www.electric-boat-association.org.uk
Volume 17 Number 1 Spring 2004

Electric Boat NEWS

The Journal of the Electric Boat Association
Supported by the Broads Authority

Electric Sailing • Tips for Trailing
Norfolk Boats • Insurance Quotes

CLASSIFIED ADVERTISEMENTS

House For Sale: Riverside House on private gated estate. Large living room, kitchen, cloakroom, 3 bedrooms, 2 bathrooms, Double garage, South facing garden with approx. 38 foot mooring, charging point.

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Members wanting to buy or sell electric boats, motors, fittings or associated equipment are invited to submit a 50-word entry direct to the Editor (Note: No agents or brokers). The information contained in members' private advertisements is provided by the advertiser and the Editor is unable to vouch for their accuracy. It is the responsibility of prospective purchasers to satisfy themselves as to the accuracy of the information given and of the condition of goods advertised.

Information sheets from the Electric Boat Association

1. **PRODUCT GUIDE & EBA TRADE MEMBERS**
(free upon request)

2. **SOLAR PHOTOVOLTAICS** by Paul Lynn

3. **ELECTRIFYING YOUR BOAT** by Hawthorne & Wagstaffe

4. **HULL DESIGN FOR ELECTRIC BOATS**
by Andrew N Wolstenholme

5. **LEAD ACID BATTERIES – OPERATION & MAINTENANCE**
by CMP Batteries

6. **HIGH SPEED ELECTRIC BOATS** by Lorne Campbell

7. **HYBRID POWER** by John Hustwick

Available:
Free to members Nos. 2-7
Non-members @ £1.50 per copy

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Woodcote, Berks RG8 OQJ

Tel: 01491 681449
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e-mail: eboat@mail.com

EBA CALENDAR

April

19th	EBA Event	Launch Supper Maidenhead Rowing Club

May

15th	EBA Event	All-Electric Boat Show Huntingdon
16th	EBA Event	EBA Cruise on River Great Ouse

June

11th – 13th	EBA Represented	Beale Park Boat Show Pangbourne

July

11th	EBA Event	Thames Rally Bisham Abbey, Marlow
11th	EBA Interest	Steam and Electric Boating Festival Sudbury
17th – 18th	EBA Represented	Thames Traditional Boat Rally Henley

September

18th	EBA Event	Norfolk Cruise weekend
19th	EBA Represented	incorporating A Silent Sensation

October

tbc	EBA Event	Laying Up Supper Maidenhead Rowing Club

For further details of the above, or notice of other events, please contact the Secretary

Electric Boat News is published quarterly by the
Electric Boat Association

Cover Picture: **Carolann sailing in Bideford Bay**
Photo: Jenny Hill

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CONTENTS & EDITORIAL

Contents

At the start of the boating season, this issue is full of practical information which I hope will please the reader who wants more technical content in the magazine. If you are thinking of building or converting a boat there are some very interesting articles from EBA members about their experiences, as well as useful tips on trailing and expert advice on insurance.

The last edition of the magazine was delayed by problems at the printers so I am allowing more time for the Thames Quiz. If you abandoned it because of the tight deadline, please give it a bit more thought and send in your answers by the end of May. The questions are repeated on Page 16.

As we go to press it has just been confirmed that the Broads Authority Sustainable Development Fund has awarded £18,000 to 'Go Electric' for the promotion and conversion of electric boats. I will report in more detail on the scheme in the next issue. Our congratulations to Tony Fogarty and his team for all their hard work in securing this funding.

Sylvia Rutter

Editor

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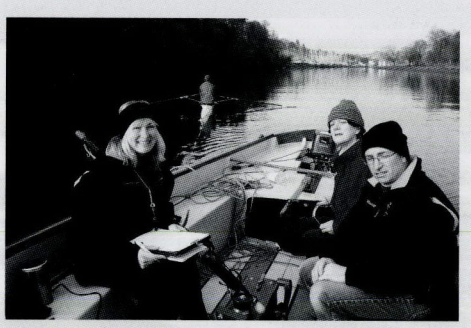
Copy Deadlines:

Material to be considered for inclusion in the next edition of Electric Boat News should be sent to the Editor (preferably by email) by the following date:

Summer 1st June

Converted Boat Page 10



Recording Boat Page 12

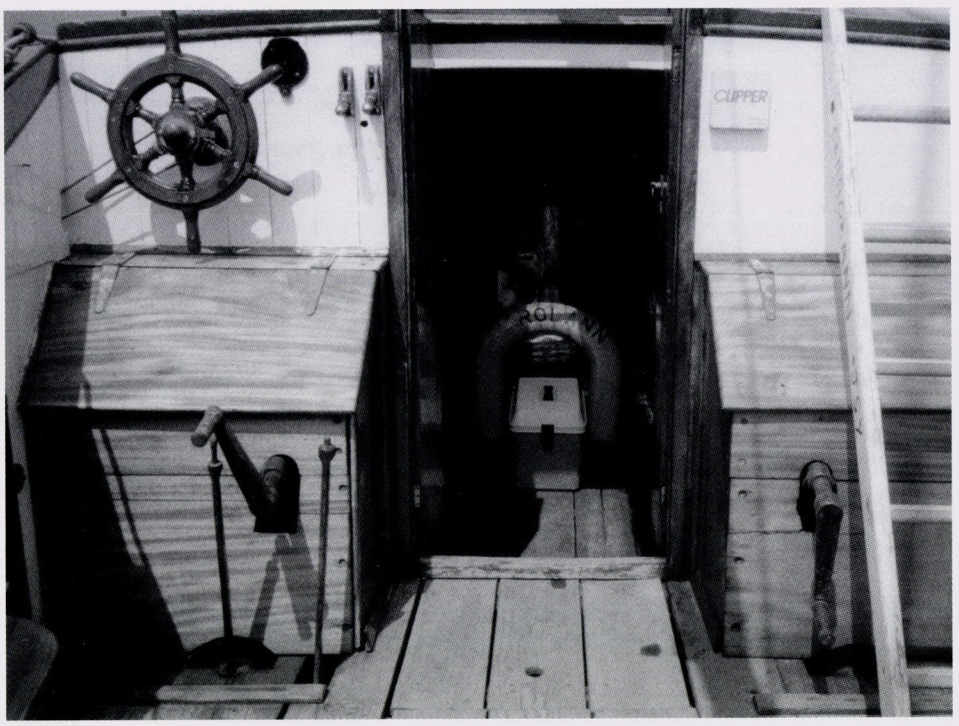
Solar Boat Page 18

CAROLANN'S CONVERSION

Words and pictures from David Graham on a recent conversion to electric power in a traditional sailing boat:

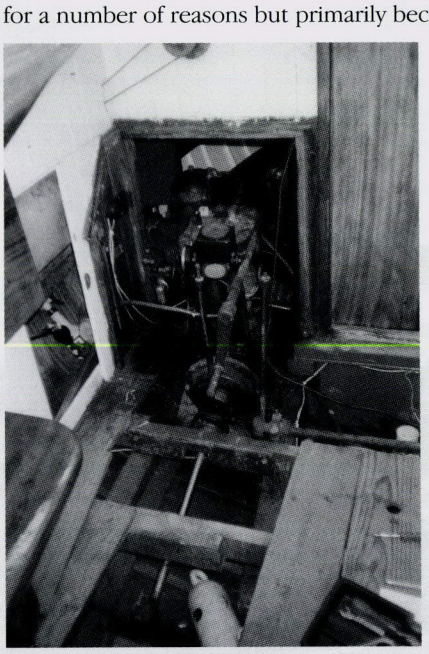
The 27 foot ketch *Carolann* was built in Teignmouth in 1937 for day sailing, fishing and picnicking out of St Peter Port, Guernsey. She passed through the German occupation of the Channel Islands and two other owners before we found her in Jersey and brought her to Instow in North Devon. When first built she featured in the February 1937 Motor Boat magazine under the title 'An Unusual 50/50.' This was a reference to the requirement to perform equally well under both sail and power.

In order to achieve the performance under power she was fitted with 2 Brit Marine 10hp petrol engines driving contra-rotating propellers through reversing gearboxes. These engines were completely handed in all respects including rotation. To start one you swung the handle clockwise and the other anti-clockwise. In all other respects *Carolann* was in good order. The engines, however, were never wholly satisfactory and on a couple of occasions gave real trouble. After two seasons it was obvious something needed doing.



