The Roads & Road Transport History Association

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THE 'COMPANION' LAUNCHED

The Association's *Companion to Road Passenger Transport History* was given its official launch at the London offices of the Confederation of Passenger Transport (CPT) on 2nd April.

Thanks for the support provided by the two major sponsors, FirstGroup and Stagecoach, were expressed by the Association's Chairman, Robert McCloy. In response, Giles Fearnley (Managing Director UK Bus, First Group) and Mark Threapleton (Managing Director, Stagecoach London) warmly commended the book as an essential directory to the development of the road passenger transport industry. They congratulated the editorial group for its obvious enthusiasm and diligence. Present at the launch also were a number of distinguished members of the bus industry and representatives of various academic institutions and transport societies.

Two weeks earlier, the editorial group had had its final 'winding-up' meeting and a 'celebratory' lunch in Birmingham. A particular pleasure for the group was to have the company of Professor John Hibbs OBE, its first Chairman when back in 2002 the 'gleam in the eye' had begun to turn into reality.

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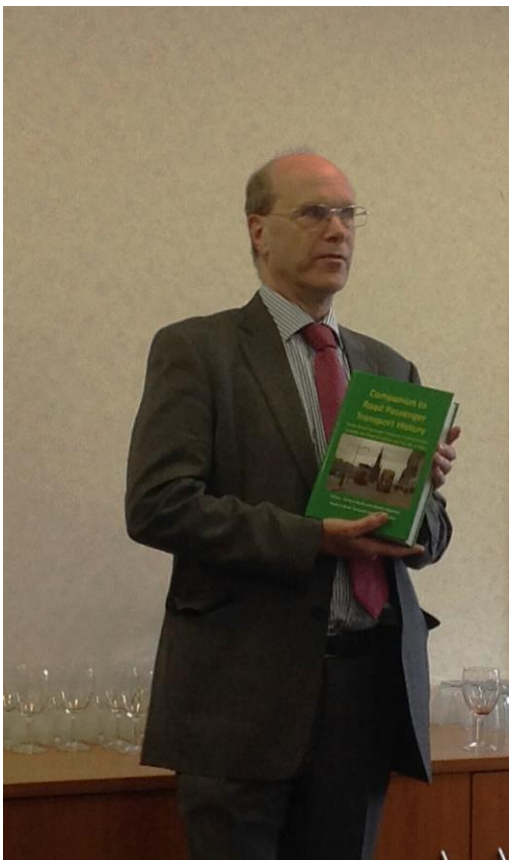

Above: Giles Fearnley of First Group launches the Companion on 2nd April 2014 at CPT offices. (Christopher Nice, CPT)

Roads & Road Transport History Association

Roads & Road Transport History Association
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Professor Hibbs was unable to be present at the launch ceremony but sent the following message:

'When the 'Companion to Road Passenger Transport History' arrived through the post back in January, I felt enormous pride. As Chairman of the Editorial Group between 2002 - 2006, I feel I can legitimately claim some part in the success of this project but as illness took its hold, I took comfort in the fact that the project was safe in the hands of Ken Swallow and the other dedicated members of the Editorial Group.

I had the great pleasure of meeting the Editorial Group at its last meeting in Birmingham, my home City, on Tuesday, 18th March. It was so stimulating to be part of this group once more and to acknowledge the excellent work that had been done.

I am certain that the 'Companion to Road Passenger Transport History' will become an established reference book, and will be a source of information and inspiration for many, many years to come.

Almost 13 years in the making - and worth waiting for. My very best wishes to you all.

I am sorry not to be able to join you but will raise a glass to your good health around 4pm.

Sincerely,

John Hibbs OBE
Chairman of the Editorial Group, 2002-2006

The *Companion to Road Passenger Transport History* spans almost two centuries of the development of British road passenger transport, from horses and the first mechanically powered trams and buses to hybrids and hydrogen buses; and from stage coaches to motorway express services.

Through a range of articles it explores every aspect of the industry's history, and will be an essential reference work for anyone with an interest in road passenger transport. It is the second encyclopaedic work of reference prepared by the Roads and Road Transport History Association and follows the *Companion to British Road Haulage History*, published in 2003.

The 730 page volume comprises some 850 entries by 150 expert authors, covering all forms of public passenger transport by road, including buses, coaches, trams, and taxis, as well as minor modes

such as rickshaws and sedan chairs. These are approached from many different perspectives, including vehicles, operators, services, legislation, regulation, key individuals, the industry's customers, cultural aspects, and technologies in use and developed during the period covered. Entries provide a comprehensive overview of the topic, along with a range of key references to further reading to guide the reader in their further exploration of topics of particular interest.

It includes:

- Preface by Sir Moir Lockhead, First Group plc
- Foreword by Sir Brian Souter, Stagecoach plc
- Bibliographically annotated historical introduction
- Comprehensive bibliography of books and pamphlets, reference sources, legislation, government publications, journals, major series of articles and principal archives
- Chronology of key dates
- 128 photographs, the majority previously unpublished
- French and German Summaries: Résumé Français; Deutsche Űbersicht

The *Companion to Road Passenger Transport History* is available from **MDS Book Sales**, 128 Pikes Lane, Glossop, Derbyshire SK13 8EH price £50 post free.

(photo by Christopher Nice, CPT)

Association Matters .... reporting from Oxford

Keeping the Show on the Road

The Management Committee met on April 10th, once again at Cowley House, Oxford. The committee was pleased to note that Pat Campany had assumed responsibility as Membership Secretary, relieving John Ashley of one of his many tasks, but with regret learnt that Tony Newman, having resigned as a director, had also resigned as a member of the Committee. They were pleased to note, however, that he would remain Research Co-ordinator. Royston Fisher had also agreed to remain Treasurer whilst the quest continued for his replacement. The Committee, welcoming the news that Professor Mike Phillips, Pro Vice Chancellor, University of Wales, Trinity St David, had agreed to serve as a Director, extended an invitation to him to join the Committee. Subject to the advice of John Howie, Company Secretary, it was recommended for the next AGM's consideration that no more than three directors be appointed and that the directors be requested to give strategic direction to the Committee from time to time by formal direction.

The AGM and Conference

The committee noted that the arrangements for this year's AGM and Conference in Coventry had run smoothly. The AGM had been advised that the membership would be consulted on draft proposals for the development of the Association. In reviewing the past year, it was noted that whilst there had been much progress, including the bringing to fruition of the 'Companion', the re-establishment of a regular programme of events and regular publication of the Journal, a re-casting of the Web Site, clarification of our purposes, including the role of corporate members, and the need to be more effective in promotion and follow-up now merited closer attention. Tony Newman presented his annual report on Research Co-ordination, printed in this edition. Ken Swallow and Tony Newman, retiring as directors, were thanked for their services in these roles.

Vehicle Design: Past and Present

In the conference that followed, on the theme of vehicle design, John Dickson-Simpson,

magisterially first set the scene tracing nineteenth century developments, as a prelude to Roy Larkin's account relating to the First World War and its immediate aftermath, and thereafter resumed the historical theme. Roy Larkin's authoritative contribution effectively demolished the notion that, however destructive were the effects of war, it could surely be relied upon to be a spur to mechanical invention. Both John and Roy have been asked to transpose their exceptionally-well received talks into articles for the Journal. The conference's final session was in the hands of David Burnicle who took the theme into contemporary times and held spell-bound the still very attentive audience to the very end! David's contribution is the major piece in this edition of the Journal.

