descents and slower on any kind of hills. This makes for sort of a rubber-band effect. Many roadies don't appreciate this.

While there are more performance-oriented recumbents these days, some are more extreme (laid back seat + high BB) than you might be willing to put up with.

In contrast, upright road bikes are lighter and faster than they have ever been and recumbents have a difficult time competing against the state-of-the-art *road* technologies and affordable sub-20 pound road bikes.

A fully-faired recumbent is the fastest (like a Lightning F-40). Lowracers (like a Velokraft) and highracers are next (Volae, RANS & Bacchetta), followed closely by a partially faired LWB OSS with a body sock (Easy Racers). Expect just average performance from most entry level recumbents, SWB, LWB and trikes. CLWB is probably being the slowest type of recumbent. Trikes can be very fast, but usually can't match the speeds of a highracer, lowracer or LWB OSS with a body stocking.

A typical long wheelbase recumbent might be faster than other (non-faired) recumbents on the flats and down hills, but it will usually be slower up hills (heavier bike). Riders on drop bar road bikes will notice slower recumbent speeds more than typical recreational riders.

Recumbent performance really shines on the flats and downhills. Hill climbing is where the speeds drop significantl for many, but not all, riders.

Hill Climbing: Recumbents are usually slower up hills because they are heavier, riders can't *stand* on the pedals and/or rock the bike back and forth (using upper body). This point was really made clear to me when I started experimenting with a single speed rainy day commuter. With no gears, my only choice was to *stand* on the pedals when I came to a hill. In contrast, most recumbent riders shift into an easier pedaling gear when they come to a hill.

When I rode the Slumgullion Colorado tour, I trained myself to stay in the middle chainring longer because the minute you dump into granny low gear, you lose all of your momentum (you need the muscles and wind power to pull this off).

Riders who train both aerobically, building their leg strength and doing interval training (or add a steep hill to your daily ride) will see immediate improvements in their recumbent climbing ability. The faster recumbents are faster up hills, but there are other hill climbing secrets:

- Install a lower low gear
- Install a lower mid-range gear
- Consider shorter crank arms which help promote spin

Here are some other climbing tips:

- Spin in a low gear
- If you are a strong rider, stay in your middle chainring as long as you can
- Push your back into the seat back
- Sway the bars back and forth in rhythm with your climb (try not to weave)

Not every tip will work for every rider on every style of bike. See what works best for you, and make sure your bike is properly geared for your home terrain.

FIRST RIDE/LEARNING CURVE

Some recumbent types are easier to ride than others. I suggest that you test ride recumbents in this order:

1. LWB low pedal, over-seat steering
2. Delta trike
3. Tadpole trike
4. Medium wheelbase
5. Short wheelbase
6. Under-seat steering models.
7. Any under-seat steering model
8. Lowracer

You might want to delete the types that you aren't interested in, or you might want to try every type you can.

You should know how to shift the bike you are test riding. Don't wing it, ask how to shift and use the controls properly. You shift gears more frequently when you ride a recumbent.

Remember that you should always be able to sit flat-footed at a stop to be safe. Taller riders may not fit some LWB models (I'm 6' with a 44.5" x-seam and barely fit on several one-frame size models). Shorter riders may not be able to fit on SWB or highracers.

A recumbent may initially feel foreign to you: too sensitive, overly quick, or it may take you some time to get accustomed to the closer-to-the-ground position. This is especially true for the recumbent newbie. The word to remember is RELAX! Lean back in the seat and enjoy the ride. Many problems can be traced directly to the habit of upper-body stiffness from riding your upright. Allow your body to relax and stay loose. Ride several bikes and decide which design style to choose.

Keep in mind that starts are slower, and don't forget to be in a low enough gear. The higher the pedals, the more difficult it will be for a new rider to start out. Try to avoid starting out on hills if you can.

For your first ride, be sure you have proper safety equipment and find a quiet street or preferably a parking lot to practice. Be sure that the bike is set up for you, and is the proper size bike for you. Here is how you get on a recumbent:

1. Squeeze one brake lever to keep the bike from rolling and hold.

2. Straddle the boom or frame and lean back into the seat.
3. Familiarize yourself with the controls: be sure you understand how to shift and brake
4. Place your power foot (are you right-handed or left?) on the right or left pedal in the 1:00 o'clock position.
5. Power to the pedals as you let go of the brake and achieve balance.

Remember, ask questions if you need to and have a friend run along side of you until you achieve balance. I've seen this sequence take one minute, and I've worked with other people for an hour. Certainly, a three-wheeler will be the easiest to learn on. The second easiest is a low-pedal LWB and third a compact LWB.

SAFETY

Most recumbents are lower than their upright brethren. Recumbent riders often ride one or more head levels (the height of your head) below an upright rider. While this isn't such a big deal on a country road, or bike trail, it can be a big deal in busy urban traffic. Visibility = Safety; higher is better. We recommend the following safety equipment: rearview mirror, safety flag, reflective tape and clothing, tail light (solid & flasher), head light (if you ride at dusk or dark), bell (other cyclists or pedestrians) or air horn (for motor vehicles).

We do not advocate the use of low recumbents (lowracers, trikes etc.) on city streets and in urban settings. Low recumbents should only be used on closed courses, bike trails, rail trails and perhaps quiet country roads where YOU feel comfortable and safe riding. (See recumbent safety article in RCN 087.)

DEALERS & MANUFACTURERS

Take responsibility for your own recumbent education, here is how to learn more about recumbents:

- Read RCN and other recumbent magazines
- Subscribe to newsgroups
- Find a local rider group
- Visit several dealers
- Take test rides
- Ask questions

It's important to find a good recumbent dealer. Many advertise in RCN, online and in other magazines. Ask around in newsgroups and bike clubs or local rider groups.

Another good way to track down local and regional recumbent dealers is to visit builder websites and see if the company has a local dealer. The following manufacturers have lots of dealers listed: Bacchetta, Burley, Catrike, Easy Racers, RANS and Sun (Recumbents)

Remember to call first before you visit the shop to see what they have in stock. In some cases dealers listed may not stock any bikes.◆

Recumbent Components

By Bob Bryant

Bicycle components have changed a lot over the years. We're now in a world of disposable bicycle components, many of which are marketed like computer software and updates. That's the bad news. The good news is that fine bicycle components that will last for years, or even decades, are still available if you shop carefully. Entry level parts are fine if you use your bike recreationally. But start commuting, and watch the cheap parts fall apart.

To start with, you'll need a basic understanding of the main component groups. Most recumbents will have 7-, 8- or 9-speed rear cassettes (freewheel or cassette on the rear wheel). 7-speed are basic entry level, 8- is entry level enthusiast and 9-speeds are for enthusiasts. Some retro enthusiasts prefer 8-speeds because the parts are less expensive and they work better in friction mode (vs. indexed "click" shifting). In the high end, 10-speed cassettes have now become available.

Recumbent drivetrains are made by two main companies, SRAM and Shimano. This list will help you understand the basic levels of Shimano and SRAM drivetrains:

LEVEL	SHIMANO	SRAM
Basic Entry Level:	Alivo	SX4
Entry Level Enthusiast:	Deore	SX5/MRX
Commuters & Tourists:	Deore LX	X-7/Attack
High Performance:	Deore XT	X-9/Rocket
Serious Riders/Racers:	XTR	X.0

Bike components are expensive and getting more expensive all the time. For 2006, in order to keep prices affordable, builders will have to use parts that aren't as good, or are further down the line — even lower line than the above.

CRANKSETS

Most recumbents come outfitted with a "road triple" crank which were designed for upright 700c road bikes and have chainrings of 30/42/52. This gearing works okay if you ride mainly on flat terrain or if your bike has a 16" or 20" drivewheel (then it might be a bit low). However, if you ride in hilly terrain on a recumbent with a 26" or 700c rear wheel, this gearing may be too high (see below).

The 30/42/52 road triple crank has a 74mm (inside chainring)/130mm (middle and outside chainring) bolt pattern. Inside chainrings are available in sizes from 24- to 36-teeth. Middle chainrings are available in sizes from 38- to 54-teeth.

Examples — Road triples from: Truvativ, Shimano, FSA, Suntour, RPM, and other non brand name cranks.

ReGearing (swapping chain rings or cranks): If you need lower gears for hill climbing, trailer-towing, cargo hauling or loaded touring, consider the following regearing options:

Chainring Swap: Swap out your road triple chainrings to a 24/39/48 or 50 (we actually found a 24/39/52 crank stock).

MTB Triple: Change to a mountain bike triple crank. These come as 22/34/44 and will give you significantly lower gearing — perfect for hill climbing, trailer-towing and loaded touring. You can get a 20-tooth chainring for the inside (the smallest chainring made), which is the smallest chainring available.

Touring Triples: Like the Sugino XD 24/36/46 (\$110 from several sources and comes in 165mm, 170mm and 175mm) are more difficult to find, but are a great choice and they allow you to use smaller middle chainrings than road triples. We've heard of a new Shimano Deore LX "Trekking" 26/36/48 crank that sounds intriguing (at Nashbar for \$170 in 175mm only).

Shorter Crank Arms: Some recumbent riders have found that going

to shorter crank arms offers certain benefits, including: easier spinning, a smaller leg rotation of the crank (easier on hips & knees), better shifting, a lighter crankset and less chain. The size that seems to work best for most recumbent riders is 153mm or 155mm. Shorter riders may benefit from cranks as short as 145mm. If you reduce the length of your crank arms, you should reduce the size (teeth) of your front chainrings by the same percentage that you reduced the crank arm length. In theory, this all makes perfect sense. However, there are few sources for short arm cranks, and if you can find the shorter arms, getting the smaller rings is difficult, if not impossible. Even if you don't want to try 155mm cranks, my best advice is to consider going to a slightly shorter crank than you usually would. A good source for shortened cranks is Mark Stonich at www.bikesmithdesign.com. See RCN 091 for more info.

Stamped Rings: Watch out for cranks that have stamped steel or riveted-on chainrings or brand names you've never heard of. If your crank has riveted on chainrings, you will be throwing your crank in the trash when the chainrings wear out. Good cranks have removable and replaceable bolt-on aluminum middle and outside chainrings and an aluminum or sometimes a steel inside chainring.

Non Brand Name Cranks: Even many high-end recumbents come with house brand cranks (usually Dotek, Tracer, RPM or other). These aren't so bad, but we'd expect better quality on bikes costing more than \$1,500. Sometimes these are used because the manufacturer wants chain guards/guides, which is a noble mission.