Before work started showing starting handles and control levers

At first I considered two options: rebuild the petrol engines or replace them with diesels. Rebuilding the engines was discounted for a number of reasons but primarily because of the need to carry large quantities of petrol on an old wooden boat. Also, no matter how good the rebuild, there would still be the requirement to hand start them. As I investigated replacing them with diesels it became apparent that it was not going to be either cheap or easy. At that point I came across some articles on electric power in old Classic Boat magazines.


Old petrol engine

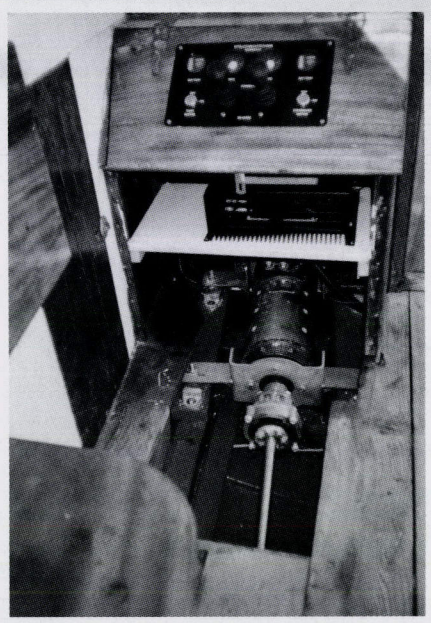
Membership of the Electric Boat Association led to discussions with some very helpful and informative people. This and a trip to the London Boat Show gave me enough contacts to examine the project properly and put my ideas together. I set these out with as much information as possible and sent them off to a number of potential suppliers. The response was patchy, ranging from nothing at all, despite follow up phone calls, through to a complete package including the calculations to support the choice of propellers. I would ask all suppliers to help their customers by answering their queries fully or, if they don't want the business, to say so. This would save a lot of frustration.

The supplier I chose gave me considerable help in sorting out the details and a complete system was agreed. The only bits of the old set up to be retained were the shafts and, given the subsequent problems of fitting the props to the taper, they should probably have been replaced too. The old engines, gearboxes, control gear, fuel tanks, and bearers were removed and stored. (This is probably the wrong forum in which to advertise old petrol engines for sale). A really good clean up revealed the need for some minor repairs and then the fun could begin.

The installation I decided on was in fact two completely separate propulsion systems. The theory being that a total failure on one side, for whatever reason, could not affect the other. The motors, control gear and charger control unit fitted easily into the old engine boxes.

The batteries went underneath the berths in the cabin. Because *Carolann* sits on a swinging mooring the charging system has to be on board as well and the generator is stowed out of the way in the cockpit. Calculations indicated that the total weight of the motors, batteries and generator was very close to that of the old engines, gearboxes and fuel load. The weight was lower down and further forward so a small re-distribution of the ballast already on board brought her back to her design water line.

There was a considerable advantage to using one supplier for the whole system. Everything required was put together and bench tested before delivery and a complete set of installation instructions, drawn up specifically for my needs, was provided. These two things meant that the actual installation was straightforward. Indeed the most difficult part of the work was dealing with the considerable interest among all the others in the boat park as we prepared for the season. On many occasions I explained with great confidence how it would all work. There were however doubters and, in spite of all the calculations, I was probably one of them.

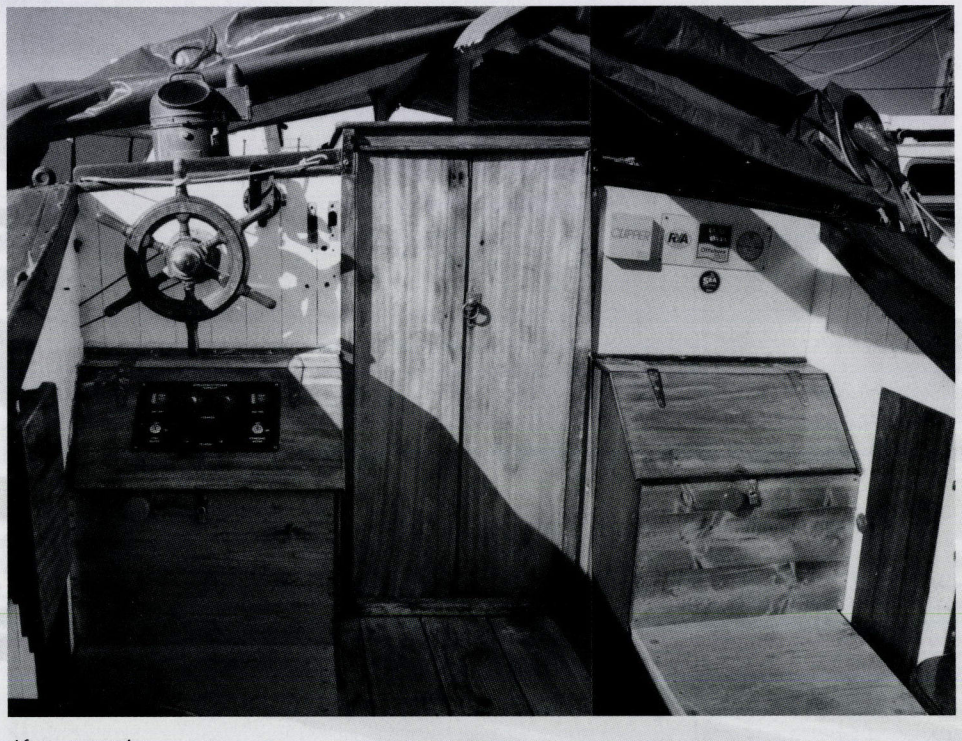


New engine with control box and panel for both engines

With the exception of problems with a switch in the charging system that refused to respond to logic and matching the prop shaft taper, installation was trouble free. The weather on the day chosen for sea trials was filthy but there was a certain amount of credibility at stake here. ("It's not much good if it can't cope with a bit of a blow"). With a friend's boat in company, just in case, we dropped the mooring. After about 10 minutes there was total panic as a strong smell of burning hit us. Frantic searching revealed no fires on board and then the crew pointed out that we were down wind of a large bonfire ashore. An uneventful hour later we returned to the mooring, started the generator and retired to the pub.

We prefer to sail *Carolann* and only use power to clear the mooring area and get out of the estuary. When I do need power I tend to use only the down wind motor, pulling only 30/40 amps for short periods. I use both motors only occasionally and that is to push against a strong tide or head wind. We achieve the theoretical hull speed with power to spare. On returning to the mooring we close the boat down and, just as we leave, start the generator.

We have now had a season of electric power and it has been a complete success. The clean, quiet, trouble free, responsive motors have changed the whole character of *Carolann* and a good old boat has been given a new lease of life. I would like to thank every one I talked to for their help and particularly Rupert Latham of Stelco Yachttechnik (UK) who put the package together for me and provided advice throughout.



After conversion

DETAILS

Boat: *Carolann* (27'L x 8'3"B x 2'9"D) wooden, twin screw, motor sailing ketch. Built by T Bulley & Sons of Teignmouth in 1937.

Engines replaced: 2 x Brit Marine, hand started, 10hp, 2cyl, 4 stroke, petrol engines driving through 1:1 reversing gearboxes to 3 blade 15" x 14" contra rotating propellers on 1" stainless shafts with solid couplings.

System Installed: 2 x 2.5kW 48V SEM direct drive motors with SEM-1C controllers driving 2 x 3 blade 14.6" x 10" contra rotating propellers on 1" stainless shafts with flexible couplings to the motors. There are 2 banks each of 4 x Elecsol 12V 220 Ah monobloc batteries charged by a Honda 230V AC, 2kW generator through an NG1 48/18 charger.

INSURANCE COVER

Last summer EBA Chairman John Hustwick took his boat *Rhapsody* to the Steam and Electric Boat Day on the River Stour and was advised that he must not offer rides to the public because he was not insured for hire purposes. Although he was not charging for the boat trips they were deemed to be 'hiring' because visitors had paid to attend the event.

Navigators & General offer an insurance policy with a favourable premium to EBA members and a small commission to the EBA so we asked for their comments. This is the advice from their Marketing Manager, Joe Field:

With the boating season almost underway, thoughts are no doubt turning to itineraries for the year and getting the maximum amount of enjoyment and use out of the boat that you have probably spent a great deal of the Autumn, Winter and Spring months working on.