Wales on Wheels

It was confirmed that the 'Wales on Wheels' event, which was to be repeated on May 17th , 2014 in Swansea, in collaboration with FirstGroup and the Swansea Bus Museum, was being actively promoted by the City of Swansea and promised to be more extensive than last year. Readers are urged to view the web site! The Swansea Bus Museum would be celebrating the hundred year anniversary of South Wales Transport with the publication of a book and special events. A reception would take place at the Waterfront Museum followed by a Dinner at the Marriott Hotel on Friday, May 16th, at which Professor Stuart Cole was to speak. The Swansea Bus Museum would be continuing their celebratory programme on the Sunday [May 18th].

The Great Book

As for the 'Companion', Martin Higginson reported that sales were proceeding satisfactorily and the committee repeated its appreciation of the patience and industry that had been exercised, in particular, by Martin Higginson, Simon Blainey and Ken Swallow, but also by the Editorial Board generally and their many collaborators, in bringing this major aid to scholarship to completion.

The launch, on April 2nd at CPT's offices at Drury House, had run smoothly, with addresses given, on behalf of the book's sponsors, by Giles Fearnley, representing FirstGroup, and Mark Threapleton, representing Stagecoach; and the Chairman, who had alluded to the need for greater collaboration between the Association and other organizations with related interests. The Committee expressed their appreciation both for the hospitality and arrangements made.

The Journal very much back on track

The committee was warmly appreciative of the fact that the Journal was now produced regularly and reliably on a quarterly basis and hoped that it would be possible shortly to expand its content. The request for additional copy was reiterated and committee members undertook to contribute articles, within their fields of competence, if commissioned by the Editor. The view was expressed that such direct commissioning, specifying subject, number of words, and submission date, would probably be more effective than a general invitation to the membership to contribute articles! Roger Atkinson's new regular column was warmly welcomed. Philip Kirk undertook to contribute, on a regular basis, news of corporate members based on their newsletters / journals. John Ashley, Web Master, had reiterated the need for a regular supply of new material, especially comment.

Whither the route and whence we came

The committee gave preliminary consideration to a draft discussion paper on the Association's development focussing attention upon our principal purpose. It was considered that, to some extent, the intention of establishing the Association as an umbrella body bringing together a range of organisations as corporate members, had necessarily been qualified by time, as individuals very reasonably obtained membership, and it became increasingly impossible to have a national focus on a particular university. In this context, it was appropriate to explore ways in which the Association might work more effectively with other organisations. The committee, having considered a preliminary paper prepared on archive policy by Tony Newman and Richard Storey commenced a listing of papers to be incorporated into the archive.

Dates for the diary

It was confirmed that this Summer 2014 event would take place in collaboration with London Bus Museum on the weekend August 1st-3rd, and be held at Brooklands, with the Association's

particular events: a formal dinner, taking place on Friday evening, with an optional vintage bus ride to Guildford Cathedral on the Saturday morning, and a programme of talks in the afternoon, on the theme of Transport on the Eve of the First World War.

It was also confirmed that the Annual Dinner and Conference would take place in Coventry on the weekend October 3/4, John Minnis, of English Heritage, being the Conference's keynote speaker. The dinner would take place at the Ramada Hotel, on the evening of Friday, October 3rd, the conference at the Herbert Art Gallery and Museum on Saturday, October 4th.

Honouring an obligation

As for the Tilling Group History Project, the Committee agreed that all arrangements should now be made to facilitate proceeding to printing as soon as sales of the 'Companion' had met the Committee's requirements**.**

Kindred Spirits

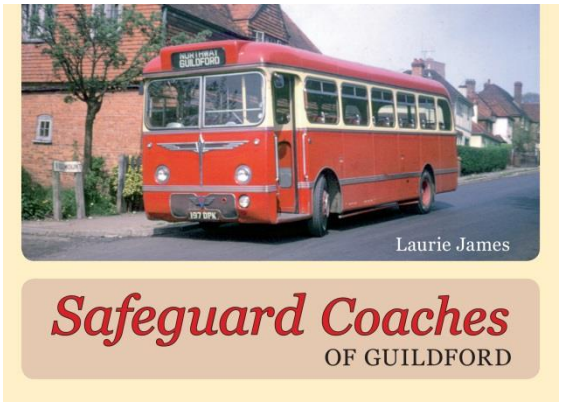
The Committee received reports on the Transport Heritage Conference held on March 1st at the London Transport Museum Acton Depot. Attendance by representatives of the Association had been worthwhile, it being observed that, in many respects, the Conference had constituted a further positive attempt to effect a higher degree of co-ordination amongst organisations with related interests. The Committee resolved that their next meeting would be held on Thursday, July 24th, 2014, when they would be pleased to consider your comments.

Robert Mc Cloy, Chairman

BOOK REVIEWS

Safeguard Coaches of Guildford Laurie James. March 2014. ISBN 978-1-4456-1690-2, 128pp, hardback, £20.00. Amberley Press, The Hill, Merrywalks, Stroud GL5 4EP *www.amberley-books.com*

This very well-illustrated history is published to coincide with the ninetieth anniversary year of the business, which throughout its life has been very closely associated with the Newman family. A very comprehensive account is provided from the start of small-scale operations in 1924, to the growth of the company both as an operator of scheduled local bus services, and extensive coaching & contract work. The continuity of operation by this independent is noteworthy, as is the fact that local bus operations have been focussed on urban services (primarily housing areas on the western side of Guildford) rather than rural operations more characteristic of the independent sector.



The competition with larger 'area' companies, notably Aldershot & District and its successors (especially post-deregulation from 1986) emerges as significant factor, although following use of the powers under the Local Transport Act 2008 a more stable pattern of operations has now resumed, with benefits to passengers. The illustrations are very extensive, many from more recent years being in colour, also including members of the Newman family, and other staff of the company, who role is emphasised in the text, Mention is made is the 1984 proposal, by Safeguard and two other local independents (Blue Saloon and Tillingbourne) to take over area company services in the city at much lower cost (familiar to this reviewer as a member of the consultancy team assessing the proposal), albeit this was overtaken by deregulation shortly afterward.

Comprehensive appendices list the fleet since the start of operations, and the extensive service changes from deregulation in October 1986. Some maps are provided showing town services at various dates, although for those not familiar with the area, a slightly more extensive map could have been useful. This very minor point aside, the work is exceptionally comprehensive and the price very good value.

PRW

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WHERE IS ROAD TRANSPORT GOING?

David Burnicle BEng, CEng, FIMechE, FSAE

This paper is a summary of the talk given at our Spring Conference in Coventry on 15 March 2014.

Firstly let me say that I have no infallibly accurate view of the future. What follows is my personal opinion of the hurdles that transport has to face, some of the phases that will be gone through and what some likely final conclusions may be. I have deliberately not put a specific time scale on the predictions as from experience I know these inevitably will be wildly wrong.

My thoughts are heavily biased towards future energy scenarios. No amount of beautiful styling, superb suspensions or excellent braking systems will be any good if there is no fuel to put in the tank. Hence the discussion centres on energy availability coupled with some of the economic and social drivers also influencing future transport developments in the UK.

