A Century of Change

Britain's Railways
and
The Railway Study Association
1909-2009
and a view forward

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This book is dedicated
to everyone who has served in the railway industry over the last century
and to those who will follow during the next.

Foreword

Richard Brown CBE
Chief Executive, Eurostar (UK) Ltd

Celebrating its 100th birthday makes the Railway Study Association a unique railway institution. Over the last 100 years railway companies have been grouped and then nationalized, a variety of public bodies have come and gone, and most recently a new generation of rail companies emerged. Few other railway organizations founded 100 years ago are still with us in broadly the same form that they started in. To have survived, and still be thriving 100 years on, gives the RSA and its archive a unique perspective on our rail industry.

This book, drawing on a wide range of lectures delivered to RSA members over the decades provides a fascinating read. It is interesting both in itself—history is always a stimulating subject!—but also because of the regularly recurring themes and issues over the years. Shortage of investment, the need to modernize, meeting road and air competition, reconciling the tensions between providing a public service and financial discipline, coping with reorganization and restructuring: these are all regularly reappearing subjects, to name just a few, that resonate with us today.

Centenaries are important milestones, occasions to reflect on the past, as well as to celebrate continuing existence and achievements over the years. This book fulfils all of those requirements giving a wide ranging account both of the progress of the RSA over the decades, but also of the industry it serves. As George Santayana said: 'Those who cannot learn from History are doomed to repeat it.'

Mike Horne has done a great service, not just to the RSA, but also to Britain's railway industry, in putting together this book. I am sure many people will enjoy reading it and true to the RSA's mission, it will also undoubtedly help promote broader understanding of all aspects of the railway industry.

Acknowledgements

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Disclaimer

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Introduction

It is always noteworthy when an organization succeeds in reaching its centenary. As the Railway Study Association (RSA) observed its own centenary approaching, it thought it should review what it had done for its Golden Jubilee in 1959 and, more widely, to see what records had survived. A certain volume of bureaucratic material had survived in the archives of the London School of Economics and this served not only to show how closely the link between the school and the RSA had been, but also how closely the RSA had been embedded in the training objectives of the railway industry and the extent of the support that had been given.

In determining how to mark the centenary it was agreed that a book should be produced. It became obvious quite quickly that a tome devoted solely to the workings of the Council, the machinations of the sub-committees or the menus provided for the convention dinners (prodigious as they were) could only be of limited interest. Another approach was going to be needed.

The inevitable centenary subcommittee eventually determined that a reasonable approach would be to paint a picture of the industry as seen by RSA members during the last century. By this means it was hoped to produce a book of enduring value that would hopefully provide some new insights for the majority of members about how the problems and practices of the industry have changed over the years. Above all, it has allowed us to draw on the tremendous resource of the RSA Proceedings, in printed format between 1925 and (in a rather different form) today.

This is not a history book. Nor is it a book about the 'train set'. Rather it is a book that focuses on the nature of the business and the methods it has employed to undertake its business. The business and the methods required to address the problems of the day were meat and drink to those giving RSA lectures, which were primarily to train and inform aspiring general managers over the years.

To assist readers, it should be made clear that as far as possible the railways referred to in the text, and the statistics used, relate solely to Great Britain (England, Wales and Scotland), though in isolated cases certain statistics might include Ireland where sources have been ambiguous. Additionally, railways referred to are public railways comparable to those existing today and exclude an impressive mileage of lines owned by bodies not directly involved in the railway business such as collieries, quarries and independent ports. These organizations would demand a book of their own.

On the basis of the evidence examined, the proposition is that the railway system in Britain has been in a state of continual evolution, perhaps characterized as growth, consolidation, retrenchment and now a period where it is under test to see if it is part of the solution to the immense challenges facing the country; there is a recognition that railways probably are part of the solution and not part of 'the problem', as seemed at one time to be the opinion. So what is the next phase, the one that will see railways 'reinvented' as an essential component of the new and hopefully better world? The one that railway 'students' should be excited to be a part of. Perhaps, though tentatively, we would suggest it is the era of innovation? The rail network must understand not only what it is best at doing now, but what it will be best at doing 50 years hence and where its unusual skills might be harnessed at the edges of the industry to produce the greatest good with the most efficiently-deployed skills.

We hope that what is in this brief encounter with the RSA's long history will paint a picture of an industry infinitely adaptable and embracing a workforce that, preferably with some notice, can produce some incredible results that are good value for money.

In any event, the authors and the Council of today's RSA hope you find something of interest within.

MACH

Chapter 1 – Britain's Railways in 1909

Introduction to the railway of 1909

The railways that existed when the RSA began in 1909 are so different in character to those existing today that some description is essential. After all, the development of the RSA is intimately linked with changes within the industry itself. But perhaps some things don't change. The researcher C.E.R. Sherrington recalls that during 1909 traffic was rising and by 1910 'one of the problems of the period was that of finding means to carry added traffic over the existing lines, already scheduled to carry, in many cases, as much as the signalling equipment and the speeds of the trains would permit with due regard for safety'. He explained that the accepted way forward seemed to be the widening of lines, electrification, and improvements to the signalling. Moreover, in 1909 some 'high speed' lines had either just been built or were imminent! With only a minor change of emphasis, this prognosis strikes a chord today. The RSA seems to be supporting a railway that faces huge recurring problems. There is one major difference across the century. The system in 1909 was profitable, dividends averaging 3.14 per cent were being made, and the railways raised all their own investment.

In 1909 there were in Great Britain some 203 separate railway companies of which 92 were worked by, or leased to, one of the other companies and 40 were statutory committees of two or more companies operating jointly. There was also a handful of small railways that had 'temporarily' ceased operating or were in receivership. The companies varied considerably in size and many were quite small concerns operating along narrow gauge tracks, or were so-called 'light railways' operating by virtue of a special government order rather than an Act of Parliament. However, the predominant railway business of the country was conducted by fifteen, vertically-integrated railway companies together serving most towns and communities in Great Britain.

New railway construction had been slowing down since around 1870 as all the obvious traffic objectives had by then been connected; later construction comprised duplication of facilities or 'infill'. Although some of this was beneficial, an ever increasing amount of new work simply invaded ever less promising territory to the extent where these rural branches in many cases failed to recover the capital expended and in some cases failed even to cover their operating costs—though the financial processes of the day would have disguised these ugly facts. The railway of 1909 therefore already included some excess and loss-making mileage, though at the time the only financial impact was a small diminution of profits compared with the late Victorian heyday. Some duplicative services, one company competing with another, are likely to have been in a similar position. After 1909 there was very little new mileage, beyond that required for new commuting areas. However the enthusiasm of the companies to build new branches, in effect to grab traffic at any price, whilst perhaps understandable at the time, was to sow the seeds for much trouble later.

Railways as a mode pretty much then had a monopoly over all but the shortest distance passenger traffic which had the alternative of the local bus, or walking. In many towns, the new electric tram was developing quickly. Roads were adequate for prevailing short-distance traffic but private cars were still a novelty and for most people quite unaffordable. Freight traffic, and especially the carriage of minerals, was also substantially a railway monopoly, though coastal shipping and (less so) the canals offered limited competition between suitable places, especially for non-perishables. There was the merest hint of road competition emerging in some areas of freight movement.

As with most monopolies, regulation was very much evident with both passenger fares and goods rates heavily regulated by complex statutes and the attentions of the Railway & Canal Commissioners. This body, which was a tribunal acting as a court of law, had a number of functions included amongst which was settling disputes between railways, ensuring fares and goods

rates were properly published, and acting in the public interest to compel railways to provide adequate facilities for carrying the traffic or providing facilities for through traffic. The Board of Trade also had a number of regulatory functions, and its Railway Inspectorate acted as an independent safety regulator.

Although the companies were essentially regional in character, there was considerable territorial overlap. Many larger towns were served by two or even three companies, each of which would provide its own stations and yards, with each competing hard for business. For competitive reasons, one company would often try to obstruct the development of another in order to minimize competition, perhaps to the ultimate inconvenience of users denied the wider benefits. There is no doubt that some towns were hopelessly over-provided with facilities while others failed to generate much interest at all.

1909 was a notable year in London when on 1st December electric train services began operating on the South London Line between London Bridge and Victoria, via Denmark Hill, on the 6700 volts single-phase alternating current overhead line principle. This was the first main line electrification in the London area and the start of the Brighton Line's London area electrification. There had been earlier schemes of main line electrification in both Liverpool and Tyneside, including one for goods work.

Another feature dating to 1909 was the decision by the Great Western Railway to introduce automatic train control (ATC) on the main line between Paddington and Reading; this was introduced the following year and gradually extended over virtually the whole of its system. This followed trials begun in 1906 which had proved the equipment satisfactory and reliable. Each installation comprised a long metal ramp between the rails, located 440 yards in advance of each 'distant' signal. A detector on the locomotive caused a warning whistle or horn to sound in the cab and (if the whistle were not cancelled) a full brake application would be made. If the distant were clear, the ramp was electrically charged and the locomotive equipment suppressed the warning sequence and sounded a bell. Although the system was robust and worked well into British Railways days, other railways were very slow to follow.