Across the UK, there are a number of events, fetes or fairs that are organised throughout the year on canal, river or lakeside locations for a variety of extremely worthy causes. It is extremely generous, and commendable to offer your boat and services to the organisers of any event to offer short trips, or tours, but it is extremely important to note that any of these activities may invalidate your insurance policy. This could put you at risk of a lawsuit against you should an injury occur, or indeed any other claims such as loss or damage to third party property.

Most pleasure craft insurance policies contain a warranty (which, if breached, invalidates all cover under the policy) that restricts the use of the vessel to private and pleasure purposes. This allows you to take out friends and non-fare paying passengers, however this does not cover members of the general public who have paid to enter an event which includes a trip on the boat, or who are receiving a demonstration or tour by yourself. This is because you have an increased duty of care in the eyes of the law to look after them and, as a result, increases the likelihood of those passengers claiming compensation for being injured, which in today's compensation minded culture could result in a substantial claim.

This is not an effort by Insurers to use small print to avoid paying claims, but very simply a big increase in exposure on their part. This is because of the additional activities undertaken which Insurers need to be aware of, in advance, to decide what terms and additional premium to apply (if any), prior to accepting the risk.

Therefore, due to the increased risk of exposure for you and the insurer should you undertake these activities, if you are intending to use your boat for any fete, charitable, or demonstration purposes you should contact your Insurers or Insurance Broker in good time and advise them exactly what events or activities you are going to be involved in over the year. This will give them adequate time to assess the additional risk, notify you of any specific terms you should adhere to and calculate any additional premiums that are necessary.

You will then receive an endorsement extending your policy for the planned use, thereby satisfying the terms and conditions of the policy.

Navigators & General has been insurer of the Electric Boat Association Scheme for a number of years and do receive the occasional enquiry of this nature. We are likely to make a nominal additional charge for this increased liability exposure and make certain stipulations about crew, experience and safety gear on board. We hope that by applying sensible precautions coupled with good risk management and safety conscious skippers, we will be able to allow this type of activity for worthwhile causes to continue in the future.

For new business quotations at Navigators & General call 01273 863420. To extend an existing policy call 01273 863430.

NICK GOLDRING

Georgie and Rhapsody on the Stour

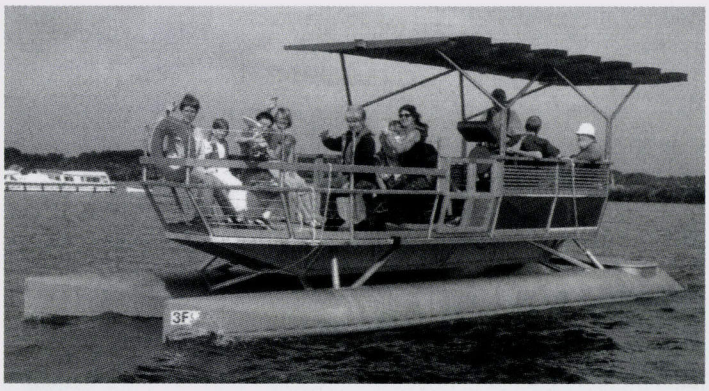
NEWS

SOLAR BOAT FOR CHICHESTER HARBOUR

Chichester Harbour Conservancy will shortly be taking delivery of their new solar powered catamaran from Switzerland, bought with a grant from the Heritage Lottery Fund. EBA Chairman John Hustwick has been invited to the launch day on 21st May. The boat, called the *Solar Heritage*, will be used for educational trips, with themes such as Nature Watch and Photography, taking school parties and the general public. Bookings can also be made by community groups, clubs or groups of friends with trips arranged to suit their particular interests.

To book trips, telephone 01243 513275 and for more information see the website on www.conservancy.co.uk

WETLAND MANAGEMENT COURSE



Broads Authority Solar Boat Ra

The Broads Authority is hosting a training course from April 19th to 24th in Norwich on the theory and practice of wetland management and restoration. As part of the course, participants will learn about environmentally sensitive ways to enjoy the Broads waterways and countryside by taking a trip on the Authority's solar-powered boat *Ra*.

More information from the Broads Authority website www.broads-authority.gov.uk

ELECTRIC BOATS FOR HIRE

Oxford-based Salter Brothers have taken on 12 new electric boats for day-hire, expanding its hire fleet to 30. Director Neil Kinch said: "We had a good summer last year and with bookings now already up by 20% on 2003 we are looking forward to an even better season this year. We decided to take on 12 new electric boats as they were popular last year and we're keen to keep up with customer demand".

For more information contact Salter Brothers on 01865 243421 or visit their website www.saltersteamers.co.uk

ELECTRIC BOAT TRIPS ON THE STOUR

Rosette

Easter weekend is the start of the season for the two Edwardian style electric launches operating on the River Stour. Every Sunday and Bank Holiday until 3rd October *Rosette* will be offering return trips from The Granary at Quay Lane, Sudbury while *Stour Trusty II* goes between Flatford and Fen Bridge. On Bank Holiday Monday 3rd May *Rosette* will be giving Teddy Bear Boat Rides to Cornard from 3 p.m. Children accompanied by teddies will travel free!

For general enquiries about boat trips telephone 01787 313100 or 01787 313199 (24-hour answerphone)

On Sunday 11th July the River Stour Trust will be holding their annual Steam and Electric Boating Festival at Quay Lane, Sudbury with boats, railway models and many other stalls and attractions. All steam and electric craft are most welcome to attend. Launching, bar and catering facilities will be available.

More details from David Rayner on 01268 753245.

LADIES WHO LAUNCH

Hambleden Sales & Charter, based on the River Thames near Henley, now have a three-women sales team. Director Gillian Nahum has been joined by Louise Binney, who is in charge of marketing their charter boats, including the self-drive electric launch *Millers Lass*, to local companies. Jill Robinson, a fellow boating enthusiast, 'mans' the office in Gillian's absence and deals with general enquiries. All three are keen to develop the business and looking forward to the new boating season.

Louise, Jill and Gillian

More information from 01491 578870 or the website www.hambledensalesandcharter.co.uk

TELCO OPEN DAYS

The Thames Electric Launch Company are holding a series of open days for people who want to try out their boats and motors. Provisional dates and places are:

Monday 3rd May	Goring-on-Thames
Saturday 15th May	River Ouse
Sunday 23rd May	Staines, Thames
Saturday 12th/Sunday 13th June	Goring-on-Thames

On show will be the Interboat 16, Interboat 19, Dragonfly 12 and the full range of Minn Kota electric outboards.

For more information telephone 01491 873126, Fax 01491 872217 or e-mail thameselectric@goring.co.uk

4-DAY RIVER RALLY

Electric boats at Cookham Island in 2001

The Royal Yachting Association and the Environment Agency are organising a 4-day rally on the Thames. Starting on Wednesday June 23rd, boaters can meet at either the Upper Thames Motor Yacht Club if travelling downstream or at the Windsor Yacht Club if travelling upstream. On day two all boaters will meet at Cookham Island for a midsummer barbecue and on day three there will be boat handling demonstrations and assistance. Free moorings will be available on Cookham Island and on the Saturday participants can disperse at their leisure. The registration fee of £35 includes moorings, facilities and one free meal.

To register, or for more information, call RYA Cruising on 0845 3450370 or e-mail cruising@rya.org.uk

OLDEST ELECTRIC BOAT

Possibly the oldest electric boat still afloat in England is to be converted back to electric power. The 41 ft. *Lady Lena* was built in 1890 by Burgoine of Kingston-on-Thames for Immisch's company the General Electric & Traction Co. Originally with a cabin, she carried passengers first on the Thames and later on the River Ouse through Bedford. She remained as an electric boat until 1963 when she was laid up. In 1980 she was discovered and restored by Jenkyn Knill, at which point she was converted to steam propulsion. Now Jenkyn, a new EBA member, wants to convert her back to electric power and has commissioned the

Lady Lena

Thames Electric Launch Company to do the work. She will be ready to run again by the summer and it is hoped that she will make a trip down to the Thames from her present home on the Kennet & Avon Canal.