Considering some of the drivers for change

World Population Growth. The quite alarming growth in world population, together with increased life expectancy in the Western world, will bring with it extreme competition for space, food supplies, energy resources and the need for travel and transport. I remember thinking some years ago that improvements in modern communication methods would reduce the need for people to travel. I was wrong. What seems to have happened is that better communications have caused a huge increase in the amount of communicating that we do (albeit a lot of it of a trivial nature) and factors such as more leisure time, worldwide product sourcing and internet shopping have actually increased the need for travel and transport.

Increased Energy Demand From Developing Countries. Higher populations and increased industrial activity bring with them an increased demand for energy. This increased demand has a worldwide impact from which none of us is immune.

Global Warming. The graph of world carbon dioxide concentration *(Fig 1)* shows a remarkable correlation with the industrial activity of man on Earth. So it is hard to ignore the pressures to limit further CO_2 emissions and indeed this is the view of governments worldwide who will be pressing ahead with further curbs on this greenhouse gas. Because CO_2 emission is directly proportional to fuel consumption in the types of prime-mover and fuels that we will be considering, CO_2 reduction is a doubly worthwhile quest.

Crude Oil Production is Nearing or Even Past its Peak. The rate of finding new sources of oil and gas is diminishing and falling behind the increase in demand.

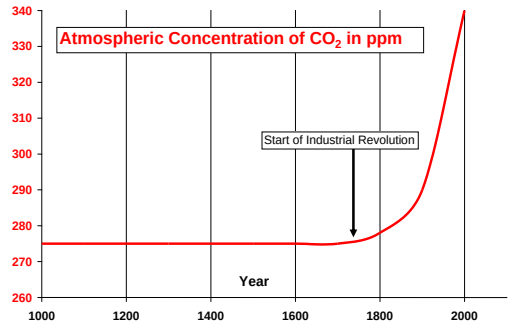


Fig 1 Carbon Dioxide measurements taken from air trapped in ice cores, then from 1958 by direct air sampling in Hawaii. (ref: Dr David JC MacKay)

More effective or new extraction techniques will not bridge the gap for ever. Therefore alternative primary energy sources must be found and made applicable to road transport needs.

There will be no Let-up on Legislation Controlling Air Quality. Legislators will continue to press ahead with ever tighter limits for Carbon Monoxide, Hydrocarbons, Oxides of Nitrogen and particulate emissions for all classes of road transport vehicles.

There will be no Backtracking on Vehicle Safety. In spite of other external pressures, it would be unthinkable for vehicles of the future to be less safe than those of today. In fact safer vehicles and roads on which to run them will be a constant quest.

Economy of Operation will still be a Priority for all Classes of Commercial Vehicle. Almost by definition, commercial vehicle operation whether urban delivery vans, buses or heavy goods vehicles, must strive to be economically viable whatever design or fuel constraints are placed upon them in the future.

Faster Time to Market is Needed. In order to react to a faster rate of change of customer needs and radical outside influences, ways must continue to be found to create new vehicle designs and get them proved and into production as quickly as possible.

Emissions testing

One of the likely changes in legislation which will affect light-duty vehicle is the way in which cars and vans are tested in Europe. Currently the vehicle is soaked at 20^0C then run on weighted rollers over a very closely controlled speed cycle. This twenty minute cycle involves a series of accelerations and decelerations with periods of idling in between.

Tailpipe emissions are monitored throughout the cycle and for example the emitted CO_2 is quoted at the end over the low speed part of the cycle (Urban) and the higher speed part (Extra Urban) and totalled to give the 'Combined' figure in terms of gm/km CO_2 and miles/gal fuel consumption. These values are the ones manufacturers are allowed to quote in their literature, and it is these that cause so much controversy in the marketplace as car owners treat them as gospel and not just as comparators. For this reason an attempt is being made by European legislators to make the test more representative of real world expectations.

One other effect of the cycle currently in use is that with its numerous steady deceleration phases, it favours hybrid vehicles with their energy recovery systems and partly allowable operation in electric-only mode. As a result hybrid cars produce even more unrealistic published fuel consumption figures.

Where we are

For various reasons, mostly economic, we are in a phase of road vehicle evolution where the emphasis is on fuel economy commensurate with meeting all current weight, dimensional, exhaust emissions, noise and safety regulations. This phase will continue until pressures of fuel availability and tighter emissions laws force radical changes to the fuels and prime-movers used.

However in order to be ready for the radical changes when they become inevitable, vehicle manufacturers are already dipping their toes into uncharted waters of alternative fuels, different types of hybrid vehicle and various forms of electric vehicle. Most of these experiments are taking place in light and heavier duty passenger carrying vehicles, i.e. cars and buses. Some goods carrying vehicles are being offered in experimental form but these are mainly those that have a close relationship with passenger cars or are HGVs operated within the confines of towns and cities on local distribution work.

I like to think that we are at the beginning of a 'bridging' phase in which we are seeking the way forward into what I call the 'post-oil' era, the idea being to find the best mature technologies that will carry us forward into the age when oil is being prioritised for aircraft and military use.

It is an exciting period for those involved in the vehicle design and manufacturing industries because of the scope for innovation on offer. Before we take a look at some of the technologies under development let me say that the piston internal combustion engine has still got many years ahead of it, although some say that the diesel version may be reaching the limits of its emissions capability due to the ever tightening limits of Nitrogen Oxides and particulates. It is certainly the case that exhaust after-treatment systems are starting to dwarf the diesel engine in heavy duty vehicles presenting packaging and maintenance challenges.

Conservation

The first oil well was drilled in 1859. The oil was used for lighting lamps. This was great timing as it permitted the invention of the powerful lightweight internal combustion engine for transport purposes. We have benefitted from the enormous energy density of oil fuels ever since. However the 'oil-age' will only last for approximately 10 generations. We, as about the sixth generation, were some of the lucky ones to have lived during this period.

So it is imperative that we concentrate on ways of eking out our diminishing oil supplies. This buys us time to find a good sustainable alternative. President Reagan once famously said that *"Conservation is a viable new energy source."* He was right and this is an approach that all forms of transport have now bought into. The key word is efficiency. Efficiency potential must be designed into the vehicle then realised in its mode of operation.

Design features recently introduced to improve vehicle efficiency include: direct injection high speed diesel engines for cars and light vans, engine stop-go systems, twin and variable geometry turbochargers, petrol engine downsizing, alternator charging only on overrun, electric power steering, modulated cooling fan drives, LED lighting, low rolling resistance tyres, alloy wheels on trucks, cars with 8, 9 & 10 speed automatic gearboxes and CVT transmissions, low speed converter lock-up, twin clutch automated gearboxes, driver economy displays and incentives, computer optimised routing for delivery vehicles, and of course hybrid vehicles.

Hybrid vehicles

All hybrid vehicles have a single aim and that is to save on fuel costs. There are fuel hybrids and powertrain hybrids.

An example of a fuel hybrid is a truck or bus powered by a compression ignition engine fuelled by the injection of a small amount of diesel together with compressed natural gas. These are dual-fuel vehicles.

