

Making the World Safe for Recumbents

You Can Be the Biggest Show in Town. Just Ride an Avatar 2000 Around the Block and Watch the Jaws Drop

John Schubert

I'm cycling to work on what one would politely call a commercial section of highway. Unending streams of motorists, Big Macs in hand, overtake me from behind.

They drive unusually slowly. After they pass, their eyes are plainly visible in their rearview mirrors. They're staring at me. A few motorists put on their brakes so they can stare longer. Passengers invariably crane their necks for a better view.

There's no blending into the wallpaper when you ride a recumbent. The Avatar's co-designer, Dick Forrestall, puts it this way: "I feel like I'm the Pied Piper when I ride it."

Yet, recumbents are not new. They

were first seen before the turn of the century, and the French recumbent Velocar broke a series of track records in 1932. It was promptly banned from competition.

Bicycling reported on a recumbent designed and built by Dan Henry (also the inventor of the sling saddle and lightweight spring-suspension frame) in 1968. The Avatar, however, is the first hand-built recumbent we've seen offered and promoted for widespread sale.

Different Recumbent Designs

There are many ways to build a recumbent. Dan Henry's has an armchair-like rider position, with the crank axle

(and pedals) below the seat. The Avatar 2000 is more sports car-like, with the crank axle almost directly in front of the cyclist. Alternatively, a recumbent can maintain the conventional bicycle's torso-to-legs angle, in which case the crank axle is slightly higher than the seat. The Sofa Cycle, described in an accompanying article, is built in this way.

Recumbents have been built with wheelbases as short as 36 inches and as long as seven feet. Maneuverability is improved by a short wheelbase, comfort by a long one.

And so the Avatar, whose other co-designer is the well-known David Gordon Wilson, is not an untested first-of-a-kind. Its design has evolved from a series of prototypes and thousands of miles of cycling.

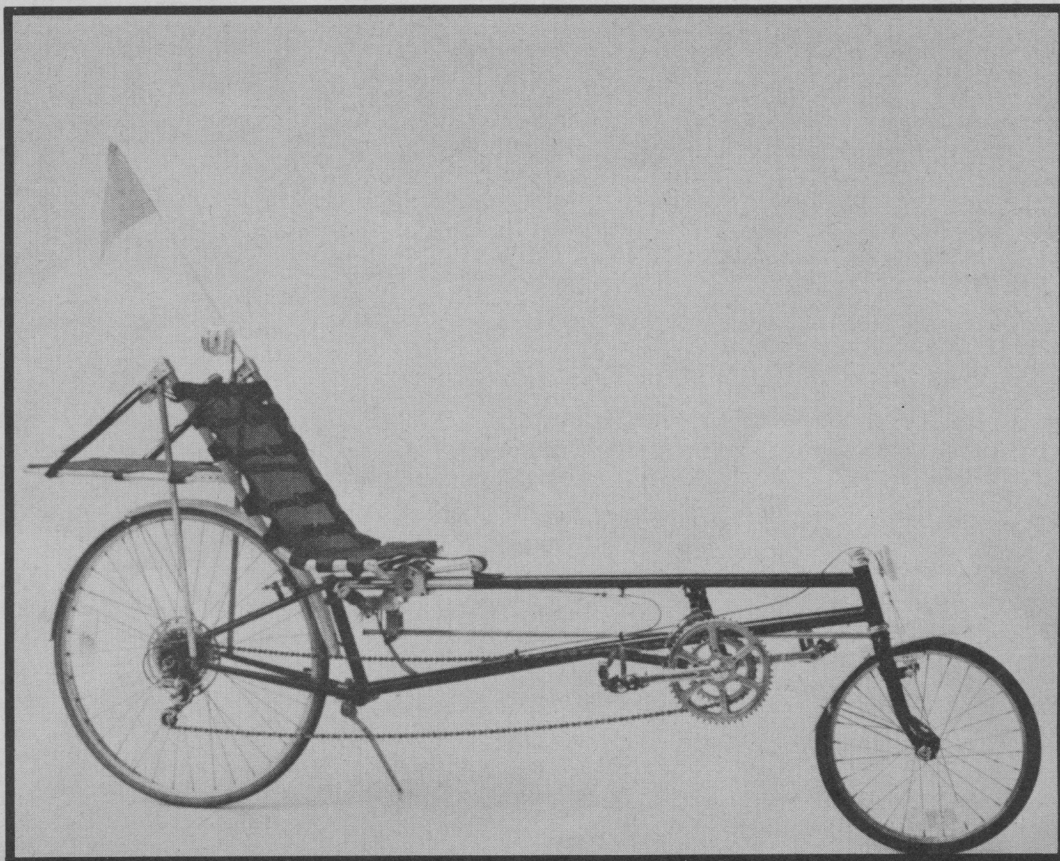
So what's it like to ride? It's great. But you have to get used to it—and until you do, it's not so great.