ELECTRIC LAND SPEED RECORD RAISED

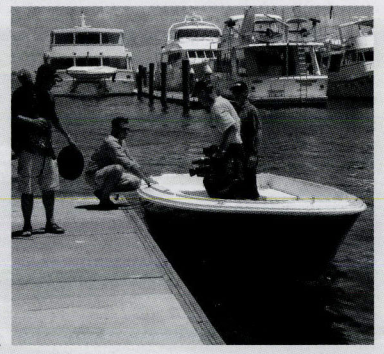
Kevin Desmond reports that the new world land speed record for electrically-propelled vehicles is now 257 mph. The *Buckeye Bullet 3006*, piloted by 61-year old Craig Taylor, a former US Navy fighter pilot and Indy-style racing driver, even reached an unofficial 271 mph on one run last October on the Bonneville Salt Flats in Utah, USA. The 30ft long by 2ft wide vehicle is powered by a 500 hp electric motor with 12,000 nickel-metal-hydride batteries positioned forward along 6 ft and stacked twelve high. They can be recharged in one hour.

Buckeye Bullet 3006 is a collaboration between current and former students of the Ohio State University's Center for Automotive Research-Intelligent Transportation and private industry and took 41 months from conception to achieving the record. The team's target for this year is 300 mph. Kevin points out that the 100 mph world electric water speed record still has to be broken. . . .

QUEENSLAND BOAT SHOW

Australia's national Channel 9 TV featured Charles Fitzhardinge's electric 'Woolwich 20' in their recent Boat Show programme. This involved Charles in a 12 hour, 1000 km tow north, followed by a morning of filming and another 12 hour tow back to Sydney. Unfortunately, Charles reports that the Range Rover used as the towing vehicle expired very expensively 800 km north of Sydney on the return trip, due to a cracked block. His long-suffering son had to get up at 3 am to drive his trusty Toyota Land Cruiser to rescue Charles and the boat while the Range Rover travelled ingloriously back to Sydney on a truck.

The photograph shows the film crew boarding the Woolwich 20 for filming on the Broadwater on Queensland's Gold Coast.



More information from Charles Fitzhardinge on (02) 9879 4222 or from the website www.solarboat.com.au

DATES FOR YOUR DIARY

HUNTINGDON ELECTRIC BOAT SHOW

Hartford Marina will again be the venue for the third All Electric Boat Show at Huntingdon on 15th May. The marina has excellent facilities for exhibitors and visitors with a family restaurant/pub on site. The EBA will have a marquee for the display of leaflets and equipment and there will be 'try a boat' trips on the River Great Ouse. There is an easy slipway, with help on hand if required, for people bringing boats. The event has the support of the Environment Agency who will waive licence fees for the weekend.

The Saturday show starts at 12 noon and runs until 5 pm. On Sunday 16th May there will be an informal cruising day on the River Great Ouse for EBA members and friends.

Further information from EBA Secretary, Barbara Penniall

IAN RUTTER

Try-a-Boat at Huntingdon 2003

BACK TO BISHAM

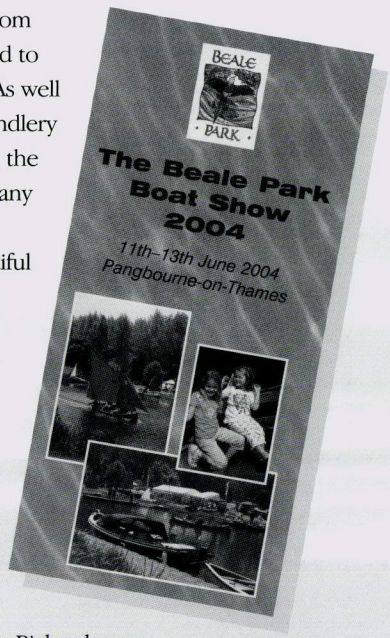
The 21st Anniversary celebrations at Bisham Abbey last year were such a success that the EBA is delighted to be returning to this beautiful location on Sunday 11th July. The event will be rather lower-key than last year but will include lunch at the Abbey and an afternoon cruise. As before, Roy May of the Bisham Abbey Sailing School is making moorings available for the whole weekend, so boat owners can moor up before the event and leave their boats on Sunday night if they are travelling home on the Monday. Since there is a good public slipway at Marlow, almost opposite the Abbey, this is an opportunity for boat owners and friends from outside the area to spend a weekend exploring a very attractive stretch of the Thames.

More details and an application form will be sent by post nearer the time but please put the date in your diary.

IAN RUTTER

Electric Boats at Bisham

BEALE PARK BOAT SHOW



This year's Beale Park Boat Show, from 11th to 13th June, is being expanded to appeal to a wider range of people. As well as the traditional boat builders, chandlery and craft stalls the show will feature the 'Italian Experience' marquee and many new exhibitors. Beale Park near Pangbourne-on-Thames has a beautiful riverside location and its 7-acre lake with navigable channel to the Thames will again be the venue for the popular 'Try-a-Boat' scheme. The Electric Boat Association is one of the show's supporters and will be represented on site with the EBA stand. Show Chairman, EBA member Richard Howard, says he is "looking forward to what promises to be a fantastic show".

Ticket prices are £6 for adults (£5 in advance) and £1 for under 16s and are available from Beale Park on 0118 984 3417. For more information e-mail events@bealepark.co.uk or call 0118 984 3369.

See also the EBA website for details of how to get to these events.

ELECTRIC BOAT NEWS ADVERTISING RATES

Eighth page £30 per issue

Quarter page £60 per issue

Half page £100 per issue

Complete page £150 per issue

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or visit our website **www.hambledensalesandcharter.co.uk**

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Dragonfly 12

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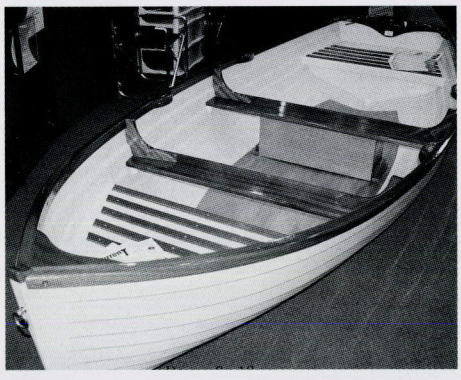
Carries 4-6 people, with up to 8 hours running time. Easily towed and launched. From £1795 inc VAT.



The Thames Electric Launch Co.
PO Box 3, Goring, RG8 0HQ
Tel: 01491 873126 Fax: 01491 872217 www.thameselectric.com

PATIENCE AND ELECTRIC

Albert Lambert tells the story in words and pictures of the conversion of a Broads cruiser:

We acquired the 25ft Freeman *Patience* in 2001 and from the start the very tired 1964 Ford petrol engine had given us trouble. For two seasons we persevered until earlier last year it was decided that the engine had had its day. It had to go.

So what to do? Recondition the engine? Find a replacement in better condition? Convert to diesel? It was while we were reviewing all these options that we took the opportunity of a trip in John and Sandy Williams' electric launch, 'Festival 23'. So impressed were we that it prompted the question, half in jest:

"Couldn't convert Patience, could you, John?" And brought the most unexpected answer: "Sure, no problem."

Patience after conversion

First and foremost, though, John suggested we visit Tony Fogarty who had converted his 27ft Elysian cruiser *Moonglow* some time before. It was thanks in the main to Tony's enthusiastic welcome and extensive demonstration of *Moonglow* that it was decided electric propulsion was the way to go.

The decision made, it was back to John Williams with a request that he allow me to work alongside him during the conversion. His acceptance was greatly appreciated.

First the recalcitrant engine, together with redundant electrical wiring and petrol tank, were removed and the bilges cleaned and painted. Then essential shaped bearers were fitted to spread the weight of the batteries evenly across the hull.