Scale of operations

At the end of 1909 there were 19,889 route miles of railway of which 7563 was single track while the balance of 12,326 miles comprised two lines or more; this equated to roundly 35,000 single-track miles of line, to which must be added a further substantial mileage of sidings. Of Britain's total track mileage, the length of electrified railway was just 434 miles, of which about half was operated solely by electricity and largely comprised the London Underground lines.

There were roundly 7000 passenger stations, most of which could also handle freight, and 1200 other freight facilities. Capital employed by all railways had reached £1.3 billion (over 100 times that amount in today's terms). There were also many thousands of miles of non-public lines owned by quarries, mines, independent docks and so on, but the RSA (and this book) is purely concerned with the public lines that came to form today's system.

The scale of operations was vast. There were 21,885 locomotives (virtually all steam), 49,817 passenger carriages, 18,797 other vehicles designed to operate as part of a passenger train, 1047 electric multiple unit carriages or steam rail-motor vehicles, 724,946 livestock and mineral wagons and 20,338 other vehicles. Needless to say these huge numbers of vehicles covered a considerable age and huge multiplicity—on one railway alone there were over 58 different types of goods vehicle with a further 45 different types of mineral wagon. In addition to railway-owned mineral wagons, there were probably an equal number of (mainly coal) vehicles owned privately by the collieries or quarries and which the railways hauled.

Through traffic, standardization and the clearing system

Long prior to 1909, railway companies discovered that passengers did not want to be constrained by the geography of

their own companies but wanted to make through journeys, particularly between the main population centres. This generated a need for through trains where locomotives and rolling stock originating from one company would operate over the metals of perhaps several others to reach their final destinations. This called for early standardization of rolling stock, braking and coupling systems, and some consistency in signalling and rule books; these latter points were only achieved just before the dawn of the twentieth century. Through trains were often operated by agreement, but just as common were statutory powers granted to individual companies to operate their trains over particular lines of another company. The receiving company had to honour these powers with good grace, and provide all the facilities needed for handling the trains and their passengers, for which, of course, they were remunerated in accordance with the provisions of the Act or agreement that applied.

Equally, it had already proved essential for agreement to be reached about basic commercial practices involving the issuing and use of tickets. It is widely known that tickets in those days were pre-printed on card and specific not only for every ticket office but for most different types of journey. Revenue for all journeys was collected at the issuing offices, but where through journeys were booked the revenue had to be apportioned across all the companies over whose lines the passenger would travel, usually on a mileage basis. Elaborate accounting processes were adopted to ensure that every company received its correct apportionment of inter-company revenue. With 1.2 billion tickets issued that year, it may be seen that this revenue allocation system was quite a job, especially without electronic computers.

To deal with matters of standardization, and of the equitable allocation of revenue between companies, an organization known as the Railway Clearing House (RCH) was in evidence. Formed in 1842, its duties had grown enormously by 1909. Its management committee was appointed by the various railways that were party to the clearing scheme (which included nearly all railways in the UK except a few small self-contained ones) and it employed a vast staff of clerks. By the turn of the century, its principal regulations occupied 217 pages and covered every eventuality requiring a common approach by its members, but focusing especially on commercial matters. Examples include: at what point at a junction, where a goods train was handed from one company to another, was the commercial risk attached to the goods transferred; or instructions for describing lost property, so that there was one standard method across the country to aid identification. The RCH was involved directly in ticketing only where 'through' tickets were issued. The most common 'through' tickets were pre-printed and advices about these were sent to the RCH from each issuing railway's accountants. For less common journeys, booking clerks would have to work out the fare and make out what was referred to as an RCH paper ticket, where the duplicate would be sent to the RCH for accounting. (Less common journeys confined purely to one company would result in a blank card ticket being issued, with less formality.)

The RCH was responsible for a standard operational railway rulebook. At one time each railway issued its own rulebook, with rules often incompatible with those of neighbouring lines. From the 1870s, the amount of through and joint operation was so large that inconsistencies were found to be causing accidents and under considerable government pressure one common system was adopted. The process was for a committee of railway officers to agree periodically a single code of rules and for the RCH to issue a new standard book every few years. Each railway was required to adopt the standard with identical wording and numbering but was free to make minor changes or include different appendices to suit local circumstances, providing they did not contradict anything in the standard. A new standard had been issued in 1904, and was still in force, though owing to the need for updating several railways reissued their books in 1909. The last book in this style was issued in 1950 and lasted until 1972 with surprisingly little change.

Traffic and receipts

Most passengers—about 94 per cent—travelled third-class, so virtually every train carried third-class accommodation, the quality of which compared favourably with many foreign systems. The small proportion of other travellers was pretty evenly spread across first and second-class accommodation. This preference for 'good value' was well set by the end of the nineteenth century, though it had not always been so; in the 1840s only a fifth of passengers used third-class and the quality of accommodation was dire. As much as anything this shift reflects the switch from the aristocratic and business legacy left by the stagecoach to the railway serving the nation at large and attracting people who would not previously have travelled at all.

Passenger fares were regulated mainly by Acts of Parliament which set the maximum fares that could be charged, the actual charge made varying slightly according to the whim of each railway. The majority of tickets sold were ordinary single or return, though a huge range of special tickets was available, described later. Typically, first-class fares were reckoned at 3d a mile, second-class at 2d a mile and third-class at between 1d and 1½d a mile. There were also cheap workman's return fares typically available for forward journeys starting before 7.30 or 8.0 a.m. for return after midday. Thus the ordinary third-class return fare between London and Watford (17½ miles away) was three shillings, which equates to about £11 today on a retail price basis, which is comparable with current charges for walk-on fares*. This made long distance travel quite expensive, especially as some of the 'crack' expresses commanded premium fares. On the other hand, as now, season tickets offered a significant discount. One huge advantage in having a fairly uniform means of charging is that it made revenue allocation between the dozens of companies fairly easy, as everything was done on a mileage basis.

In 1909, the average receipt per passenger was 2s 6.7d (11.1p) first-class, 1s 6.7d (7.8p) second-class and 6.3d (2.6p) third-class. Most trains had first and third-class accommodation and although many still carried second-class facilities, that class of travel had been declining since the 1880s and it was pretty much defunct at the time of grouping in 1923. Passenger revenue from carrying operations amounted to £51.2 million, mainly from third-class tickets (first and second-class tickets together came to less than £6 million). Luggage, mails and parcels contributed just over £9 million.

An unusual adjunct to season ticket traffic was the ability on a few railways to travel in a 'club' car. This was only available to first-class season ticket holders who had also subscribed to 'club' membership and this enabled them the exclusive use of a whole or part of a carriage with minimal risk of disturbance by strangers. The fad was not widespread and seems to have started in the 1890s, dying out by the Second World War. Members would tend to occupy their favourite seats and treat railway employees like the servants they were accustomed to in their London clubs. To some extent Pullman cars on certain commuter trains later carried on this function.

Freight and police

Even more important to most of the railway businesses was the carriage of goods and minerals; overall, goods then accounted for over half the revenue of all the railways, though the proportion varied from one concern to another. During 1909, some 395 million tons of minerals were hauled and 104 million tons of 'general merchandise' freight. It is perhaps no surprise that of the mineral traffic nearly two thirds comprised coal. Mineral and freight trains were scheduled to run a total of 153 million train miles, compared with passenger services which operated 264 million train miles. Goods traffic generated £59.5 million.

Until 1963, Britain's railways were deemed by the common law of England and Wales to be so called 'common carriers'. Under this doctrine they were compelled to carry anything that the railways held themselves to be open to carry, provided the

* At time of writing ordinary return is £13.20 and cheap day £8.50

consignor was prepared to pay the rates reasonably required and presented the goods at reasonable times. In other words, if the railways said they carried (say) pianos, then someone arriving at any station wanting to arrange to consign a piano could not be turned away. Since railways had to convey the goods at their own commercial risk they naturally sought to minimize the inconvenience and risk to themselves by encouraging consignors to send goods under more onerous conditions of contract and at 'owner's risk', consignors usually accepting these terms as they were somewhat cheaper.

Although it was impossible to anticipate exactly what might be presented to a railway in the nature of goods, the RCH made a brave attempt to do so by producing a substantial manual, listing every item or commodity it could foresee, and setting out into which class that item should be allocated. Freight charges had a huge effect on the economic behaviour of the country and parliament stepped in with the Railway and Canal Traffic Act of 1888, the effect of which eventually was to produce a standardized method of charging across the country. This was not a simple job, since even a moderately sized company such as the Great Northern Railway could have 13 million rates available when all combinations of goods class and journey were allowed for. The arrangements were finally introduced on 1st January 1893. General dissatisfaction resulted in a further Act giving the Railway & Canal Commissioners the right to review rates, though the railways remained dissatisfied that all these restrictions were denying them the right to manage the natural market price elasticity effectively. Some of this might sound familiar rhetoric today.

