Electric bike

BONUS ISSUE

Issue 0

Welcome to Issue 0 of Electric Bike!

An online exclusive, featuring the best electric bike reviews from recent issues of *Velo Vision* magazine...

Electric Bike Magazine – Issue 0

As a bonus treat for our online readers, here's some reading to while away the time as you wait for Electric Bike magazine Issue 1!

This 'Issue 0' brings together some of the recent electric bike reviews we've featured in Electric Bike's sister publication, *Velo Vision*. Some are a few years old now, but I hope they're still useful!

So read on to enjoy:

From Velo Vision 34, June 2009:
Gocycle review

From Velo Vision 32, December 2008:
Electric kits reviews: BionX, Sunstar. Heinzmann, Alien, Nano

From Velo Vision 31, September 2008:
Heinzmann Estelle Sport review

From Velo Vision 26, June 2007:
Three way review: Ezee Forte, Airnimal Joey Move, Sparta Ion M

Velo Vision Sample Article

This PDF is a sample of the material in *Velo Vision* Issue 34, June 2009. The full contents page is shown opposite.

To get an idea of our current output, please visit:

www.velovision.com

where you will find, amongst much else, full subject/author indices, sample articles to download and an online shop where you can subscribe, on paper or in a digital edition.

If you have any problems or suggestions about the magazine in general, or this PDF article in particular, please email me at

peter@velovision.com

I hope you enjoy the read.

Peter Eland.

Peter Eland
Editor and Publisher,
Velo Vision

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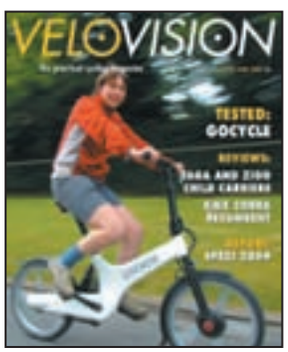
VELO VISION AND VELO-VISION
We weren't first with the name. Velo-Vision is a bike shop in Körten, near Bergisch-Gladbach, Germany. *Velo Vision* magazine exists in friendly harmony with Velo-Vision in Germany.

Velo Vision is printed on paper produced from sustainable forests to Nordic Swan standards.



COVER: Gocycling! *Photo: Peter Eland*

OPPOSITE: A swarm of bees on parked bikes in Bishopthorpe Road, York, provided an unusual sight for shoppers. *Photos: Arthur Clune*

On the move

As you'll read in the News section, and see in the masthead details above, we moved premises in late May, and we're now happily settled into our much larger office at the Eco Business Centre on the north edge of York. Please do use the new address if you need to contact us or send anything.

We've also been on the move to the SPEZI, with another convivial coach trip to a packed weekend of cycling and innovations, as you'll see in our full report.

Finally, we've been moving ourselves around on a fascinating range of review bikes this issue, all in their own ways innovative and interesting. The Gocycle and Taga in particular are rare instances of 'designer' concepts embodied as practical, useful products – but do their looks get in the way? Is the simplicity and affordability of more traditional cycle engineering, as on the Zigo or KMX, a better bet?

There's an easy way to find out – read the reviews and decide for yourself!

Peter Eland


Gocycle

GETTING ON WITH THE GOCYCLE

It's a bike like no other, a compact electric-assisted bike which also packs down superbly small. So can the Gocycle live up to the promise of its appearance? We tried one of the first production machines to find out.

BACKGROUND

The Gocycle has had a long gestation, from the early prototypes which designer Richard Thorpe showed to us back in the early days of *Velo Vision* to today's finished article. As we described last issue, the first batch of bikes were placed with 'beta' test riders for several months before production of the current machines commenced – so that any weaknesses would be exposed and could be fixed. Production has now moved to the UK, and Gocycle are busy developing a dealer network. Overseas distribution arrangements are expected to be in place shortly, too. As we go to press, orders placed now expected to be delivered in August. Some dealers may have them in stock, though.

The Gocycle is now only available complete with its electric-assist system, which they call the 'Empower Pack', and in this form the bike costs £1158 (simple assembly required) or £1198 (assembled or via dealers). As you'll see later, it fits together very easily, so I'd suggest saving a few pounds and going for the first option.

Our bike came fitted with the optional lightweight kickstand (£35), the lighting set (£25). The mudguards and integrated cable lock are included as standard.

Luggage-carrying is provided in the form of a stem-mounted front pannier rail (£14) from which you can hang a full-size pannier (max 5 kg), and/or a rear luggage arm (max 15 kg recommended). This follows the contour of the rear mudguard and provides a platform onto which a variety of hard-shell luggage can be attached using Ortlieb's quick-release plate system.

Other accessories available include the hard-shell carry case (£90) and a fabric carry bag with foam insert (£40). A heavy-duty two-leg stand is also available for extra stability (£30). Finally, anti-theft bolts (£10) are available to make the wheels not quite so quick-release and tempting to the mischievous or light-fingered!

FIRST IMPRESSIONS

As you can see from the photos the Gocycle is a radical departure from conventional cycle design – and most would agree it looks fantastic: modern, stylish and smart. The smooth curves, classic black/white colour scheme and five-spoked wheels all contribute to the very 'clean' look: there's little of the fussy detail of spokes, chain and loose cables which many bikes display.

BELOW: The five-spoke wheels are, like the frame, made from cast magnesium.

The frame is cast from magnesium alloy, coated to prevent corrosion, and it's flawlessly finished in pure white. The frame has a 100 kg weight limit for rider, clothing and luggage. The user manual (supplied in digital PDF format on a USB memory stick) is full of reasonable enough exhortations not to let it sit around wet, perhaps as much for the sake of the electronics as for the frame.

The frame does have a lifetime warranty, and there's a two year warranty on other parts. And because the bike uses so many non-standard components, if anything goes wrong Gocycle say they will simply ship out replacement parts, modules or even complete bikes on a next-day courier service, either direct to the customer or via dealers, to fix the problem.

One of the main features of the frame is that the rear swing-arm completely encloses the chain drive system, so when manhandling or riding the bike there's no need to worry about getting chain muck on your clothes. The enclosed drive should last indefinitely without maintenance, too. A three-speed hub gear in the back wheel gives gear ratios of 35", 53" and 71".

The wheels, with slick, wide 20" (406) tyres, are Gocycle's own design, again moulded in magnesium with five spokes apiece. They lock to the hubs via three curved levers; the action is very positive and secure-feeling. The wheels certainly look good, but the user manual strikes a note of caution, urging checks for

fatigue cracks every 500 miles or so, particularly at the spoke heads.

Each wheel is equipped with a mechanical disk brake, which stays in place when the wheels are removed. Wisely Gocycle have provided a shroud for each disk, so avoiding a common problem with disk brakes – the ease with which you can bend a rotor. Sure, the shrouds reduce the ventilation a bit, but that's unlikely to be a problem for this type of bike.

The stem assembly is pleasingly chunky, and it's angle-adjustable in three settings. Height is also adjustable via a solid Allen key clamp. The cables are guided neatly down through the stem, entering just below the handlebars. The bars themselves have 'soft touch' padding to create a smooth taper from centre to end, again contributing to the clean lines. A twist-grip for the gears and a small bell adorn the right-hand side, while on the left there's the push button for the electric assist system.

The saddle and seatpost are again chunky, large-diameter tubes finished in satin black. Instead of using a standard quick-release, saddle height is adjusted using a long lever just under the saddle; this expands an internal wedge to lock it into the lower section at your chosen height. A small thumbscrew lets you remove the whole assembly (see later).

ABOVE LEFT: The stem can be locked into any of three positions to adjust the reach.

ABOVE: The power button and not very comfy grips.

ABOVE RIGHT: Note the long lever just below the saddle, used to lock or unlock the seatpost for height setting.

LEFT: The motor is discreetly built into the front hub. Note the USB port on the fork blade.

FAR LEFT: Cables are neatly gathered in plastic mesh sleeves.

On then to the electric assist system. The motor is a discreet unit built into the front wheel. The NiMh type batteries are concealed within the main frame. Control electronics are also built in. There's even a USB port on the front fork leg to allow you or Gocycle to connect the bike to a computer for reprogramming if firmware updates are ever necessary.

A substantial 'smart' battery charger is provided – Gocycle recommend you leave the machine on standby charge all the time, for best battery life. With cables, it weighs around 1 kg. There's a noticeable cooling fan noise when actually charging, but it's silent on standby.

The mudguards are stayless,

cantilevered out from their support points, but were nonetheless remarkably rigid and flop-free. Substantial aluminium ribs run up the underside of each of them. They did run close to the tyre, and any grit on the road would rattle up there rather. But again not a problem – this isn't the bike for muddy tracks or riding in snow.

The 'Shocklock' cable lock (weighing 655 g) is fitted through the bike's shock absorber for carrying. Extended, it's long enough to lock through both wheels of the bike, and unless you've got the anti-theft bolts this might be wise. It's certainly handy for low-risk situations, perhaps for locking the bike up outside a cafe where you can keep an eye on it. But cable locks are notoriously easy for thieves to cut, so for higher-risk areas a more effective combination would be those bolts for the wheels plus a decent D-lock, carried on your person perhaps. Gocycle also offer a heavier-duty chain lock (£70), but I've not seen it yet. Then again, this is the sort of bike you'd probably only choose for commuting if you have secure parking at each end of your journey.

The lighting system is simply two small LED lights, attached neatly to the fork crown and under the saddle. Definitely lights to make you legal and to be seen by – you could easily fit a more powerful battery light to the handlebars if you needed more.

Last but not least, the lightweight twin-leg stand folds up remarkably small – so close against the frame that it's easy to miss. It did a good job of holding the bike up on firm surfaces, but if you use it a lot I'd go for the heavyweight version for extra stability.

Weight as tested was around 17.5 kg, including all of the accessories. That matches up with their claimed weight of 16.2 kg with electric package and mudguards. Without these, the bare bike apparently weighs just 11.9 kg. Either way, it's extremely light as electric bikes go, and weighs less than a good few non-electric machines!

THE RIDE

The Gocycle is a very rigid bike, and it instantly feels remarkably stable and solid. The stem assembly, often a weak point on small-wheeled bikes, felt strong and flex-free. The big fat slick tyres helped give it a super robust and stable ride; just like the Big Apples on my own town bike, they give the feeling you can hit any obstacle and do no damage. Together with the rear suspension, they also do a good job for ride comfort. Not quite up to Moulton levels, but smooth on most surfaces.

With the stem at its middle setting, the riding position is pleasantly upright – no bad thing for a town bike.