Wobbly At First

I spent several very wobbly and insecure days riding the Avatar before feeling comfortable on it. Starting up from a standstill was a shaky ordeal, and my neighbors in Allentown, Pennsylvania, will long remember me tracing sine waves in the road as I pulled away from stoplights.

Minor evasive maneuvers and simple

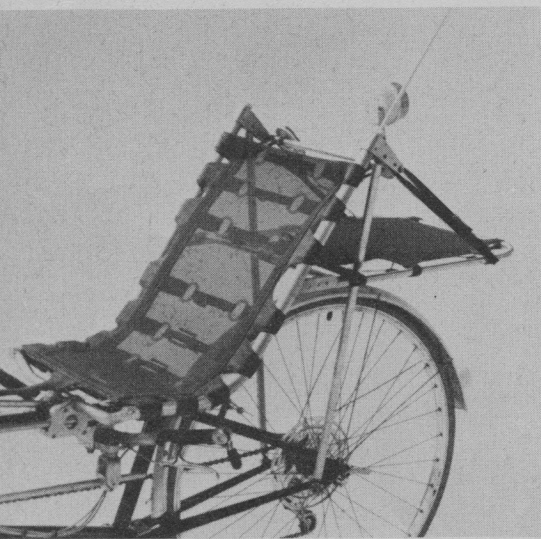
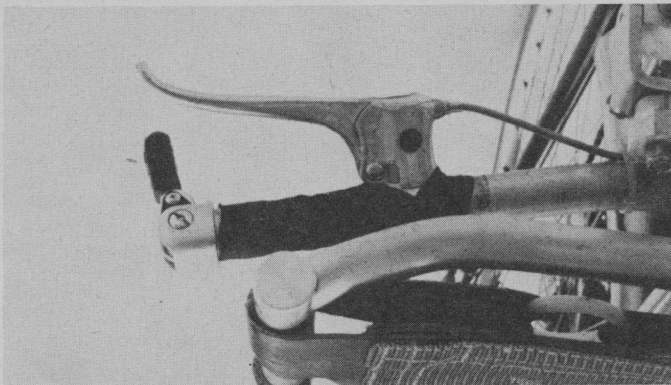
Avatar 2000



PHOTO/STAFF



Above: When riding the Avatar 2000, you may have to turn down offers of competition from passing motorists. Right: Hand controls are placed so you're always ready to shift or brake. Below: The Avatar's seat area shows many features seldom seen on a bicycle. The hollow seat tracks serve as guide tunnels for the rear cantilever brake's extra-super-long "transverse" cable. A neatly-bundled harness of control cables and sealed-bearing steering mechanism (which uses aircraft control rod hardware) are two nicely-thought out touches.



PHOTO/STAFF

intersection manners were frightening, and my utter lack of slow-speed directional stability made hill-climbing impossible. Looking behind me to negotiate a lane change was out of the question. It took me so long to get moving successfully each time I got on the bike that I thought it was impractical for short errands.

Better With Experience

Time and experience completely changed my attitude. After a week or two, I was hooked; I would scorn other bikes in the house to take the Avatar to the corner store. I found it at least as easy to ride and stable as a conventional bike, and it was much more comfortable. I had no qualms about cruising in traffic with the Sunday *New York Times* under one arm.

Because you don't lean on the handlebars on a recumbent, you have more control during one-handed cycling—not that I advocate one-handed cycling. But placement of the controls allows you to steer, brake and shift simultaneously with one hand.

With experience, I could look behind myself with aplomb, drop the 21-speed drivetrain into the 31-inch granny gear and creep up the steepest hill, dodge potholes and successfully ride up the narrow lane between stopped cars and the curb. And I loved sitting in a real seat while I was doing it.

The ability to ride quickly and exercise effectively also came with experience. Initially, my legs weren't trained to lift their own weight in this new position, and I couldn't spin very effectively. And it's hard to psyche yourself for strenuous exercise when you're sitting back in a comfortable chair.

But my ability to spin fast and push myself progressed quicker than my ability to handle the bike. One notable difference was that I found cleated cycling shoes more important for efficient pedaling technique than they are on a conventional bike. Without cleats, I had to fight to keep my feet from slipping back back out of the pedals.