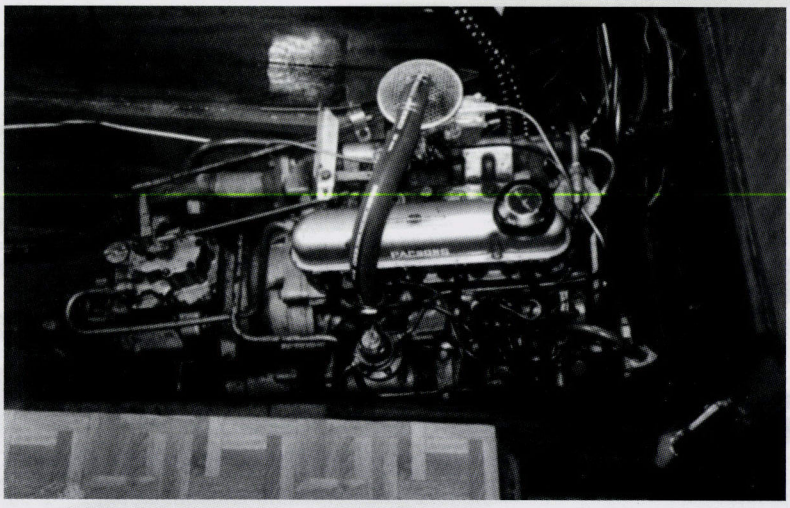
It was decided to install a 48 volt system comprising sixteen 6 volt 195Ah Monobloc batteries in two banks of eight. This configuration was chosen primarily for two reasons:

1. Having reviewed a number of battery types, including the very excellent Elecsol batteries used by Tony Fogarty, it was found that the size of the Monobloc most suited the physical space available in the Freeman.

2. Ease of charging. Using a 48 volt x 30 amp automatic charger and charging from an 80% discharged state, each bank of eight could be charged, using the most readily available waterside 16 amp power supply, in just 12 hours.

Calculations indicated that each bank of batteries, run down to the recommended discharge state of 80% at an average of 25 amps, would give just over 6 hours cruising. 12 hours in total for both banks. It wasn't as simple as that of course. As already demonstrated by Tony Fogarty in his own published details, much more needed to be considered, not the least being the weight and configuration of the boat and its movement through the water. Only the final trials would confirm the figures.

The control equipment - a 4QD-300 controller - proved to be an excellent choice. Used in conjunction with a Geisman hand lever, it gave fingertip control throughout its range in both forward and reverse. A small but frustrating point should be made here. Though the 4QD website is as comprehensive as any I have seen, and e-mail replies are prompt, obtaining technical advice by telephone can be difficult.



Old engine

PROPULSION

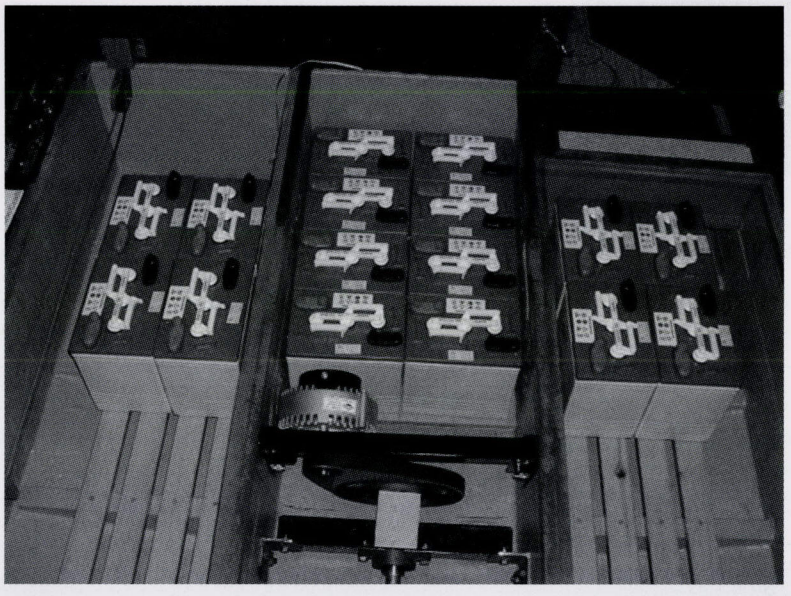
Propulsion was supplied by an E-Tek motor, the Briggs & Stratton version of the Lynch design with a 4:1 toothed rubber drive to the prop shaft.

The elapsed time taken for the complete conversion was a little short of 4 weeks. With some delays in component deliveries and considering my own requests for John to carry out additional tasks, I considered it to be an excellent turn-round.

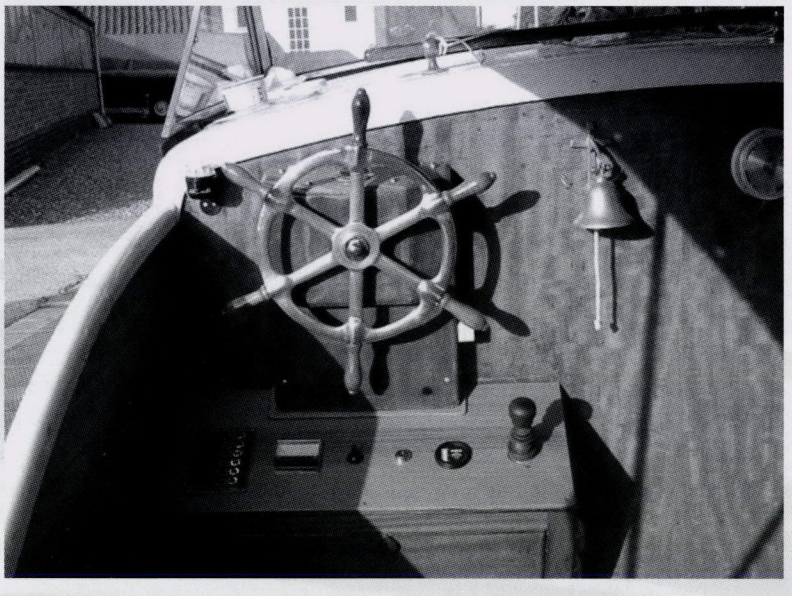
And the final result? It can be summed up in few words. Clean and quiet with no smell and a control and reliability simply unachievable previously. And, of course, no cans of petrol to be lugged to and from the boat. In other words, a joy to cruise.

And performance? Having run the system now for almost three months, I can confirm that at an average consumption of only 25 amps the Freeman cruises at around 4mph with a duration of 6.5 to 7 hours from each bank of batteries. A total of 13 to 14 hours cruising on a complete charge.

Previous fuel costs using unleaded petrol were approximately £2.50 per hour. Our initial charging experience indicates that to charge each bank of batteries takes some 10 units of electricity, 20 units for a complete charge. At a standard domestic rate of approx 6 pence per unit, this would equate to £1. 20. And this for 12 to 14 hours cruising, remember! A more precise cost of charging will be possible in the coming season thanks to the support and co-operation of Eric Bishop and the guys at Cox's boat yard, Barton Turf, who have just completed the installation of fully monitored individual charging points.



Engine compartment after conversion



Dashboard after conversion

And the cost of the conversion? Difficult to define in the case of *Patience* as more work was carried out than just the conversion itself, and I did put in a good many hours myself. It would also be true to say that, due to the many different configurations and designs of cruisers, it would be difficult to estimate an average cost of the labour without each cruiser being individually assessed and estimated. I can confirm, however, that the cost of components required for the conversion of *Patience* was some £3,500. Add labour costs and some may not consider this the most cost-effective of options. But I do. The minimal future maintenance requirements (a mere £16 including VAT for a replacement drive belt and, in the unlikely event of motor failure, only £350 for a new unit), the comparatively minute cost of fuel and the sheer joy of quiet, non polluted cruising makes it worth every penny. I would recommend it to anyone.

And if, with the help of the EBA, Tony Fogarty's commendably dogged persistence in his search for a grant system bears fruit, a major advance in the introduction of electric propulsion together with a reduction in pollution across the Broads, could be ahead.

My grateful thanks to John and Sandy Williams, Tony Fogarty, Cedric Lynch, and Eric Bishop and the team at Cox's for their invaluable assistance in what I hope to be only the second of many such conversions.

NOT SUCH A DRAG

Inspired by an article about *Solar Flair* John Poland undertook some drag tests on the River Dart. Here he reports on the results:

The tow assembly on the Dart

The 'FISA' hull

J. H. & 'Empacher' hull 'self-propelled'

Long slim hulls have been used since time immemorial when seeking displacement speed, rather than payload, with a given power. EBA Technical Officer, Paul Lynn, wrote about his successful solar catamaran *Solar Flair* in Electric Boat News Volume 15 Number 3. His study and evolution of power application efficiency is fascinating. For low drag he used a pair of hulls modelled on a 1907 Thames skiff and he operates successfully at 3.5 mph with one person on board or at 3 mph with two people, four batteries and camping gear. This makes for a total displacement of 460kg with each hull at about twice its design loading.