The handlebar grips, though, are round, hard and somewhat uncomfortable. I'd replace them with some more ergonomic grips in an instant, and perhaps add some bar ends, if it were my own bike.

The brakes are truly excellent, giving powerful controlled stopping from any speed.

The three-speed gears are operated by a twist-grip, and changes were smooth and easy even under light loads. The fully-enclosed drive system is almost silent, and only occasionally on bumps would there be a 'knock' as if the chain were hitting the side of the casing. The drive, through a three-speed Shimano Nexus hub gear, seemed reasonably efficient, and the bike's rigidity also contributed to a feeling of an instant response to pedalling effort. I found the ratios (35", 53", 71") well suited to urban use, especially if you're happy with a fairly high cadence. That low gear is certainly good for acceleration from a standstill. Some riders who preferred a lower cadence did find it undergeared, and if you can't spin fast it does force you to rely more on the motor to achieve decent speed.

So to the electric assist. To turn it on you just press the red button, and wait a moment or two for the motor to kick in. As delivered, the bike is set to 'UK mode' which does not require you to be pedalling for the motor to operate. If you take it to mainland Europe you'll need to switch it to 'EU mode' to stay legal, as most of these countries require pedalling for power assist to cut in. Swapping over is simply a matter of holding down the power button and releasing it after the appropriate series of beeps.

In either mode the motor cuts out as your speed reaches 25 km/h (16 mph). There's also a lower bike speed limit below which the motor

ABOVE AND BELOW: The twin-leg 'display stand' tucks away very neatly against the swingarm when not in use.

won't operate, too. I suspect the idea is to discourage you from using the motor at very low revs, which soaks up battery power for little effect, and possibly also to avoid accidental operation.

It's when the motor is turning a bit faster that you get more efficient performance anyway – so if on a hill start you're still moving slowly, it will struggle to accelerate you. On the same hill, get up a bit of speed first and it will boost you up powerfully.

For me, the top gear ratio let me pedal comfortably just a bit faster than the motor cut-out speed, so on the flat it had little use, just kicking in occasionally to help me over bridges and the like. For serious gradients, however, it was excellent, really pulling you along. So while it's not a fast bike in top speed terms, the electrics let you keep average speeds quite high even in hilly areas without much effort. Alternatively, you can just ease off completely on the pedals and let the motor pull you along, perhaps to cool off on the last bit of a ride for a non-sweaty arrival.

The motor is quite noisy, with a whining quality to the sound: other cyclists or pedestrians you overtake will definitely know you've engaged the motor. In heavy traffic it's much less noticeable of course.

Gocycle quite rightly say that range is too dependent on riding style and use to set a definitive value, but they say that with 30% usage of power assist you should be able to go for around 20-25 miles on a full charge. There's no battery level indicator (except a warning beep if the charge level gets dangerously low) so it's hard to say how much was left in the batteries after any particular journey. On my bike, a single charge was showing no signs of depletion after at least 20 miles of mostly flat commuting.

THE 'FOLD'

As Gocycle are at pains to point out, this isn't a fast folding bike with which to do an origami act on the station platform. But it will dismantle to a seriously small package in just a few minutes.

First, you turn the bike over so it's resting on handlebars and saddle – in a neat touch the bell swivels round easily so that it stands stable. You then undo the three quick-releases on the back wheel. The wheel now pulls off – or a tap on the rim may be necessary to dislodge it. Now remove the rear mudguard (a simple thumbscrew).

The next job is to remove the front fork, with wheel and mudguard still in place. First you unhook the front brake cable, then unplug the motor connection cable. You can then simply undo the quick-release at the fork crown, pull back the spring-loaded safety pin, and the whole fork comes away.

The rear swing-arm can now be folded over, once you've removed the lock from the suspension unit. A little tab on the end of the rear disk brake shroud very neatly drops onto the end of the exposed steerer tube, protecting it from scuffs and making the whole package nice and solid.

At this point, you need to turn the bike back over. Another quick-release and safety pin lets you remove the stem assembly (it remains attached by a cable bundle, however) and the little thumbscrew near the shock releases the whole seatpost system, which can be shortened using the lever below the saddle.

The parts as shown here all fit extremely neatly into either the hard shell case (ideal for air travel, perhaps) or into a fabric case with foam 'cradle' which supports the components in their proper positions. Several dismantled Gocycles would of course also fit easily into almost any car, I'd imagine.

CONCLUSIONS

Firstly, the Gocycle is a tremendous design and engineering achievement. In a cycle industry where most bikes are simply a selection of standard components bolted on to more or less standard frames, the sheer amount of work that has gone into almost every specially-made part is mind-boggling. That they have done this, made it look fantastic, and added portability and lightweight electric assist to boot, for no more than the price of a decent upmarket folding bike, is remarkable.

It also rides really very well. The gearing arguably limits it to the role of an urban bike, but it does that superbly. The electric-assist system may not add much for fit riders in flat places, but for anyone less than fit or who lives somewhere hilly, it's a real boost to confidence and journey speed. It could also be a boon to those who aspire to arrive unsweaty and unruffled at work, perhaps in a suit – the bike is certainly smart enough to match the nattiest attire.

It's fantastic technology, and has a high 'I want one' factor, even for a jaded journalist like me. But my head says that I should sound a gentle note of warning. If you buy one now you'll be an early adopter of a good number of relatively unproven innovations: cast magnesium frame and rims, those quick-release wheels, cantilevered luggage racks, and more. And most parts are Gocycle's very own, so you're reliant on them for continued support.

If you're comfortable with that, go for it and buy one – you'll be one of the first to own a remarkable bike, with unique features and performance.

Peter Eland

AVAILABILITY

The Gocycle is available either direct from the manufacturers or via dealers throughout the UK – overseas distribution details were yet to be finalised as we go to print. The first point of contact in all cases is the website www.gocycle.com

Velo Vision Sample Article

This PDF is a sample of the material in *Velo Vision* Issue 32, December 2008. The contents page is shown right.

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If you have any problems or suggestions about the magazine in general, or this PDF article in particular, please email me at

peter@velovision.com

I hope you enjoy the read.

Peter Eland
Editor and Publisher,
Velo Vision

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COVER: Well bundled up against the cold on the S-300.

OPPOSITE: After you! Pedestrians and cyclists carefully negotiate the snowy surfaces around York's Millennium bridge. *Both photos: Peter Eland*

WINTER WARMERS

Many thanks to all of the readers who answered my call in last issue for holiday pictures to banish the winter blues – turn to page 46 to see a selection! This issue also sees a spectacular crop of reader bikes, with impressive and functional modifications, stylish home-builds and more. All of these contributions are much appreciated – by me, and I think it's safe to say, by many readers as well.

You may have noticed the new subtitle on the cover. This is there for two main reasons. The first is to make it clear what the magazine is about: 'Velo' still isn't a familiar term for many English speakers. Secondly, it will tie in with my book which is due to be published next year – the *Practical Bike Buyer's Guide*, a beginner's guide to the best bikes for transport and touring. For more details you'll just have to wait until next issue!

Talking of next year, I'm also looking forward to the SPEZI coach trip in April. Details are on page 7, and I hope many of you will join us!

Peter Eland

ROUNDING UP THE RETRO-FIT ELECTRICS

Rather than buy a whole new electric bike, why not add extra power to an existing machine? Richard Peace fits and tests products from Tongxin, Alien, Heinzmann, Sunstar and BionX which can add electric assist to your pedalling.

ELECTRIC bike kits, it has to be said, have been the poor cousins of 'off the shelf' electric bikes, in the UK at least. Whilst 2008 has seen a wave of new E-bikes, ever lighter and with ever longer ranges, kits have remained relatively hard to get hold of and with a very low media (and real-life) profile compared to complete bikes.

Whilst the sheer variety of cycles means coming up with a 'one size fits all' retro-fit solution is never going to be realistic, there are signs that several manufacturers – and just as important, knowledgeable retailers – are recognizing and trying to tap into what could prove to be a keen demand from cyclists. Even so, a number of kits have been out there a while (keeping rather a low profile) and many are in the pipeline.

After all, the advantages of retro-fit kits over complete E-bikes are many; you might want a bit of extra assistance on a cherished machine that fits you like a glove, or maybe the type of bikes you prefer just aren't available as E-bikes (most folders and recumbents are cases in point) or you may want the option to try the kit out on several different bikes. In essence, you get to ride the bike you want, not one that an E-bike manufacturer wants you to. And for those cycling veterans out there who think they have tried every sort of cycling there is, well, this could be a new challenge…

Of course, there are cons. I found the biggest problem was getting hold of kits in the first place! There appears to be much more demand than supply (speaking from a UK perspective) with kits selling out quickly and waiting times for further deliveries stretching to weeks.

Some of the kits were easier to fit than others, with the Sunstar definitely being the most involved (quite understandable as it is the only add-on crank motor I've come across). Kits are never going to look as neat as pre-finished E-bikes, but again some designs were definitely sleeker than others. Both the Sunstar and Heinzmann stood out in this regard, with high quality connectors and cabling giving you the confidence to do smooth tight cable runs to minimize the kit's visual impact on the bike's lines.

I also took on the challenge of fitting kits to folding bikes – none of these kits are specifically designed for folders, but with a bit of thought about cable runs and where to sit the controller it proved to be no problem. There are no bespoke retrofit kits for folders, with the exception of certain Brompton-specific developments (not officially endorsed by Brompton, it should be stressed). See the 'Future Stars' section, later.

Regardless of the potential downsides, once the kits had been fitted and tested, and a few technical niggles aside, I was quite impressed and could see a potential role for them all. Read on to find out how they worked out in practice.

THE CONTENDERS

Like many other areas of life, the world of electric bike motors finds itself in the middle of the seemingly eternal struggle of competing technologies.

In the red corner are hub motors, usually housed in the front wheel but sometimes in the rear, and usually controlled by a handlebar-mounted throttle. They can potentially be very sizeable and power hungry (Heinzmann, for example, offer a 500 W version – effectively making your bike into a moped, requiring tax, insurance etc).

In the blue corner are crank motors – the Sunstar being a rare example which has found its way in small numbers from its home in Japan to Europe. Rather more ingenious than their hub-housed competitors, crank motors drive, as the name suggests, through the crank area rather than supplying power direct to the wheels. This lets them provide power over a greater speed range provided that you keep in the 'right' gear for the system, which works by sensing pedal force.