Eight freight classes were set out by statute, based on a combination of goods value and the complications of handling which each class presented, and maximum rates were set for each class. There is no room even to begin explaining what went in every class, but some flavour might be given by observing that commodities such as minerals, coal, iron ore and suchlike mainly comprised Class 'A', while goods characterized as in the first process of manufacture (such as pig-iron and ingots) formed Class 'B'. Both were conveyed in units of not less than four tons. Class 'C' described slightly more developed items (such as iron rods, hoops and tubes) and were carried in units of not less than two tons. These lettered classes were generally carried in open wagons, usually covered by canvas sheets and dealt with in the open air rather than in sheds; they were loaded and unloaded by the consignor or consignee, and were sometimes referred to as 'station-to-station' goods, as the railway neither stored nor delivered the load.

The rest of the classification was divided into five numbered classes relating mainly to the awkwardness of the goods. Class 1 included such things as wagon axles, RNLI lifeboats, dog biscuits and garden rollers; Class 2 included beef in casks, ginger beer, nickel ore and new ropes at owner's risk; Class 3 included shirts, cured bacon (packed), shoe-horns and ships' sails; Class 4 included velocipedes, sausages and steam gauges; and Class 5 the delicate stuff such as ivory, papier-mâché goods and plaster figures (packed). Goods in Class 5 were the most expensive to carry.

Several levels of service were possible for each of the numbered classes. Much traffic was collected from the consignor (or delivered to the consignee) by road vehicle, usually for an inclusive rate within the railway's delivery area; these delivery or cartage services could be operated by the railway itself or by a contractor. Other goods were either collected from a private siding or railhead*, or customers had to deliver or collect from a station or depot. Then there was the question of whether to pay for carrier's risk or accept owner's risk, as each method had its own rate and the regulations were different. Storage had to be charged for, if the load required it, together with a charge for loading. Railways preferred vanload traffic, as the whole vehicle then contained only a specific consignment. Worst of all were small consignments ('smalls') that had to be loaded with others

* The 1904 RCH Handbook suggests there were well over 20,000 'private' sidings connected to the main line rail network.

in a van, with much opportunity for loss or pilferage. Smalls also gave rise to trans-shipment costs as items often needed to be moved between different trains and vans during their journey. Train paths were arranged to pick up and deliver individual vans to and from all of the seven thousand or so stations and yards generally at least once each weekday. These were sorted in marshalling yards at least once and perhaps four or five times on a long journey, so they could be placed in the local pick-up freight train for delivery. Most goods transport involved huge numbers of rail vehicles that spent most of their life stationary.

Establishing the rate for any goods presented at a station required great care and skill. Those accepting goods had first to refer to the RCH station handbook to be sure the receiving station could handle whatever was being sent, or whether a nearby station with more facilities would be needed. Then came the chore of finding the correct rate. The classification was one thing, but each class was charged a different amount by ton according to the distance travelled, the highest rate being charged for the first 20 miles then successively lower rates for the next 30, then 50, then the remaining mileage. Exact knowledge of route was essential and just to add to the thrill of the job each railway had a slightly different loading gauge, so that factor had to be reckoned into things from tables provided, the smallest readings necessarily having to be used throughout.

Having thousands of tons of precious goods lying around in yards and warehouses was apt to attract the interest of thieves and the police had a lively time. The railways often chose to have their own police officers and by 1909 most companies of any significance had their own force. Police on the earliest railways had at first helped to manage general law and order and assisted the operation of the train service in the manner of a constable on 'point duty' directing road traffic at busy junctions before traffic lights caught on. Dedicated signalmen soon displaced them from train movement duties, but the growth of goods traffic soon became a major preoccupation, with police manning entrances to larger warehouses and docks, and patrolling yards. Police were also known to accompany large consignments of cash and provide escorts to those carrying wages, and they also had a preoccupation with guarding mail. The privileged cab system had died in London in 1907—this was a system where only certain cabs could ply on railway premises and the police recorded all outward journeys made by cab as an aid to tracing missing luggage. After 1907 any cab could ply at a London terminal but the police collected a penny charge, an unsatisfactory arrangement that collapsed during the war a few years later. Police also attended to missing luggage, lost children, crowd control and fares fraud, and most forces eventually had their own Criminal Investigation Department and (somewhat later) dog section.

For many years, most freight traffic was carried in individual 4-wheeled wagons that were so basic as to lack any form of braking except a hand brake that could be applied from ground level. Many trains were formed at that time entirely of such vehicles and relied upon their locomotive to bring them to rest, assisted by braking applied from the guard's van that had to be attached to the rear end of every train. The guard's van was a very heavy vehicle equipped with a very strong hand brake that could be applied by the guard; the driver used the engine whistle to request application or release of braking by the guard. Such limited brake power meant serious limitations on the speed of such trains, though the signalling system meant that drivers usually had plenty of warning of a danger signal ahead. For reasons of safety as well as to accelerate the service, it was becoming the practice to install vacuum brakes on a proportion of vehicles (known as 'fitted' vehicles); these could be operated from the train engine, but only if they were marshalled next to the locomotive, which was not always possible. To give more flexibility at minimal cost, an additional number of wagons were fitted with brake pipes (but no brakes), and provided all vehicles between the locomotive and the final braked vehicle was either braked or piped then at least some brakes would function. There were thus three types of wagon (fitted, piped and unfitted) and

guards were responsible for shunting their trains in order that the proportion of operable braked vehicles was adequate for the class of train, speed and maximum distance ordained in the timetables and regulations. It will be fairly clear that with large numbers of slow, unfitted trains on the network it didn't take much to create delays to express passenger trains.

Just beginning in 1909 were some express goods trains (mainly for perishable traffic like fish), and these were composed of fully fitted vehicles. Although the proportion of fitted vehicles tended to increase over time, change was very slow and even by the 1960s there were plenty of unfitted vehicles and trains still around.

A train substantially unfitted with brakes (other than the loco and guard's van) was a danger down steep gradients as it could get out of control. To mitigate this risk such trains had to stop before the gradient and the guard had partially to apply a proportion of the wagons' hand brakes at least sufficient to counteract any tendency to run away. Of course, this made it even harder to start the train, as well as requiring a further stop at the bottom of the grade to release the brakes. It was arguably far harder to mix paths of express passenger and freight trains in 1909 than now, and continually shunting freights out of the way of expresses was very common; at every place where a goods train could be placed out of the way, a clearance time was calculated in minutes and if a following express was likely to arrive sooner then the goods train had to be shunted, usually by reversing into a goods loop or yard.

Handbrakes had to be used frequently on goods vehicles while standing idle or being shunted and their operation constituted a huge source of danger and accidents. In 1909, some 318 railway staff were killed undertaking general duties including shunting work, so the companies were under huge pressure to introduce safer methods of work (the trend was about to rise again too). By comparison, that year just one passenger and sixteen staff were killed in moving train accidents such as collisions and derailments.

A large part of the problem was that the brake lever on a wagon was placed on only one side of a vehicle, or if a brake lever were placed on each side then only the lever used to apply the brake could take it off. In consequence, in busy yards, staff were constantly darting from one side to the other, between moving wagons, to apply or release brakes. After numerous design failures, the 'Morton' brake was invented. This was a very ingenious arrangement where, although there was a brake lever each side, either lever could apply or release the brake (including partial applications). It began to become common around 1909 and became the standard on 4-wheel wagons throughout the remainder of their existence on Britain's railways.

Farm produce was important railway traffic but more so for certain railways serving particular rural areas. The Great Eastern was particularly keen on this traffic and supplied suitable boxes at nominal rates to farmers and market gardeners in the region, some 90,000 boxes being distributed in 1911 in the expectation they would be used to convey produce by rail, much of it to London markets. Other railways provided suitable receptacles for other specialist items, like game from Scotland packed in boxes marked with number of brace and date killed. Rabbits from Thetford required their own vans in which the carcasses were set on rods. To promote traffic, the Great Eastern had its own demonstration train to promote rail for carriage of eggs and poultry; rail was often used to convey boxes of live chicks.

Stations, tickets and parcels

Station operations were varied, with most stations handling both passenger and goods traffic. On the passenger side the issuing and collection of tickets was a substantial function. The ticket issuing process was perhaps focused around the need to account for the money rather than to make a sale, judging by the instructions that were issued. Nearly all sales involved identifying the correct card ticket—tickets were stored neatly in 'tubes' and clerks identified the correct tube and pulled out the bottom ticket which was then dated in a press next to the issuing win-

dow. At smaller stations the sales were 'booked up' after each train in a train book, the cash being reconciled with the value of the tickets sold. The latter was established by checking each ticket tube, identifying the number of the next ticket to be sold and comparing it with the numbers at the previous booking up (either from the train book or in some cases where the clerk had written the numbers on slates next to the tubes). It was impractical to use train books at larger stations, but in any event each day the office was 'booked up' in a proof book (a vast ledger) and the cash made to balance the sales, allowances being made for refunds or tickets made out in error and cancelled. Reconciliation between cash and sales took place methodically at the end of each week and again at the end of each month. Everything was summarized and reported to head office, and audits took place. Errors had to be accounted for, however small. Practice varied about how these errors were treated; many railways allowed credits against cash shortfalls, provided they were infrequent. Some required cash to be made up from amongst the staff, though this was regarded as an encouragement to short-change passengers as a means of making the money up.