BOTTOM BRACKETS

Most recumbents come with ISIS bottom brackets with Truvativ cranks. If you change or upgrade your crank, you may have to change your bottom bracket and even find the correct spindle width (bottom bracket axle). Choosing a BB must be done in conjunction with choosing a crankset. There are four different types of bottom brackets available:

Classic Square Taper: This is the retro holdback from the 1970s. Shimano still uses them on entry-level models, as does Phil Wood. These are excellent, but they are a dying breed. Shimano still makes fine square taper BBs, but sadly not the cranks to fit them.

ISIS: These come on Truvativ, FSA and other cranks. I've heard it said that ISIS doesn't offer the bearing surface of a square taper, and don't last as long. That said, I'm hard on equipment and have had only one problem ISIS crankset, and it wasn't a bearing issue.

Octalink (Shimano Hollowtech proprietary): These are similar to ISIS, but used only on certain Shimano models. The cranksets MUST BE used with their corresponding Shimano bottom bracket.

External Bearing (EXO): This is the new external bearing standard that is becoming available. It solves the bearing surface concerns of the ISIS, and is the latest bike technology. FSA and others are using this. We're reviewing one on our 2006 Stratus XP.

DERAILLEURS

Shimano and SRAM are the primary suppliers of recumbent derailleurs. Enthusiasts should opt for Tiagra, 105 or Ultegra up front and Deore, Deore LX, 105, XT or XTR in back. IRD makes a front derailleur for those of you who make the change to 46- or 48-tooth large chainrings (see www.rivbike.com).

If you want a time-proven and durable drivetrain, match up a Shimano cassette, derailleur and some bar-end shifters. This is pretty much the same recommendation that I would have made a decade ago.

SRAM seems to update its drivetrain components more often than most, and some may even label them as disposable. The 2:1 shifting makes for about the quickest shifting available to cyclists. SRAM systems don't seem to require adjustment as frequently as Shimano, but both have

their fans.

SRAM 3.0/5.0 are really entry level parts, however, I rode with them for two months and had no problems (2006 RANS Stratus LE).

SRAM X.7 is the least an enthusiast should opt for. While known as a decent entry-level derailleur, I've had them fall apart in my hands and was not impressed. Just as this article was about to go to press, I took delivery of another X.7 equipped bike. The derailleur position set screw and plastic threads had popped out and were on the bottom of the shipping box. The alloy body 2005 model corrected this problem, but that didn't hold the pivot bolt and washer on this new derailleur (c-clip fell out in shipping).

SRAM X.9 From what I hear, the new and improved X.9 version is better than previous 9.0 models. SRAM X.0 has a forged aluminum body and offers improved strength and performance, or so we hear.

Some makers, including RANS, Cycle Genius and others, are using Microshift front derailleurs. These seem to work fine, but can't be as good as an upper-line Shimano front derailleur. I would be skeptical of a Microshift rear derailleur or shifter until they have proven themselves.

No recumbents come (that we know of) come with Campagnolo parts. They build mostly high-end 20/30-speed (10-speed cassette) road racing components. Unless you know and love Campy, our recommendation is to stick with Shimano/SRAM drivetrains unless you are skilled enough to spec your own bike.

SHIFTERS

SRAM: These twist-grip shifters shift quickly and are undoubtedly the most popular shifters for recumbent use. The downside is that they aren't as durable, they are louder (noisy plastic clicks) and when they fail, you lose your ability to shift. We've had three lower line SRAM shifters, one front and one rear, fail this year with no advance notice whatsoever. In my opinion, the ESP 3.0, SR4/5, 5.0 and perhaps even the MRX are suspect. These parts work fine out of the box, but they don't seem to be designed for serious use. We received a 2006 test bike with new SRAM SR4 shifters. The front shifter broke on our set-up stand. A plastic detent that holds the cable in the middle chainring position broke off inside the shifter.

The SRAM X.9 X.0, Attack and Rocket models are the best SRAM choice for more serious enthusiasts. While I've had trouble with the X.7, the new model looks okay and I never had them break on the road. Frankly, if ultimate durability was the primary concern, I just wouldn't use twist-grip shifters.

SRAM twist grip shifters are notoriously difficult to twist. A local rider friend of mine had to remove his left shifter (triple crank shifter) and replace it with a Shimano bar-end, which requires much less twisting pressure to shift.

Shimano: Shimano bar-end shifters are about the best shifters in the world and require less effort to shift. They are tough and even have a friction mode (an absolute must for touring). Paul Components makes an adapter called the "Thumbie" which converts your bar-ends to retro style thumbshifters. These can be expensive AND only work with Shimano rear derailleurs. Also, bar-ends don't fit all handlebar types. Those that don't fit will probably accept Paul Thumbies (www.paulcomp.com).

Rivendell: This boutique brand offers retro friction down-tube and bar-end shifters based on the old Suntour power ratchet design (little clicks, non-indexed). If you are tired of 9- and 10- speed indexed shifting headaches, friction shifting may be the answer. The down-tube model can be used with the Paul Thumbie (www.rivbike.com).

Under-Bar Shifters (like Shimano Rapid Fire): don't work that well on recumbents (especially OSS) due to knee clearance issues.

CASSETTES

Shimano and SRAM are the industry standards and offer high-quality shifting performance. Sunrace is used solely as a cost-cutting measure. Most recumbents use wide-range mountain bike cassettes from Shimano and SRAM in 8- or 9-speed. 8- tends to be spec'ed on entry level bikes, and 9- on more enthusiast level bikes. The most popular size is the 11-32, however, an 11-34 is available and will give you even lower gearing.

MID-DRIVES

These are midship-mounted gear changers that require a two-chain drive system. There are a few different types:

Rear derailleur: This is a two-chain drive system that can offer up to 72 speeds. It adds complexity and may take extra time to get accustomed to. Examples: Rotator, Penninger and Lightfoot.

Front derailleur: This type shifts a midship-mounted crankset (with no crank arms) or a custom cassette with several cogs. The crankset type is more common. Examples: Cannondale, Rotator and Longbikes.

These systems are probably unnecessary for the casual cyclist. Don't buy the argument that the shorter chains/two-chain drive system improves anything. If you are just a gear-head, there is really nothing wrong with them. Sometimes mid-drives serve a purpose for unique drivetrains, like those found on the Penninger and Lightfoot trikes. Just be sure to stock some replacement parts. When Trek stopped making its mid-drive recumbent, owners were stuck with no parts for this proprietary system.

INTERNAL GEARS

Schlumpf: This is a two-speed gear inside the bottom bracket that is shifted by a heel button (where the BB dust cap should be) and

doubles the number of gears on your bike. There are three varieties: the Mountain Drive is a reduction gear that reduces gears by a factor of 2.5; the Speed Drive is an over-drive that multiplies gears by a factor of 1.65; and the High Speed Drive multiplies gears by a factor of 2.5. These are ideal for small drive-wheel bikes or for those who want a simple drivetrain but a wide range of gears.

SRAM DualDrive: This is a three-speed internal hub mated to a seven-, eight- or nine-speed cassette offering 21, 24 or 27 gears at the rear wheel. The #1 gear is a 27% reduction, #2 is a 1:1 lockup, and #3 is a 136% over-drive. These work especially well with small drive wheels or where a very wide gear range is necessary. On recumbents the Dual Drive is often used in conjunction with a front crankset, producing an 81-speed bike (27 gears + 3 Dual Drive ranges)

Rohloff Speedhub: This is an expensive jewel-like planetary hub transmission that offers 14 gears that cover the same range as a 27-speed derailleur drivetrain, and provides a 526% increase between the lowest and highest gear. The downside is the weight, noise in certain gears and especially the cost (an additional \$1,000 or so).

CHAIN MANAGEMENT/IDLERS

Due to their unique frame configurations, recumbents often require guides or chain idlers to route the chain through the frame and to bypass the front wheel on SWB models. Each idler robs some power by adding friction, vibration and noise into the system. Power-side (top chain) idlers are the worst for adding friction. Idlers can be modified skateboard wheels, plastic chain tubes or fancy CNC aluminum cartridge-sealed bearing assemblies. Idlers and chain tubes will need to be checked every season as part of standard maintenance. Keeping a spare set may not be a bad idea. The larger diameter and after-market idlers should last much longer. Upgraded longer life idlers are available from the TerraCycles.

BRAKES

The following types of brakes are found on most recumbent bicycles:

Dual Pivot road brakes: These modern brakes look like the side-pull brakes of the past, but with two pivot points for extra leverage, they work like a center-pull. These simple and elegant stoppers are very lightweight and are found mostly on recumbent road bikes (highracers). These should be THE choice for a serious recumbent road bike. If you've only ridden mountain bikes, you'll find the road calipers weak. Dual pivots are lightweight, are easy to mount and adjust, and changing the pads is simple. The Shimano 105 and Ultegra stop the best; Tektro and private label brakes are fine, but certainly not as good as Shimano. Fitting good pads can increase braking power.

Linear Brakes (V): These are powerful rim brakes from the mountain bike world. They are much like cantilevers but are more powerful and easier to adjust. Levered arms pull brake pads against the rim side wall for braking power. We've had good luck with Shimano, but Avids seem to be the number one choice. Tektro brakes are acceptable, but the pads are marginal. Talk to your dealer about getting some really good Koolstop Supra II brake pads (see RCN 090). Linear (V) brakes in heavy service can wear out pads in as little as three months. (I recently did this on my commuter.) Steer clear of abrasive MTB brake pads that can ruin your rims.

Some entry-level recumbents are equipped with stamped linear brakes (like Alhonga). These were a hassle and I wasn't fond of them at all.

Disc brakes: These are like the powerful discs found on cars and motorcycles. Current bicycle disc brakes are available because of the mountain bike industry. Discs are good for wet weather and mucky conditions. Bicycle disc brakes come in two distinct types: mechanical, which are cable-actuated, and hydraulic, which have mineral oil or hydraulic fluid in the lines.

Mechanical Disc: These are the simplest of the disc brakes, but some are better than others. I've had several test bikes over the past two years with discs. I've had excellent luck with some brands, although I was surprised at how frequently I needed to adjust the pads (which can be as easy as turning a dial). Discs are more of a hassle than dual pivot brakes, and can present different problems than V-brakes. Three of our recent test bikes arrived with slightly warped disc rotors, and inserting the rear wheel can also be more difficult with disc brakes. Discs have a mechanical power ratio designed for big wheels (mainly 26" MTB size). This can make them feel overly strong or lacking sensitivity when used on small wheels.