The choice seems to boil down to the simple 'power on demand' of hub motors against the more efficient but measured power application of crank motors. All UK road legal kits, both hub and crank drive designs, are limited to 15.5 mph assistance and 250 W continuous output motor rating (200 W according to some – a grey area in law perhaps best ignored!)

Another battle – perhaps now drawing to a close – is that of NiMH vs lithium-ion batteries. With several large, prestigious companies, Heinzmann being among the latest, throwing their weight behind lithium-ion it seems this more power-dense technology is coming out on top. On paper, lithium-ion wins hands down. It gives more power per unit weight and has no 'memory effect', unlike NiMH.

However, there is still a question mark over the reliability of some lithium ion batteries, especially at the cheaper end of the range. A good guide is the battery guarantee offered by the manufacturers and retailers. I would say that one year is the acceptable minimum, two years the ideal – replacement batteries are expensive and a rash of Li-Ion battery failures on some bikes (problem now sorted it seems) has knocked confidence in this facet of E-bike technology in the past.

TONGXIN / NANO

The lightest-weight motor tested here is the Tongxin. In the UK it's become known to some as the 'Nano', thanks mainly to Nano-Brompton, a company that showed great promise but now appears to be struggling to fulfil orders. It merits the 'Nano' name, and at 2.3 kg it is by some way the lightest motor out there.

It proved easy to fit to my sister's fairly standard *el cheapo* mountain bike-style hack steed. Once I'd had the motor itself professionally spoked into a spare rim it was simply a case of slotting in the front wheel and fixing the rack, which houses battery and controller. Then, the most time consuming bit was replacing the brake levers and fixing the acceleration trigger to the handlebars.

I didn't bother fixing the pedal motion detector inside the crank as I simply don't see the point of such devices – they mean the pedals must be turning for power to feed through to the motor, limiting the utility of the thumb throttle switch, not enhancing it. This is often billed as a 'pedelec' option but is really nothing like a true pedelec system – merely an add-on to make the system conform to the law in some European countries. Had the brake levers not been permanently wired into the system I wouldn't have bothered with these either.

A spin up the very small but naggingly constant gradient of the Spen Valley Greenway (a splendidly surfaced example of Sustrans' finest work) notched up around 25 miles range. Rather bizarrely, the motor powers up even on a standing start, as soon as you switch it on via the battery-mounted ignition key, and then knock the bar mounted 'on' switch. If you aren't sat on it the bike magically starts to run away from you. For me this was a confusing and pointless feature – though I understand it's to be discontinued on the next version of this kit.

Once you start to feed on the power with the thumb trigger all is forgiven. The steady thrust from such a small hub was amazing, both to an experienced cyclist like myself and also to my sister Beth, who'd be the first to admit she's more of a fair weather pedaller. Because of the way the Tongxin was geared it certainly helped to wind the speed up a little before approaching steeper hills – as you would do on a non-motorised bike anyway. From about 6 mph to 13 mph the power is steady, silent but very appreciable, rather like an invisible magic hand pushing you along. The technologically curious will be fascinated by the silent performance of the Tongxin: it is achieved through the use of a roller friction-drive system, rather than the normal sun and planet gears.

I'd heard a lot of good comments about the Tongxin from other electric bike enthusiasts but this was my first taste and I was impressed. The only note of caution was sounded by the front wheel wobbling alarmingly when freewheeling

fast, hands-free. As it's not a reported problem it was most likely an unfortunate combination of motor and bike geometry and probably not peculiar to the Tongxin.

Details are just in as we go to press about the next version of the Tongxin kit, known as V3. This will feature essentially the same motor and rack-mounted 24 V battery as my test kit, so performance should be very similar. The main difference is that it will be 'modular' – so rather than coming as a long 'snake' of components permanently attached to the integral battery and controller set-up, each component will plug into the next one in the chain. This should be a great improvement as far as installation goes, and will allow you to dispense totally with the rather pointless pedal motion sensor and brake levers which come with this particular kit.

Who would use it?

The Tongxin is not the most powerful motor out there so if you are after pure power you might want to look at the Alien or the high torque version of the Heinzmann. Where it does score is the light weight and silent running, making it the least conspicuous retrofit option.

Don't get the wrong idea though – powerwise it's no slouch up moderate hills. For an efficient, lightweight kit for long distance riding up nagging gradients and into will-sapping headwinds it has a lot going for it. The light weight also commends it for use on folders.

Specifications

Motor weight: Approx 2.3 kg
Battery weight: Approx 2.8 kg
Battery capacity: 240 Wh – rack mounted
Charger weight/recharge time:
To be finalized for Version 3
Replacement battery cost:
To be finalized for Version 3
Bike requirements:
Should fit all standard dropouts
Guarantee:
1 year on all components and batteries
RRP: Approx £750
Note: Complete Version 3 spec still awaited at time of writing so above details may vary slightly.

ALIEN

Installation and assembly of the Alien is similar to the Tongxin system, although it is already 'modular' (with plugs between the various components).

The rather snazzy looking alloy-cased front hub motor will be familiar to those who know the Ezee Torq E-bike. It came well-built into a sturdy deep-section, double-walled alloy rim which looked more than up to the job. though I suspect few will be familiar with the 'Hailian' branding. I connected up the spaghetti junction of wires coming from the controller to the various components (except brake levers and 'pedelec' sensor which I left off again – see Tongxin comments) and the motor

sparked into life at the end of the 'dry run' at a brief flick of the thumb-lever style throttle.

The wheel then slipped easily into the front forks of my chosen host bike, the urban-styled 26"-wheeled Dahon Jack. The anti-turn locating washers did need a bit of grinding and filing down for it to sit fully in the dropouts. A solid alloy rear rack goes on next (to house the hefty 36 V Li-Ion battery) before the most fiddly part – clearing the left side of the handlebar so as to mount the battery capacity meter and the thumb throttle.

With all of the wires gathered into the nylon zip bag it becomes apparent that mounting the controller and all of its protruding wires at the rear of the bike – as recommended – will mean two cables running the length of the bike across the folding frame joint. A quick trip to the local DIY shop and a bit of soldering later, I had an extended battery-to-controller lead which runs from the front to the back of the bike, allowing the Velcro-mounted controller bag to go on the handlebars, and keeping the wiring more compact.

First impressions? I always pedal E-bikes without power on the very first ride, and like the Tongxin, the Alien has good 'freewheel' speed when no power is applied. You don't really notice much extra resistance, just extra weight in handling when throwing the bike around, especially from the extremely sturdy looking alloy-encased battery at the back, which is quite heavy and quite high up. This proved more of an issue when parking the bike – I kept wishing it had a strong centre kickstand.

The motor is connected via a kettle-style lead – not very reassuring in theory perhaps, but it

survived several hours of driving, heavy rain while riding into the wind with no ill effects at all. In short, a winner in construction terms.

The Jack itself is a lovely bike for cross town jaunts, dropping off kerbs and soaking up potholes with its Schwalbe Big Apple tyres. If you don't need the motor or run out of power it's still a great bike to ride with that free running motor.

The main test was on a 100 mile tour in France, riding around Rouen then down the River Seine to Le Havre. The main difficulty proved getting the bike there in the first place – it was rather a heavy and bulky lump to heave on and off Eurostar and a variety of French trains (especially along with

touring luggage). But once this was behind us the bike came into its own around the vertiginous valley sides near our base south of Rouen.

Again, due to the motor's gearing, it gives out the most power once you'd got up to about 5 mph. I quickly developed the technique of getting in the right gear for a 10 mph climb and easing the power on as I felt the pedalling becoming harder up the gradient. 'Alien Jack' as it had now been christened, made short work of the mile-and-a-bit haul from the local town of Elbeuf back up to our accommodation using this method. It was an average 1 in 10 gradient with plenty of steeper hairpins, and with full throttle and a bit of pedal power it left a very sporty Kalkhoff pedelec bike in its wake.

At the end of a 40-plus mile day ride this climb saw the battery reserves just about exhausted – a good range for a bike which stresses robustness over lightness and speed. You'd undoubtedly get more miles per charge from a sleeker, more efficient bike. If you are annoyed by background noise then the 'angry bee' buzzing of the Alien motor at certain speeds might spoil an otherwise great experience. I started not to notice it after a short while.

The Jack itself proved fine for our subsequent 'pottering along' style of touring once we'd left the steep slopes round Elbeuf, though it has no long-distance pretensions whatsoever. Very selective use of the throttle through easygoing terrain saw the battery regularly clocking up 40 miles and more. This was over fairly undemanding territory but with two full panniers and a 12 stone rider on board.

Several hours unforeseen headwind just reinforced the value of power assistance, allowing us to reach a hotel with reasonable speed – without electric assist, it would have been one of those truly spirit-sapping days.

Who would use it?

I deliberately went for the heavier 36 V system to give a bit more power potential and to provide a step up from the Tongxin option (there is a 24 V option with seatpost mounted battery). Although the battery failed once back in the UK (replaced by Alien immediately with the replacement still going strong) it proved, otherwise, a pretty robust system once the controller and connections were safely tucked away in a solid, waterproof bar bag – my modification as the Velcro bag provided came apart. Although I used the kit on tour it would be excellent for hilly urban riding – combined with the Dahon Jack's ruggedness it would make a great load puller for day to day tasks.

It could also live with tracks and trails quite easily – but perhaps not extreme rough-stuff style riding, where its weight might make it feel more of a burden than a benefit. The cost conscious will note it's the least expensive kit tested by quite some way.

Specifications

Motor weight: 3.4 kg
Battery weight: 5 kg
Battery capacity: Approx 360 Wh
Charger weight/recharge time: 650 g/4-6 hours
Replacement battery cost: £210 post free
Total retro-fitted bike weight: 24.7 kg
Bike requirements: 110 mm front fork dropout width. 36v kit ready spoked in 26" wheel (24v kit ready spoked in 20", 24" or 26" wheels). Check the profile of your forks with the retailer to confirm they will not foul the hub motor.
Guarantee: 1 year on all components and batteries
RRP: £419 plus £20 postage (24v kits: £359 plus £20 postage)

The Alien's battery fits neatly into the 'shelf' on the rear rack (BELOW) but the bag for the controller eventually split (LEFT). Richard had soldered up a longer lead so that only one cable needed to run past the main frame hinge, and eventually stored controller and wiring in a handlebar bag (BELOW LEFT).

HEINZMANN

The Heinzmann undoubtedly vies with the Sunstar for the highest quality kit out there. An initial inspection of the parts confirms it – from the 'twist and click' style battery plug to the high quality cabling, it reinforces the idea that German-made equals quality and durability.