A demonstration of considerable ingenuity with electric power on water in suitable but, *perhaps*, slightly improvable hulls. It is all of particular interest for electric boating, and perhaps above all for solar boating, where power is especially precious.

Thus inspired, it seemed worthwhile to gather some drag figures for fairly low speeds in modern, fine, racing single-scull hull forms and to present the results by graph. Single-scull rowing race speeds are higher, being from about 5 knots at the slowest part of the rowing stroke up to about 13 knots at the fastest part in fast hands. Typical average boat speed over one hour is around 6 knots with a human engine applying less than half a horsepower to a pair of (inefficient) oars.

The Drag Tests

We towed single-scull hulls with a rower on board at between 1 knot and 6 knots, recording at half-knot intervals: water speed at both towing and towed hulls, wind speed and tow-line drag. At least one run was done in each direction both upstream and downstream with two different hulls.

For towing we used a 5.5m LWL Drascombe Longboat with 9.8 HP out-board and a crew of four. A calibrated spring-balance and log were presented in front of Gary at the throttle who called each 'on-speed' when Debbie, recording, would blow her whistle to synchronise simultaneous recording of data.

The 28 metre tow-line was boomed out to take the sculls away from prop-wash and wake. If we had had more speed available I suspect that the wake would have begun to cause distortion of the drag readings.

From about 5 knots the stern began to squat, starting a trailing wave in which the scull had to be very carefully positioned by tow length. At 6 knots we positioned this 8 cm wave at 1/3 from the bow of the scull to maintain a level trim on the scull.

Scull Hull Data

Two modern competitive racing hull forms were used which represent the commonly found extremes, albeit slight, of design. One is the older (relatively) FISA hull with semi-straight keel and the other the later and more 'rockered' Empacher design shape. (Rocker is the 'banana-shaping' of the keel when viewed from the side and is a mild wave-drag reducing shaping).

The biggest change in modern times has been in material, rather than any major shape change, with carbon-fibre (used for both test hulls) offering great stiffness at a light weight with better durability than wood. (Fibreglass can be a mixed blessing).

Bilge forms were perfectly circular for minimum immersed surface area for minimum skin friction.

Hulls were perfectly fair and clean. 1-3 thousandths of an inch of 'dirt projection' can matter. Dirty bottoms are worth many extra amps. *Waterlines:* 7.85 m. *Beams:* 0.26m. *Weight:* Hull (13), outriggers and oars (5), rower (80) = **Total Weight 98 kgs.**

John Harris, a skilled sculler, sat at 'half-slide' in the towed scull to maintain level trim and maintained balance with his feathered oars which occasionally just touched the water but without a readable effect. At 'the whistle' John recorded his own boat speed which was the 'master' speed reference.

Conditions

The River Dart at Totnes is at its best on the top of a Neap Tide with miles of near mirror calm water over 5m deep with a stream of 0-1 knot. True wind speed varied between 0 and 2 knots.

Accuracy

Scull Speed read to 1/100 knot by NK 'Stroke-Coach' calibrated to better than 0.2%. Tow speed read to 1/10 knot by NASA log . Spring Balance +/- 0.5 kg - the least accurate instrument. Anemometer: +/- 5%.

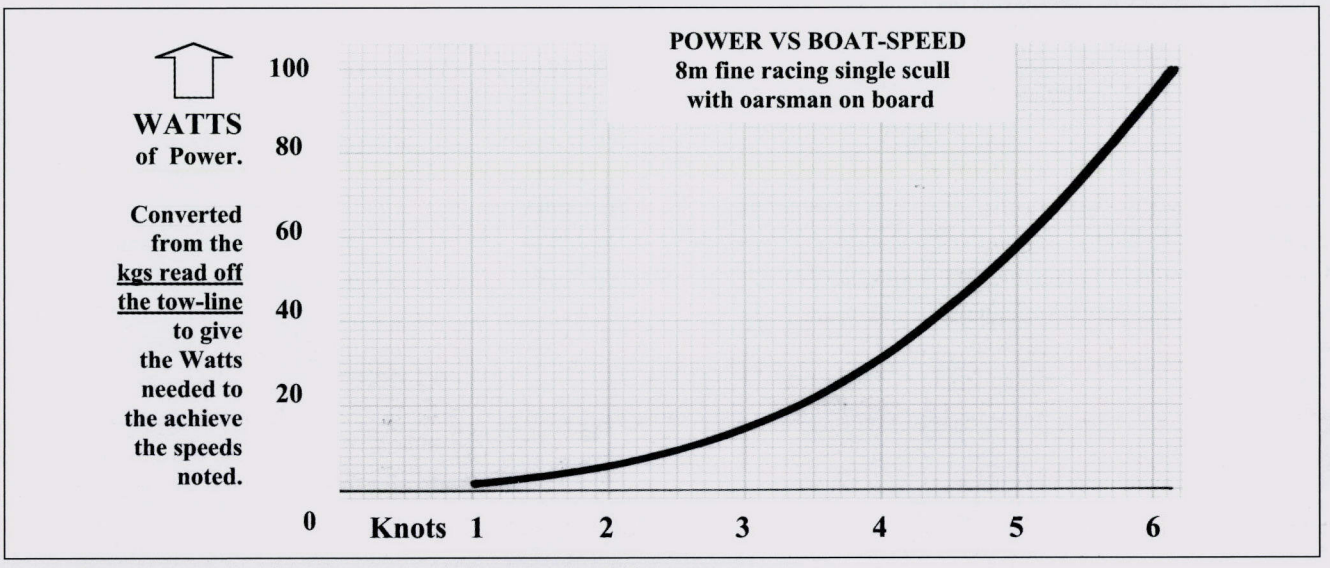
The graph represents the average of all readings from all runs. Spread of plotting away from the graph was 0.25 knots or kg.

Conclusions

Low speed drag is quite extraordinarily low e.g. 2.26 kg at 5 knots which needs a mere 57 watts/0.1 hp of useful thrust. (Multiply by about 3 times for wattage input due to losses from cabling, standard electric outboard motor and propeller. See Paul Lynn's article).

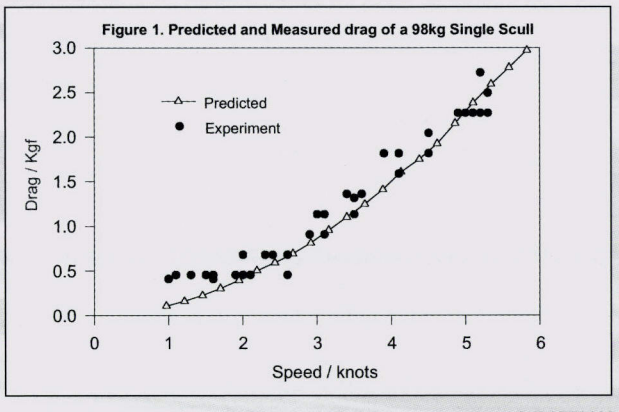
We found no convincing difference in drag between our two modern hulls at the speeds tested.

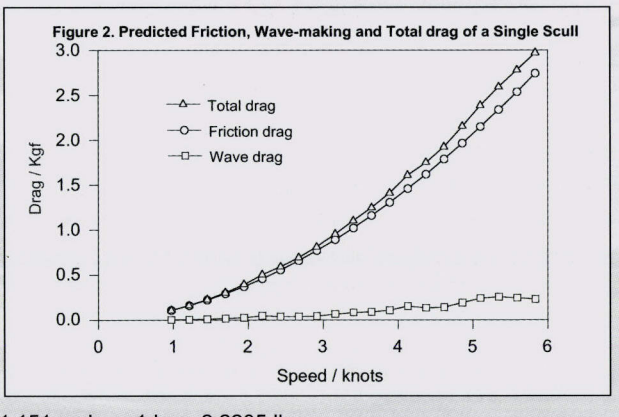
Two of these hulls as a catamaran may represent one 'least-drag' option. Air drag of the single rower in a single hull would, hopefully, not double in a two-place catamaran with a bit of streamlining like *Solar Flair.* And you wouldn't have oars sticking out! You could, probably, usefully lose a metre or two of length off these hulls for low speeds.