A bi-fuel hybrid is a car or van powered by a spark-ignition engine which can use either petrol or LPG separately. In such a case careful calculation is necessary taking account of the annual mileage, the cost of conversion and the relative cost of the fuels per litre. Cars with poor MPG on petrol or running high mileages are likely candidates especially if operating from a fixed base where bulk refuelling facilities can be provided. This last statement will apply more and more as other new fuels are introduced for transport use.

We are perhaps more familiar with hybrid vehicles having two 'engines'. The vehicles can come in various forms *(Fig 2)* but the chief aim of all of them is to recover braking energy and re-use it to reduce the overall fuel consumption of the vehicle. Most rely on an electric battery to store the recovered energy, and a motor/generator unit to feed the 'bonus' power back to the wheels. However we are starting to see mechanical systems which mostly use a high speed flywheel as the energy store. These flywheels are made of composite materials and rotate in a vacuum at up to 60,000 RPM. The composite materials have several benefits such as, very high tensile strength, lightweight and should overspeeding occur, a benign failure mode.

The spectrum of hybrid vehicles is a continuum starting at one end with a slightly downsized i.c. engine and a small battery energy store, through to one with a tiny i.c. engine and a large battery

Fig 2: A diesel powered bus with a hydraulic pump/accumulator/motor system for the recovery of braking energy.

energy store. This latter type is becoming known as an electric vehicle with a 'range-extender' i.c. engine. The logical progression from this last one is to the full electric vehicle when battery technology has evolved sufficiently to permit a usable range between charging without the need to carry any form of i.c. engine.

One problem with all hybrid vehicles is that they rely on a variable speed duty cycle and rates of retardation compatible with the ability of the system to absorb and store braking energy which would otherwise be wasted as heat. Not all traffic scenarios fit the ideal pattern for hybrids. They are best suited to operation in the urban environment but even so they need to be driven with limited use of heavy braking and rapid accelerations. Urban buses are an ideal application and the use of hybrids here will continue to find favour. There is one proviso however and that is that the extra complexity of the hybrid bus does not give rise to high maintenance costs which will detract from the

fuel savings. High initial cost is also currently a factor. This may reduce as production levels increase although the extra equipment carried does give rise to an inherently expensive vehicle.

Government grants help overcome some of the high initial cost but inevitably as the technology starts to take a hold the total grant money becomes too much for governments to support resulting in the grants being withdrawn. Treat government grants as 'pump-priming' only and ignore them when calculating running costs and whole-life costs in order to properly evaluate the merits of a new technology.

Alternative energy

I have already touched upon other fuels such as Compressed Natural Gas (CNG) and Liquefied Petroleum Gas (LPG) but before considering others that may make viable alternatives in the future it is important to differentiate between Primary Energies and Secondary Energies.

Primary Energy is energy in its 'raw' form. It is mostly not usable directly in a prime-mover without a degree of change or refinement. For example neither electricity nor hydrogen are primary energies – they have to be made. The process starts with some form of primary energy and the transition itself uses more energy. Considering all the stages from gathering the primary energy through to 'burning' it in a prime-mover gives what is known as the 'Well-to-Wheel' efficiency. Most of the energy chains used in road transport today have a 'Well-to-Wheel' of around 15%. The low figure seems to indicate that there is some scope for improvement.

Fuel Cells are often cited as being the 'engines' of the future but from the arguments above they are merely secondary energy converters. Their energy chain is quite tortuous being, say: coal to steam to electricity to hydrogen to electricity to electric motor, each stage having its share of losses.

Looking at all likely primary energies and all likely secondary energies together with the range of prime-movers that could be used, we have nearly 5,000 combinations, far too many to be individually pursued. Fortunately from a vehicle designer's point of view many are clearly impracticable and many are just variants of what we are already doing so can be dismissed. The chief conclusion the designer can draw is that so many of the routes lead to the generation of electricity. Electricity is therefore the key to considering future vehicle propulsion systems.

Electric vehicles (EVs)

Electric cars have been built that are powered solely by photo-voltaic solar cells *(Fig 3).* Such cars, whilst ingenious and novel have shown the impracticality of the concept. The array of solar panels has to be so large and the car so small that they are not seen as a practical way forward. However solar panels

Fig 3: A single-seater Honda car powered by a solar panel array

do have a future as static providers of electricity, and also on the roof of motor vehicles to provide power for air conditioning systems and the like.

Electric cars, taxis, buses and commercial vehicles have a long history going back as far as the 1890s but sadly their progress has always been eclipsed by the undoubted superiority of the internal combustion powered vehicle. However perhaps now is the time for them to stage a comeback. Ignoring tramcars and trolleybuses the ideal electric road vehicle has always been seen as one reliant on battery power. And as such its development has always been governed by battery development. This has been slow and only now is real progress being made, forced by the massive upsurge in the use of mobile communication devices coupled with the growing realisation of the benefits that electric road vehicles can bring in terms of clean air in urban areas and as a replacement for oil. Both these arguments are based on the premise that the electricity of the future will not be generated from fossil fuel sources.

The lead-acid battery is rugged and reliable but very heavy and having a very low energy density.

A value of 35 Wh/kg compares very unfavourably with a full tank of petrol at about 2000 Wh/kg. New battery types such as Nickel Metal Hydride and Lithium Ion push the energy density over the 120 mark but obviously much more is needed to adequately replace the petrol and diesel engines without unacceptable compromise. It may be that equivalent energy densities may never be achieved in which case the operation and use of electric vehicles will have to be adjusted to suit their time and range envelope.

In the meantime electric vehicles are being produced with various means of overcoming the range deficiency. Some are targeted solely at short distance operations.

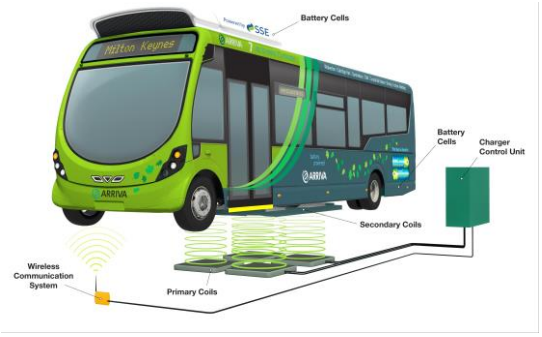
Others are being built with small range extender i.c. engines which act as electric generators pending the vehicle being able to reach a charging point. Interesting developments in this regard are tests of miniature gas turbines as on-board generators and also the possible use of the very compact Wankel rotary engine.

Other developments are for fast recharging of batteries using dedicated recharging stations both private and public. The public ones will have to be rolled out throughout the country at a more rapid rate than hitherto before people will believe they won't be left stranded.

For vehicles running on fixed routes, such as buses, there is the possibility of using wireless recharging points en route. These are being trialled in Milton Keynes (*fig 4, below*). Eight buses operate a 15 mile route for 17 hours per day. At each end of the route there is a pad flush with the road surface. There is a similar pad on the underside of the bus.

When the bus is correctly positioned the two pads move to come closer to one another. An alternating current in a set of primary coils in the road pad induces a current in the secondary coils in the bus pad. This current charges the bus batteries without any contact being made. The breakthrough compared to earlier uses of such technology is that the energy transfer takes place at a transfer efficiency of 90% or more. Some degree of mismatch can be catered for, so the technology has obvious promise for public use where the

Figure 4: Eight Wrightbus electric buses are operating in Milton Keynes using wireless recharging at the ends of the 15 mile route



positioning skills of car and van drivers may not be up to bus drivers' standards.