Although the Heinzmann has been around for many years it has only recently seen the introduction of a digital controller – an excellent addition allowing for the provision of an accurate handlebar-mounted battery meter, an effective battery-saving 'Eco' mode and more powerful standing starts.

I specified the high torque version of Heinzmann's 200 W rear hub motor complete with eight speed freewheel and the larger capacity battery option as I wanted to test out the most varied potential uses of retrofit kits. Torque means immediate power – ideal for the steepest, roughest climbs – rather than an ability to push you along at speed. The ideal companion then, was that rare thing, a folding mountain bike. In this case I used the Montague Paratrooper (as reviewed in *Velo Vision* 25).

The kit came ready-fitted and featured the very practical 'rucksack battery' option (rack mount also available). It attached and detaches using Electric Mountain Bike's very own 'emergency bail out' connector, which can snap free without damage. It would probably have been the simplest kit to install anyway – fit the motor wheel into the forks, mount the on/off/Eco switch onto the bars along with the twist grip throttle, attach the controller under the rear of the seat then connect up and cable-tie your cable runs.

Playing around with the bike on the grassy 1-in-3 banking of the local park I remembered my youth spent messing about on trials bikes – this bike really does have a similar feeling of being able to climb mean and rough gradients from a standing start. The skill is in the rider's front to rear bal-

For off-roading it makes sense to carry the heavy battery in a rucksack. This means a break-away connector (ABOVE RIGHT) is needed. The Heinzmann digital controller fits neatly under the saddle (RIGHT).

ance and careful power application to avoid skidding the rear wheel or stalling. I also discovered why I gave up trials riding – I was never very good and kept falling off.

Whilst reliving your youth in this way is great fun it saps the battery alarmingly quickly and I decided a more meaningful test would be to take it for a longer, smoother off-road run and to use the Eco power option a little more to try and gauge its potential range.

This combination of bike and motor is undoubtedly great fun to ride – my initial test ride proved that much. The longer 'Eco-mode' run, mixing road, trail and bridleway, showed that 25 or more miles is well within its range – probably much more if fitted with slicks and used on tarmac. And, if you come to a very steep hill you can knock off Eco mode simply by pressing a button on the handlebar control and away you go.

Who would use it?

I twinned Heinzmann's high torque motor with a proven mountain bike as Steve Punchard, owner of Electric Mountain Bikes, has used this combination time and again on the rough tracks and vertiginous gradients around his home in the North York Moors. As a mountain bike guide in Dalby Forest he clearly practices for fun what he preaches as business. This makes it the one system I've come across which has been used repeatedly in the most testing biking conditions – good news not just for mountain bikers but for anyone considering purchasing a Heinzmann system. In the light of this kind of quality the relatively high price looks much more reasonable.

Off-roading is, of course, only one use of the Heinzmann system – the lower torque version with correspondingly longer battery life would suit all sorts of applications. A quick search of the web reveals them fitted to everything from load carriers to Moultons! Surely one of the most versatile systems around.

Specifications

Motor weight: 3.5 kg
Battery capacity & weight:
187Wh = 1.9 kg; 345Wh = 3.4 kg
Charger weight/recharge time:
475g. 187Wh version: 4 hours; 345Wh: 7.5 hours
Replacement battery cost:
£335 (187Wh); £525 (345Wh)
Total retro-fitted bike weight: 23.6 kg
Bike requirements: Front wheel version: min 100 mm dropouts. Rear wheel version: min 135 mm dropouts. Spoking: 36H.
Guarantee: Battery 1 year, other parts 2 years
RRP: 187 Wh kit = £1061; 345 Wh kit = £1251 – front or rear wheel drive. Seatpost mounted rucksack version kits = £999/£1189 respectively. Montague Paratrooper mountain bike, complete with motor kit = £1699/£1839 respectively.

SUNSTAR

I've been using this kit on my Pashley PDQ recumbent for over six months now. Uniquely amongst retro-fit kits the Sunstar is a crank drive system and is a lovely piece of engineering too. It was ordered direct from French retailers, Zone Cyclable, after a brief trial ride outside their premises in Lyon. The motor itself is frame-clamped near the bottom bracket and drives through a small sprocket via a chain onto a granny-style chainring which sits inside the main chainring.

This reveals the main limitation of the system: as the Sunstar comes with its own bespoke bottom bracket and chainring you are limited to a single front ring, whereas a front derailleur system would normally give a choice of three. This was no loss on the PDQ, where gears are provided entirely at the rear end via a SRAM DualDrive setup.

Other possible quibbles are lack of raw power and a very short motor-to-battery cable run, which really does limit where you can put the battery. It is clearly designed to be frame-clamped near the motor, 'amidships' on a conventional upright frame. The fitting process is quite lengthy overall. It involves removing your current bottom bracket and careful refitting of the Sunstar bespoke bottom bracket with integral pedal force sensor. This connects to the motor unit via a bracket which allows the motor to slide in order to tension the drive chain.

The 180 W motor was never designed to give an immediate surge of power to inefficient

bargain basement bikes – as is the case with the vast majority of cheaper hub motors which are fitted on many of the cheapest E-bikes available in the UK. Rather, it's meant as a lightweight, subtle addition for a quality lightweight bike. Most importantly, the small but very positive surge of power which it delivers is available throughout the very wide gear range of the PDQ, converting it into an excellent hill climber.

The advantages are many – it's the second lightest motor here and the integral motor and controller mean it has a lovely clean appearance with the minimum of cable runs. The efficient application of power for just long enough between pedal strokes will be familiar to all those Giant Lafree lovers out there – that bike works in a similar fashion.

This feature means any bike fitted with a Sunstar will retain its essential pedalling and riding characteristics – whereas bikes fitted with hub motors start to take on moped-like qualities. Small DIP switches, housed within the tiny handlebar on/off switch, can be set to make the motor power anything with wheels from 12" to 28" inches according to the manual. In practice I found the best power came when all of the switches were simply turned off. In terms of pure efficiency at converting battery power to hill climbing ability the Sunstar is probably the best kit I've tested yet.

Who would use it?

My earlier carping about lack of power amounts to criticizing a gazelle for not being a rhino. The Sunstar is the gazelle of retrofit kits and has proved a hillclimbing boon on the PDQ, which previously struggled in cramp-inducing fashion up steeper inclines. If you are looking for a lightweight 'power supplement' for a bike which is already quick this is certainly worth considering. It would also combine well with a lightweight folder. Zone Cyclable use it on a number of lightweight Dahon-style folders which they sell as complete bikes.

My only real criticism was the tiny capacity and high price of the batteries. I'd like to use it as a long-distance tourer but this problem has so far limited me to local leisure rides (around 20 miles maximum, including use of a spare battery). I've experimented with NiMH batteries from an old Lafree: this works OK but the range still isn't really satisfactory, so I'm still searching for a company capable of fitting a suitably large capacity Li-Ion battery. If I can manage that I'm convinced that an almost effortless 100 miles or more a day for fully loaded touring is easily achievable.

Specifications

Motor and integral controller weight: 3.2 kg
Battery weight: 870 g
Battery capacity: Approx 80 Wh
Charger weight/recharge time: 425 g/1.5 hours
Replacement battery cost: 250 Euros
Total retro-fitted bike weight: 21.6 kg
Bike requirements: BB shell width of 68–70 mm and correct thread (check with retailers). Frame size where motor mounted no less than 180 mm.
Guarantee: 2 years all parts, including battery
RRP: 899 Euros

BIONX

I've tried this very sophisticated Canadian made pedelec style hub motor system a couple of times and it's smooth quiet power is pretty impressive. The motor gearing on the BionX-equipped Airnimal I tried was designed to assist at speed rather than for torque, but it made for a very acceptable long distance commuting or touring system (see Issue 26 for a full review of the Airnimal Joey Move with BionX – Ed].

The BionX system itself has been around for a number of years and has a proven track record, especially in its home country of Canada. It consists of a large-diameter but thin hub motor, groovily-shaped frame-mounted battery and a small handlebar mounted LCD console which allows you to control the various power settings.

It's unique – as far as I know – in being the only regenerative kit on the market. That is, it uses the motor to feed power back into the battery whilst descending or braking. This regeneration is controlled by power settings which are set via the console on the bars, so you can set the system for anything from a real hill-climbing boost to regeneration mode – with enough braking from the motor that you don't have to touch the brakes on all but the steepest of descents. How much regenerated power this provides in practice is a moot question however. I consistently managed to get over 30 km on a single NiMH battery in moderately hilly country, so more recent Li-Ion battery options should give a very impressive range.

Who would use it?

For me the BionX would be an ideal touring or commuting system, especially for those looking for quality and reliability above brute power. Undoubtedly you are paying a premium for the Li-Ion version – but if you want unique technology, a truly unique riding experience and a piece of bicycle history then BionX stands out. It's highly unusual in being a true pedelec to ride but with a hub rather than crank motor – needless to say this involves some fairly complex electronics. If you are aiming for really steep climbs though, it's best to look at other options.

Specifications

Motor weight: 3.5 kg/4 kg
Battery weight: 4 kg/3.1 kg
Battery capacity: 192 Wh/345 Wh
RRP: £970/£1550 kit only. Full fitting around £60 depending on exact requirements
Bike requirements:
Can be spoked into 20" to 700c wheel bikes.
Guarantee: Battery 1 year. All other components 2 years.
Note: This spec is as supplied by Electric Mountain Bikes and the two figures given are for the NiMH and high torque Li-Ion systems respectively. Airnimal also supply the NiMH version.

CONTACTS

Tongxin: The Electric Transport Shop has branches in Cambridge (01223 247410) London N7 (0207 4822892) and Oxford (01865 243937).
See www.electricbikesales.co.uk
Alien: Alien Bikes – see www.alienbikes.co.uk. Sorry, no phone number.
Heinzmann: Several UK dealers: Tel 01642 713 023 or see www.emotivecontrolsystems.co.uk.
Test kit supplied by Electric Mountain Bikes: 01751 432936 or see www.electricmountainbikes.com
Sunstar: Zone Cyclable/EV Showroom, Lyon, France (will supply outside France)
Tel +33 (0)478375044 or see www.sunstar-ibike.com
BionX: Electric Mountain Bikes (see Heinzmann above) and Airnimal: Tel 01954 782020 or see www.airnimal.eu

FUTURE STARS?

The following kits were either being developed at the time of writing or are available only outside the UK. Worth keeping an eye out for though, when and if they become available here.