Ticket machines were tentatively becoming available, and one or more 'pull-bar' machines could be found at larger stations that issued and dated the commoner tickets on insertion of one or more pennies, depending on fare. Automation within ticket offices was being looked into and about this time a 'Regina' machine was being tested at Birmingham, where a clerk could issue a large number of different tickets from a machine containing a number of printing plates which printed tickets on demand; as usual the complication was the certainty of accounting for the cash, rather than its utility.

The range of tickets was huge; 'ordinary' tickets were quite expensive and to tempt traffic a range of far cheaper tickets was available under various circumstances. One contemporary list offers the following possible ticket types as being available from time to time, mainly to particular (and sometimes obscure) classes of passenger:

Amateur Dramatic Societies
Ambulance Associations
Anglers
Archery Clubs
Athletic Clubs
Band of Hope and School Children
Band of Musicians
Billiard Parties
Boats' crews
Boy Scouts
Boys' Brigades
Cheap Tickets for return journeys during afternoon of early closing days
Chess Clubs
Choirs and Church and Handbell Ringers
District Messengers' Club Tickets
Emigrants
Firemen
Golf, Hockey, Lacrosse, Football, Rifle &co clubs
Music Hall Artistes and Theatrical Companies
Shipwrecked Mariners
Soldiers' Daily Tickets.

The range is enormous and each variety of ticket was subject to different constraints and different conditions at time of issue. For example a letter from a club secretary might be needed for one type of ticket, while the physical presence of a uniformed group above a minimum number might be sufficient for another. Generally, return travel using these tickets was reckoned at one and a third times the ordinary single fare, but this was far from universal. Each class of ticket had its own restrictions on return travel. One commentator observed:

Bands of musicians accompanying excursion trains were conveyed at half the excursion charges, but brass bands were charged single fare for double journey, as were military bands, though the double journey had to be completed within four days, Sunday being considered 'dies non'. What happened if a military band claimed to be a band of musicians is not related.

In addition there were tickets available to the population at large, but for particular purposes, including several varieties of cheap and tourist ticket, and more exotic types such as 'walking tour' or 'cycling tour' tickets which allowed outward travel to one station and return from another after a refreshing walk or cycle. These were issued cheaply (often on certain days only) as by their nature they were unlikely to be used as an alternative to regular tickets by anyone except walkers or cyclists. The logistics of managing all these ticket stocks was huge.

Ticket examination was undertaken on a scale that today might be regarded as obsessive, but in 1909 reflected the reality that it was only by frequent checking or collection of tickets that actual travel patterns could be ascertained and the correct inter-company accounting accomplished (as well as deterring irregular travel). Season (or contract) tickets were an especial problem and it is recorded that passengers seriously resented having to show them when they were known to the staff, nor could the tickets usually be punched. Most stations were then 'closed' and it was impossible to gain access to the platforms without a ticket. This was regarded as the best method and also presented the opportunity for issuing platform tickets, which was a useful source of revenue. At a 'closed' station every ticket was inspected and punched on entry, using a distinctive punch that proved the ticket was used at that station (and sometimes a particular barrier or by a particular inspector or at a particular time). Books were even issued by the RCH showing the entirety of the UK punch marks for reference. All tickets (or portions of a return ticket) were collected on exit, preventing re-use. Collected tickets were (so say the instructions) sorted by station of origin and ticket number and returned to headquarters for further inspection and analysis. It is even recorded that where tickets known to have been issued were not subsequently returned, enquiries were made as to why.

Ticket inspections *en route* were a problem because most trains then lacked corridors. However every opportunity was taken to inspect and punch tickets where corridor trains were in use or where passengers changed, distinctive punches leaving evidence on the ticket about the route actually taken for the later delight of the audit staff.

The real problem was the open station. Practices varied widely, but it may generally be said that tickets were collected at the last station at which a train was booked to call (or by a travelling inspector on a corridor train). This led to some curious practices, such that a ticket issued at Paddington for travel by a non-corridor train for Exeter (an open station, which coincided with the train's first call) would be collected at the way-in barrier at Paddington. Having said that, it was still common to stop trains at a station just before a busy open station pretty much just for the tedious purpose of entering every compartment, inspecting tickets and collecting those for the subsequent open station(s); there were extreme cases—until 1910 every Waterloo train was stopped at Vauxhall to allow an army of examiners to enter all compartments to deal with tickets. The fact that most single tickets were available for three days and return tickets were available for up to six months, and that any number of breaks of journey were permitted, greatly complicated matters; the Great Western Railway (GWR) is recorded to have come up with an ingenious arrangement of inspections and distinctive ticket punches to make misuse very difficult.

Various fraudulent practices were soon discovered with platform tickets where passengers would obtain several before starting a journey; this avoided a 'correct' ticket being punched on the way in or collected on the way out, with opportunity for reuse of a travel ticket. The railways were then looking at a French system where numbers between one and twelve were printed around the periphery of the ticket representing the time of issue, the ticket collector punching the appropriate number upon entry. The tickets were available only for an hour, so an explanation was called for if such a ticket was presented too much later. Many British companies subsequently adopted this system. Certain stations presented peculiar problems calling for a novel solution. At Crewe, the booking offices were on the platforms,

largely owing to the huge interchange traffic requiring rebooking. To prevent fraud each booking clerk insisted upon collecting an existing ticket before he would issue a fresh one. For this to work, Crewe had to be a closed station. To allow a passenger entering the system at Crewe to get to the booking office, free platform tickets were issued; these were, of course, simply collected by the booking clerk on issue of the correct railway ticket. It may be seen that, although 'through booking' was available for many journeys, the technology made it impractical for every station to have available every conceivable through rate; a rebooking facility at the larger interchange stations was then a feature, especially where passengers wanted the cheaper tickets.

An insight into railway work was the tact necessary when dealing with passengers where doubt arose about the circumstances of a passenger's journey. For example, passengers were allowed to take a certain amount of *personal* luggage with them, usually defined by Act of Parliament. A court case was eventually brought against a passenger who had a portable typewriter with him, the railway suggesting this was not personal luggage. Indeed, the court found that the passenger was travelling on the business of his employer and that he should therefore have paid for the typewriter he had with him. This was the strict letter of the law, but how it was usually enforced, if at all, was anyone's guess, as it was hardly practicable to close question every passenger as to what was being carried. Personal luggage allowances varied by class of travel and to an extent its nature, excess charges applying for items overweight or in specific categories. Lists were made of 'professional' items that might be carried (such as cameras, musical instruments and so on) though they must not have been for 'trade' purposes. Items falling outside the allowances had to be weighed and a merchandise ticket issued.

Other activities taking place at stations included the handling of parcels traffic. Perhaps counter-intuitively, a railway parcel was not quite as straightforward as one might think. The railway definition of a parcel was anything (other than a passenger) up to two hundredweight (about 100 kg) that could be consigned by passenger train and which was charged by weight, including perishables. For good measure, the definition was also extended to include milk, horses, carriages, bicycles and a few other things. Railways had been encouraged by Parliament to support the distribution of fresh food, and the carriage of milk, butter, cheese, cream, eggs, fish, fruit, dead game, poultry (live or dead), rabbits, meat, vegetables and ice were far from uncommon accompaniments to passengers, though thankfully the items would be confined to the guard's compartment or to special vans designed to operate as part of passenger trains. All these items had to be accepted at stations, safely stored, brought out onto platforms ready to be loaded but without getting in the way, quickly loaded under the control of the guard (who had to store the items conveniently for subsequent unloading at the right place with minimal sorting on route and without delaying the train), subsequently unloaded at the right station and then stored ready for collection or if necessary handed over to a delivery agent. Needless to say, the charging arrangements for the infinite variety of parcel that might arise were complex, though, broadly, perishable items fell into one of three categories and charged by weight and distance. Parcels were carried at the railway's risk unless the consignee could be induced to sign a 'risk note' accepting the risk himself—they usually did as 'owner's risk' rates were somewhat cheaper.

Milk had a separate scale of charges provided it was consigned in approved cans or 'churns' and this rate allowed the empty churns to be returned later to their particular stations; one proviso here was that the consignor had to help railway staff load and unload them. Horses were an exceedingly large and inconvenient type of parcel and special arrangements had to be made in advance, sufficient time being given to arrange for a horse box to be attached to a suitable passenger train (a horse box had accommodation not only for two or three horses but also a small compartment for a groom). Further complications arose where hunting was involved and there were special regulations to cover the conveyance of hunting horses, packs

of hounds, grooms and so on. Incidentally, during the hunting season train drivers were warned to keep a sharp lookout when the hunts were active, being asked to watch out for hounds on the line and 'to do everything possible to avoid injuring them'; quite what a driver was expected to do when bearing down on a pack of hounds with a 400 ton train was not stated, let alone if a horse were encountered, but presumably the real risk was to avoid disrupting a day's sport which the railway's directors might have been enjoying in person. Running over the fox appears to have been acceptable.