The obvious extension of this recharging technology is for it to take place without the need for the vehicle to stop. This is some way off but cannot be ignored as a future possibility.

Some years ago the solution to the problems of EVs' limited range was to offer battery exchange stations. At these the discharged battery pack would be slid out from under the vehicle and a freshly charged pack slid into its place. This may work for fleet operations but not for the general public. The idea seems to be losing favour for both technical and economic reasons.

Fuel cells

Hydrogen has been mentioned earlier as a possible alternative fuel. It could be used in slightly modified spark ignition engines and in theory with its very high resistance to knock (octane rating c.120) it should make a good fuel and enable the very high worldwide investment in piston engines to be utilised. Unfortunately experimenters in Germany and Japan found the fuel economy results disappointing and most seemed to have abandoned their projects in favour of its use in the fuel cell.

As also mentioned previously hydrogen is not a primary energy source so it has to be made. It is made by the electrolysis of water which obviously uses electricity.

The fuel cell in simple terms is the reverse of the electrolysis process. It combines hydrogen and oxygen to produce electricity and water. It is very clean and effective. But at present it is a very

expensive piece of equipment in motor industry terms. However it is surely one of the serious rivals to the electric battery when it comes to considering ideal power sources for future road vehicles. It is an environmentalist's dream with its exhaust of only steam/water and its reasonably quiet operation. It requires several auxiliary systems of pumps, fans and coolant circuits but these are reasonably within the bounds of current technologies.

The major road vehicle problem is in the methods of on-board storage of the hydrogen. It can be carried as a gas under pressure of c.700 bar or cryogenically at minus 253^0 C.

Both present packaging problems and vehicles have to be designed from the outset to accommodate the hydrogen tanks without compromising the passenger or goods carrying potential of the vehicle *(Fig 5).* None of this is insurmountable, but again cost is the chief bugbear.

Fig 5 A Mercedes-Benz car powered by a hydrogen/ air fuel cell. The hydrogen is stored in three carbon fibre wrapped underfloor tanks at 700 bar pressure – enough for a 250 miles range.

Many fuel cell powered vehicles are operating worldwide so ever-increasing experience is being obtained with which to advance the technology, as in the case of the small fleet of hydrogen fuel cell buses operating on service RV1 in London *(Fig 6).* It is one of the very few options for powering heavy duty trucks *(Fig 7)* and coaches in the post-oil era.

Fig 6 One of a small fleet of hydrogen fuel cell powered buses operating in London

Fig 7 A fuel cell powered truck operating in the USA

Safety

Apart from propulsion systems, there are many other aspects of vehicle design which will also be receiving attention in the years that lie ahead. I have picked just one to discuss here, and that is safety.

No matter what pressures road transport manufacturers and operators of the future are subjected to, no backtracking on safety will be permitted. Lawmakers and the general public would not have it any other way. Not only will new technologies such as on-board hydrogen storage and the like be subjected to rigid safety requirements many other aspects of vehicle safety will be advanced from their current states of art.

In recent years big strides have been made in what can be called *passive* safety measures *(Fig 7),* examples being: seat belts, pre-tensioners, air bags, side protection beams, safety cells, crumple zones, coach roll-over protection, self- dipping interior mirrors, pedestrian-friendly bonnets, etc. Some development in similar areas will continue but future developments will be aimed more at *active* safety measures.

Most passive safety measures are aimed at reducing injury after an accident. Active safety measures are aimed at avoiding the accident in the first place.

Some active measures are with us now, such as anti-lock braking systems, anti-jacknifing systems on artics, dynamic stability control, adaptive cruise control, emergency brake assist, high-mounted stop lights, pulsing brake lights, projector headlamps with clean cut-off beams, steerable headlights, daylight running lights, etc. cut-off beams, steerable headlights, daylight running lights, etc.

New developments will come in the areas of: head-up displays, lane guidance, forward and side scanning radar, etc. Some possible developments may provoke fierce resistance, for example remote speed control. This would enable outside sensors (or the police) to regulate a vehicle's speed by interfacing with the vehicle's on-board computer, the object being to regulate traffic flow by achieving safe spacing between vehicles and a faster, more regular flow through congested road sections as well as conformance with speed limits. As I say, the public may feel this is a step too far.

Figure 7: A reminder of the time before crumple zones, seat belts and air bags

Similarly, I don't think driverless vehicles will be accepted on our roads. Apart from the difficulties faced by piecemeal introduction of them, there would be general public disquiet about the idea.

It is likely that electronic linking of HGVs on motorways could be achieved so as to reduce driver fatigue and maintain safe spacing at all speeds. This would need a lot of thinking through before implementation.

Under the guise of safety, subjects such as: more congestion charges, road pricing and fuel rationing will no doubt be on the political agenda. Inevitably some or all of these will be introduced purportedly to 'keep the wheels turning' as traffic densities increase.

Conclusions

I have not discussed all of the following conclusions in depth in this article but I list them here to promote discussion and debate on a future that none of us can predict with any certainty but on which some of the younger generation may be able to exert an influence.

- We must conserve fuel to eke out oil reserves (us and the World together).
- There will be more constraints on car usage (congestion charges and the like).
- Hybrid cars, vans and urban buses are inevitable but hopefully will be only a passing phase.
- Bio-diesel will help keep HGVs running in the interim.
- Electricity will be generated from many sources, some renewable, some not.
- Battery cars and vans will come. First with range-extender i.c. engines to overcome 'range anxiety', then as pure battery vehicles operating from fixed bases initially.
- Then all small to medium vehicles will become battery-powered as better batteries/capacitors and fast contactless recharging become available.
- Government grants will be phased out as the volumes of EVs grow and 'Transport Electricity' will be taxed as the HMR&C start to see fuel tax revenues diminishing, so EVs won't be as cheap to run as they appear now.
- Heavy duty Fuel Cells are the answer for trucks and coaches. These will use hydrogen sourced from fixed bases then

later from a network of liquid hydrogen refuelling stations on trunk routes – a huge initial investment is required to make this happen.

- Vehicles will not get lighter – but light high-strength materials will be further developed and made suitable for volume manufacture. They will be increasingly applied in order to maintain the weight status quo as vehicle equipment levels increase due to tighter emissions limits, alternative fuels, increased safety features and a general rise in vehicle specification features offered.
- Design and Development techniques will advance to achieve faster reaction times to meet market demands with shorter lead times to production. These will utilise increasingly fast and reliable computer modelling, 3D holographic visualisation and simulation methods together with 3D printing used for more than just prototyping.
- Vehicle Safety systems will continue their development with more emphasis on collision avoidance – but we likely won't accept driverless vehicles.
- Current road surfaces and layouts have enormous potential for improvement, however there will be opposition to major new motorway developments and the like if HS2 is anything to go by.
- Developments such as Maglev, Hovertrains, Personal Pods, etc will only find limited specialised application as now. The pneumatic tyre and wheel will reign supreme *(Fig 8).*
- And finally - continued improvements in communication methods will not necessarily reduce the desire or the need for the transport of people or goods.

Fig 8 One of fleet of electric driverless 'Pods' operating a car park shuttle service at Heathrow Airport. Such specialised means of transport will not find general application.