Cytronex

Only available as a ready-to-go bike, but this high quality, good value offering is certainly one to watch. In its current form it's based around the excellent Nano/Tongxin motor allied with a very convenient but rather small Ni-MH 'bottle battery' which fits in the bike's bottle cage.
Tel 01962 866122 or see www.cytronex.com

Ezee

About to become available at the time of writing. This appears to be one of the few hub motor kits that is disc-brake compatible. According to website blurb, it combines a 3.3 kg, 370 Wh battery with a 3.5 kg motor which comes ready-spoked in a choice of 26" or 700c wheels.
Tel 01273 672 555 or see www.cyclepoint.net

Gruber Assist

A very innovative lightweight kit from Austria. The website promises a 900 g motor delivering 200 W of power (sounds almost too good to be true). The motor itself is housed in the bike's seat tube and powers the cranks through a bespoke bottom bracket arrangement. Electric Mountain Bikes in the UK will be stocking these soon, or contact the manufacturer direct:.
Tel 0043 5332 70317 or see www.gruberassist.com

Sparticle Brompton Conversion

With Brompton's unique folding bike geometry – narrow dropouts and the like – finding a neat, lightweight motor conversion has been the Holy Grail for many Brompton owners. Until now nobody had come up with a widely available solution, but the Sparticle kit was about to be launched as this article was being finished.

The prototype I've just received came fully fitted to an older M-type Brompton and performed well. It featured a motor which looked identical to the Alien, but it had more high torque power for steep hills, if less assistance at moderate speed up moderate hills. Unlike the Dahon Alien it's a 24 V system and comes with a 240 Wh 'Phylion' branded battery. Overall weight was around 19 kg. Unfortunately on the prototype the controller mount interferes with the seat post locking system when folded: let's hope that's resolved before production. The launch is imminent and the £750 price will include a rim and spokes for you to make up yourself (a wheelbuild is £80 extra). Full fitting to your own Brompton will cost an extra £150.

It is sold by Tongxin: the UK supplier is to be The Electric Transport Shop (see main Contacts section).

Velo Vision Sample Article

This PDF is a sample of the material in *Velo Vision* Issue 31, September 2008. The contents page is shown right.

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peter@velovision.com

I hope you enjoy the read.

Peter Eland
Editor and Publisher,
Velo Vision

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VELO VISION AND VELO-VISION
We weren't first with the name. Velo-Vision is a bike shop in Körten, near Bergisch-Gladbach, Germany. *Velo Vision* magazine exists in friendly harmony with Velo-Vision in Germany.

Velo Vision is printed on paper produced from sustainable forests to Nordic Swan standards.

COVER: Taking the Estelle for a spin.

OPPOSITE: The impressive cliffs at Etretat were the destination for a day-ride on our tandem tour this summer.
Both photos: Peter Eland

THERE AND BACK

It's been rather longer than it should have been since last issue, for which apologies. Various factors conspired to make this issue late: particularly a nasty lurgy which struck me down shortly after returning from Eurobike. We'll be back on track for next issue, which will reach UK readers before Christmas as usual.

Before all of that, I did manage to actually go cycling for a few weeks in July, as you'll see from the photo opposite and other items throughout this issue. Getting away for a few weeks by bike is a real tonic, in a way that everyday riding and weekend outings can't quite match. We took a leisurely ride westwards along the coast from Dieppe in northern France, striking it lucky with the weather and a series of spectacular cliff-top campsites.

I hope many of you managed to get away cycling over the summer, too – if you did, why not send a picture? We'll publish a selection next issue to help banish the winter gloom!

Peter Eland

ELECTRIC ESTELLE

Way back in Issue 9 we reviewed a Heinzmann-powered Estelle electric bike, and five years later we're back with another, the Sport. What's changed over the years?

BACKGROUND

Heinzmann have been making bicycle electric assist systems for around a decade now, and their 'own brand' motor-equipped bikes go under the 'Estelle' name. They've had a series of distributors in the UK, but the line was recently taken over by Peter Walsh of Emotive Control Systems, who supplies a number of manufacturers and dealers as well. The electric-assist motor, control electronics and battery are also available as a kit, and we'll review it in that form next issue as part of a wider electric-assist kits test.

The Sport stands out in the range as being less oriented towards comfort and perhaps elderly riders, and more as a smart, fast commuter bike. It's one of the lighter machines in the range. Emotive also produce an electric-assist mountain bike, and offer assisted versions of various workbikes including Pashley bikes and trikes.

Most Heinzmann systems can be specified as 'e-bike' or 'pedelec'. The former let you apply power manually using the twist-grip, at any time. Pedelecs only work when you're pedalling, and this configuration is required for hassle-free use in most EU countries (e-bikes are fine for the UK, too). Our review machine was the pedelec configuration. Both systems only add assist up to 15 mph, the legal maximum in the UK.

The Sport comes as standard with a single 5.2 Ah lithium-ion battery, at a base price of £1795. The battery is now encased in a smart pannier-style bag. Extra 5.2 Ah batteries cost £385, or you can upgrade to a 9.6 Ah model for £190 extra. Upgrading to twin 9.6 Ah batteries is £765. For an extra £40 you can have a 'hill-climbing' version of the motor which does better on steep gradients, and has steel instead of synthetic gears inside. Spare chargers cost £49.50.

Possible upgrades to the bike parts include Rohloff hub, Magura brakes, different tyres and saddle and pedal upgrades. Two frame sizes are available, 50 or 57 cm, and we reviewed the larger model.

The 200W Heinzmann motor is also available in a higher-torque, lower-speed hill climbing version

FIRST IMPRESSIONS

The Sport is built around a TIG-welded aluminium frame. It's very close to what I'd call MTB style, with sloping top-tube and oversized tubing, but built around 700c rather than 26" wheels. But it is solid and robust-looking. Included are mudguard mounts, a single pair of bottle cage bosses, low-rider bosses for a front rack, and a sliding dropout system compatible with both disk brakes and Rohloff hub.

In this case braking front and rear comes from 'Maxcycles' V-brakes, decent alloy models, and gearing is in the form of a Shimano Nexus Premium 8-speed hub gear. A single chainring with trouser guard on the outside drives this via a corrosion-resistant KMC chain.

The rest of the components are also of good quality and look smart in all black. The fairly flat stem, above 2" or so of headset spacers, looks a bit odd at first, although I guess it does keep your adjustment options open perhaps more than a

more angled stem, without spacers, might. As it is, the riding position is in between upright and sporty.

The lighting system is driven by an AXA bottle dynamo on the rear wheel, driving a Hella halogen headlight – strange that they didn't use an LED model, which are almost standard these days. At the back there's a B&M Toplight Flat, a quality LED light. Wiring for this runs via the two conductor strips within the SKS mudguards: there are connectors near the dynamo, then at the back light, and also near the bottom bracket, from where wires run up to the front light. A neat system for keeping the bike as clean as possible.

It does make sense to keep the dynamo system separate from the electric assist, incidentally. You may need lights even if you're riding with a flat battery. It's just a shame the motor can't act as a dynamo in such a situation: its presence in the front wheel is what requires the use of a side-running bottle type instead of a silent and more reliable (won't slip) hub dynamo.

The 200W electric motor is built into the front wheel of course, and the large hub shell, around 17 cm in diameter, means the front wheel is spoked single cross. Both wheels are fitted with 700c x 35mm Ritchey MaxCross tyres, a slightly odd choice, as the grippy cyclocross tread isn't really needed on-road. But they have nice reflective sidewalls, and seemed to roll well enough without noticeable 'buzz'. Upgrades to Schwalbe Marathon Plus or Conti Contact are available.

The rest of the electrical system comprises four main components: the handlebar twist grip, the pedal sensor, the rear rack with control electronics, and the separate battery in its bag. A separate mains charger is also provided.

Starting with the twist grip, this is a full-length model by Magura, which rotates easily for throttle control. Attached to it is a rather boxy-looking control unit, with battery level indicators and an 'eco' indicator on the top, and buttons for on-off and 'eco' on the side facing the rider. Because this needs to be on your right hand, the twist grip for the 8-speed hub is mounted upside-down on the left. Ergonomically that's no problem – just the numbers are upside down in the little window which tells you which gear you're in.

The pedal sensor at the bottom bracket is unobtrusive: there's a slotted disk inboard of the chainset, and a small pickup.

The heart of the electric assist system is the control electronics, mounted under the top plate of an oversized rear carrier rack built in thin-wall steel tubing. There are cross rails at three levels for hanging panniers, and a spring hook on the top for casual loads. It looks perhaps rather large compared to 'normal' racks, but certainly provides a big flat top surface for strapping on extra loads.

The control box itself has a key-operated off-on switch, plus sockets for the wiring to the motor, sensor and throttle. All three of these cables are bundled together in the wiring loom which runs forward down the seat tube (kept in place, like much other wiring, by black cable ties). A flying lead runs from the control box to the battery pack where it plugs in. The power plugs for both motor and battery are seriously chunky, heavy duty locking connectors and overall the wiring looked very robust.

On the pedelec version, the twist-grip throttle (ABOVE LEFT) only adds power when the sensor (ABOVE) detects pedalling. The hub gear shifter (LEFT) is upside down on the left side of the bar.

The battery pack is held in a smart-looking pannier, with the latest Rixen&Kaul hooks for attachment. Twin lower hooks wedge securely into the carrier structure, and once on it's very well attached. Open the flap for access to the battery itself: this has separate (and different) sockets for the control box plug and the charger plug. There's also a four-LED power indicator, and a moulded-in hollow where you can tuck the charger should you need to take it with you. Charge time from flat is around six hours, and you can top up at any time.

You can pull the whole battery out of the bag if necessary, and this reveals a shoulder strap tucked away inside. This hints at a possible issue: given the price of batteries, you may not be keen on leaving one on a locked bike left in public, but it is a bit of a lump to carry around with you.

Weight as tested was 20.47 kg for the bike, 4.15 kg for the battery bag, and the charger weighed 475 g. As electric bikes go that's not bad at all, and that was the large frame size too.

ABOVE LEFT: The battery can be unplugged and detached from the bike for recharging.

LEFT: Key-operated control electronics under the rack.

ABOVE: The mains charger is fairly small and light, and fits within the battery bag if necessary. Charge time from empty is around six hours, and you can top up the battery at any time.