The railways also had detailed arrangements in force to accept from pigeon–fanciers containers of homing pigeons, which the luckless guards had to put out at the right stations for release by station staff; all fees were paid at the beginning of journey. Station masters were particularly asked that, when several consignments of pigeons arrived for release, each must be allowed to travel out of sight before the next batch was released, for fear of confusing them. It was not unknown for special trains to be operated comprised entirely of containers of pigeons requiring release for special competitions, which must have presented an interesting sight for ordinary passengers waiting for more traditional railway facilities. Dogs were a further source of trouble and, where conveyed otherwise than on a leash with the owner, were carried under 'parcels' conditions, and could occupy baskets or horse boxes. It was the railway's duty to make sure live animals were looked after and watered (and if necessary fed) where required.

Railways vacillated over whether it was better to operate their own parcels delivery service or subcontract the work. In London, the firm of Carter Paterson had a contract with at least half a dozen London railways to deliver parcels within the London area that had been sent by train, but other companies chose different contractors (Pickfords was a favourite) or undertook the work themselves. Naturally there was a rich variety of rates and charges depending on what the parcel was and how far it had to go. The railways also had an arrangement with the Post Office for carrying, for 55 per cent of the value, Post Office parcels under seven pounds and costing the sender between 3d and a shilling, allowing a universal service to be provided equivalent to ordinary mail. The Post Office made periodic payment to the Railway Clearing House which distributed the proceeds according to the estimated work done by each railway. The Post Office had separate arrangements for carriage of mail. Mail was usually loaded and unloaded by Post Office staff, or sometimes carried on its own trains, some of which had sorting facilities, but this is beyond the scope of the railway parcel. The carriage of mail was a legal compulsion, but there were other compulsions too, such as a requirement to carry soldiers, police and prisoners (with escort).

Newspapers were a useful source of revenue. Although regarded as parcels for some purposes, they had a class of their own in that transport could be prepaid by special newspaper stamps issued by each railway; this was mainly to speed up the handling at stations. Sometimes special newspaper vans were required and occasionally special trains, where traffic was substantial. What exactly constituted a newspaper packet had obviously given rise to much thought; the conclusion was that it would be a periodical not appearing less frequently than monthly, but also including advertisements for posting, placards, railway guides, printed commercial prospectuses, sheet almanacs and show cards.

On the subject of special trains, station masters at the larger stations had it amongst the forefront of their duties to monitor traffic closely and if necessary they were required to strengthen trains or provide additional trains. Such activity was rarely a complete surprise and suitable rolling stock was kept on hand for these eventualities, plus crews. Trains could be strengthened only within limits, depending on the platform lengths at terminal and intermediate stations, in turn depending on the delays overlength trains might create. It was not unknown for long distance trains to be loaded in more than one platform and then coupled

up immediately prior to departure*. Sometimes timetable paths were pre-arranged where heavy loadings often required 'duplicate' trains to operate. On other occasions, more spontaneous duplicates had to be arranged by telegraph immediately prior to departure and signalmen had to find paths as best they could. If the traffic was there, it had to be carried. The experienced officials on the spot were considered the only ones who could see events as they unfolded and were given all the tools of the job. Today things are rather different and trains are comparatively inflexible, spare stock is at a premium and traffic staff can do little more than watch overcrowding develop and prevent access if serious overcrowding seems likely.

The local station master (SM) was the link between the railway headquarters and the local people, both staff and public. There was at one time at least half a dozen different grades of station master, the lowest responsible for smaller stations with perhaps a dozen staff to look after and the highest grades responsible for major stations with perhaps up to 500 staff. Station masters were responsible for all traffic moving through their area including the operation of signal boxes, train despatch, the handling of operating incidents, organizing platform working, control of passenger guards, porters, all station facilities, information and services, payroll payment and a host of other activities. SMs were actively encouraged to take part in community affairs and local positions of office, and this was regarded as good public relations and impacted favourably on opinions that might be felt about the company. Although SMs at country stations were not particularly highly paid, they were amenable to receipt of local gifts and 'purses' by way of thank you for their efforts, sometimes of high monetary value.

At most stations the SM was also responsible for the booking office, left luggage and enquiry offices and all that happened therein. This extended to helping the company sell travel, and the local SM would be active in helping to market travel within his community (canvassing) and do things such as organize excursion trains and help sell the seats. The SM did not usually get heavily involved in freight as the business was quite demanding of time and it was placed in the hands of so-called goods agents; though at very small stations not worthy of their own dedicated goods staff the SM would also have had control of the yard, shunting and loading arrangements and the acceptance and security of the goods in transit. Wagons on hand had to be reported, usually daily (there was a tendency to hoard wagons and the railways insisted on frequent returns to discourage this expensive indulgence), together with requests for new or special wagons or vans for the outwards goods that was expected. This information was usually telephoned or telegraphed to district office in good time for the necessary wagons to be made available for the daily 'pick up' freight.

On the subject of communications, the telephone was a relatively new facility and most communication at this time was by telegraph instrument using one of a variety of systems, usually Morse code in which station staff needed to be proficient. At large stations the volume of communication was huge and at Edinburgh Waverley, for example, there was a very busy railway telegraph office with the SM responsible for 40 dedicated telegraph clerks. The telegraph was also used to pass the Greenwich time signal to all stations and signal boxes at 10 a.m. each day so clocks and watches could be regulated—a practice enduring in one form or another at least until the 1970s.

Not exactly in the category of parcel, but nevertheless conveyed by passenger train, was the conveyance of corpses. Under certain circumstances coffins could be conveyed by ordinary passenger train in the charge of the guard, though sometimes special vans were available. The London & South Western Railway (LSWR) conveyed a substantial number of corpses, together with entire funeral parties, from the London Necropolis Company's private station at Waterloo (in Westminster Bridge Road) to their private stations at the Brookwood cemetery; this traffic only stopped owing to bomb damage during the Second

* During the Second World War there was a period when the *Flying Scotsman* comprised 23 vehicles, giving rise to all kinds of inconveniences at platforms.

World War. Waterloo, it might be remembered, was the starting point for Churchill's last journey by train in 1965 when he was conveyed to Blenheim before being laid to rest in Bladon churchyard. Paddington was the obvious starting point for such a journey but when Churchill was asked to comment on the proposed arrangements he wanted for his funeral he insisted upon Waterloo, despite the huge inconvenience, in order to make a final point to de Gaulle, the French President, who would have to be in attendance.

Staff and workshops

As now, staff numbers in the industry are difficult to assess owing to the imperfect system of reporting and debate about who was or was not employed upon railway business. (For example cartage men employed by the railway might be included while another railway who outsourced the service would ignore them.) The commentator Edwin Pratt concluded that in 1910 there were 608,750 railway employees reported in a particular class of government return, but examination of the data indicates that it ignores senior staff, possibly even those we would think of as managers. It also appeared to exclude workshops, so it looks as though directly-employed staff might exceed 800,000. In any event, this is a vast number of people and Pratt considered in 1912 that it was certain 'the railway service affords employment for a greater range and diversity of talent, skill, ability or effort than probably any other single industry or enterprise on the face of the earth'. If we take the UK population in 1911 as 42 million, then railway workers comprised nearly one in fifty people, or perhaps as many as one in twenty working males.

Pratt troubled to list the number of employees in the works of the larger railways and considered there were 79,000 in that area of activity alone. Huge numbers of staff were youngsters under 18. The total number of employees would appear to include many in the ancillary businesses such as port operation, shipping, hotels and a few canals. Of the total, about 395,000 were wage-earners in the coaching, goods, locomotive and engineers' departments (ie numbers exclude clerical and other salaried staff); their average wage was £1 5s 10½d a week*. In addition to staff actually employed by the railway concerns, there were independent suppliers of vehicles, goods and services which probably takes the number of people in the wider railway industry to around a million.

There were at that time 25 major works facilities in England and Scotland dealing with the construction or heavy maintenance of locomotives or carriages or wagons or combinations of any of these. The largest (Swindon) employed 11,700 staff and the smallest (Lancing carriage) 129. Railways had not always done everything themselves. In the early days, locomotives and rolling stock were designed and purchased from third party coachbuilders and engineering firms. Very quickly, railway development quickly outstripped design and construction capacity and the companies variously concluded they were sufficiently large businesses to justify their own facilities. As they amalgamated the economics became yet more favourable and all the large companies constructed their own locomotives and many of them also at least a proportion of their other rolling stock. The smaller companies variously purchased rolling stock from independent sources. Further amalgamations allowed some specialization of works, with some devoted solely to construction and others to the heavy maintenance, with a few for carriage and wagon work. Workshop output varied by year, but in a typical year (1913) some 453 new steam locomotives were constructed and 931 carriages, pretty much all from railway company workshops. A further 35,000 other new vehicles were built that year, mainly wagons, but construction of these was shared with third party manufacturers. In the same year, 17,421 new privately owned wagons were registered for use on the main line railways, all would have been manufactured privately. One can see that the railways were vast engineering and manufacturing businesses quite apart from the day to day activity of moving people.

* This equates to (say) £100-£200 a week but meaningful comparison is complex owing to disparity between average wages and average prices.