Is the recumbent a better design for biomechanical efficiency? There's no simple answer to that question. Of course, recumbent and prone bicycles dominate the International Human-Powered Speed Championships. But the top-name bicycle racers who power these vehicles often complain about their unfamiliarity with them. They don't always feel in control, and their performance suffers accordingly.

The ability to perform depends on your comfort with the rider position. Once you're used to a recumbent, it might or might not be better. But when you factor in lessened wind resistance and lessened fatigue of the back, arms and shoulders, it's probably a better package deal for most cyclists.

In an admittedly crude experiment, Forrestall compared the Avatar's ability to push against a vertically-mounted bathroom scale with that of a conventional bicycle. Several cyclists tried both bikes. The Avatar scores averaged 70 pounds to the conventional bicycle's 40.

In accompanying articles, two opinions of the recumbent's hill-climbing ability are offered. Wilson says it's fast; Gary Fisher says it's slow. I'll have to side with Gary. For me, it's slow, but easy.

I found the Avatar's maneuverability adequate for any movement I wanted to make, including U-turns in narrow side streets. Of course, the 63-inch wheelbase (a couple inches shorter than most tandems) will not allow some handling tricks that a conventional bicycle (40- to 42-inch wheelbase) will allow. But you can pedal the recumbent through sharp corners because the bottom bracket is about two inches higher, and the pedals won't scrape the ground. So a comparison of handling abilities is not a clear-cut victory for either side.

Short vs. Long Wheelbase

The earlier-design recumbent which Wilson rides to work has a much shorter wheelbase than the Avatar 2000. (The front wheel is tucked in between the cyclist's knees.) In my early days of Avatar cycling, when I was less comfortable with its handling characteristics, I couldn't imagine why Forrestall and Wil-

“We have to get started. Unless we do, there will never be any innovations in bicycling.”

son would have turned away from the short wheelbase.

"The long wheelbase gives you better braking physics," Forrestall told me. "The short-wheelbase version is fairly easy to tip. In addition, it has more front wheel rolling resistance, with more than 60 percent of the weight distribution on the front wheel. The long-wheelbase version corrects this."

The steering linkage offers a choice of two ratios: normal (for a bicycle) and geared-down (somewhat similar to automobile). Although most people assume the geared-down ratio would be easier for a beginner, I found this wasn't the case.

The geared-down steering restricts maneuverability too much, and its handling characteristics are counter-intuitive. Moreover, of the dozen or so people who rode the recumbent while I had it, those who tried the normal ratio adapted to it much more quickly. Nonetheless, Forrestall believes the geared-down ratio is better for some novices; and it only means drilling another hole in the factory.

One Frame Size

The Avatar is advertised as a "one size fits all" bike. This claim is generally true. I could slide the seat forward far enough for a five-foot, two-inch cyclist who normally rides a 19-inch frame with the seat all the way down, and far enough back for a six-foot, two-inch cyclist whose seatpost soars out the top of his 25-inch Paramount. Each time, the seat was near the end of its range of travel. (For a taller cyclist, Forrestall would mount the seat a few inches higher; it can then be slid farther back as well.)

With a 48-inch chainline, the Avatar has no trouble with its three chainwheels and seven cogs. The half-step-plus-granny gearing runs from 31 to 110 inches, with a hair-splitting average seven percent difference between adjacent gears. You can shift just as methodically and keep your cadence as constant as you want.

And if all that shifting confuses you, you can leave the chain on the middle ring and have a perfectly good 44-to-102 seven-speed. Or you can get a new cluster with five cogs.

Experience with tandems led me to expect some problem with the slack side of the extra-long chain slapping against the frame, but no such problem occurred.

The Avatar we rode is a prototype, and production models will incorporate several improvements. An invisible change in frame construction will make the bottom bracket stiffer (I had no complaints with this one), and the steering linkage will be changed slightly.

A much-needed G.E. Lexan® polycarbonate chainguard will protect the cyclist's pants, which tend to rub the chain more than on a conventional bike. More mundane changes include different hubs,

chain, pedals and other standard components.

Some desirable changes will be harder to make. The Avatar uses Mafac cantilever brakes with Weinman brake levers. The levers are designed for sidepull brakes and do not have enough cable travel to exploit all the cantilever brakes' stopping power.

In another admittedly crude test, I compared the Avatar with a conventional bike for stopping distance. The two bikes were ridden side-by-side and both cyclists braked hard at a predetermined point. Even though the Avatar's rider outweighed the other rider by 30 pounds, he was able to stop a bit more quickly—but only by pulling the brake levers alongside the handlebars so they didn't bottom out.