THE RIDE

It's been a while since I've had a proper chance to ride an electric bike, and it was an educational experience. I'd forgotten just how easy it is to simply let the electric assist do all of the hard work, the accelerating and hill climbing. With just a dab on the throttle at every junction, bridge or headwind, all your legs end up doing is powering the bike along on the flat which,

unless you're in a hurry, takes almost no effort at all. It would be very easy indeed to eliminate a good proportion of the fitness benefits of a regular commute. It's just so seductively easy…

Of course, for many riders who through health, age, distance or extreme hills can't easily manage a particular commute, an electric bike like this could be the difference between cycling and not cycling. It would also be great for pulling big trailers or workbikes around. And if you must arrive at work sweat-free, this is certainly one way to do it.

Operating the system is very easy – switch on at the key switch, then hold the red power button down for a few seconds until the lights come up on the display. Then just twist the grip to add power. The motor kicks in immediately, assuming you're pedalling, and you pick up speed fast. The throttle grip offers good control of the assist level, from just a touch to full power.

As speed rises to the legal limit for power assist the motor cuts out, restarting once your speed has dropped a bit. But if you use it just for acceleration and hills, this probably won't happen much. It can also get tiring riding with your wrist bent holding the twist-grip full on for long periods.

The motor is rather noisy, enough so to turn heads, and at certain speeds it sort of rattles as well – something to do with an internal freewheel apparently. Again, this encouraged me to just use it at junctions, where noise is often masked by revving traffic anyway.

The 'eco' mode, when engaged, seems to reduce the assist power available. If you have a very long commute it might make sense to conserve battery, but I didn't end up using it much. Having decided to use an electric boost, you may as well make it a powerful one.

Another mode I found only occasionally useful was the 'walk' mode, designed to help you push the bike up hills and the like. It's the only mode in which the electrics will operate while you're not pedalling. Twist the grip and the electrics will drive the front wheel at around walking pace, so that you can walk alongside it without having to push. I can see this being handy in hilly pedestrianised areas, especially if you have a good load of shopping on board.

I didn't even attempt to measure range. On a longer ride without much starting and stopping I'd hardly use the power assist, maybe just on hills, and the range is then more a matter of how far I want to cycle than a matter of battery capacity. If you rely entirely on the motor that's another matter, but I didn't have the patience I'm afraid. Anyway, for what it's worth, the manufacturers quote 20 km in e-bike mode, or 30km as a pedelec. It would certainly handle several moderate daily commutes without a recharge.

Without electric assist, the Sport rode fine, just a little ponderously because of the weight. On a hilly course that might matter, but for reasonably flat riding it's not a big issue. And it was in general no problem to manoeuvre it around by hand, or to lift in and out of doorways etc. Overall, it was a reliable and practical commuter.

CONCLUSIONS

Non-assisted, the Sport is a solid performer as a bike, and the non-electric aspects of it are well chosen. I liked the choice of a hub gear, decent dynamo lighting, mudguards and a good stand. Low-rider mounts on the forks were a nice surprise, too. The electrics are fairly neatly and robustly built onto this base. The 'all-black' wiring of the kit sort of blends into the background alongside the bold orange lines of the standard bike frame, making it much less obviously electric than many purpose-built machines. Only the bulky motor is a dead give-away that it's electric at all.

The Heinzmann power assist is effective and by all accounts reliable, but the technology is no longer cutting edge. Indeed, it seems little changed since we last reviewed it, other than that it now uses a more modern battery and control system. The main problem it has compared to the latest brushless systems is noise: I for one would certainly like a more discreet drive. The motor is also large and relatively heavy. It also doesn't do regenerative braking, have fancy control options or other such 'whistles and bells' offered by some systems. And at £1750, the bike is at the higher end of the scale: all three of the electric bikes reviewed in Issue 26 (Sparta Ion, Airnimal Joey, Move, Ezee Forte) were cheaper, and many other models now come in at under £1000.

On the other hand, the Heinzmann system has an unrivalled track record, and after being on the market for a decade it can safely be said to be a mature, proven design. Heinzmann has the continuity to assure you that spares, warranty and support will be available into the future.

With this in mind it's still a serious contender for 'fleet' or corporate roles, despite now elderly technology. It's also a good system to choose for workbikes, perhaps. Riders looking for a reliable and well supported electric assist system may also still find Heinzmann an attractive option.

Peter Eland

AVAILABILITY

Manufacturer: Heinzmann, Germany. See *www.heinzmann.de*
UK importers: Emotive Control Systems: Tel 01642 713 023 or see *www.emotivecontrolsystems.co.uk*. They have 12 dealers around the UK: contact them or see website for the list.

Velo Vision Sample Article

This PDF is a sample of the material in *Velo Vision* Issue 26, June 2007. The contents page is shown right.

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If you have any problems or suggestions about the magazine in general, or this PDF article in particular, please email me at

peter@velovision.com

I hope you enjoy the read.

Peter Eland
Editor and Publisher,
Velo Vision

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VELO VISION AND VELO-VISION
We weren't first with the name. Velo-Vision (note the hyphen) is a progressive HPV-friendly bike shop in Körten, near Bergisch-Gladbach, Germany, who also make their own recumbents. *Velo Vision* magazine is working in friendly harmony with Velo-Vision in Germany.

Velo Vision is printed on paper produced from sustainable forests to Nordic Swan standards.

COVER PHOTOGRAPH:
Andrew Walters rides his prototype Monval Excel semi-recumbent tourer.

OPPOSITE: The deadly ducks of Escrick? We didn't stop to find out...
Both photos by Peter Eland.

SURPRISE!

I keep on being surprised by bikes. The electric bike review and Stokemonkey report show just how much of a practical proposition today's quality models have become. The Catrike review overturned my ideas on trike direct steering and amazed me with the performance on offer for under £1000. Riding Andrew Walters' 36"-wheeled bike showed that semi-recumbents need not be slow. And Bike Friday's Tikit, seen at the SPEZI, promises to be an extremely exciting development in folding bikes. On a smaller scale, the Weber mLite is one of those simple inventions so useful I'm still amazed it hasn't been done before.

There's more, too, as you'll read in this issue of *Velo Vision*. It's a reminder to keep an open mind, to revisit assumptions. Improvements in materials and technology, or just clever design, can make practical transport solutions out of ideas which just a few years ago seemed non-starters. It's an exciting time to ride your bike!

Peter Eland

MORE 'E' VICAR?

Paul Robison in flat-as-a-pancake Cambridge and Chris Stebbing from hilly Sheffield were both keen to try electric bikes – and so they've compiled this thorough report for Velo Vision on their experiences using three of the latest models

OPENING THOUGHTS

From Paul in Cambridge:

Maybe it's an age thing, maybe it's an engineer thing – I'm not sure. But I find electric bikes more and more fascinating. And a recent chat with my old engineering friend Chris revealed that he felt the same way, so the plan I had been hatching to review a few electric bikes began to take shape. My commute is relatively long (I never knew how long until the display on the Sparta told me it was 16 miles) but pancake flat, so how could I test them on hills? I wasn't keen on riding up and down Castle Hill in Cambridge several hundred times. But hang on! Chris lives in Sheffield and all I associate with Sheffield is knives and forks and hills.

So these bikes have been tested for endurance over some long flat commutes on some pretty rough tracks along the disused railway line between Cambridge and St Ives. And, probably more typical of their intended and likely usage, they have been used as practical transport for lots of short hilly journeys. Chris is a vicar at Saint John Park in Sheffield and has been looking for an environmentally friendly way to get around. Forget Dibley: Chris is from a tough parish and wouldn't want to invite ridicule. In comparison, all I have to contend with are suicidal rabbits and cyclicidal drivers who try to bully me onto the pavement.

Incidentally Chris and I come from different ends of the spiritual spectrum, so please excuse the blasphemy and hackneyed vicar puns for which I take the blame entirely!

Paul Robison

From Chris in Sheffield:

The flat landscape of Cambridgeshire, clear cycle routes with long runs at steady speed – yes, we can all see how an electric bike could be viable in these idyllic conditions. But how many of us live in that perfect environment? What if everywhere you go involves serious hills? What about the power-sapping stop-start of urban driving? This is where the real test began.

Sheffield is a city built, like Rome, on seven hills. It's a harsh environment for cyclists – there are precious few cycle paths. Bikes share the roads with growing numbers of cars, buses and trams. Sheffield's air quality is now in places as bad as it was in the days of the dreaded Sheffield Smog. But the cause is no longer steelworks belching out smoke – there's very few of those left. The cause is our old friend the motor vehicle, ably assisted by the smoky diesel train.

My work as a parish vicar involves a lot of short journeys around our inner city parish. The vicarage is towards the bottom of a long, slow hill (City Road) which has the crematorium half way up. The visibility of getting around by bike is very appealing in my job – people will see you as you travel to and fro, and they will know that the Church is alive and well and still there when they need it. However, the practicalities of time and the physical effort needed to cope with the local hills mean that the car is just too comfortable an option. I need to arrive at my destination fresh and ready to lead a service, or give of my best to people – I can't afford to be tired or out of breath.

Could the electric bike really be a viable option for me living and working here? Are they good enough to make me leave my polluting car at home? Time to find out.

Chris Stebbing

ARE ELECTRIC BIKES A GOOD THING?

More and more around Cambridge I (Paul) notice people pootling along on electric bikes – more often than not just sitting there with the saddle stupidly low and with no intention of pedalling. These bikes tend to be cheap and nasty skip-fodder bought from motor spares shops, with lead-acid batteries and nameless frames and components.

Most of the bikes shop owners I've spoken to in Cambridge are dismissive of electric assist bikes for various reasons, from the snobbish "we only deal with real bikes" to the pragmatic "they are a nightmare to service".

I don't want to devote too much space to the argument, but the basic objections seem to be either that it's 'cheating' or that it's not going to save the planet because the electricity still has to be generated in a power station. How you view these arguments depends on how you rank the benefits of cycling – which readers of Velo Vision know very well: personal (health, saving time over walking and often over driving); public (less congestion, less pollution); or pleasure (i.e. you cycle just for the sheer joy of it). Personally, my motivation is the last of the three and I think that the others follow as a consequence. As for wanting to get other people to share the joy, I know electric bikes aren't perfect but at least they're better than a car.

Our reviewers tested three high-end electric bikes: from left to right we have the Sparta Ion, the Airnimal Joey Move, and the Ezee Forte from 50Cycles.

THE BIKES

The three bikes here take very different approaches to using a motor to help you on your way:

- Perhaps the simplest option is that used on the Ezee Forte from 50Cycles: a motor in the front wheel with a throttle-like control on the handlebars. This is independent of the drivetrain and therefore you don't have to pedal if you don't want to.
- The Sparta Ion uses a motor in the back wheel hub which only assists when you pedal.
- The Airnimal Joey Move system is similar to the Sparta but goes one step further and re-charges the battery when you apply the brakes.