Docks and ships

The railways were huge developers of docks, which they saw as a natural adjunct to their business as virtually everything carried by a ship tended to be delivered by rail. There were 17 sets of railway-owned docks amongst the 72 docks, harbours and piers in which they had an interest. Some of the railway docks were immense operations in themselves and also generated considerable rail business. Railway quays amounted to almost a hundred miles in length. Some 600 fishing vessels were registered at Grimsby (Great Central Railway) alone, while many other vessels used the port, especially during the herring season. Grimsby was responsible for handling 179,972 tons of fish in 1909, most of which went away by rail. Understandably, this meant that the marine department was apt to employ a large staff. Marine work was so important that at the new docks at Immingham (opened in July 1912) sidings were installed adequate to hold 9120 wagons, much intended for dealing with coal exports.

It may today seem odd that railways should be involved in shipping, but by generating a demand it helped generate rail traffic too. So-called 'continental' passenger traffic was already a million a year in 1900 and had nearly doubled by 1913; the port railways heavily advertised continental facilities, arranging tours, ships and foreign railway tickets. By 1909, the railways operated one of the largest fleets of short sea steamboat services in the country. Powers to do so had been built up gradually since the 1860s and from the 1870s they already dominated the cross-channel traffic. The railways were innovative and forward-looking. The London, Chatham & Dover got the Dover-Calais crossing down to an hour by 1896 and their vessel *Queen* was the first turbine steamer operating across the Channel. Over 70 vessels were built for the railways' channel services alone before the First World War, including some freighters; at that time there were 223 railway steamboats in all, nearly half of them exceeding 250 tons. Many groups of services ran, especially to Holland, Ireland and the Channel Islands, together with various ferries and pleasure craft that operated from places such as Windermere. With Ireland still wholly part of Great Britain there was huge traffic connecting it with England and Wales with railways constantly seeking to improve communication between London and Dublin. It is perhaps indicative of the importance of the shipping business that such a line as the tiny Somerset & Dorset Joint Railway owned twelve ships, even though it never owned its own railway rolling stock!

Where the railway operated ships, the staff had of necessity to hold the necessary Board of Trade certification and held ranks in the merchant marine. Sometimes the goods operations were placed in the hands of shipping agents (as on the Great Central), while in other cases the railway handled everything itself (as in the case of the LSWR at Southampton).

Hotels, sleepers and catering

The railways engaged in the hotel business in a big way. Train travel was inevitably quite slow and the railways considered it their duty to provide facilities for rest in the larger towns, as well as a further opportunity to develop emerging tourist traffic. Hotels were often built in towns on the same plots as the stations, which was convenient in a sense, if a little noisy. Some tourist hotels were built in smaller locations where the views were pleasant. The first railway hotel is reputed to be what was later known as the Euston Hotel, built by the London & North Western prior to 1840, though a flurry of railway hotels were opened in London by the main lines in the 1850s and '60s. Railways continued to build hotels until the Second World War, perhaps the most famous being the Midland Hotel, in *art deco* style, at Morecambe, built by Oliver Hill in 1933. As the war loomed in 1914, the railway hotels numbered 113. Some railways sourced their own food and provisions. The Great Eastern Railway, for example, had its own farm at Bentley supplying produce for railway hotels and catering establishments. This railway also considered that the Great Eastern Hotel at Liverpool Street would benefit from having a brine bath, and arranged frequent delivery of sea water in barrels from Lowestoft.

In 1909, it was possible to make use of sleeping cars on certain very long distance services, but only for first-class travellers. Such a facility had crept slowly into use from humble beginnings in 1873 and the Great Western in 1890 introduced cars with sleeping compartments leading off a side corridor, each with a double bunk. An extra charge was payable and bedding provided. It is no surprise to find the sleepers mainly working Anglo-Scottish and London-West Country services.

In addition to sleeping, long journeys made dining a complication, initially addressed by tedious stops for feeding purposes, a process that was wholly unsatisfactory. The American firm of Pullman began to operate cars in the UK towards the end of the nineteenth century, but the cars commanded a supplement merely in order to secure occupation and not all railways supported their use. Dining in the railways' own carriages did not really take off until the 1890s, after the difficulties of storage and cooking had been solved. By 1909 both third-class and first-class catering vehicles were expected on the longer journeys—prices charged between the vehicles differed but the food appears suspiciously similar. It must be said that storage was a huge problem both on and off train and that, coupled with hard-to-forecast demand and a disinclination towards waste, gave rise to an unenviable long-standing reputation for the railway pies, sandwiches and cakes, though the cooked food faired better and the six-course lunch might have been tolerable at the price.

By 1909 (facilitated by more corridor trains) the new buffet or restaurant car was more in evidence, where snacks could be bought at any time rather than in dining cars where meals were served at tables during 'sittings'. It is worth pointing out that in recent years the word 'restaurant car' has been used generally for the dining service, though it is pretty much dead now in its form as a 'restaurant'. Cooking was necessarily achieved by coke or gas ovens, the latter predominating until quite recent years. Prior to the introduction of food service on trains, many passengers relied on luncheon baskets being supplied for a fee and being made available immediately prior to travel. Inevitably, this essential operation was a logistical nightmare. On the LSWR the caterers Spiers & Pond had the concession for supplying food in this way and supplied 60,000 a year, arrangements having to be made for used baskets to be returned to the stations of origin after use. Tea wagons also supplied an 'at window' service for weary travellers where station stops were long enough and passengers were reluctant to disembark.

On the subject of tea, the variety purchased by the railways for their hotel and catering purposes must have been quite powerful. Reminiscences of a senior manager from the London & North Western Railway (LNWR) mentions that the company's disinclination to endure waste resulted in used tea leaves being sold on to Blackpool landladies for reuse. One can only speculate about the form that this arrangement took, and the method by which the leaves were dried, packed and perhaps even labelled 'used railway tea'*.

Organization and scale

It is difficult to find any activity that was engaged in by the railway industry that was not vast. The railways owned over 30,000 acres of land beyond that actually used for their undertakings, and over 58,000 houses, mainly for the use of staff. The houses in the railway towns were not generally railway-owned but enclaves existed in various places, the Glasgow & South Western building a model village at Corkerhill, for example. Railways built copiously for staff and institutes, concert halls, dining clubs, hostels and even hospitals were numerous. The railways owned 33,000 goods road vehicles and nearly 500 road passenger vehicles. This required the use of tens of thousands of horses (also used for wagon shunting), and all that entailed—the London & North Western alone had 6000 and many railways had their own mills producing horse feed. Nor should it be forgotten that by 1909 over a third of the UK canal system was owned by the railways, amounting to more than 1000 miles. The

* See *Journal of the Railway & Canal Historical Society*, Vol 35 Pt 5, July 2006, Article about A.W. Norman pp346.

GWR even owned their own coal mines, primarily for the supply of locomotive coal.

With this vast span of control and diversity of activities, railways inevitably differed in their structures but the following was regarded as typical at the time.

General Manager's Department

The general manager was the chief official and in addition to establishing broad policy he usually had his own department dealing with matters such as parliamentary affairs, publicity, stores, stationery, statutory returns, passes and permits, claims and prosecutions, rates and fares policy and the like. Reporting departments include:

Superintendent of the Line—Staff appointments and conditions, passenger fares and parcels rates, season tickets (these were not then available at ticket offices), canvassing (ie sales), engineering and signalling works (coordination and training), distribution of carriages and wagon stock, passenger train timetable preparation, goods train operations, general excursion and tourist traffic advertising and booking, commercial telegraph arrangements. The most critical operation is the timely operation of all the trains. In later years this department came to be known as the traffic department.

Goods Department—This was responsible for the totality of goods operations except when a train was physically travelling between goods yards, since actual operation was necessarily in the hands of the superintendent's staff. The main goods functions were the management of the armies of clerks and messengers employed in the business, the byzantine accounting processes surrounding goods operations, the canvassers and collectors, the control of the draymen and their foremen, the management and control of the hundreds of horses and vehicles, the planning and shunting of vehicles, the loaders and porters, the checkers and number-takers and the 'sheeters' (the army of staff responsible for provision and deployment of wagon sheets or covers).

The organization was volatile and some railways were beginning to formalize a division between commercial people (dealing with canvassing, sales and accounting) and operating people (organizing the collection, delivery and loading operations and planning the disposition of stock). The latter job alone was colossal. Much goods work was invariably broken down into goods districts where local knowledge was invaluable, and district organization was often similar to that of head office but in miniature.

Local goods depots were in the hands of the Goods Agent (the goods equivalent of stationmaster). Again he had indoor and outdoor staff to assist, but this time they actually came into contact with the traffic being consigned.

Engineering Department

The department was headed by the chief engineer who typically split work into maintenance, new works and parliamentary sections. The last job was quite a busy one when railways often had to steer their own annual parliamentary bill through the system, and often they had offices near Westminster. The largest job probably fell to the maintenance assistant who was himself supported by functional staffs individually responsible for (amongst other things) the bridges, permanent way, architectural works and lighting. Engineering was further broken down into divisions, each responsible to a divisional engineer who undertook most of the detailed work, most particularly for permanent way. Also, usually, under this heading is found the signalling & telegraph engineer, responsible for the provision and maintenance of the signalling system, telephones and telegraphs. A few companies had vast in-house works for things like signalling where others preferred to outsource at least the chore of installation. Some companies additionally required canal engineers, inspectors and lock keepers, all of who came under the engineering function.