Disc brakes are also louder than V- or side-pull brakes; they make a car-like metallic noise when applied; they make fender and rack installations difficult; and they add about one pound over V-brakes. Disc brake power is wonderful, but not always necessary. There certainly is a place for these brakes. Some cheaper disc brake calipers drag on the rotors making them noisy. Keep in mind that if you need to upgrade your disc brakes, or convert from V- to disc, the cost is about \$100 or more per brake.

Avid discs are considered the best mechanical discs as they are the most adjustable and easy to work on. Discs work great in the rain, and our rims will last longer.

Hydraulic Disc: These are definitely more powerful than mechanical discs, but they rely on enclosed hydraulic systems with hydraulic fluid or mineral oil in the lines. One benefit is that on trikes, you can have both front brakes apply even pressure with one brake handle. Some dual piston models designed for downhill mountain biking are very strong.

I don't use these for one simple reason: I don't know how to work on them and nobody around here does either. If a brake line is pulled and you lose system pressure (which I've seen happen on a tour), you're basically stuck. If you want this type of brake, learn how to set up, adjust and maintain it yourself and carry the parts necessary to do a roadside repair. These are superior stoppers if you learn how to maintain them, or if there is a local shop that can do the work.

Lastly, some disc brakes have one piston (one side) and others have two (both sides). In theory, two are best, but every recumbent disc brake I've tried had plenty of power.

Drum brakes: These are like automobile and motorcycle brakes with small brake pads inside a small aluminum drum, and are manufactured by Sunrace Sturmey-Archer. Drum brakes are smooth, quiet and simple and have a velvety smooth brake feel. In contrast, discs have an abrasive metallic sound and feel. Drums don't have as much braking power as discs, but for the majority of riders they will be perfectly adequate. Also, maintenance and adjustment is easy and the pads last a long time.

CHAINS

Many bikes come with affordable KMC chains. They are okay, but

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the KMC chain links (Quick Links) must be replaced every time you remove the chain and are not always easy to find (so keep spares). I wouldn't go out of my way to replace a new KMC chain until it was worn out or I was heading out on a major tour.

When it comes time to replace it, I would opt for a SRAM (formerly Sachs) chain, which I consider to be the best bicycle chain available. SRAM generally shifts better, lasts longer, and is more trouble-free.

I recently had the opportunity to fit Shimano chains to a recumbent, and what a painful experience it was. They use break-off push pins to splice the links. I ended up using four pins in one chain, broke a chain tool and was still concerned about the chain's strength. Stick with SRAM and your chain problems should be kept to a minimum.

SUSPENSION FORKS

The best recumbent suspension is one that is already integrated into the bike design — such as those available from HP Velotechnik (Spirit) and Cannondale. These are well thought-out systems with the suspension inside the fork, and are the best I've tested. HP Velo is also using a new fork, the Spinner Grind2, which we haven't seen yet. Aftermarket forks are also available from Meks, Ballistic and White Brothers.

The biggest negative about suspension forks is the added cost of the fork, and for additional maintenance costs (rebUILds). Be sure to ask how often service is required on your fork.

Lighter Weight Forks: Highracers can benefit from lighter carbon fiber forks. Check out the bike forums for the latest information. RANS offers a house-brand aluminum fork upgrade (and standard on some models). These forks are lightweight options, and probably not ideal for fork commuting, touring or heavy riders.

REAR SUSPENSION

A cushy ride can be wonderful and will spoil you. Suspension is best for urban commuters, small-wheeled bikes, tourers and those who ride on rough roads. Rider/load combinations over 200 pounds should look into the availability of optional heavier springs. Suspension can complicate fender and rack mounting, adds weight to the bike, is more expensive, and requires more maintenance (shock replacement can cost hundreds of dollars).

The best recumbent suspension designs have low pivot points for the rear swing arm. Consider your body weight and if your cargo weight will also be supported by suspension. *Pogo*, or pedal-induced suspension movement is the sign of a marginal suspension system.

A cheaper alternative is to run fatter low pressure tires like Schwalbe Big Apples (see www.balloonbikes.com and www.schwalbetires.com).

Some frames have more flex to them, and steel frames are usually more forgiving. Larger

diameter wheels generally ride smoother than smaller wheels. Steel frames are more forgiving and have a smoother ride than aluminum, and titanium will have the smoothest ride (although some think titanium is too flexible).

HEADSET

One interesting aspect of recumbency is that not all manufacturers are using threadless steerer tubes, even on some high-end bikes. Many companies have unique threadless clamping systems. Some systems are really good, and others are just okay. You'll know by how difficult installation and adjustments are. Some threaded headsets can't be upgraded without spending big bucks, so ask questions before you buy.

As far as headsets go, the differences are the quality of the bearing, cartridge-sealed vs. caged bearing, ease of adjustment, and quality of materials. A headset can cost from a few bucks to over \$100. I really like cartridge-sealed bearing headsets. Two excellent examples are the Chris King and Ritchey WCS. The Ritchey WCS lifetime headset has precision machined aluminum cups, angular cartridge sealed bearings and is more affordable than a Chris King. Angletech offers the WCS on several models.

Watch out for non brand name brand mediocre headsets. Recumbents can put more pressure on a headset than a road bike, so this isn't a place to cheap out. This isn't something to run out and replace right away, but if you build up from a frameset, get a good one.

PEDALS

Most bicycle enthusiasts these days use *clipless* pedals. This means that your pedals have a snow ski-type binding and your shoes have a cleat that snaps into the binding. Finding the system that works best for you can be a time-consuming and expensive task. The most popular brand of pedals is the Shimano SPD (Shimano Pedaling Dynamics). SPD pedals have become the industry standard primarily because they are easy to use and are relatively affordable. Some enthusiasts favor BeBops (www.bebop.com) because they have lots of float. I've had at least one report of reluctant engage and release in touring conditions with BeBops. Sadly, these have been discontinued but may be reintroduced at a later date by a new maker. Others prefer Crank Brothers Egg Beaters (www.crankbrothers.com) which have easy entry/exit (four possible entry positions compared with two with BeBops or SPDs). I've used Egg Beaters and was unhappy with the durability. I like Shimano SPD because the design is time proven.

Some riders experience pain using clipless pedals (from having your feet in the same position). Harry Wozniak of Wheel & Sprocket likened the pain to standing on a ladder for an extended time. The problem is that clipless systems were designed for upright bicycles.

Recumbent clipless systems need to have the cleats mounted further back on the shoe. Sometimes there isn't enough room on the clipless cleat mounting tracks to mount far enough toward the middle of the shoe. Some riders modify their shoes with a Dremel tool, others just ride with incorrect positioning, and others stop using their clipless pedals in favor of basic platform pedals.

I use platform pedals and Shimano cycling shoes for most of my riding. They work especially well for commuting and on recumbents with low to medium (seat height) crank positions. The higher the crank, the more you may need a foot retention device.

Thanks to the component makers building parts for Freeride and Downhill style mountain biking, we now have some really cool platform pedals to choose from. After breaking a rather inexpensive oval caged bear trap pedal (the bike fell over and bent the cage and spindle), I recently switched to aluminum pinned pedals. Look for a CNC aluminum or magnesium body, removable pins, a ChroMoly spindle and cartridge bearings. The pins act as upside-down toe clips, though I can vary my foot positions as I wish. Cool pedals like this can be found from Sun/Ringle (Zu Zu), Wellgo (Magnesium), Azonic, Truativ (Holzfeller) and Syncros (Mental). Angletech sells a few of these, and others can be found at www.mtbr.com.

These pinned pedals hold my Shimano shoes to the pedals and allow me to vary my foot's placement on the pedal. I know I'm in a minority of non-clipless users, but I'm extremely happy with my retro pedal choices. Racers and other performance cyclists may need to use clipless, but commuters, recreational cyclists and tourists really don't need to. One last option is the Power Grip strap. This is a diagonal strap that crosses the platform pedal. You slip your foot in at an angle, straighten it, and the strap holds you in. Ask for these at your local bike or recumbent shop.

SHOES

If fit is everything, cleat placement is a close second. On a recumbent the cleats should be mounted more towards the center of the shoe, so be careful before you lay down your hard-earned cash.

Angletech sells SIDI shoes which are very high quality and come in wide sizes. I prefer the basic Shimano SH-M021G that cost just over \$50. They are relatively flat-soled and have laces instead of Velcro straps. These are my favorite bike shoes — ever.

WHEELS

Here are the common recumbent wheel sizes:

- 16" 305 mm: This smaller diameter and wider 16" size is found on recreational CLWB models.

- 16" 349 mm: This is a folding bike size, and are now found on folding and performance trikes.
- 18" 355mm: This is a more rare European folding bike size used on Birdy folders and some Catrike and ICE trike models.
- 20" 406 mm: This is the BMX (bicycle motocross) standard which has now become a recumbent standard. This is the most popular and durable size of recumbent tire.
- 20" 451 mm: This is a taller, skinnier and rarer BMX size with fewer available tire options.
- 26" 559 mm: This is mountain bike standard, and is by far the most popular wheel and tire size.
- 650c (571 mm): This is a slightly smaller road racing wheel size used primarily on highracers in performance applications.
- 700c (622 mm): This is the road and touring standard. Skinny road racing tires to wide touring tires are available.

The taller the wheel the faster and farther it will roll. This is why Tour de France racing bikes have 700c wheels. Most highracers use 650c wheels because 700c wheels are too tall for many riders.

RIMS

Durability is everything to me when I look for wheel parts. I suggest looking for double walled rims with eyelets and DT stainless steel spokes. I like the Sun and Mavic rims (Rhyno Lite, BFR, etc.) and have heard good things about Velocity, Ritchey and DT Swiss. When you select a new rim, be sure to ask your wheelbuilder what they recommend for your specific application and your weight, whether it be touring, commuting, fast performance or racing. You can also read more about specific rims and wheel components at the bicycle component review websites listed at the end of this article.

HUBS

The best hubs for recumbent use are upper-end Shimano such as 105, Ultegra, Deore LX or XT. Some riders have reported having good luck with lower line Shimano hubs as well. Shimano hubs are forged aluminum, and not just CNC machined (carved from aluminum billet). Angletech's Kelvin Clark uses a lot of Phil Wood parts which have precision cartridge-sealed bearings and are about the most respected aftermarket hubs (and very expensive).

Road bike hub spacing is 130mm, mountain bike is 135mm and tandem spacing is 145mm. Mountain hubs are stronger than road hubs, but tandem hubs are the strongest. Currently nobody is building a recumbent for loaded touring with 145mm rear spacing.