David Burnicle

David is now retired but during his career he held senior engineering positions at Perkins Engines Ltd, Leyland Bus Ltd and Tickford Engineering (formerly Aston Martin Tickford). He continues to take a strong interest in all subjects related to road transport and energy.

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MOCK TUDOR BUS GARAGE

This rather elegant mock-tudor fronted bus garage and filling station was built for the Chiltern Bus Company of Lane End in Buckinghamshire in 1935. Whether it is truly unique is not known, but it lasted in sadly modernised form as an office and store until very recently, now unfortunately demolished. After it passed to Thames Valley with Chiltern it saw some limited operation, winter storage of coaches, and then spent the war years full of sugar on behalf of the Ministry of Supply (Illustration from Paul Lacey collection)

TICKETS - A NEGLECTED HISTORICAL RESOURCE

Roger Atkinson

If you have written a book, or even an article, on road passenger transport history, you will have been aware of a need to touch on the historical period covered, the vehicles, the operating territory together with competing or adjacent enterprises and, perhaps more fleetingly, the managers, political influences and social history. And you will have familiarised yourself with archival sources. But when publication is imminent, an editor or publisher may have pointed out that you have not illustrated any tickets. An assembly of tickets will then have been scrambled together, and an accompanying text written to tell the reader that the ticket colours were 1d white, 2d blue, 3d pink and so on.

I must insert an important caveat. This is not true of all authors; a few do fully recognise the value of tickets as a serious historical resource in themselves, and even as pointers to matters that they might have overlooked in their writing.

In this article, I confine myself to Liverpool and its northern suburbs, save for a couple of illustrations, which use the ferry to Birkenhead. From a handful of selected tickets of just this one city, it is possible to embrace several aspects of national and social history: the development of suburbia, bombing in World War II, the Suez Crisis, the decline of Liverpool as one of the world's greatest ports and finally the development of regional authorities absorbing, and wiping out, the smaller local bodies that originally created and ran the trams and buses. However to maintain a balance, there is also emphasised the promotion of 'integrated' transport by the regional bodies, with tickets covering all railways, buses and ferries.

A very important date to keep in mind is already more than forty years ago. On 1st December 1969, the *Merseyside Passenger Transport Executive* took over the operations of the Liverpool, Birkenhead and Wallasey Corporation transport undertakings. Even earlier there had been at least three other disruptions to long-established forms of public transport on Merseyside that had had a wide effect on patterns of travel. The first Mersey Tunnel for road vehicles, the Queensway Tunnel, had opened in 1934. The *Liverpool Overhead Railway (LOR)* had closed in 1956. The Birkenhead Woodside station of British Railways closed in 1965.

The Mersey Tunnel

The Mersey Tunnel was open to motorised road vehicles and immediately diverted goods traffic from the ferries. Public passenger transport (i.e. buses) through the tunnel, however, faced two deterrents. Firstly, a toll of 5/- per bus or coach plus 2d per passenger, necessitating fares that offered no conceivable competition with the 4d return fare on the ferry or 6d return on the under-river Mersey Railway. Secondly, the necessity for obtaining a licence for the service from the Traffic Commissioners in the face of opposition by the municipal operators. *Crosville Motor Services Ltd*, for example, applied to extend its lengthy Denbigh – Loggerheads - Mold - Birkenhead (Woodside) service through to Liverpool, but it was refused. Only some long-distance coach services, which had hitherto used the goods and luggage ferries were granted licenses for services through the new Tunnel.[1]

LOR and connecting services

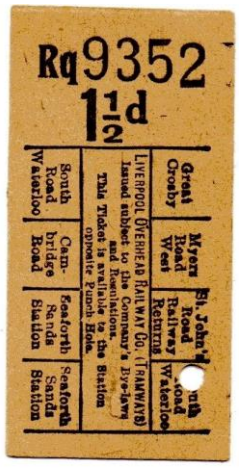
The LOR had been an electric railway with third rail current collection that, for sixty years, when the port of Liverpool was at its zenith, ran from north to south down the line of Liverpool's docks. However, the focus in these notes is not on its railway tickets, but on its tram tickets. The Urban Districts of Waterloo-with-Seaforth and Great Crosby, both relatively wealthy and progressive northern suburbs of Liverpool housing a potential commuter population, jointly promoted an Act of Parliament enabling them to construct an electric tramway from Great Crosby southwards to Seaforth Sands, where the tramway terminated adjacent to the already functioning LOR station.

The line was opened in June 1900, and was leased by the two urban districts to the LOR for operation. When the lease expired at the end of 1925, the Councils decided that, instead of renovating the tramway, they would offer a five year lease to a bus company to operate a bus service over the route. The LOR trams therefore ceased on 31st December

1925 and the new lease was granted to the *Waterloo & Crosby Motor Services Ltd* from 1st January 1926.

A connecting bus service, continuing some through-booking facilities to and from LOR trains, was then provided by the Waterloo & Crosby company for five years to 31st December 1930. *Ribble Motor Services Ltd*, which had meanwhile acquired control of the Waterloo & Crosby company, thereafter provided services in Waterloo and Crosby, but these were independent of the Councils and the LOR However, they continued to provide through season ticket facilities to and from the LOR, extending the area of these beyond the limits of the former LOR tram service. However, it is believed that no other through booking facilities, apart from these season tickets, survived into Ribble days.

Below:- LOR Tramways 1½d setting out four bookings:
Great Crosby – South Road, Waterloo;
Myers Road West – Cambridge Road;
St John's Road Railway Returns – Seaforth Sands Station;
South Road, Waterloo – Seaforth Sands Station

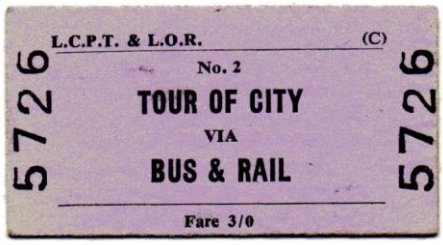


This 1½d tram ticket dates almost certainly from the 1920-1921 period; it represents an increased fare. Earlier there were tickets that showed the intermediate stages at 1d and the throughout fare at 2d. The "St John's Road Railway Returns" booking was a specific facility. The 1½d fare from Seaforth Sands Station applied only as far as South Road, Waterloo; but holders of railway through tickets to Waterloo were allowed to travel as far as St John's Road.[2] The back of this same ticket is also shown *(below)*, with its advert for Shopping Tickets through to Liverpool. These were available on the trams and provided First or Third Class rail travel to Liverpool (James Street).

The Waterloo & Crosby bus ticket *(below)* shows that the throughout fare, Great Crosby – Seaforth Sands station, had reverted to 2d. Tramway fare increases had been common in the 1917-1919 period, but had had to be sanctioned by the Board of Trade (or Ministry of Transport from 1919) and had been limited to a strict two-year period. This lower fare will have been reverted to long before the buses took over.

The ticket from World War 2 *(below)* was for use on temporary replacement buses when bombing had disrupted sections of the LOR.

The fourth ticket *(below)* originated at the time of the Festival of Britain, 1951, when the country sought to celebrate a return to something near normalcy after fully twelve years of preparation for war, the war itself and post-war austerity. The tour is believed been reintroduced each summer until the closure of the railway.