Locomotive Department—This department was traditionally headed by the locomotive engineer but the fashion was just changing such that its head was now known as the chief mechanical engineer.

The precise organization varied considerably between railways, but certain common functions are evident. In particular, railway construction activities required one or more works managers and a chief designer.

Operation and maintenance activities were almost entirely devolved to divisions, then to districts and (at the lowest level) sheds. Usually under the district superintendent came the responsibility for organizing the maintenance of the locos and their crewing, including all the drivers and firemen, as well as the shed staff. It must be remembered that drivers were invariably recruited from firemen, in turn recruited from engine cleaners. Higher level planning took place at division, which also operated an army of inspectors. Asset inspectors would have had engineering training but there were also locomotive inspectors who were responsible for maintaining driving and other footplate standards.

The senior staff were almost always very experienced engineers; drivers could exceptionally reach inspector level, but most seemed content to have reached driver (which itself might have required 25 years employment).

Marine Department

The marine department would cover all matters connected with the operation of the railway-owned ports, docks and harbours and the operation of the railway's steamships and ferries. As these operations were not immediately comparable with other activities undertaken by the railway, the department would tend to deal with everything that was required, supported by others (such as engineering) as required.

Training in the railway industry to 1910

The foregoing, though brief, description of railway working a century ago is offered to indicate the huge, diverse and intricate nature of the business. Most activities took place remote from headquarters' oversight and large numbers of managers had considerable regional autonomy to deliver the outputs as best they could. This raises fascinating issues about recruitment of future managers of adequate calibre and their training and familiarization into both the narrow functions that were required on a day-to-day basis and the broad view that was essential as they worked their way up the management structure. It is in that light that, just before the turn of the century, externally-provided formal management training courses were first offered, and just afterward railway students themselves saw a need for an association where ideas and good practice could be shared.

Although the railway businesses were enormous, the majority of the staff had clearly defined jobs of work and could be trained as they went along. For skilled work, apprenticeships were possible. Most jobs on the railway were by no means peculiar to railway work, the main exception being the operation of the trains themselves and perhaps some of the engineering work. The problem the railways had was the peculiar economics that attended the carriage of passengers and goods, and the sheer scale of the operation. This latter aspect was a challenge as there were few organizations from which to draw advice. The obvious source was the army or navy, where suitable officers were familiar with a wide breadth of command as well as the need for discipline, particularly where staff were out of immediate contact but were required to behave professionally, or at least predictably. The issue of financial control had to be addressed as the enterprises grew in size and the nature of them changed; gradually, best practice and the need to adopt standards acceptable to Parliament provided consistency in approach for many years, though the relationship between costs and charges remained something of a black art until comparatively recent times, and some might say continues to remain a difficult area.

The kingpin in the railway management structure was the general manager. Railways soon worked out that such a person needed to have considerable knowledge and experience and that he and many of his staff needed better training than could ever be achieved by simply being 'on the job'. Although Edwin Pratt never quite got to the bottom of the exact numbers in the industry, he was satisfied that it lay between 600,000 and 800,000 directly employed, but was fairly certain that the number of salary-earners was somewhat under 10,000, or under two per cent. Given that it tended to be the salary earners who would eventually emerge as a general manager (even if they had previously been wage earners) it perhaps hints at where the emphasis went in relation to training and development.

The formal training of more junior staff attracted early attention. An early manifestation of this was the mechanics' institute, which also provided some recreational facilities. The Crewe Institute went back to 1844 when the Grand Junction Railway provided a library and reading room, but it soon developed into something more formal. It ran courses to help develop younger staff, and these were also open to outsiders. The Institute was enlarged on the formation of the LNWR. For the 1910-11 courses, the art, literary and commercial classes were transferred to the local authority but the institute continued with scientific and technological subjects and developed more advanced classes in addition to the ordinary ones, resulting in a diploma. The LNWR later organized a Science and Art Institution at Wolverton and a similar one at Earlestown.

The Great Eastern had something comparable at Stratford from 1851, with copious recreational facilities including baths and a ballroom. A range of classes was arranged mainly on mechanical subjects, with much practical work, and in due course this was linked to City & Guilds qualifications. From 1903, lengthy leave of absence was available in order to help participants obtain more technical qualifications. In 1910, four such people had obtained a BSc in engineering.

The Midland also formed an institute in Derby in 1851 on similar lines, but perhaps somewhat larger, and included courses in French and shorthand. It had over 2600 members in 1910. Almost as large was the Lancashire & Yorkshire's Institute at Horwich, encouraged by a gift from Samual Fielden, a former director*. The lecture hall here could hold 900 people. Other railway institutes were formed at Swindon, Vauxhall, Eastleigh and York, amongst other places.

The Swindon institute began as a library in 1843 and originally gave technical instruction at local schools. In 1896, a Swindon & North Wilts Secondary School and Technical Institution opened to which were transferred classes for GWR technical and clerical staff. In 1903, a day studentship scheme was started for the benefit of apprentices for whom a number of free studentships were available, limited to 48, who attended for a day a week for 26 weeks on full pay. It was felt that this scheme raised the general standard of knowledge and encouraged students to apply for promotion to the higher grades. Prizes were given to the top students each year in the engineering and commercial classes.

In London, the Institutes of the Board of Education were used freely by the railways and their staff and in 1910-11 had over 500 railway students enrolled, largely with a view to passing specific examinations. The special arrangements comprised a preliminary 2-year technical course, a 5-year mechanical engineering course and a 4-year electrical course (this latter seems quite a lot for that time). It also hosted a scientific club where further lectures of relevance were given to anyone interested.

In 1903, the Great Western opened a signalling school at Paddington. Regarded as something of an experiment, it proved so successful that many other railways soon followed its example. It is evident that students went away with certificates of competence that had a five year life, staff being expected to be re-examined before their certificates expired in order to maintain competency, a process having many parallels with modern practice. The LNWR followed suit in 1910.

* Samuel Fielden (1816-1889) was a leading businessman in Lancashire's textile industry but had progressive liberal leanings and was a great believer in education, endowing several institutions.

Attention does not seem to have been given to the higher educational needs of railway staff until around the dawn of the twentieth century. Some things were best done in house. The Great Western's goods department felt the need to embark on training courses to give instruction into railway accounts and the intricacies of goods transport which (as might have been inferred already) was very complex. Shorthand was also available. These, too, led to certification.

The LNWR required boy clerks entering the service to pass an educational exam and to be further examined after two years to see what they had learnt about railway work, railway geography and shorthand. Before a clerk could obtain a salary greater than £50, he was further examined about his knowledge and was required to write a paper. This, of course, was an encouragement for individuals to do some learning under their own steam.

The Great Central introduced a scheme in 1908 focused on its head office and continental department staff. This was a selection scheme where six positions were offered annually to members of staff under 25 who displayed the highest ability and standard of knowledge assessed by examinations. In effect, the successful individuals received accelerated promotion over their fellows, with commensurate pay rise, and were given special training to help them on their way. The training was based on periods of work of between eight and twelve months in eight of the principle departments (including marine work). The whole course lasted four years and it is evident that the trainee had to work very hard and was under constant scrutiny. It is possible that this represents the earliest specific management training scheme in the industry.

The North Eastern Railway (NER) had a very structured approach to training involving a large number of tests, though the general tests could be avoided if satisfactory evidence of competence were furnished. Training and examination in railway work also took place, initially to provide staff competent in station work, and later to evidence competence in wider areas of railway operation. The general knowledge required was to a high standard and included French and German (possibly needed only for continental work).

The London School of Economics and its railway courses

Turning next to the education provided by external bodies, the work of the London School of Economics (LSE) comes first.

The LSE was opened on 10th October 1895 with a modest budget, £2400 covering its first (1895-6) sessional costs. It was a reaction to the lack of technical economic training that was available at the time and for which there appeared to be a growing need. It was not entirely without contention, since 'economics' was not then a recognized subject and indeed it was many years before even basic economic theories were accepted (and even today some entirely contradictory theories abound). It was also contentious because the founders and their backers all had strong political opinions and were hardly without bias. However, it did get going and there can be no question that its training was exceedingly useful and that it had many supporters.

The main thrust was to be teaching in six disciplines: economics, statistics, commerce, banking, currency and finance. When it came to finding tutors, William Acworth* was identified to lecture on commerce, but in fact this branch was heavily focused towards railways, partly because of his own interest and partly because they were huge commercial enterprises anyway, from which wider lessons could be drawn. The courses would last for one year of three terms at a cost of £3, with most lectures and all classes being in the evenings.