Comment by Joddy Chapman: I thought it would be interesting to compare John's experimental data with Leo Lazauskas' Michlet, a computer program that calculates the hydrodynamic drag of slender hulls. Fig. 1 below shows the raw data compared to that predicted by the programme - agreement is pretty good. Fig. 2 shows just how small the wave-making drag of this slender hull is compared its skin-friction.

For these light and slender boats, air resistance becomes significant. For a single-sculler it may double in an 8 knot head wind (14 knots on deck). Propeller efficiency is another major area for attention, especially when using fine hulls with minimal spare power. Lessons may usefully be drawn from man powered speed record water craft.





NB 1 horse-power = 0.7457kW 1 kt = 1.151 mph 1 kg = 2.2205 lbs

John Poland, an EBA Member with a background in Naval and Civil Aviation and small craft in general, is a qualified rowing coach. John Harris is a professional scientist and competitive oarsman in single sculls. Joddy Chapman is the designer of the famous foil-borne and sail-powered catamaran *Ceres* (capable of 20 knots in 12 knots of true wind). He produced and commented on the vital Predicted Data and comparison of results with predictions.

TECHNICAL REPORT

ELECTRIC POINTS: 'HITCHING A LIFT'

In the third of a series of short articles on technical aspects of electric boating, EBA Technical Officer Paul Lynn discusses boat trailers and trailing.

Many of us use trailers to get our boats to the water. When not in use, it is tempting to forget a trailer completely and assume it will be ready at a moment's notice. But, as with an electric boat, it is wise to pay attention to proper setting up and maintenance to avoid being let down at the worst possible moment.

Nothing in this article should be taken as contradicting the advice or recommendations of your trailer manufacturer (who may well offer a service facility as well). With this proviso, let's start with a few general points:

- Boats vary in shape and weight, even those in the same class. Time taken at the beginning to adjust a trailer to its boat is time well spent.
- Axle position is very important. The axle(s) should be placed to give the correct 'nose weight' i.e. the downward weight at the nose of the trailer where it is hitched to the towing vehicle. Typically, the recommended nose weight is about 4% of the total weight of the loaded trailer. For example, if your boat and its trailer weigh a ton (1000 kg) a suitable nose weight is probably about 40 kg.
- Twin-axle trailers should have the load properly shared between the two axles.
- If you have a winch, it should have a straight-line pull under load.
- Trailers are required by law to have an effective breakaway cable or chain, properly secured to the towing vehicle.
- Trailers must have lights (including brake lights) and a number plate.
- Speed restrictions in the UK for towed boats are 50 mph (80 kph) on single carriageways and 60 mph (96 kph) on dual carriageways and motorways.

BARBARA PENNIALL

Hauling out – showing trailer guide posts

Maintenance of your trailer is essential. Typical manufacturer's recommendations include the following:

- After about the first 25 miles (40 km), and every 500 miles (800 km) thereafter, check/tighten the wheelnuts.
- Every 2500 miles (4000 km), check adjustments of brakes (if fitted) and wheel bearings.
- Regularly inspect for tyre wear, and keep tyre pressures in line with recommended values.
- Regularly check the winch and breakaway cable (or chain) for damage.
- Keep the hitch and jockey assembly well greased.
- An occasional smear of vaseline on the 7-pin lighting plug helps prevent corrosion and ensures good electrical contact.
- Wheel bearings dislike fresh water, and hate salt water. Bearings are pre-packed with grease by the manufacturer, but this will need replenishing from time to time, especially if the trailer is regularly immersed.
- Proper trailer maintenance, especially of brakes, wheels, and lights, is a serious business. If in doubt about any of the above points or procedures, always seek expert help. Trailer manufacturers usually offer a service facility, so take advantage of this if you don't feel confident about doing the work yourself.

Having set up and maintained your trailer it is time to set off:

- Before starting a journey check tyre pressures, lights, and brakes, and ensure that the breakaway cable or chain is properly attached.
- Make sure that the boat is well tied down and cannot slide back, forth or sideways, and that all fittings are secure. Inspect regularly during the journey.
- Before moving off, check that the jockey wheel is properly raised and secure.
- After a few miles, stop and check that the wheel bearings are not heating up.
- Carry a spare wheel for the trailer. If you can't change it yourself, your breakdown service will do it.
- Remember the extra vehicle length behind you, especially when cornering. If there is a substantial portion of boat sticking out *behind* the trailer wheels, a sharp turn to left or right will cause that portion to swing in the *other* direction.
- The most common problem when towing is trailer 'snaking', caused by insufficient noseweight, or running a two-axle trailer

nosedown causing it to pivot around its front axle, or travelling too fast. If you experience snaking stay calm, hold the steering wheel firmly, and slow down gently. Don't apply the brakes or accelerate.

Floating a boat on and off a trailer is quite an art, and requires practice. It is a good idea to fit guide posts to the trailer to indicate the exact line of approach when the boat is to be floated back on, and to paint marks on the posts indicating how deeply the trailer must go into the water. For safety reasons, don't let other people move on to a slipway while you are winching the boat back on to the trailer.

This may all sound a bit daunting, and trailing a boat certainly means taking extra care. But with careful preparation, some common sense and a little practice there is no reason why 'hitching a lift', electric fashion, need cause sleepless nights!

NOTICEBOARD

WELCOME TO NEW MEMBERS

Private Members	**Location**	**Boat where notified**
J E Bowman	Solihull	
Jenkyn Knill	Bath	Lady Lena
Veronica and Stephen Worrall	Sudbury	Piper's Dawn
Colin Johnson	Maidenhead	
Pat and Simon Davis	Bray	Patricia
Business Member		
Dudley Canal Trust (Trips) Ltd	Dudley, West Midlands	
Hartford Marina	Hartford, Huntingdon	
Ditton Cruisers and Harts Cruisers	Thames Ditton	
Kris Cruisers	Datchet	

EBA WEBSITE

The EBA website has had an impressive makeover, thanks to our new Webmaster, Nick Goldring. Do take a look at it if you haven't checked up on it recently. One attractive new feature is the selection of photographs of members' boats. If you would like your boat to be included, please send a photo to Nick at 8 Ambleside Close, Woodley, Reading, Berks.RG5 4JJ (enclosing a stamped self-addressed envelope for its return) or e-mail it to nick@electriccanoe.co.uk.

SLIPWAYS

Barbara is starting to compile a list of slipways as a service to members, so if you have information on slipways you have used recently, please pass it on.

HELP AT BOAT SHOWS

If you are visiting the Beale Park Boat Show or the Thames Traditional Boat Show at Henley, and could offer some help in manning the EBA stand (if only for half an hour over a lunch break) the EBA team, which generally consists of John Hustwick and Barbara Penniall, would be very grateful.

MOORINGS FOR HENLEY ROYAL REGATTA

Please could any members able to offer moorings for Henley Royal Regatta contact Barbara, who will be pleased to put members looking for moorings in touch with you.

MIDLANDS REP

If anyone can volunteer to be the EBA Regional Representative for the Midlands would they please contact Barbara. There is the possibility of a Stratford location for a rally if someone would be prepared to organise it.

INFORMATION SHEETS

We are currently compiling some additional information sheets, one covering fitting out and preparing your boat for the season, another more detailed version of Paul Lynn's article on Trailing your Boat. If you would like one or both of these, please get in touch with Barbara. Information Sheets (see advertisement on the back page) are free to members and cost £1.50 each for non-members.

RON CALLARD AND FERNY ROOFTHOOFT

We are very sad to have to report the recent deaths of two EBA members. We will miss their company at EBA suppers and seeing them on the Thames, Ron in *Clivella* and Ferny in *The Mary Anne.* Our sympathies go to their families and friends.

LETTERS

From Hans Asyee, Reeuwijk, Netherlands

Dear Barbara

Currently involved in an argument with local authorities about the advantages of electric boating, someone stated that e-boats endanger wildlife because the water-birds hear them very late and hence become more frightened than when a noisy boat is approaching. He refers to 'experts' but is unwilling to reveal more detail.

Does EBA possess a better founded opinion concerning this matter? In this stage I do not wish to refer to my personal experience which is obviously clearly opposite.

Looking forward to your reply,
Best regards,

Hans

BRIAN PARNELL

Editor's note: Surely the advantage of an electric boat is that it doesn't disturb the birds at all. A keen wildlife photographer who came out in our electric boat Irene was delighted to be totally ignored by a variety of normally shy water birds, even when we were very close. I think his photograph of this grebe on the nest proves the point.