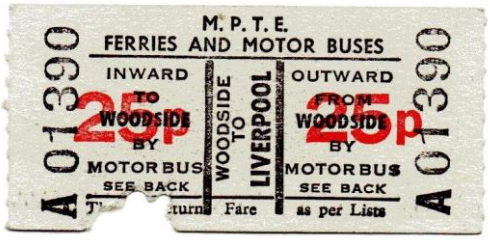
The fifth ticket *(below)* shows the survival, right to the end of the LOR's operations in December 1956, of the bus-rail Seasons, in a range, embracing 1st and 3rd Class travel on the trains, for 5 Days and 6 Days, from different points on the bus services to a number of LOR stations.

Closure of Woodside station

The second disruptive closure, that of Woodside station in Birkenhead in 1965, changed the travel habits of a lot of Chester or South Wirral commuters. When the steam trains ran to Woodside, they disgorged there an abundance of passengers who then crossed the Mersey on the frequent ferry service provided by *Birkenhead Corporation* Ferries. Woodside was also Birkenhead's principal bus station, with several bus routes feeding in to it and thus conveying still more passengers to the ferries, rather than on to the British Railways-operated Merseyrail electric trains that ran under the river to Liverpool. To further encourage the use of the ferry rather than the rail connection, the buses issued a range of bus-ferry through-booking return tickets to Liverpool (correspondingly, the Woodside ferry terminal sold through bookings to the Corporation buses).

The closure of Woodside station left Rock Ferry station as the railway interchange point, the change there being from the diesel (replacing steam) trains from Chester to *Merseyrail* electric trains; there had not, for many years, been a ferry at Rock Ferry. The loss of the railway service to Woodside did not bring about a closure of the Woodside ferry; indeed, it has not entirely closed to this day. It did, however, seriously affect the ferry's viability. Two ferry boats working a ten minute frequency crossing, dodging the still heavy upstream and downstream river traffic, with superbly swift, efficient disembarking and embarking of passengers at the Woodside and Pier Head landing stages had been a wonderful achievement, but it had relied on a high traffic volume for profitability. Without the passengers pouring off the trains at Woodside, the ferries went into decline; then reduction of service, which stimulated more decline. The through Returns from the Birkenhead Corporation buses continued into PTE days and achieved decimal currency issues (The United Kingdom adopted decimal currency on 15th February 1971).

A PTE-titled decimal currency Through Booking issue is illustrated *below.*

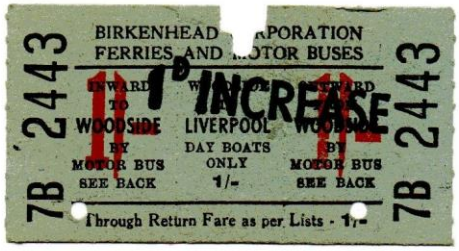


But before we leave the through booking tickets, two other facets of rather forgotten history can be brought to mind by them.

The Suez crisis

Firstly, the Suez campaign of autumn 1956. Abdul Gamal Nasser, the Egyptian President nationalised the Anglo-French constructed and owned Suez Canal, a vital connection between the Far East and Western Europe. Britain and France sent a joint military expeditionary force to secure the canal; it

met with armed resistance by Egypt. Moreover, Egypt had the support of President Eisenhower in the USA who deemed the Anglo-French action 'colonialism'. Faced with this lack of support and by some internal opposition in Britain and France as well, the expeditionary force was withdrawn. The canal had meanwhile been blocked, so that shipping between Persia, India, Pakistan, Malaya, Hong Kong etc. and Britain had to travel round the Cape of Good Hope at significantly increased cost and voyage time. The British government imposed a temporary increase in Fuel Tax. Bus operators were allowed, equally temporarily, to increase their fares. A boat-bus Birkenhead Corporation through return ticket stamped 1d INCREASE is illustrated *below*. A piece of somewhat forgotten national history enshrined in a (boat and) bus ticket!

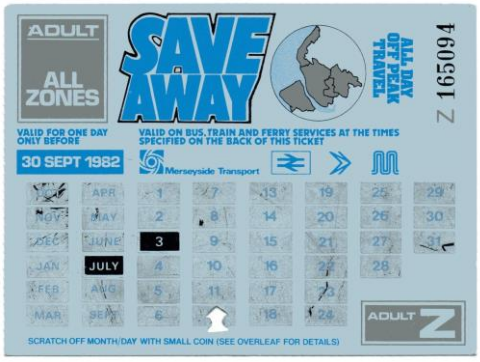


The other example is illustrated below – a ticket issued by the *Mersey Tunnel Joint Committee*. Earlier in these notes it was explained that to 'protect' the ferries for many, many years no bus service operated through the Mersey Tunnel – nowadays umpteen do – but, in the quiet decline of the ferries even as early as the 1950s, the first withdrawal had been that of the Night Ferries, and their substitution by a Night bus service from 14th May 1956. The buses were provided by Birkenhead and Liverpool Corporations jointly, but the operation was controlled, and the tickets sold, by the Mersey Tunnel Joint Committee. This example is a Prepaid Ticket. Cash fare tickets also existed.

At the outset of this article I claimed that I would produce bus (or tram) tickets, just from Liverpool, without venturing farther afield, that would illustrate several facets of social or national history. So far, I hope that I have demonstrated all the points that I claimed to cover, except for two – the decline of the Port of Liverpool and the development of 'integrated' transport under the Passenger Transport Authorities / Executives under Transport Act 1968. The decline of Liverpool as a port does thwart me somewhat. Tickets can only illustrate what was there to be collected when Liverpool and Birkenhead were thriving ports; these tickets exist no longer. One of the major functions of the Liverpool Overhead Railway was to transport dockers from one dock to another in the course of their day's work. When one ship had been loaded or unloaded, a whole batch of dock workers needed to move to another dock to work on a different ship. The Mersey Docks & Harbour Board or, in a few cases, major shipping lines, issued the dockers with prepaid tickets to make these journeys by public transport.

Below. An MDHB ticket for use on the LOR (admittedly a railway ticket, not a bus ticket) is shown here. MDHB prepaid bus tickets existed in Birkenhead.

Finally, we come to the wide field of inter-modal tickets that Merseyside PTE has fostered. For many years now, the scratch-off card Saveaway has been on sale, covering local rail and bus travel in various Zones, with an All-Zone issue including travel on the Mersey Ferries. This facility was a very early introduction by the new PTE. Originally, for a fairly short period it was known as the Traveller ticket. An All Zones Saveaway of 1982 is illustrated on the next page.



Above: An all-zones Saveaway ticket of 1982

I hope that I have demonstrated that bus tickets are not just something that transport historians 'have to mention', but a source they could often profitably include in their researches.

References:-

1. Mersey Ferries, Vol.1. by T B Maund, (Transport Publishing Co Ltd, 1991) p108.
2. Liverpool Transport Vol.2 1900-1930 by J B Horne and T B Maund (Transport Publishing Company and LRTA, 1982) p.42

SUTTON & CO

Arising from the article on Lancaster carriers by James Bowen in our last issue, Paul Lacey has written as follows:

"I would like to add a comment on the Carriers from Lancaster article. The author mentions that Sutton & Co. had a daily service to London, but I feel that should be clarified, as Suttons were a nationwide parcel carrying service, and not even necessarily by road.