TIRES

Skinny or Fat Tires: Consider a fatter lower pressure tire than you would usually select for your upright bike. The main reason for this is that un-weighting your seat (like standing on your pedals when you see a road hazard on your upright bike) over road hazards is difficult, if not impossible on a recumbent. The bikes that have skinny tires are selling an unreasonable dream. Fatter tires are more comfortable, less skittish to ride and have fewer flat tires. I generally ride with 1.5" tires (or 35-40mm). Lighter weight riders might want to go with 1.375" tires (or 30-35mm).

The following companies offer recumbent-specific tires: Greenspeed Scorchers, Kenda Kwest, Primo Comet and Schwalbe tires. The Greenspeed tires are 16" and 20" sticky high performance tires, Kenda offers the all-around and affordable Kwest which is a durable and affordable *all-around* tire. I have put many miles on the 26" and 20" x 1.5 100 psi Kwests. Primo offers the performance oriented Comet, and Schwalbe has a complete line of premium tires of all types for recumbents. Contact your recumbent specialist for other good recumbent tires.

WHEELS

Machine-Built Wheels: Most recumbent bicycles come with machine-

built wheels. Wheel quality varies depending on where these wheels are built, who builds them and how much extra service the builder provides. How much time is spent tensioning the spokes during set-up is VERY important and can strongly influence whether you'll have a trouble-free set of wheels.

Nearly all production recumbent wheels are built using a wheel-building machine. These were created for making large production runs of identical wheels very cheaply. Inside this mega-machine, the wheel is laced, tensioned and trued, all in a matter of minutes. One report I read called this, "a very brutal process." Few will argue that this sometimes leads to poorly tensioned wheels.

Not all machine-built wheels are bad. We've had good experiences with several brands of wheels that we knew were machine built. If they start with a good double wall rim, preferably with eyelets for the spokes, and use a brand name stainless steel spokes, brass nipples and a dab of spoke prep, even mega-machine wheels can be okay. Hand tensioning of machine built wheels (before they are ridden on) is another way to insure a long wheel life.

Wheel Problems: Recumbents tend to be easier on wheels than uprights and small wheels are stronger than large wheels (20" wheels are very tough). All new recumbents should have their wheels checked within 100-200 miles. If the spokes are squeaking or coming loose, get them fixed. If you are start breaking spokes — this means you have a wheel (spoke/rim/wheel build) problem. This is most likely due to a machine built wheel or problematic no-name spokes. At this point, you'll either have to make due, or solve the problem by rebuilding your wheel (respoking) or buying a new hand-built set of wheels.

Boutique Wheels: Paired-spoke light weight high performance wheels are the latest trend in recumbent wheels. Velocity are the most popular, coming in: 20", 650c, 26" and 700c size wheels. Most have 24 spoke rear wheels and 20 spoke fronts. These wheels are lighter and more aerodynamic than standard wheels, but not as durable as hand-built wheels. They are probably best for sport riding and performance (for average weight riders) and not loaded touring where ultimate durability is required. Also, they use special spokes and replacement parts may not be as readily available. I will be testing some fancy Bontrager Race Lite 26" wheels on our Angletech RANS Stratus XP TO27 D soon.

Hand-Built Wheels: This is an option that you don't hear enough about. To create a hand-built wheel, a skilled wheel builder collects the necessary high-quality parts. The spokes are then laced and evenly tensioned by hand, and then the truing process begins until the wheel is perfectly round. There are custom wheel builders in larger towns and a few recumbent wheel specialists. Angletech, Zach Kaplan Cycles and others offer custom wheels. Peter White Cycles is well known in upright bicycle circles as being a top-notch wheel builder.

FRAMES

Recumbent Frames: While many recumbent bicycles have trussed/

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- Easy Racers
- Bacchetta
- Sun
- Burley
- RANS
- Catrike
- Haluzak

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triangulated frames, others have modern mono-beam frames with no triangulation. Mono-beam frames are clearly not as robust. Frames of this type can also have more torsional flexibility making for a twitchy or at least a very lively ride. For this reason, these frames are less ideal for touring.

Recumbent frames can be found made of hi-tensile steel (entry level), Aircraft Chrome-Moly steel (ChroMoly) (medium-high end), aluminum (medium-high end) and Titanium (very high end). ChroMoly is rugged and can

be repaired. Aluminum is often lighter, but has a shorter fatigue life, a rougher ride and cannot be repaired. Titanium offers the smoothest ride, ultimate durability and light weight, but is VERY expensive. In the upright bike world, you don't pay a premium anymore for an aluminum frame. Actually, ChroMoly frames are more difficult to find. In the recumbent world, you certainly do pay a premium for an aluminum frame.

Beware of cinch bolts used on steel frames. If over-used these can strip out and cause you no end of grief. These are really made to be set up once, not to be adjusted often. A slide-on binder/collar is probably a better idea. Catrike uses these on their booms. Some modern recumbent frames have multiple cinch bolts to make their frames easier to ship. While convenient, this adds complexity.

DURABILITY

Durability is the number one issue for me when I select bicycle components for real-world use. I use my bicycles and RCN test bikes for

daily transportation. I ride my 12-mile round trip commute to the post office once or twice per day. If you have received mail from us, the odds are good that it was delivered to the post office by bike.

For those of you who are less than 160 pounds and ride on Saturdays down the bike trail or around the block — buy whatever you want. If you are heavy, carry a load, or spend any time commuting, cheap parts will come back to haunt you.

If you buy a recumbent in the \$1,200 and under price range, you will generally get a fairly robust frame and seat, but some components may be mediocre. Problems that we've experienced are: twist shifters failing, bottom Brackets coming loose, wheels going out of true and breaking spokes.

The bottom line is that a recumbent bicycle set up for serious commuting, touring or performance riding will require high end and expensive parts. Often it's better to spend the money in advance instead of replacing parts as they fail on an entry level bike.

SPARE PARTS

If you love your bike and plan to keep it, you should consider keeping a cache of spare parts specific to your bike: tires, tubes, chain idler/chain tubes, seat mesh/cover, seat slider quick release, suspension shock, spokes (two of each size) and any model specific specialty parts. (You don't want to be in the position of many BikeE, Vision or Trek owners with no parts source when these companies ceased production of their recumbent models.)

OLD STOCK COMPONENTS

Some recumbent builders have been spec'ing dated old stock componentry. This is marginally acceptable these days. If something old or not current, bring it to the attention of the selling dealer and perhaps get it exchanged. Preferably before you order the bike or take delivery.

FINAL COMMENTS

Well, there you have it: my personal views on recumbent bicycle component options. My final thought is that you should become educated yourself. Surf the web, read some books and hang out in bike shops to learn more about bike stuff. Enjoy your education and form your own opinions based on your body, the available bikes and how and where you ride. Keep in mind that durable bicycle components are available, but more difficult to find these days.

ADDITIONAL RESOURCES

- www.mtbr.com: MTB bike and parts forums
- www.roadbikereview.com: Review forums
- www.bikeforums.net: Bike forums
- www.sheldonbrown.com: Bike info
- www.peterwhitecycles.com: Wheels
- www.paulcomp.com: Paul Components
- www.rivbike.com: retro components ♦

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Recumbent Mini-Reviews

By Bob Bryant

LONG WHEELBASE (LWB)

BACCHETTA AGIO: I rode a prototype of this bike briefly at Interbike. In design theory and components, the bike looks great. Hopefully we'll get to test it soon.

BURLEY KOOSAH/JETT CREEK: On paper this bike is almost perfect. Decent components, good looks, excellent value and built in Eugene, Oregon by a fine and respected company. Some riders have difficulty with the Burley seat base and adjustment mechanism (positions are too reclined and seat base noses downward).

BURLEY CANTO: This is the convertible (long wheelbase to short wheelbase) model with a level-height bottom bracket (BB) and over-seat steering (OSS). The conversion from LWB to SWB is not a quick change, but overall, this just might be the most refined of the Burley recumbents. The higher BB is ideal for the seat adjustment. This is a casual, comfortable riding LWB with excellent build quality.

BURLEY SPIDER: This is the suspended version of the Koosah. The high-pivot suspension design makes for some "pogo" (pedaling induced suspension bounce), but the new Fox shock has tamed it somewhat. This is a cushy-riding recreational recumbent for those looking for a luxury ride, rather than high performance.

BURLEY HEPCHAT: This SWB OSS model was initially designed to fit between the V-Rex and the P-38 in the SWB market. It's not as much of an all-rounder as a V-Rex, but it is perhaps more versatile than a P-38. The bike has Burley's high-quality construction, but some of the refinement snafus as well, including the seat base and an odd OSS system that is high and close to the body.

CYCLE GENIUS LTX: This is perhaps the best bike in the CG line. The bike rides very well, and is an excellent value. Some feel the frame design is odd-looking. Go for the new chopper-style bars.

CYCLE GENIUS RDX: This bike is a lighter, faster skinny-tire version of the LTX. Most riders will prefer the LTX for its all-rounder prowess, but the RDX is a bargain speedster with a 700c rear wheel and higher gearing (perhaps too high for hilly terrain).

EASY RACERS TOUR EASY: This is the Freedom, CA-built classic LWB performance touring bike. It's fast and handles great, but the ride is relatively stiff. Easy Racers bikes still use 700c rear wheels. The bike begs for an upright riding position, but the seat base is made of glued layered foam, making it the finest seat base available on this type of recumbent. Easy Racers models are also very durable recumbents. The downside is that the finish details are lacking a bit, and the price is high when compared to other similar bikes.

EASY RACERS GOLD RUSH: This magic bike is THE fastest LWB I've ridden. The ride is smooth and the bike moves. You pay a premium for an Easy Racer these days. The 700c rear wheel and fairing/body sock option place this LWB in a category all by itself. We have a Fold Rush here now for the first time.

LIGHTFOOT RANGER: The Ranger is the best off-road, rough-stuff LWB machine there is. The Ranger is hand-built for you by Rod Miner and his staff in Montana. It's a bit heavy and has recently been overshadowed by the new RANS Stratus XP (which is a road bike).

RANS STRATUS LE: This is by far the smoothest-riding LWB made and the LE is the best-buy enthusiast LWB. It's very comparable to bikes costing much more. The downside for me is that at 6' tall, I must ride an XL frame size. Check out our review in this issue.

RANS STRATUS XP: The XP is the current HOT LWB bike. The XP is a reconfigured and updated Stratus frame designed to accept a 26" front wheel. Rather than the relaxed and casual feel of the 26"/20" model, the big-wheeled bike is more aggressive, faster, and smoother-riding and the big wheel leads you around. Most who try it will love it and dual big wheels are the rage. RANS has enjoyed incredible sales numbers with

this model since it was introduced last summer. This just demonstrates that there are performance-minded LWB buyers out there looking for something new. Watch for our Angletech XP test soon.