There is a fourth option: this is to help the chain on its way with a motor just behind the bottom bracket. This system was used very successfully on the Giant Lafree (no longer available) and is still used on the Swiss Flyer range (see SPEZI report). Then of course there are other power sources, such as fuel cells, but that will have to wait for another review.

SPARTA ION M-GEAR

PAUL'S REPORT:

First impressions of the Sparta are that it's like riding with the hand of God at your back. The motor is eerily silent and the assistance is so subtle that you easily forget it's there.

The Ion doesn't look like an electric bike because the batteries are hidden away in the frame. Quite apart from the well-integrated electrics, the bike is a high quality, comfortable machine with a typical Dutch kitchen sink approach to accessories. The batteries power the lights: when the battery is empty, the motor automatically acts as a dynamo so you're not left stranded without lights.

The control unit is at the heart of the system. It twists into place and acts as the key. It clearly displays, speed, trip distance, assistance level (off, eco, normal, power) and it has a good battery meter with fine gradations. Removing the control unit acts as an immobiliser (to the electrics anyway, not in the sense of a car immobiliser). It even has its own little pouch!

The model tested was the Ion M-Gear (the derailleur geared model imported by H Drakes). There are cheaper versions and also one with an extra battery to extend the range. Battery life (according to the Sparta website) is at least 500 charge cycles (on average), replace every 15,000 km, guaranteed for two years.

This is a really well thought-out bike that is lovely to ride (on the flat) without the motor. The attention to detail is outstanding and the integration of the electrics is superb.

SLIGHT NIGGLES

- The charger whirrs away (you wouldn't want it in your lounge). But it is lightweight and does its job well and quickly (and shuts off when charging is complete).
- There is a slight 'pulsing' sensation around the assistance limit: you subconsciously learn to ride just below the speed at which assistance cuts out. As one friend who rode it commented, you can either put in 20% of the effort to do 24 km/h or 80% to go 1 km/h faster. By the way, all three bikes display in km not miles, which is good exercise for the brain even if not for the body.

REGULATIONS

There are all sorts of regulations in different countries. The British rules are that an electric assist bike can't assist you above 15 mph or put in more than 200 Watts continuous power (that's equivalent to an enthusiastic tandem stoker before lunch). The position on 'e-bikes' (i.e. the sort you don't have to pedal) is a bit ambiguous with European and British standards being different. If you want to know more, go to *www.dft.gov.uk* and search for 'EAPC'. Other countries, notably Switzerland, have more lenient rules.

CHRIS'S REPORT:

Route: To Crematorium and back
Distance: 1 mile each way
Terrain: Continuous up hill – approx 1 in 10 gradient on major road. Reverse on return.

I would call the Sparta 'pedal assist' – as you start to pedal you feel the motor giving a gentle, silent push. As the bike picks up speed, you still need to pedal only gently. On the flat I was soon in top gear cruising along at a decent speed (easily 15 mph or so), whilst simply pedalling in a genteel manner – most satisfying. But when the hills hit, it started to change. The Sparta slowed down to around 8 mph on what is really a fairly gentle hill. I needed to drop to 2nd or 3rd gear, even with the motor in power mode. I was disappointed at this at first, but then found myself overtaking a nice lightweight racer, and soon after, went past a mountain biker who had resorted to pushing his bike up the same hill – hmmm... maybe I'm not doing as badly as I'd thought.

Route: Wedding rehearsal at neighbouring church
Distance: 3 miles each way
Terrain: Continuous up hill – approx 1 in 10 gradient on major road for first 2½ miles, then ½ mile down the other side. Reverse on return.

I wouldn't have attempted this on a normal bike, because I need to arrive fresh and ready to meet people. As I cruised pedalling gently up the hill a slightly larger electric vehicle – the Supertram – came up behind. He had to wait behind me, but I was still managing a respectable 8 mph, and when I cycled through a lay-by to let him past he gave me a respectful 'clang' on his gong. Despite the long hill I arrived fresh and relaxed – ready for action.

Coming home afterwards the build quality of the 'normal' bike became apparent as I touched 45 km/h freewheeling home – I (almost) wished the bike had regenerative braking. The power assist stops at 15 mph (UK regulations), so it was down to gravity and a streamlined machine – not bad considering it doesn't have drop handlebars. The meter advised that this trip had used 30% of the battery life.

Route: Parish visit
Distance: ½ mile each way
Terrain: Steep down hill – approx 1 in 5 gradient on minor road. Reverse on return.

Once the gradient became steep the motor just couldn't cope. It was down into bottom gear, and pedalling was just as hard as cycling without power assistance. I suspect that the heavy weight of the bike starts to work against itself. The motor's power is used simply to drag the bike itself up the hills, and there was little benefit to the rider over a normal bike.

Route: Chapter meeting at the far end of the deanery
Distance: 12 miles round trip
Terrain: Total 5 miles up hill (1 in 10), 5 miles down 1 mile flat, 1 mile up steep hill.

No way would I have undertaken a trip this of this length on a normal bike, but buoyed up by previous successes I went for it, and it worked out fine. I had a lot of positive comments from colleagues about keeping fit (alright – I came clean about the motor eventually), and when we adjourned to the pub for lunch they were amazed at how quickly I got there. But the trip was power hungry, using an indicated 70% of the charge. This allowed me to calculate the range of the bike over this type of terrain at around 16 miles. There is an optional battery pack which fixes to the rack which would double this. Average speed was around 14 km/h, again not bad for the terrain.

There was an interesting comparison with the superfit Sheffield Wednesday Chaplain who cycled his mountain bike from the meeting to the pub. On the flat or a gentle hill, I could leave him behind easily, but when the gradient increased he kept pace with me – again suggesting that on a steep hill all the power of the motor is taken up pushing the weight of the bike.

The ability to keep up with traffic better makes things safer, plus with legs not so tired it means you've got more in reserve when needed, e.g. for nipping out to overtake parked cars or to get out of the way of a bus.

Just a word of warning – the battery display began to flash below 20% and in actual fact it died altogether when the reading still said 10%, so don't rely on that last bit of charge!

LIKES:

- Looks like a normal town bike (more anonymous and better for security)
- The electronic key, power controller, speedo and battery gauge in one
- Lovely backlit display – cool!
- Good level of info about battery
- Lovely intuitive power control – just comes on automatically
- Stops you being completely lazy – you still have to pedal a bit
- Comfortable saddle and ride
- Silent operation
- Equipment – lights, rack, stand, lock all useful

DISLIKES:

- Heavy (28 kg) – hard to lift onto a bike rack or wheel up or down steps
- Slows down on hills
- Charger a bit noisy

Cost as tested £1429

Available in the UK from H Drake Cycles in Cambridge: Tel 01223 363468 (no website). Manufacturer: Sparta Bikes, the Netherlands. See *www.sparta.nl* for details of international distributors.

EZEE FORTE

PAUL'S REPORT:

This is a nice-looking bike with Shimano Nexus 8-speed hub gears, neat cabling and a good level of equipment (only the pump and frame lock of the Sparta are missing here). The lights are similarly integrated and operated by a switch on the handlebar. It also has front suspension, though with the enormous tyres I'm not sure it's really needed.

The ace up the sleeve of the Forte is concealed under the bottom bracket. Turn the bike over and fish out two wires. Disconnect them and zoom, zoom, zoom! 50Cycles stress that this 'turbo' mode is for off-road use only, to comply with UK regulations. The extra turn of speed meant that I needed to put on an extra layer of clothing for my spring morning commutes!

SLIGHT NIGGLES

- A squeak which I thought was coming from the bottom bracket or the pedals (because it had the same rhythm as my pedalling) turned out to be coming from the hinge mechanism in the saddle (which allows it to tilt forward so you can slide the battery out). While I can see that this is a nice touch, I would prefer to have a standard saddle and just remove the seatpost to get at the battery.
- After riding the Sparta, I found myself wanting more information than green-amber-red on the state of the battery.
- Once or twice I accidentally braked while holding the 'throttle' open: this activates a cut-out (so you have to switch off and on again to reset).
- The charger is a bit heavy: for commuting use I would want to buy two and keep one at work. But it is solid and quieter than the Sparta's.
- The manual is more a list of disclaimers: we are not yet as litigious as our American cousins so I don't think this is really necessary.

CHRIS'S REPORT:

Route: To school for assembly
Distance: 1 mile each way
Terrain: Mainly flat

It's a stylish bike, and it's obvious that it's not a normal bike. There were shouts from the kids along the lines of 'great bike' and 'nice bike Vicar' – in fact, thinking of security, it may be a bit too public.

Route: Crematorium and back
Distance: 1 mile each way
Terrain: Continuous up hill – approx 1 in 10 gradient on major road. Reverse on return.

The eZee took the hills in its stride – keeping a steady 10 to 12 mph on the fair gradient with just gentle pedalling. The power is much more obvious on this bike. There's a 'surge' as you twist the handle to start off, and you can hear the motor working. It's more akin to a 'twist & go' moped, and you can set off without pedalling. It does take more thinking about than the intuitive Sparta. For example, when turning right at lights you have to remember to steer and twist the grips at the same time. Power fades away at 15 mph (UK regulations) – quite fast enough really, but takes a little getting used to. This power for pulling away is useful in city traffic, helping you get through gaps and keep up with the speed of cars.

A word of warning: left hand turns whilst going up hill are difficult, as when you take your hand off the handlebars to signal, all power assistance is suddenly lost.

Route: Wedding at neighbouring Church
Distance: 3 miles each way
Terrain: Continuous up hill – approx 1 in 10 gradient on major road for first 2 miles, then ½ mile down the other side. Reverse on return.

I wanted to run the battery flat so that I could do an endurance test, and sure enough, three quarters up City Road disaster struck – the bike just died. The level of battery information is minimal on this bike – just green, amber, red. I'd had a few warnings as the amber and red lights dipped on, but the power went very suddenly, and I was left to pedal a very heavy bike up the hill. Thankfully the gears were pretty good, but the weight of the bike was such that it felt like something was pulling me back. Over the hill top and it was of course fine down the other side – I made it to the Church on time, and two couples were happily married. The battery had regained a little of its charge during the services, enough to get me a few hundred yards, but then died again. Thankfully the majority of the return journey was downhill.

Route: Several parish visits
Distance: Typically ½ mile each way
Terrain: Steep down hill – approx 1 in 5 gradient on minor road. Reverse on return.