To illustrate that I will quote from my own researches, largely in connection with my book *The Newbury & District Motor Services Story*, where I found Sutton & Co. listed in Kelly's Directories for Berkshire under Railway Carriers in 1911, 1920, 1928 and 1939 editions.

Additionally, in my Wokingham researches, also in Berkshire, I find local jobmaster and shop proprietor Richard Herring advertising that he is the local agent for Sutton & Co. parcels forwarding, along with the Globe Express Service for worldwide parcels, both clearly operated on a commission basis. Herrings told me that each day the parcels were taken by taxi to the Wokingham Station and forwarded to Waterloo for onward forwarding by Sutton's agent there, presumably by rail where appropriate.

In 1923 the company was registered as Ltd., with a registered office at 22 Golden Lane, London EC1, with a similarly titled (Manchester) company registered a few months later in 1924, with different Directors but the same London address. By 1932 they had over 600 agents across the country, and their shop-front agency signs can sometimes be seen in old photos."

James Bowen has responded with this observation:

"As Paul Lacey has suggested, in much the same way that the local shop master served as an agent for Sutton & Co., it is likely that the example given the case of Lancaster was part of a much larger national network of shop-based agents advertising in trade directories. His evidence suggests that they were not necessarily carriers themselves in the traditional sense, but rather probably developed with the growth of railways which allowed the movement of goods and parcels by rail. In the example of Sutton & Co you are seeing the shift away from the country carrier towards a more integrated carrying trade which is more akin to the modern systems of couriers which exist today, although we seem to be less focused on distribution by rail, but rather road transport."

The 'Cody Bus'

The quality for reproduction of this illustration in the piece by Paul Lacey in our last issue (page 19) was unfortunately rather poor, hence it is shown here again.

REPORT FROM RESEARCH CO-ORDINATOR TO AGM

As Research Co-ordinator, Tony Newman presented the following report, which is reproduced here in full as a guide to recent developments, especially, in newspaper archives.

1. The Contents List of our Newsletters and Journals now covers issues 1 to 75, together with a corresponding list of Book Reviews and Book Notices *. As the list of contents grows, a full-scale index seems unrealistic. As a possible compromise, consideration has been given to ways of indicating the subject matter for articles with enigmatic titles. Members' thoughts on how best to achieve this would be welcome.

2. My personal catalogue of Company Registration Files at The National Archives relating to Road Transport with an emphasis on Passenger Transport is regularly updated and available to any member on request. I have increased the scope of this collection by including files from High Court proceedings, where these are relevant*.

3. The British Newspaper Library at Colindale closed to readers on 6th November 2013. From March 2014, the newspaper readers who previously used Colindale will be able to visit a dedicated newspaper Reading Room at the Library's main site at St Pancras, where microfilm and digital copies will be available. The website <www.britishnewspapersarchive.co.uk> offers regularly updated information on which newspapers have been digitised and how to access them.

4. Each year from The National Archives Annual Summary Lists of Accessions to Record Offices, I produce a select listing based on themes that are likely to be of interest to our members. The list of Accessions now covers the years 1994 – 2012*.

5. During the past year I have also compiled a list of references to about 300 businesses (both operators and manufacturers) whose archives have been deposited in UK Record Offices. The two sources for this summary have been: 1) the National Register of Archives (NRA), which draws its lists from around 400 depositories in England and Wales and: 2) "a2a", which covers the whole of the UK and concentrates on Names: Personal, Business and Place*.

6. One further list of sources recently compiled is for Tramway Undertakings prior to the 1870 Act*.

7. During the year there has been encouraging news of improved cataloguing and finding aids at both The Kithead Trust and the Omnibus Society Library and Archive.

8. Other work has included such diverse subjects as: Location of Copies of Garcke's Motor Transport Year Book & Directory (1916-42); London Horse Trams Network; Black & White Motorways, Cheltenham; Trevett family's activities in London Omnibuses 1828-44 and Passenger Transport History in Market Harborough and South Leicestershire.

If any of these topics light up an area of interest for the reader, I will be happy to supply further details.

* Copies of these lists are available to any member on request by e-mail. Hard copies are available but with an 'at cost' charge for paper and postage

Tony Newman

e-mail: <toekneenewman@googlemail.com>

8th March 2014

Subsequent to the report above, Tony Newman recalled that the Herbert Art Gallery & Museum (where the AGM was held) was also visited by him in 2009, as he reported at the 2010 AGM:

The Daffern Archive, at Coventry Record Office, consists of a set of bound volumes, comprising mostly annual reports of directors and annual financial statements produced by companies and sent to Daffern, a firm of Chartered Accountants, between 1896 and 1946. I have produced a summary of companies included in the archive that are of potential interest to our members, and have recently visited the Coventry Record Office to sample this archive, which is accessible under Reference **PA 606/1-47.**

If anyone wishes to obtain a copy of the summary, they have only to e-mail Tony at the address shown above.

BOOK REVIEWS *(continued from p5)*

Bristol City Buses Mike Walker, March 2014. ISBN 978-1-4456-1775-6, 96pp, card covers, £14.99. Amberley Press, The Hill, Merrywalks, Stroud GL5 4EP www.amberley-books.com

Published in the familiar Amberley Press style, this is primarily an illustrated history of buses and services operated by the Bristol Omnibus Company, including its predecessors and the 'Bristol Joint Services' from 1937 to 1978, in which the City Council had an involvement, although not on the scale of 'municipal' operation found in almost all cities of equivalent size at that time. A concise text provides the essential historical background, the majority of the book being devoted to a wide range of illustrations from the horse bus era through early motor buses, up to changes following deregulation in 1986.

From Mike Walker's book, a Bristol 1922 4-ton model with 30-seat bodywork, outside the Victoria Rooms (original source: Bristol Vintage Bus Group)

Later illustrations are in colour, but the majority in black and white. As one might expect, many of the vehicles shown were manufactured in the city, the K type double-decker playing a major role (despite the introduction of the Lodekka model, Ks were delivered until 1957 and a few survived to receive NBC livery.

From Mike Walker's book, Bristol K-type characteristic of the city's network for many years, in this case a 1957 KSW model (view by author).

Operations in areas around the city are also covered, and the shift to one-person-operation through RELL single-deck and subsequently VRT double-deck introduction. **PRW**

The Winchester Taxi: A 50 year celebration Carl Lemon. Bowden Publishing, Bromley. 2013. 48pp, illustrated. ISBN 978 09572 6852 4. Available from the author at 49 Fen Road, Holbeach PE12 8QA. £7.50 including p&p.

This nicely produced and well-illustrated booklet is a labour of love by a Winchester owner and long-time enthusiast. Although fewer than 70 were built in total, the Winchester has an interesting place in London taxi-cab history, having been initiated by the Owner Drivers' Society in conjunction with the Westminster Insurance Group. The author takes the Winchester story on from initial production by James Whitson & Co of Yiewsley, which the late Tony Beadle examined in *Armadale to Aquila* (2010). Legislative changes and the problem of serving such a small output consigned the Winchester to history: gone, but thanks to the author's work, not forgotten. **RAS**

COPY DATE FOR THE NEXT ISSUE IS 1st AUGUST