From Graham Terry, Boreham Wood

Dear Barbara

The Association sure turns out a nice magazine and it is interesting reading but, for me, there is not enough technical content. For example, you had a lovely article on Waterscape.com but a few extra technical details would not have come amiss, such as the fact that the battery bank was 48 volt and that the slower cruising speed could be maintained at a current of ten to fifteen amps but the higher propeller speed drew up to a hundred amps and this could occur in the manoeuvring of the craft. Good article anyway and I only know about the details as I went aboard at the Beale show.

My best wishes

Graham Terry

From Tony Pratt, Worthing

Dear Sylvia

Reading the Technical Report in the winter issue about Matt Strange and his Seahopper folding dinghy was a case of 'deja vu' for me as I went through a very similar experience with my own Seahopper kit some 22 years ago! Frog has now achieved 16 years electric cruising with the same Minn-Kota outboard so I'm sure Matt can expect similar longevity with his outfit.

Regular readers may remember that Frog featured in a documentary video entitled 'The Lost Wey to the Sea' revisiting a Victorian journey from the Thames to the Solent made in 1867 by J.B. Dashwood.

The journey included the Wey & Arun Canal now being restored by the Trust of that name, which operates an electric outboard powered Shetland dayboat for hire by its members. If any EBA members would like to join us and experience the short stretch of restored canal at Loxwood please contact me via the e-mail address anthonypratt@onetel.net.uk and I will supply details.

I am attaching a couple of pictures of Frog and the Shetland on the canal.

Thanks for an excellent and interesting magazine.

Kind regards

Tony Pratt

THAMES QUIZ

To give you a second chance at the Thames Quiz from the last issue, here are the questions again. Answers on a postcard, including your name and address, to the Editor by the end of May, please. The first correct entry drawn wins a £10 voucher for goods from the EBA shop.

1. A donkey call
2. Cattle cross here
3. ... and spies cross here
4. Shakespeare's rival
5. Red wine does this
6. The royal surname
7. A place to lay poppies
8. Site of a significant signing
9. Oscar Wilde did time here
10. Home for dogs
11. Farm buildings
12. Lorries wait
13. Built by a butcher's son, taken by a King
14. Form a line
15. Syrup from the northeast of England
16. Eights v Eights with champagne
17. A president's daughter
18. A sexy romp at this house
19. Navigation stops here
20. Zero line

TERRAPIN

Among the many boats assembled for the 21st Anniversary celebrations at Bisham one which attracted a great deal of interest was the solar electric launch *Terrapin*. Owner David Williams explains the thought processes which led to its design.

IAN RUTTER

Terrapin at Bisham

Being an amateur designer and builder of sailing boats, with no experience whatsoever of motor craft, I had to start from first principles when my wife, Jean, asked me to build her a launch which she could manage single-handed.

I had the good fortune to meet Cedric Lynch, who invented the LEMCO electric motor, and Chris Goodings, a specialist in the solar panel field. I became persuaded that the combination of solar panels and batteries would provide a suitable source of power.

Criteria

- To be a `picnic' boat for 4-5 people with space for 2 extra occasional seats or a table.
- To drive `like a car', the helmsman to face forward and steer with a wheel.
- To have a windscreen and a fold-away hood.
- To be a boat to sit in rather than on.
- To have all day running time at Norfolk Broads speed limits.

Hull Design

An easily driven hull was essential, bearing in mind that the power would be in the 1/4 to 3/4 kilowatt range. It would need to be lightweight and narrow beam, but long enough for 4-5 mph cruising. I decided on a flat bottomed cross-section which would slide over the water rather than plough a furrow through it.

I wanted the centre of gravity a little forward of midships as that is where the greatest depth of hull was needed to allow a smooth, flat run aft. This would counteract any downwards suction at the stern which can absorb so much energy. The position of the motor and batteries and the seating positions were arranged bearing the above in mind.

Trim

I wanted the boat to maintain a level trim, not only with the front seats occupied, but also with three passengers on the rear seat. This required a fairly long aft deck behind the seating area giving reserve buoyancy to prevent the transom being partly submerged.

Lateral Stability

For the boat to be 'family friendly' it should not be prone to sideways tipping. Bearing in mind that she was to be lightweight and narrow beam this could have been a problem. However, the flat bottomed cross-section already decided upon would provide as steady a hull as possible.

Arrangement of Electrical and Mechanical Gear

As *Terrapin* would be primarily an open launch decked in at each end and the hood to be a fold-away type, the Webasto flexible solar panels would have to be on deck, one forward and three aft of the cockpit. The panel forward and two of the three aft were fitted on to hatch lids. This allowed access to the motor and other electrical gear (reserve charger etc) under the foredeck and to a large stowage locker aft. This still allowed the panels to appear to be part of the boat - not stuck-on extras. The batteries were installed under the two front seats, between which the greasing point for the propeller shaft is easily accessible.

Propeller

Several handmade propellers of various sizes were tested to discover the optimum pitch and diameter. The method was to compare the performance of the boat with the different propellers fitted, timing a run past a set distance marked out on the bank, running at the same amps setting. The results were helpful when selecting from a catalogue the most suitable propeller for our purposes.

Controls and Handling

I decided early on that a small unballasted keel should be included because it would:

- help maintain course in crosswinds
- protect the propeller and shaft from obstructions
- make steering very positive

Having the keel and rudder well separated makes the boat easy and light to steer in forward or reverse gear. She is able to turn almost in her own length, pivoting on the short keel.

The propeller, being well forward of the rudder, cuts down the possibility of any vibration in the steering and reduces disturbance in the water behind the boat.

IAN RUTTER

Terrapin at Marlow slipway

DAVID WILLIAMS

Terrapin on her summer mooring at Irstead

Extras

Two weed hatches, one under the rear seat and one under the aft deck, give access to the propeller and rudder respectively.

A full length boat hook is housed out of sight in a length of plastic pipe and is accessed under the rear seat.

The front seats swivel to face the rear when in picnic mode.

Positive buoyancy is installed fore and aft.

Electric horn is fitted flush to the hull at the bow.

A solar powered ventilator cools the motor compartment.

Construction

I chose half inch marine ply on mahogany frames for the hull with a double thickness of ply for the bottom panel to support the weight of the batteries. The keel also helped stiffen the hull at this important position.

When the decks, hatches, floors, battery boxes, windscreen and dashboard were all in place, she was taken to Colin Buttifant's boatyard in Ludham for the motor and propshaft and all the electrics to be installed. Colin also added many finishing touches and finally did his usual perfect paint and varnish job, for all of which I have been receiving the undeserved credit ever since!

Result

All the above resulted in the *Terrapin*, L.O.A. 24 ft, beam 5' 2" running on a 24 volt system. Six gel-type batteries, which require no maintenance, produce a total of 285 amps at 24 volts, of which 80% (228 amps) are available for propulsion. This enables us to do all the cruising we want in the 10-30 amps range.

Terrapin spends the winter under cover, but after a mains charge at Easter, she is moved to an outdoor mooring. Thereafter, the solar panels take over the task of maintaining the charge without help for the whole of the summer.

ELECTRIC BOAT ASSOCIATION SHOP

EBA Tie – navy blue with narrow green/white diagonal stripe £9.50

EBA Pennant – good quality cotton, royal blue with 'Electric Boat Association' and grebe in white £10.00

EBA Brooch – delicate blue and white grebe edged with silver Safety pin clasp, 25mm high £5.50

EBA Sweatshirts and Polo Shirts

Good quality, both in pale blue with royal blue logo or bottle green with gold logo

Please state Small, Medium, Large or Extra Large – sweatshirts £20.00

– polo shirts £16.00

Why not add the name of your boat for an extra £2.50

All prices include post and packing (UK only)

Please send cheque for £..... made payable to the Electric Boat Association to:

Barbara Penniall, 150 Wayside Green, Woodcote, Reading, RG8 0QJ

Tel: 01491 681449 Fax: 01491 681945 email: eboat@mail.com

Tie ☐ Pennant ☐ Brooch ☐ Sweatshirt ☐ Polo Shirt ☐

(Please indicate quantity, size and colour required plus additional boat name as appropriate)

.....

Name ..... Tel No: .....

Address .....

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