Because the Avatar has such a low center of gravity, a conventional kickstand works on it much better than on a conventional bike. That's important, because the bulky Avatar is a lot less convenient to park. It did, however, fit completely inside both a VW Rabbit and a Mustang II with only a few minutes' disassembly, so multimodal transportation is still possible.

Recumbents are frequently criticized for being too inconspicuous on the road. I don't think this criticism is really valid. No bicycle is sufficiently conspicuous unless the cyclist takes steps to make it so, and there are plenty of such steps you can take on the recumbent. I logged more than half my mileage after dark, sometimes under very murky conditions, and experienced no problems with being seen. Maybe my two Belt Beacons and leg light helped.

Many people can't tolerate the discomforts of a conventional bicycle. Most of us are luckier than that. We can tolerate these discomforts and adapt to the point where we don't even notice them. But the conventional bike is inherently uncomfortable. The recumbent is inherently comfortable. Your back, arms, neck, shoulders and rump will never feel as relaxed during sustained exercise. Your hands will stay warmer during winter cycling. The suspended-mesh seat with leather trim is very well-designed and built.

So who builds the Avatar? Forrestall, known in the Boston area as a bicycle expert, has formed a small corporation with the help of marketing ace Harald Maciejewski. (Their two last names combine to spell Fomac, the name of the company.) Co-designer Wilson, who has worked with Forrestall for several years, is a phone call away.

Fomac has plans to introduce panniers, a fairing, a front luggage bag and other accessories for the Avatar. Until that time, I suspect their happiest customers will be people capable of sewing their own custom-design bags. Fomac has a patent pending on the sliding seat-

and-steering mechanism.

Both Forrestall and Maciejewski are quite hopeful about their venture, though Maciejewski has been heard to mutter about how much they've mortgaged themselves to the Avatar's success.

Fomac plans to build some 800 Avatars in 1980 and sell them, mostly "to serious tourists," for \$1575 each. That's not cheap, but it buys a lot of innovative engineering, original thought and cycling comfort. Some pretty boring conventional bikes with outdated engineering cost hundreds of dollars more.

Forrestall looks forward to an active dialogue with his customers.

"It's a beginning," he said. "The bike may look quite different in a few years, depending on what we learn. But we have to get started. Unless we do, there will never be any innovations in bicycling."

Well, there would be innovations. But few would have Fomac's chutzpah. ○

**Thanks to Crispin Miller for technical assistance with this article.*

Avatar 2000 Manufactured by:

Fomac, Inc. Wilmington, MA 01887
40 Oakdale Road 617/658-2478

RETAIL PRICE: \$1575 (fob Wilmington, MA); rear carrier optional at extra cost; sold in one frame size only; bike tested: unnumbered prototype; total weight, including fenders, kickstand and carrier: 32 pounds, 6 ounces.

FRAME: Reynolds 531 butted seat-and chainstays, fork and steerer tubes; chrome-molybdenum 4130 head, top, seat and bottom bracket tubes; Sun Tour Superbe headset; stainless-steel seat tracks, DuPont Imron paint; wheelbase: 63 inches; chainline: 48 inches; bottom bracket height: 12½ inches

WHEELS: Sun Tour Superbe quick-release hubs; Weinmann 16 x 1⅜ 101A alloy front rim (specially-built for the Avatar 2000); 27 x 1¼ 124A rear rim; IRC 60-pound front tire (standard for sidewalk bicycles); 100-pound rear tire.

DRIVETRAIN: Sun Tour Cyclone GT derailleurs with Bar-Con shift levers; Sedis chain; T.A. Cyclotourist crankset; Sun Tour Ultra-7 freewheel.

COMPONENTS: Sun Tour Superbe pedals; tubular aluminum frame seat (can be removed and folded without tools); tubular aluminum handlebars and steering rod; aircraft control rod fittings on steering rod; Mafac cantilever brakes with Weinmann brake levers; Ampec Belt Beacon flasher.

GEARING IN GEAR INCHES

| | 34 | 49 | 53 |
|----|----|-----|-----|
| 13 | 71 | 102 | 110 |
| 15 | 61 | 88 | 95 |
| 17 | 54 | 78 | 84 |
| 20 | 46 | 66 | 72 |
| 23 | 40 | 58 | 62 |
| 26 | 35 | 51 | 55 |
| 30 | 31 | 44 | 48 |

Note: Component specifications are for production models, not for our prototype. Differences have no critical influence on the bicycle's performance.