RANS V2: The V2 is the quintessential level-bottom bracket LWB. It offers a more aggressive stance and the higher BB makes for a more reclined seat (and less potential for recumbent butt). The Chromoly V2 is a phenomenal value.

RANS V2 FORMULA: The imported aluminum frame is noticeably lighter and stiffer. With skinny tires on a rough road, this bike will beat you up. If you want a light LWB and aren't into fairings, this is your bike. As usual with RANS, it's a super value. The downside for me is that at 6' tall, I must ride an XL frame size on both V2 models.

SUN EZ SPORT: In many shops this is the most popular LWB recumbent. The key selling points are the classic cruiser looks, the robust Chromoly steel frame, Easy Racers' styling and the under-\$1,000 price tag. We recently had one with some glitches and Sun happily took care of all of our complaints. The bike is a bit heavy, but makes up for it in value. The AX is a lighter bike with better components, and while it's up there in Stratus LE/Agio/LTX territory it is still a sweet bike. The Sun seat base foam is just one piece, so it is not contoured and layered like the Easy Racers seat base.

NOTES: I haven't ridden a Longbikes USS or a modern Linear, so I can't offer an opinion. (We'd like to review both.)

COMPACT LONG WHEELBASE (CLWB)

CANNONDALE BENT 1: Too bad Cannondale doesn't put more effort into marketing this US-built aluminum full-suspension bike. The suspension and finish quality are first rate. The BB higher than other CLWB, it's a bit heavy, and not that fast. The two-chain mid-drive system adds weight and complexity.

CYCLE GENIUS CGX: This was Cycle Genius's flagship design until they introduced their LWB models a few years ago. The CGX is a level-bottom bracket CLWB, which is almost a MWB. The bike is unique, and very affordable, but the high BB is less user-friendly than an EZ1 with a low BB.

HP VELO SPIRIT: The Spirit is perhaps the finest CLWB made. It comes as a plain eight-speed, but there is a host of upgrade options that can price it into the stratosphere. The bike is attractive, nicely finished and a bit heavy. This may just be the best year-around commuter recumbent made, with SRAM DualDrive, Rohloff and Streamer fairing options.

SUN EZ1: The venerable and somewhat homely EZ1 is both durable and very user-friendly. While priced higher than the similar Cycle Genius CGX, you can often find the EZ1 on sale around the mid-\$500 range. They are tried and true over many years, rental miles and refinements. This model was designed by the late Gardner Martin.

SHORT WHEELBASE (SWB)

BACCHETTA GIRO 20: This is the most popular SWB OSS recumbent sold today, featuring a simple stick frame, comfy ReCurve seat, "tweener"-style steering, sizes that fit many riders from short to tall and a very attractive price. While the highracers get all the buzz, the Giro 20 is the all-rounder that everyone can use.

BARCROFT DAKOTA: The Barcroft is a low-production custom bike that can best be described as a lower, stretched out SWB OSS. This is a unique bike with many custom options.

BACCHETTA CAFE: This new bike is actually a MWB. Imagine a Giro with a high bottom bracket, relaxed head tube angle and a short boom. I couldn't make this bike fit me and was later told that I didn't have the seat laid back far enough. This bike is meant to be ridden very laid back, more so than the Giro 20.

BIKE FRIDAY: I haven't ridden the new Sat R Day Mk II, but it's an exciting new bike and we like the concept. The big changes are the use of 20" wheels, a higher bottom bracket and a Euro shell seat (for the touring model, too?). We've requested a test bike for 2006.

HP VELO STREET MACHINE/GTe: These bikes are dedicated SWB USS, full suspension, loaded touring bikes. They are not the lightest, but they are among the smoothest and most comfortable-riding SWBs. They're not for everyone, but the laid back position and hard-shell seat work well for those who like the magic carpet USS feel. HP Velo quality and durability are well known. Despite being located in Germany, communications are easy and our experience with HP Velo has been exceptional.

HP VELO GRASSHOPPER: If the Street Machine/GTe is the loaded touring machine, Grasshopper is the all-arounder bike. It's at home commuting, on a bike trail or on a loaded tour. Like all HP Velo models, there are many, many options. With their trademark No Squat suspension, you'll be riding on a cloud with this bike.

RANS ROCKET: The Rocket is a sweet-handling, simple and affordable SWB OSS bike. While dual-20" wheels isn't the hot setup it once was, the Rocket remains a bargain speedster and a rock-solid choice for an entry level SWB. The dual 20's are fantastic riding, but make the ride stiffer and aren't as fast as big wheels. The magic feel of the dual-20's perhaps was the inspiration for looking towards the dual big wheels that have become so popular on SWB highracers.

RANS V-REX: This is the original all-arounder, does-everything-well SWB OSS. The level bottom bracket, fine RANS seat and excellent RANS value and quality have made this bike a classic. It's also unique for a SWB in that it has a triangulated (trussed) frame. The frame is stiff and extremely durable. While not as popular as it once was, it's one of the best SWB bikes ever designed.

NOTES: I have not seen or ridden any ActionBent recumbents, but would like to review one in 2006.

HIGHRACER SWB

BACCHETTA GIRO 26: The Giro 26 is basically a Giro 20 with a big front wheel. This is a very fine bike, but you need to be tall to ride it. The dual bit wheels give that roll-over-everything feel and it's a blast to ride. In the real world, most will be better suited with the Giro 20.

BACCHETTA STRADA: This is the entry-level performance highracer from the Killer Bee team. While I haven't ridden a Strada much, I did a review on the previous Chromoly Corsa. The ride is very dialed, the performance is lively and the bike is a lot of fun. The Strada now has lots of competition from RANS and Volae.

RANS FORCE 5 LE: The F5 is RANS's take on a highracer. This model is made in Kansas, and has one huge difference over the competition: a triangulated (trussed) frame. This is the time-proven way to build bikes. RANS has had great success with the triangulated SWB (V-Rex). RANS offers several seat options (Euro shell, Zephyr, standard RANS

and carbon base) and great value in this bike. This is THE highracer if you're a bigger, stronger rider concerned about frame flex. The new Enduro has dual 26" wheels, but will take dual 700c road wheels; this just might be the ultimate versatile highracer.

VOLAE CLUB SPORT: This is the Hostel Shoppe's house brand highracer. The quality of the USA built Volae frame is exceptional. The Volae has a very stiff seat mount (stiffer than the competition), which is said to make for better power transfer, and a larger diameter idler. In contrast, the Volae Chromoly frame may not be as stiff as the competition. The drivetrain is robust, but definitely noisier (idler) than other highracers. The drivetrain was quieter with the optional mesh seat.

TRIKE - TADPOLE

CATRIKE SPEED: This is one Catrike road test that is still current (RCN 090). The Speed is state-of-the-art, light, low, fast, stiff and it moves. The handling is the best of any Catrike tested to date. This is a skinny-tire performance trike with direct steering. Did I mention it was stiff riding? The Speed also uses a 451mm 20" rear wheel (a rare size) and 349mm 16" front wheels.

CATRIKE POCKET: We reviewed the Pocket in the spring of 2005. The 2006 model has 355mm 18" front wheels, a 20" rear wheel and a wider track. The 18" size is an odd-ball, most notably used on the German Birdy folding bike. Be sure to keep a few extra tires on hand.

CATRIKE ROAD: The 2006 Road will have direct steering instead of the previous linkage steering. We're expecting the new Road here soon.

GREENSPEED GT3/5: This is THE state-of-the-art compact all-arounder/performance trike. This 349mm 16" trike has a one-bolt seat and folding frame and is the most compactable recumbent trike made. The Greenspeed GT-series has near-perfect road manners, fine performance and a good ride considering the little wheels. The 3-series trikes have drum brakes; the 5-series trikes have hydraulic disc brakes. GT-series trikes have imported frames and machine-built wheels.

GREENSPEED X-3/5: Imagine the GT-series trike, lay back the seat angle 10 degrees, cant in the front wheels and fine-tune the handling for performance, and you have a world-class folding trike. X-series trikes are built in Australia and have hand-built wheels.

ICE T: The ICE Budget trikes have a bolt-on sliding boom and a bolt-on rear triangle. The T is a bit too upright and not quite enough fun to ride. Most RCN readers would be happier with a Q or S. No 2006 news was available as we went to press.

WIZWHEELZ: The TerraTrike Tour is last year's TT 3.6. Unlike most other trikes, the Tour has bolted-on (rather than sliding) booms that are set at the factory, but the seat slides and adjusts to fit different size riders. The non-trussed frame and bolt-on seat make for a more flexible and comfortable riding trike; the most comfortable of any trike we tested in the past few years. The Tour is an exceptional value and a fine entry-level tadpole trike.

The new TTC is a slightly lower-quality component version of the Tour that now has an imported Chromoly frame and sells for \$1,299 retail. This trike will no doubt create a stir at recumbent trike dealers this spring. Our TTC has just arrived for testing.

TRIKE - DELTA

HASE KETT WIESEL: The Kett is pretty much the only performance-oriented delta trike. It's fairly light and highly customizable (Ti parts options). The center-of-gravity is fairly rearward, and we did lose traction climbing steep, wet local hills during our test. Two-wheel drive is an option (Ride model). The Hase seat is a bit narrow, but they offer an optional wider version. The base trike is a nine-speed, with a Schlumpf two-speed BB as an option. Like other European imports, the Kett gets expensive quickly when you add on options.

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Continued on page 33

2006 Recumbent Spec/Price List

CRITERIA

We've done our best to compile a list of recumbent bicycles and tricycles that are actively marketed and sold in the USA for 2006. We have listed recumbent models that are priced under \$4000 US and that have wide-range gearing for enthusiast use (no 1, 3 or 7 speed bikes). We apologize for the lack of \$4001-\$10,000 models, but we could not allow the space for each very high end model and variation. At the ends of the sections, we have noted which manufacturers have more models that are above our \$4000 mark. Please verify prices, specs, shipping and assembly charges with your dealer/manufacturer. This is only a guide. We highly suggest that you use the Internet to further research the bikes that you are interested in. Please also read the notes at the end of this section, which discuss further information on manufacturers.