The eZee bike was the only one that coped easily with the steeper hills, which is a major plus living where we do. Not only is the power more obvious, there's more of it. A further test without the speed restrictor (in off-road mode), and the eZee bike showed it had been hiding its light under a bushel. This thing can move! No longer flattening out at 15 mph – it carries on to 25 mph on the flat – even 17 to 20 mph going up a slight hill! The extra power is quite exhilarating – although it does tend to make you more lazy when pedalling. You begin to treat the bike more like a moped – just twist and go to start off, in whatever gear, and then you just remember to start pedalling to save power once you're under way. Overall endurance on a mix of gentle and steep hills with a little flat was a creditable 15 miles, even with just gentle pedalling.

LIKES:

- Great fun
- Great on hills
- Stylish looks
- Tremendous surge of power as you set off!
- Comfortable saddle and ride
- Useful equipment: lights, rack, stand

DISLIKES:

- More conspicuous
- Louder motor
- Heavy (28 kg)
- Less info on charge level
- Left hand turn problem

Cost as tested: £1345

Update July 2010: **The original contact details are now incorrect. Ezee bikes are now distributed by Onbike: Tel 01299 251514 or see www.onbike.co.uk**

The Ezee's fitted with the 8-speed Shimano Nexus hub gear and roller brake – should be a low-maintenance combination.

The display unity is a little basic in the information it gives about the charge level. To the right is the twist shifter for the eight-speed hub gears. The throttle control is operated by the left hand.

The 37V, 10 Ah battery pack gives a range of around 15 miles in hilly Sheffied. The charger is a bit heavy, so you may want to keep one at each end of your journey.

The Ezee's hefty motor in the front wheel can give a considerable boost – note also the neat mudguard fittings.

AIRNIMAL JOEY MOVE

PAUL'S REPORT:

I have to confess that the Joey is more like the type of bike I would usually ride (at least on my commute). Even without the BionX motor, the sporty position and lively nature make you want to go faster (even if you're not capable).

Whilst the Forte has one ace up its sleeve, the Joey has two: the clever regenerative braking and… it folds! The BionX system has been very well integrated: the cabling is neat and the fold is virtually unaffected. I was able to get it into a very small car with no trouble at all in less than a minute.

The controls for the BionX consist of four 'assist' levels, 'off', and four 'regenerate' levels. I tended to leave it on +4 assist all the time. In auto mode, the regeneration also happens when you lightly apply the front brake (there's a switch on the brake lever). So if you are just slowing down gently you have to remember to use the front brake and not to squeeze it too hard, so that you regenerate and don't wear out your brake pads.

The noise from the motor is slightly louder than from the Sparta (which you would have to have bat ears to hear) but quieter than the Forte. A few little bars on the display show how much it is assisting or recharging and it was so quiet I often had to check these to see if I was getting any help. Once I was cruising at about 20 mph (something I don't normally do) and was surprised to see that it was indeed '100% me' (well, 95% me and 5% coffee and walnut cake).

SLIGHT NIGGLES

- There was a rattle in the battery box (but due to a previous rider having lost the key I couldn't open it up and sort it out, nor have a peek at the battery!).
- As tested, the Joey had no mudguards, rack, stand, lights or lock, so direct comparison of the weight would be unfair. But nevertheless, this is a lighter bike meant for quick road riding (and all these accessories can of course be fitted).
- At first the regeneration took me by surprise, not so much because of the slight noise but because when you apply the front brake, the braking happens at the back wheel. It just feels a bit odd, but you get used to it.
- A black casing for the BionX battery would make it blend in better on a black bike.

CHRIS'S REPORT:

Route: Service at neighbouring church
Distance: 2 miles each way
Terrain: Continuous up hill – approx 1 in 10 gradient on major road. Reverse on return.

The BionX coped pretty well going up the gentle hills. There's little extra weight to a normal bike, so with gentle pedalling I managed a creditable 10 mph up hill. The regenerative braking is interesting: as you touch the front brake lever the rear hub starts to absorb power from the wheel, effectively braking the bike, but putting the energy back into the battery for future use. Coming home down the hill I switched this feature on permanently, and this gave a gentle braking effect, keeping my speed down to a comfortable 30 km/h.

Route: Several parish visits
Distance: Typically ½ mile each way
Terrain: Steep down hill – approx 1 in 5 gradient on minor road. Reverse on return.

Again on the flat you're soon up into top gear and cruising along at 15 mph. The BionX did manage to get me up the steeper hills, although a fair amount of pedalling was needed.

People often stop and ask about the bike. 'Does it charge up as you pedal?' was a common question. No, it doesn't – it would be inefficient to convert your pedal effort into electricity to then put it into the motor, and it's more efficient and far simpler to just drive direct through the chain.

But hang on a minute: when you pedal up hill you gain potential energy as you gain height. If you then use the regenerative braking down the other side you will charge the battery up, so in this case you have pedalled to charge the battery!

Route: Chapter meeting at the far end of the deanery
Distance: 12 miles round trip
Terrain: Total 5 miles up hill (1 in 10), 5 miles down 1 mile flat, 1 mile up steep hill.

The power control and display work well, showing how much power you are taking out or putting back into the battery. The system seems to know how hard you are pedalling, and responds accordingly – if you pedal a little harder, the bars creep up the display and you feel more power coming on. As you ease off, so does it. I guess this means maximum battery life, and it prevents you from getting lazy.

Down hills I let the speed creep up to around 40 km/h, then put on the regenerative brakes. Setting -2 trimmed the speed to a comfortable 30 km/h and the meter reported power flowing back into the battery. Well, it's better than losing all that energy to wind resistance or warming up your brake blocks!

Endurance was good too – power seemed to be fading a little at 18 miles, but a quick run downhill put enough back in to take me home – overall endurance at least 20 miles.

LIKES:

- Lightweight (20 kg)
- Power unit can be fitted to existing bike
- Regenerative braking
- Power display

DISLIKES:

- None

Price as tested £1499
Available from Airnimal Europe: Tel 01223 523973 or see *www.airnimalfoldingbikes.com*

LEFT: The BionX display and control unit offers assist and regeneration settings and a power indicator as well as the usual speed readout

BELOW LEFT: Our reviewers would have liked the BionX battery box in black to match the frame

BELOW: The motor is built into the rear wheel. Adding the electric system doesn't affect the bike's fold

CLOSING THOUGHTS

From Paul in Cambridge:
My 16 mile ride to work usually takes me about an hour each way. I really didn't know how far it was – I had always guessed about 15 miles – but it's about an hour, plus or minus 10 minutes depending on the way the wind is blowing. The total elevation change is probably about 6 foot.

After commuting on these bikes for a few weeks (with no punctures or mechanical problems, by the way, despite my journey including some rough farm tracks) I concluded that they didn't really save me any time because of the speed limiting, but they did save effort and, therefore, sweat. So I was more attractive to my colleagues (well, less unattractive) and less exhausted in the evenings.

The exception was the Ezee Forte with the speed limiter removed (for off-road use only of course) which saved about 15 minutes because I could cruise at over 20 mph.
Paul Robison

From Chris in Sheffield
If you're a cyclist and you still want to keep fit, you might prefer the Sparta – a stylish, well thought out machine. It forces you to pedal, which is good exercise. It's inconspicuous and the power control is intuitive for a cyclist. It greatly increases your endurance, and makes it possible to arrive fresh, even after a fair journey. It will get you up fair hills, but only slowly – flying down the other side is exhilarating!

For a petrol-head car driver, the sheer power of the 'twist and go' eZee bike will appeal – you can be lazy if you wish and the bike will still drag you along at a respectable speed. The eZee also did far better on the hills – no worries at all even on steeper gradients. Styling-wise it's far more 'in your face'; it looks out of the ordinary and the motor roars, but hey – if you've got it, flaunt it! Endurance-wise I thought 15 miles of constant hills (either up or down) was pretty respectable. Obviously more flat would increase that dramatically.

Surprisingly both of these bikes had about the same range over the same terrain – I had put in a lot more energy myself with the Sparta, so had expected the endurance to be a lot higher. On both bikes keep an eye on your battery level. It's harder to predict on the eZee bike, although the percentage level on the Sparta was not always 100% accurate. If your battery dies it's hard work pedalling, although not impossible – useful in emergencies. Also be prepared for lots of interest: I had people stopping me in the street to ask about the bikes (mainly the more obvious eZee). This is good from a pastoral point of view but could become time-consuming!

The BionX system is a great idea and works well. The power control is good, forcing you to pedal a little, keeping you fit and the lighter weight means that the power advantage is not lost on hills. Regenerative braking increases your endurance. The idea of fixing this unit to your own favourite bike is appealing, and should save a lot in cost, but you'd need to be an expert to lace up the spokes yourself from the BionX hub – better to leave this bit to the bike shop. For anonymity I would paint the BionX unit the same colour as my bike so less attention was drawn to it.

And the last big question – did they make me leave the car at home? Well, yes – I didn't get my car out of the garage during the three weeks of the trials, quite an achievement. That had to have a good effect on my 'carbon footprint'. I even found myself getting out and about in the parish more because of the sheer fun and convenience of using the electric bikes! From a fitness point of view I was getting far more gentle exercise than my usual combination of bike and car as the power assistance gave me confidence to undertake much longer trips by bike.

I was impressed by all three bikes. At last electric bikes seem to be growing up from a 'cranky idea' to a viable means of transport, even if you live somewhere where cycling conditions are far from ideal. So this vicar will certainly be asking for more 'e' in future!
Chris Stebbing

Thanks to:
- **H Drakes** (01223 363468) in Cambridge for supplying the Sparta Ion. They also have a very interesting range of Raleigh and Koga Miyata bikes.
- **50cycles** (Tel 01509 266656 or see *www.50cycles.com*) for sending the Ezee Forte
- **Airnimal Designs** (Tel 01223 523973 or see *www.airnimal.com*) for the Joey Move
- **BikeTec** (*www.biketec.ch*) from Switzerland for loan of the Flyer during the SPEZI show – a very interesting chance to ride a performance bike developed for that country's more permissive electric bike regulations.

Update July 2010: **Please note that Ezee bikes are now distributed by Onbike: Tel 01299 251514 or see www.onbike.co.uk**

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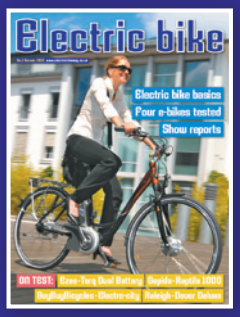

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