CRANK FORWARD

PRICE	MAKE	MODEL	COMPONENTS/SPD	BRAKES	WHEELS	FRAME/FORK	STEER	WEIGHT	SEAT
\$350	Giant	Suede DX	SRAM/Shim mix/21	V	26"	Alum/Susp	OSS	UNP	Comfort/NB
\$369	K2	Big Easy Ace	NA	V	26"	NA/Susp	OSS	NA	Comfort/NB
\$380	Electra	Townie 21	SRAM mix/21	V	26"	Alum/Susp	OSS	UNP	Comfort/NB
\$429	K2	Big Easy Deuce	NA	V	26"	NA/Susp	OSS	NA	Comfort/NB
\$470	Electra	Townie 24	SRAM mix/24	V	26"	Alum/Susp	OSS	33.5	Comfort/NB
\$700	Electra	Townie	Shimano Nexus/8	V	26"	Alum/Susp	OSS	34	Comfort/NB
\$800	C'dale	Daytripper	NA	V	26"	Alum/Susp	OSS	NA	Comfort/NB
\$895	RANS	Fusion	SRAM 5.0/Truv mix	V	26"	ChroMoly	OSS	27.75	Poly Spade/NB
\$1025	RANS	Fusion Cruz	SRAM X7/Truv	V	26"	ChroMoly/Alum	OSS	30.5	Poly Spade/NB
\$1149	RANS	Dynamik	SRAM X7/Truv/27	Mech disc	26"	ChroMoly/Alum	OSS	30.5	Poly Spade/NB
\$2495	RANS	Zenetik	SRAM X9/Uit/27	SP	700c	ChroMoly/Carbon-fiber	OSS	19.8	Carbon Spade/NB
\$2895	RANS	Dynamik Duo (Tdm)	SRAM/FSA/27	Avid disc	26"	ChroMoly	OSS	NA	Poly Spade/NB

Note: RANS and Sun now build crank forward tandems.

COMPACT LONG WHEELBASE/MEDIUM WHEELBASE

PRICE	MAKE	MODEL	COMPONENTS/SPD	BRAKES	WHEELS	FRAME/FORK	WEIGHT	STEER	SEAT
\$500	CycleGen	CGX Starling	SRAM 3.0/24	V	20"/16"	HiTen	UNP	OSS	Mesh/foam
\$625	Sun	EZ1	SRAM mix/24	V	20"/16"	HiTen	39 (Sun)	OSS	Mesh/foam
\$700	CycleGen	Sparrow	SRAM 3.0/5.0/24	V	20"	ChroMoly-HiTen	36	OSS	Mesh/foam
\$700	CycleGen	STX Hawk	SRAM 3.0/5.0/24	Avid disc	20"	Alum/ChroMoly	UNP	OSS	Mesh/foam
\$950	Sun	EZ1 AX	SRAM mix/24	V	20"/16"	Alum/Hiten-ChroMoly	34 (Sun)	OSS	Mesh/foam
\$950	Sun	EZ1 DSX	SRAM DD/24	V	20"/16"	HiTen	39 (Sun)	OSS	Mesh/foam
\$960	Turner	Transport	Mix/24	V	20"	Steel	UNP	OSS	FG shell/foam
\$995	Bacchetta	Cafe	SRAM X4/Sora/RPM	V	26"/20"	Alum/ChroMoly	33.5	OSS	Mesh/foam
\$995	RANS	Tailwind	SRAM 7/Truv/24	Avid V	20"	ChroMoly	33.5	OSS	Mesh/foam
\$1000	Giant	Revive	SRAM DD/21	V	20"	Alum/ChroMoly	UNP	OSS	Alum frame/foam
\$1570+	HP Velo	Spirit	SRAM 8 (DD 24 opt.)	Avid V	20"/16"	Susp Alum/Susp	37	OSS	Mesh/foam
\$1599	C'dale	Bent 2	SRAM/24	V	20"/16"	Alum/ChroMoly	NA	OSS	Mesh/foam
\$1999	C'dale	Bent 1	SRAM/27	V	20"/16"	Alum/Susp	NA	OSS	Mesh/foam
\$3400+	BiGHA	BiGHA	SRAM DD/27	Avid disc	26"/20"	Alum/Susp	44-50	OSS	Alum frame/foam

LONG WHEELBASE

PRICE	MAKE	MODEL	COMPONENTS/SPD	BRAKES	WHEELS	FRAME/FORK	WEIGHT	STEER	SEAT
\$595+	ActionB	MantaRay	Shimano/Durabi/24	V	26"/20"	Hiten	35	OSS	FG shell/foam
\$795+	ActionB	MantaRay GT	Shimano/Durabi/27	V	26"/20"	Alum/ChroMoly	32	OSS	FG shell/foam
\$979	Sun	EZ Sport CX	SRAM/Shim mix/24	Avid V	26"/20"	CrMoChroMoly	40 (RCN)	OSS	Mesh/foam
\$999	Burley	Koosah	SRAM SX4/5/Truv/24	Tektro V	26"/20"	ChroMoly	UNP	OSS	Mesh/foam
\$1099	Burley	Canto	SRAM SX4/5/Truv/24	V	26"/20"	ChroMoly	37	OSS	Mesh/foam
\$1100	CycleGen	LTX Falcon	SRAM 5/7/24	Tektro disc	26"/20"	Alum/ChroMoly	UNP	OSS	Mesh/foam
\$1230	RANS	Stratus LE	SRAM 3.0/5.0 mix/24	Tektro V	26"/20"	ChroMoly	31	OSS	Mesh/foam
\$1299	Burley	Nasoke	SRAM SX4/5/Truv/24	V	26"/20"	Susp ChroMoly	38	OSS	Mesh/foam
\$1325	Sun	EZ Sport AX LTD	SRAM X.9 mix/27	Avid V	26"/20"	Alum/ChroMoly	34 (Sun)	OSS	Mesh/foam
\$1349	RANS	Velocity Squared (V2)	SRAM X7 mix/27	V	26"/20"	ChroMoly	31	OSS	Mesh/foam
\$1399	Burley	Jett Creek	SRAM X7/9/Truv/27	V	26"/20"	ChroMoly	33.5	OSS	Mesh/foam
\$1400	CycleGen	RDx Raven	SRAM X7/Truv 24	Tektro SP	700c/451	Alum	32.6	OSS	Mesh/foam
\$1550	RANS	V2 Formula LE	SRAM X7/Truv/27	Tektro V	26"/20"	Alum/ChroMoly	29	OSS	Mesh/foam
\$1699	RANS	Stratus	SRAM 9/Truv/27	Tektro V	26"/20"	ChroMoly	30	OSS	Mesh/foam
\$1735+	Rotator	Pursuit	Shimano mix/48	Tektro V	20"	ChroMoly	31	OSS	Mesh/foam
\$1749	Burley	Spider	SRAM/Truv/27	Avid V	26"/20"	Susp ChroMoly	UNP	OSS	Mesh/foam
\$1850+	Lightfoot	World Traveller	SRAM 3.0/4.0 mix	Avid disc	26"	ChroMoly	34	OSS	Mesh/foam
\$1850	Lightfoot	Ranger	SRAM 3.0/4.0 mix	Avid disc	26"	ChroMoly	35	OSS	Mesh/foam
\$1985	Lightfoot	Explorer	SRAM 3.0/4.0 mix	Avid disc	26"/20"	ChroMoly	35	OSS	Mesh/foam
\$1985+	Lightfoot	Gazelle	SRAM 3.0/4.0 mix	Avid disc	26"/20"	ChroMoly	32	OSS	Mesh/foam
\$1895	Linear	Welded frame	XT/Tiagra/DA mix/27	Disc/V	26"/20"	Alum/ChroMoly	NA	OSS	Mesh/foam
\$1975	RANS	Stratus XP	SRAM X.9 mix/27	Avid V	26"	ChroMoly/Alloy	31	OSS	Mesh/foam
\$1995	Cambie	Recumboni	Shim Deore/Tiagra	Deore disc	26"/20"	ChroMoly	35	OSS	FG shell/foam
\$1895	Linear	Folding frame	XT/Tiagra/DA mix/27	V	26"/20"	Alum/ChroMoly	NA	OSS	Mesh/foam
\$2295	EasyRcrs	Tour Easy	SRAM/27	SP or V	700c/20"	ChroMoly	30.25	OSS	Mesh/foam
\$2300	Turner	T-Long	Mix	V	26"/20"	ChroMoly	UNP	OSS i	FG shell/foam
\$2395	RANS	V2 Formula	SRAM X.9/Truv/27	Avid V	26"/20"	Alum	27.3	OSS	Mesh/foam
\$2550	Hase	Tagun	Mix	NA	20"	NA	NA	OSS i	Full mesh
\$2599	Longbikes	Slipstream	Mix	Mech disc	26"/20:	ChroMoly	UNP	OSS	Full mesh
\$3445	EasyRcrs	Gold Rush	SRAM/Shimano/27	SP, D, V	700c/20"	Alum/ChroMoly	27	OSS	Mesh/foam
\$3995	EasyRcrs	Fold Gold	SRAM/Shimano/27	SP, D, V	700c/20"	Alum/ChroMoly	31	OSS	Mesh/foam

Note: Angletech, Calfee, Easy Racers and Hase offer bikes that sell for more than \$4000. Check out their websites for more details

SHORT WHEELBASE/HIGHRACERS/LOWRACERS

PRICE	MAKE	MODEL	COMPONENTS/SPD	BRAKES	WHEELS	FRAME/FORK	WEIGHT	STEER	SEAT
\$625+	ActionB	Jetstream	SRAM mix/24	V	26"/20"	Hiten-ChroMoly	32	OSS/OSS	FG shell/foam
\$995+	ActionB	Roadrunner	Shimano/Durabi/24	Avid V	26"/20"	ChroMoly	32	OSS	FG shell/foam
\$800	Lightning	Thunderbolt	Acera mix/21	NA	26"/20"	NA	NA	OSS	Mesh/foam
\$1035+	ActionB	Tidalwave	Shimano mix/24	V	26"/20"	Alum/ChroMoly	31	OSS	FG shell/foam

\$1050	S&B	SWB	Mix/24	NA	26"/20"	Steel	NA	USS/OSS	FG shell/foam
\$1095	ActionB	Tidalwave III	SRAM/Shimano/27	Avid disc	26"/20"	Alum/ChroMoly	28	USS	FG shell/foam
\$1174	RANS	Rocket	SRAM 7/Truv/24	Avid V	20"	ChroMoly	29	OSS	Mesh/foam
\$1245	ActionB	Litespeed	SRAM/Shimano/27	Avid disc	26"/20"	Alum frame	28	OSS	FG shell/foam
\$1250	Volae	Tour	SRAM 5.0/Truv/27	V	26"/20"	ChroMoly	30	OSS	Mesh/foam
\$1294	ActionB	Midracr	SRAM/Shimano/27	Avid disc	26"/20"	Al/mono fork	30	OSS	FG shell/foam
\$1399	Burley	Django	X7/X9/Truv/27	Avid disc	26"/20"	ChroMoly	32.5	OSS	Mesh/foam
\$1399	Route-X	NEOC	Shimano Deore	V	26"/20"	Alu/ChroMoly	38.5	OSS	Mesh/foam
\$1550	Bacchetta	Giro	SRAM X7/Truv/27	Avid V	26"/20"	ChroMoly/Alum	30	OSS	Mesh/foam
\$1550	Bacchetta	Giro 26	SRAM X7/Truv/27	Avid V	26"/26"	ChroMoly/Alum	30	OSS	Mesh/foam
\$1695	RANS	Force 5 LE	SRAM X7/Truv/27	Tektro SP	650c	ChroMoly/Alum	28	OSS	Mesh/foam
\$1699	RANS	V-Rex	SRAM 9/Truv/24	Avid V	26"/20"	ChroMoly	30	OSS	Mesh/foam
\$1700	Volae	Sport	SRAM X7/Truv/27	SP	650c	ChroMoly/Alum	27.5	OSS	FG shell/foam
\$1735+	Rotator	Tiger	Shimano mix/48	Tektro V	20"	ChroMoly	31	OSS	Mesh/foam
\$1800	RANS	Force 5 Enduro	SRAM/Truv/27	Avid V	26"/26"	ChroMoly/Alum	NA	OSS	Mesh/foam
\$1850	Bacchetta	Strada	SRAM X9/Truv/27	SP	650c Xero	ChroMoly/Carbon-alum	29	OSS	Mesh/foam
\$1950	Angletech	Challenge Mistral	Shimano mix	Deore V	20"	HT Alum/Susp	28-33	USS	Alum shell/foam
\$1950	Volae	Century	SRAM X9/Truv/27	NA	26"/20"	ChroMoly/Carbon fiber	26	OSS	CF shell/foam
\$1995	Barcroft	Virginia	SRAM/Shim/FSA/27	ShimanoV	26"/20"	ChroMoly	28.5	OSS	Mesh/foam
\$1995	Volae	Expedition	SRAM X9/Truv/27	Disc	26"	ChroMoly/Alum	28.5	OSS	FG shell/foam
\$2000	Hediger	Wickster	Shimano 105/27	Avid disc	26"/20"	ChroMoly	30	USS	CF shell/foam
\$2199	Burley	HepCat	XT/XTR/Truv/27	Avid disc	26"/20"	ChroMoly	31	OSS	Mesh/foam
\$2199	HP Velo	Grasshopper	SRAM 7.0 mix	Avid V	20"	Susps Alum/Susp	32	OSS/USS	FG shell/foam
\$2199	HP Velo	Street Machine GT	SRAM DD/24	Avid V	26"/20"	Susp ChroMoly/Susp	35	USS d	FG shell/foam
\$2199	HP Velo	Street Machine GTe	SRAM DD/24	Avid V	26"/20"	Susp Alum/Susp	33	USS/OSS	FG shell/foam
\$2200	Bacchetta	Corsa	105/Ultegra/FSA mix	SP	650c Uriel	Alum/Carbon-alum	25	OSS	Euro mesh
\$2200	Turner	SWB	Mix/24	V	26"/20"	ChroMoly	UNP	USS d	FG shell/foam
\$2295	Barcroft	Virginia GT	SRAM/Shim/FSA/27	V	26"/20"	ChroMoly	28.5	OSS	Mesh/foam
\$2295	RANS	Force 5 XP	SRAM X9/105/27	105 SP	650c Uriel	ChroMoly/Carbon-alum	25.6	OSS	RANS Zephyr
\$2300	Angletech	Challenge Hurricane	Shimano/SRAM mix	Tektro disc	20"	Susp HT Alum/ChroM	27.5-33	OSS	Alum shell/foam
\$2300	Volae	Club	SRAM X9/Truv/27	SP	650c Spart	ChroMoly/Carbon fiber	26	OSS	CF shell/foam
\$2490	HP Velo	Speed Machine	SRAM DD/24	Avid V	26"/20"	Susp alum	32	USS/OSS	FG shell/foam
\$2500	Hediger	DT Cruiser	Shimano Ultegra/27	Avid disc	26"/20"	ChroMoly	NA	USS d	CF shell/foam
\$2595	Barcroft	Dakota S	SRAM/Shim/FSA/27	Avid disc	26"/20"	ChroMoly/Susp	30	OSS	Mesh/foam
\$2599	Longbikes	Eliminator	Mix	Mech disc	26"/20"	ChroMoly	UNP	USS	Full mesh
\$2611	Angletech	Challenge Seiran	Shimano mix/18	Tektro disc	26"	HT alum	27-34	OSS	Alum shell/foam
\$2675	Bike Friday	SatRDay Tour 27	SRAM 5.0/Durabi/27	ShimanoV	20" 406	ChroMolyfolding	29	OSS	FG shell/foam
\$2700+	Lightning	P-38	Shimano Deore/LX	NA	700c/20"	ChroMoly/NA	NA	OSS	Mesh/foam
\$2750	Bike Friday	SatRDay Sport 18	SRAM/Capreo/18	SP	20" 451	ChroMoly folding	27.7	OSS	FG Shell/foam
\$2950	Volae	Team	SRAM X.0/Ulit/Truv/27	SP	650c Uriel	ChroMoly/Carbon fiber	24	OSS	CF shell/foam
\$2995	Bike Friday	SatRDay Tour+27	Shim 105/Sora/27	Avid V	20" 406	ChroMoly folding	29	OSS	FG shell/foam
\$3050	Bike Friday	SatRDay Tour DD	SRAM Dual Drive/27	V	20" 406	ChroMoly folding	30	OSS	FG shell/foam
\$3398	Bike Friday	SatRDay Tour EX 27	Shimano Ultegra 27	V	20" 406	ChroMoly folding	28	OSS	FG shell/foam
\$3400	Hediger	HEDTurner	Shimano Dura Ace	Avid disc	26"/20"	CroMo	28	USS	CF shell/foam
\$3890	Bike Friday	SatRDay Tour Elite 27	Shimano Dura Ace/27	V	20" 406	ChroMoly folding	26.4	OSS	FG shell/foam
\$3899	VeloKraft	VK2	SRAM X.0	NA	700c/20"	Carbon Fiber	20	OSS	Shell/foam
\$3899	VeloKraft	VK3	SRAM X.9	NA	20"	Carbon Fiber Susp.	NA	OSS	Shell/foam
\$3900	Bacchetta	Aero	Ultegra/FSA mix/27	SP	650c	Titanium/carbon fiber	22	OSS	CF shell/foam
\$4000+	Bike Friday	Sat R Day Elite 18	Capreo/Dura Ace/18	SP	20" 451	ChroMoly folding	25.9	OSS	FG shell/foam

Notes: The Burley Hepcat has a Velocity Thraxian wheelset for 2006. Bike Friday makes a Rohloff SatRDay that is priced over \$4000. The Bacchetta Carbonaero will be priced around \$5400. Velokraft recumbents are sold through Dana Lieberman's Bent Up Cycle in California. They also sell the NoCom ultra lowracer which sells for \$5725.

TRIKE — TADPOLE

PRICE	MAKE	MODEL	COMPONENTS/SPD	BRAKES	WHEELS	FRAME/FORK	WEIGHT	STEER	SEAT
\$1125	Sun	EZ-3 SX Tadpole	SRAM 3.0 mix/24	Mech disc	20"	Hiten/Hiten-ChroMoly	49	USS	Mesh/foam
\$1275	S&B	Venice Beach	Mix/24	NA	26"/20"	Steel	NA	USS	FG shell/foam
\$1395+	ActionB	Tadpole	Shimano mix/27	Avid disc	26"/20"	Alum	36	USS d	FG shell/foam
\$1495	Sun	EZ-3 CX Tadpole	SRAM X7 mix/27	Mech disc	20"	ChroMoly	47	USS	Mesh/foam
\$1750	Catrike	Pocket	SRAM mix	Avid disc	18" (355)	Alum	27	USS d	Full mesh
\$1800	CycleGen	TRX Phoenix	SRAM DualDrive	Mech disc	26"/20"	Alum	UNP	USS d	Mesh/foam
\$1899	WizWhlz	TT 3.6	Shim Tiagra mix/27	Mech disc	20"	ChroMoly	36.5	USS i	Full mesh
\$2150	Catrike	Road	SRAM X7 mix/27	Avid disc	20"	HT Alum 6061 T6	30	USS d	Full mesh
\$2195	NF Cycles	Maverick	Mix	Disc	20"	NA	NA	USS d	Full mesh
\$2199	WizWhlz	TTS	Shimano mix/27	Mech disc	20"	HT Alum	33.5	USS i	Full mesh
\$2350	Catrike	Speed	SRAM X9 mix/27	Avid disc	20"/16"	HT Alum 6061 T6	29	USS d	Full mesh

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\$2380	OEngines	Triclops	Tiagra/Deore/Ult.	Disc	20"	ChroMoly/Alum seat	42	USS i	Full mesh
\$2400	ICE	Q	Shim/Campy/Micro	SA drums	20"	Steel	35	USS i	Full mesh
\$2400	ICE	S	Shim/Campy/Micro	SA drums	20"	Steel	35.66	USS i	Full mesh
\$2400	ICE	T	Shim/Campy/Micro	SA drums	20"	Steel	37.15	USS i	Full mesh
\$2595	Greenspd	GT3	Capreo Tiagra mix	SA drums	16"	ChroMoly folding	37.5	USS i	Full mesh
\$2599	WizWhlz	TTR	SRAM X9/FSA 27	Mech disc	20"	HT Alum	31.5	USS i	Full mesh
\$2790	HP Velo	Scorpion	SRAM DD/24	Avid disc	20"	Rear susp/alum	36.5	USS i	FG shell/foam
\$2800	Hediger	TriMuter	SRAM DD mix/81	Drums	20"	ChroMoly	42	USS i	Full mesh
\$3000	Hediger	Big Wheel	Shimano mix/27	Avid disc	26"/20"	ChroMoly	39	USS i	Full mesh
\$2845	Greenspd	X3	Capreo Tiagra mix	SA drums	16"	ChroMoly folding	37.5	USS i	Full mesh
\$2995	Greenspd	GT5	Capreo 105 mix	Hyd. disc	16"	ChroMoly folding	37	USS i	Full mesh
\$3200	Hediger	Doyle Pet Honda gas	Shimano mix/27	SA drums	26"/20"	ChroMoly	39	USS i	Full mesh
\$3245	Greenspd	X5	Capreo Tiagra mix	Hydr. disc	16"	ChroMoly folding	37	USS i	Full mesh
\$3499	WizWhlz	Edge	SRAM X9/FSA/27	Mech disc	20"	Carbon fiber	29	USS d	Full mesh
\$3599	Windch	Club Sport	Shmiano mix	Drums	26"/20"	Bonded Alum	NA	OSS	Shell/mesh
\$4000	Hediger	TriMuter BionX (elec.)	SRAM DD mix 81	Disc	20"	ChroMoly	NA	USS i	Full mesh

Notes: Angletech, Greenspeed, ICE and Windcheetah offer trikes that sell for more than \$4000.

TRIKE — DELTA

PRICE	MAKE	MODEL	COMPONENTS/SPD	BRAKES	WHEELS	FRAME/FORK	WEIGHT	STEER	SEAT
\$825	Sun	EZ3 SX	SRAM 3.0 mix/24	Mech disc	20"	Hiten-ChroMoly	56	OSS	Mesh/foam
\$995	Sun	USX	SRAM 3.0 mix/21	Mech disc	20"	Hiten/Hiten-ChroMoly	65	OSS	Mesh/foam
\$1425	Sun	EZ3 AX	SRAM 5.0 mix/24	Mech disc	20"	Alum/Hiten-ChroMoly	50	OSS	Mesh/foam
\$1750+	OEngines	SUV Cargo	Shimano Sora/Deore	Disc	20"	ChroMoly-Hiten	70	USS	Full mesh
\$2495	Penninger	Traveller	Shimano mix/49	RX100 SP	20"	ChroMoly	53	USS	Full mesh
\$2795	Penninger	Voyager	Shimano mix/64	RX100 SP	20"	ChroMoly	52	USS	Mesh/foam
\$2885+	Lightfoot	Greenway, etc.	SRAM 3.0/4.0 mix	Avid disc	26"/20"	ChroMoly	50	OSS	Mesh/foam
\$3200	S&B	Speedster	Mix	NA	26"/20"	Steel	NA	USS	FG shell/foam
\$3200	Hase	Kett Wiesel	Schlumpf Mix/18	Mech disc	20"	NA	NA	USS i	Full mesh
\$3900	Hase	Lepus	NA	NA	20"	NA	NA	USS i	Full mesh

Notes: Lightfoot and Hase offers trikes that sell for more than \$4000. Check out their website for more details. Lightfoot offers several cargo carrying delta trikes. OEngines = Organic Engines.

TANDEM

PRICE	MAKE	MODEL	COMPONENTS/SPD	BRAKES	WHEELS	FRAME	WEIGHT	STEER	SEAT
\$1925	Sun	EZ TDM CX	SRAM/Shim mix	Deore disc	26"/20"	ChroMoly	59	OSS	Mesh/foam
\$2825	Sun	EZ TDM AX	SRAM/Shim mix	Avid disc	26"/20"	Alum/ChroMoly	51	OSS	Mesh/foam
\$3400	S&B	Panther	Mix	NA	26"/20"	Steel	41	USS d	FG shell/foam
\$3499	RANS	Screamer	SRAMX7/Truv/27	Avid V	26"/20"	ChroMoly	45	OSS	Mesh/foam
\$4000	OEngines	Troika	Shimano XT/Ultegra	Disc	20"	ChroMoly	58	USS	Full mesh


Notes: Angletech, Barcroft, Longbikes, RANS and WizWheelz offer tandems that sell for more than \$4000. Many now offer S&S couplers (to separate the frame). Check out their websites for more details

NOTES:

Actionbent bikes are sold direct and prices do not include shipping, or set up.
 Barcroft bikes are sold direct and prices do not include shipping or set up.
 Catrike Speed uses a 451mm 20" rear wheel and 349mm front wheels; As of mid 2005, the Catrike Pocket uses 355mm 18" wheels.
 ICE: Prices are estimates due to exchange rate.
 Lightfoot: Prices do not include crating, shipping or shipping insurance.
 Maxarya: Responded very late; website has loading problems (Macs).
 RANS: Some prices may be higher for larger size frames
 WizWheelz: Prices do not include shipping costs (optional fully assembled trikes).
 Lowracers: We did not list lowracers in this article, but they are available from Angletech (Challenge), Barcroft, and Bent Up Cycles (Velokraft).

KEY: MAKE: COMPONENTS: Truv=Trvativ cranks; Shim=Shimano; DD=SRAM Dual Drive 3x8 internal 3-speed hub; BRAKES: V=V-style linear MTB brakes; SP=Side-pull road brakes; Disc =MTB style mechanical/cable actuated disc brakes; FRAME: ALUM=aluminum; HT ALUM=heat treated aluminim; ChroMoly= Chrome-Moly aircraft grade steel; Hiten=High-tensile steel; CF=Carbon-Fiber; FORK: Susp=suspension; WEIGHT: UNP=Unpublished; STEER: OSS: above-seat steering; USS: Under-seat steering;

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Tadpole trikes
www.catrike.com

Cycle Genius
CLWB, MWB & LWB
www.cyclegenius.com

Easy Racers, Inc.
LWB & MWB
www.easyracers.com

Giant Bicycle
CLWB & CF
www.giant-bicycle.com

Greenspeed USA
Tadpole trikes
www.greenspeed.com.au

Haluzak
SWB frames
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www.barcroftcycles.com

Bent Up Cycles
Velokraft lowracer
www.bentupcycles.com

Bike Friday
Folding SWB
www.bikefriday.com

Black Bird Bikes
Sun EZ1 Quad/Kit
www.blackbirdbikes.com

Doyle Custom Bikes
tadpole trike with motor
www.doylecustombikes.com

Human Powered Machines (HPM)
SWB, LWB & folder
www.efn.org/~cat

Hediger Cycles
SWB & tadpole trike
www.trimuter.com

Just Two Bikes
Delta trike and tandem
www.justtwobikes.com

KMX America
Tadpole trikes (adult & kids)
www.kmxus.com

Linear Recumbent
LWB & SWB folding
www.linearrecumbent.com

NFCycles
Tadpole trike
www.nfcycles.com

Organic Engines
Trike, tandem & truck
www.organicengines.com

Rhoades Car International
Quads
www.rhoadescar.com

Rotator
SWB, LWB & tadpole
www.rotatorrecumbent.com

Route-X Recumbents
SWB
www.route-x.com

S&B Recumbent
SWB & trike
<http://home.pacbell.net/recumbent/>

Sidewinder
FWD rear steer trike
www.sidewindercycle.com

Turner Enterprises
SWB, LWB & tandem
www.turnerrecumbents.com

Volaer Recumbents
SWB & highracer
www.volaerrecumbents.com

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K2 Bikes
www.k2bikes.com

Lightfoot Cycles
www.lightfootcycles.com

RANS Recumbents
www.ransbikes.com

Sun Bicycles
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www.challenge-ligfietsen.nl/

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www.optimabikes.com

Trisled (Australia)
Tadpole trike
www.trisled.com.au

Windcheetah/AVD (UK)
Tadpole trike
www.windcheetah.co.uk

Zox (Germany)
SWB FWD & lowracer
www.liegerad.com

RECUMBENT PARTS

(See also individual builders for parts, accessories & dealers)

Angletech
Parts, bags, & wood fenders
www.angletechcycles.com

Bikesmith Designs/Mark Stonich
Custom short cranks
www.bikesmithdesign.com

Easy Street Recumbents
BikeE & Vision parts
www.easystreetrecumbents.com

Hostel Shoppe
Parts & Access.
www.hostelshoppe.com

Mueller Windwrap
Fairings & mounts
www.windwrap.com

Power On Cycling
Recumbent parts
www.poweroncycling.com

Rotor Systems
Custom crankset & egg rings
www.rotorsystems.com

SCOR Kneesavers
Pedal extenders
www.kneesaver.net

Schlumpf
Two-speed bottm bracket
www.schlumpf.ch

Schwalbe Tires
Recumbent tires
www.schwalbetires.com

Streamer Fairing
(See HP Velo)

TerraCycle
Idlers, h'bars, risers, under-seat racks & tail fairing
www.terracecycle.com

Zzip Designs
Fairings & mounts
www.zzipper.com

RECUMBENT CAR RACKS

Alpaca
www.alpacacarriers.com

ATOC
www.ATOC.com

Davert Rack
www.rbr.info/

Draftmaster
www.draftmaster.com

Recumbent Rack
www.topperfloats.com

Yakima
www.yakima.com

RECUMBENT PLANS

Bentech SWB Plans/Kit
www.bentechbikes.com

CruzBike FWD Kit
www.cruzbike.com

LaBent by LaDue Plans
www.radiks.net/~ladue/

Recycled Recumbent (LWB)
www.recycledrecumbent.com

R.Q. Riley Plans
Web: www.rqriley.com/bike.html

Wooden Recumbent
www.woodenbikes.com

2x4 Recumbent
www.manytracks.com/Recumbent/
jrobin.htm#Top

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Mini Reviews . . . Continued from page 28

LIGHTFOOT COURIER:
Lightfoot trikes are the toughest made today. They are custom built for the rider's size in varying wheelbases and cargo-carrying options (even with a pedicab option). The primary difference between the Lightfoot and other delta trikes is the more standard rear wheels

that are supported from both sides with standard type axles. Traction can also be an issue with this delta, and two-wheel drive is an option. While I haven't done an extensive review of this trike, I've ridden them on a few brief occasions.

SUN EZ-USX: Yeah, it's heavy, and has this odd center suspension,

but it's become a real hit in bike shops and owners love them. Okay, so I wouldn't commute, haul big loads or tour across continents on one, but it's a super value. I have not had the opportunity to review a Penninger, SUN USX or EZ3, so I can't offer an opinion. ♦

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- 16" 28-349, □
- 17" 32-369, □
- 18" 28-355, □
- 20" 28-406 folding, 28-451, □
- 26" 28-559, 23-571, □
- 28" 23-622, 25-622, 28-622, □

MARATHON PLUS:



- 20" 47-406, □
- 26" 47-559, 37-590, □
- 28" 28-622, 32-622, 37-622, □
- 40-622, 47-622, 40-635, □

MARATHON SLICK:

- 20" 35-406, □
- 26" 35-559, 47-559, □
- 28" 30-622, 37-622, □

MARATHON:

- 16" 40-305, 47-305, 37-349, □
- 18" 40-355, □
- 20" 40-406, 47-406, □
- 24" 40-507, 47-507, □
- 26" 40-559, 47-559, 50-559, □
- 37-590, □
- 27" 32-630, □
- 28" 28-622, 32-622, 37-622, □
- 40-622, 47-622, 40-635, □

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