So far as it is possible to establish, the first Railway Course coincided with the opening of the LSE, though not accompanied

* William Mitchell Acworth, 1850-1925, railway economist. He was initially a teacher, then served on Metropolitan Asylums Board and later the London County Council. He was called to the Bar in 1890, later stood several times as an MP but was not elected. He began to study railway affairs in the 1880s, starting to publish books on the subject in 1889, soon afterwards beginning to focus on their political and economic attributes, pretty much a new area. His knowledge and insight became very valuable and he served on railway boards and a number of government commissions. He was knighted in 1921.

by any particular railway patronage. We have already noted that the economics of railway operation was a dark and contentious area and these courses were valuable as Acworth was highly respected in his field. In the School's 1896-7 session, the GWR paid the fees for members of its staff to attend, and 46 did so. This was repeated the following year when the Great Eastern also joined in. In 1904, seven railway companies jointly gave a guarantee that fees would be met, which allowed the school to develop more elaborate courses, the School having become part of the University of London in 1900. This emerged as a series of courses covering the 'history, theory and present organization of transport' and leading to a degree of B.Sc (Econ), with honours in transport. This required establishing a 'committee of governors on railway subjects', with suitable support, together generally known from 1898 as the 'railway department', with Acworth as its head. The governors included five prominent members of the railway world. The LSE Library acquired a wide range of books on railway subjects, 5000 of which were presented or bequeathed by Mr Acworth himself, and this remains a valuable library resource today.

The LSE suited the southern companies with staff in or near London, but the more far-flung companies were also quick to forge a formal link with higher educational institutions. In 1903, the Lancashire & Yorkshire Railway arranged for the University of Manchester to offer evening classes in railway economics, the classes running in three year cycles. Students attending a whole cycle actually got a far wider grounding than this, as subjects covered included (for example) railway law, goods traffic, government controls and so on. The company's chief goods manager himself gave a number of lectures, subsequently reproduced in the *Railway Gazette* and then as a stand-alone work. The same company later made arrangements with Victoria University for extension courses to be run in Burnley covering a range of railway subjects. Something similar was arranged in 1911 by the NER and the University of Leeds and Armstrong University (in Newcastle) with the railway paying half the fees.

The Midland Railway made an arrangement with the University of Sheffield for a course of 40 lectures on economics to be given from October 1911 covering modern industrial economics (not just railway work), the course to be free to members of the company.

Before turning to the RSA, it is worth mentioning the various literary and debating societies that were formed, usually with the active support of the railway companies concerned; these were also a part of the higher education movement that began during this period. In particular, the Great Western Literary Society, formed at Paddington in 1852, was thought the oldest and had a library of 10,000 books. The Great Western Railway (London) Lecture and Debating Society was formed in 1904 and was designed to stimulate interest in wider railway matters. In later years it frequently had joint debates with the RSA.

The beginnings of the RSA

In order to describe the beginnings of the RSA, it is first necessary to return to the railway courses offered by the LSE, since these defined the kind of students that were involved.

The lectures were divided into two categories. The first were those specifically about railway subjects, while the second were described as courses 'useful' to railway students. In the first category were included:

Railway Economics : Operating (20 lectures);
Railway Economics : Commercial (20 lectures);
Economics of railway construction and locomotive operation;
The Law of Carriage by Railway (20 lectures);
The Consolidation of English Railways (4 lectures).

In the second category were included:

Accounting and Business Methods Part 1 (30 Lectures);
Accounting and Business Methods Part 2 (30 Lectures);
Methods and Application of Statistics (15 lectures);
Mathematical Methods and Statistics: elementary (15 lectures).

This series of 154 lectures obviously required hard application and the students would clearly have got to know each other quite well. Although the courses were primarily populated by railway students, they were open to anyone prepared to pay the fee, and some non-railway people did. The subjects covered were (despite the titles) evidently very stimulating and after the lectures various groups of students hung about discussing the topic of the day. In 1908 one such group* conceived the idea of an association to bring closer together all the School's railway students. A discussion with the School's Director gave encouragement to create such an association and it was further agreed that it would be able to use the School's facilities providing he approved the rules, which he did. It is worth noting that the LSE already had concerns about the nature of the students with which they were being presented—of particular concern was that many of the students had knowledge confined only of railway work within the limits of their own department (and often only a portion of that). This was felt to be holding them and their fellow students back, so any measure that could improve breadth of knowledge was a good thing.

The 'Association of Railway Students of the London School' (as it was first termed) was thus born and continued to meet at the London School of Economics for the next century.

Until the Second World War the activities of the RSA were governed by a committee drawn from the main line railways and London Underground, from whom other support was evidently forthcoming, such as the provision of facilities for visits, travel, lecturers and in (for example) printing the *Students' Papers*. The Committee made periodic reports to the railway department with whom there was clearly a close working relationship, and the department was asked to approve reports, changes to the rules and nominations to the Committee and generally to represent the views of the LSE†.

A more detailed chronology of RSA development is given in Appendix 3. However, suffice to say here, that after the Second World War the railway courses diminished, as economic power shifted elsewhere within the UK economy and the new nationalized transport industry organized more training in house, leaving the RSA more independent of the LSE but still heavily connected with the railway industry itself. The RSA was renamed the Railway Study Association in 1970 after it became clear that the name 'Student' had acquired undesirable connotations during the 1960s and this was inhibiting relationships with railway operators abroad.

A brief biography of the various Presidents that have served the RSA over the last century is provided on the RSA website, together with an inventory of the lectures and addresses that have been given during this time.

RSA enamel lapel badge, probably from 1920s. Lettering blue and gold with centre infill orange.

* The three names most prominent in pushing the idea forward were Messrs Major (GER), Ingleby (NER), Moore (GER).

† The Committee was first Chaired by Mr W.T. Stephenson, and the first Committee represented seven different railway companies.

Chapter 2 – Railways 1909-1921

The RSA and the developing Railway

Having described the industry as RSA students would have found it in 1909, it is now necessary to describe how it developed into that with which we are familiar today. The focus is on what the railways did, how they did it, and how they matched this against continuously changing external events and technological opportunity. Much information is drawn from the rich resource of RSA Proceedings, which throughout most of this period sought to inform those aspiring railway managers and help them learn their business. The sheer scale of the railway enterprise during this era cannot be overstated, so novices learning about the detail of how it functioned were always faced with a heavy challenge and the opportunity to hear about the issues from the mouths of the managers must have been welcome. There was no internet to resort to when something had to be looked up and textbooks on the subject were few and rapidly got out of date. The task was harder owing to the continual need to respond to external events, changing markets, the need to introduce new technology and the difficulties in raising capital. Perhaps some of this sounds familiar?

It is interesting to review the way lectures were designed, and many of them give the impression they were written (or at least heavily adapted) to suit an audience hungry for knowledge. A 1938 lecturer went further and thought that railway students should have a good grasp of railway users' business too. In particular, a number of speakers emphasized heavily the problems and issues that had to be addressed rather than volunteer specific solutions. A brilliant lecture given in 1935 by Gilbert Szlumper (deputy general manager of the Southern Railway) illustrates the point. He described what he imagined an average passenger experienced on trying to make a rail journey from Waterloo on an indifferent day, beginning with observations about the ground-in filth that pervaded every surface within the station and the complications of trying to buy a ticket, let alone find the train, and hoped that the future managers who sat wide-eyed in the audience made a better job of it than his generation. Can you imagine a manager today adopting the same approach?

The railway of 1909, already described in the first chapter, did not change very much until the Great War rudely interrupted the affairs of the nation. Until then, there was little compelling reason for these huge businesses to change drastically. That does not mean that they did not recognize they were facing challenges, and some evolutionary developments were in hand, but perhaps there was little incentive for any step change.

It is convenient to begin by describing some of the issues that the industry was facing and then to set out the huge challenges that arose after the Great War and how the railways responded during the next half century.

The President speculates

The RSA's second industry President was Sam Fay, general manager of the Great Central Railway and his address focused on how he saw the future, and what railway students would do well to be concerning themselves about.

Importantly, he thought the era of great rail expansion was firmly at an end, not least because industrialization created by the existing railways was now hemming them in. He saw the future of rail as improving operations to increase capacity using new technology and perhaps by giving some routes over entirely to freight and others entirely to passengers. New signalling would be vital, as would other scientific aids.

He was very rude about locomotive operations and thought the steam locomotive had very much had its day, being incapable of significant further development. What he wanted was locomotive power that was instantly available and responded to the touch of a button and did not waste power when standing idle. Electricity fitted the bill but he did not rule out some other power source either.

He thought that whatever the legal position, railways looked, behaved and were thought by the public to be public services and were quite unlike other private enterprises such as shops or factories. He thought they had contributed huge public benefits (despite government interference) but they considered themselves short of public gratitude, being little commended and criticized for every failure. He thought at some time railways would be visited by clearer rights and duties. He did not rule out state ownership.

Fay thought that statistical methods would prevail in due course but warned students to collect and analyse only useful ones containing facts and not estimates, and to look out for the 'lie'. He hoped his audience had no inclination to collect masses of figures for the sake only of gloating over them.

He was critical of education in the railway industry and thought it an industry where one's education could never in fact be complete. Hitherto, he described steps taken by the companies as 'pitiful' but thought that things showed signs of getting better and commended the LSE and its railway courses. He noted some companies were complaining about the dearth of capable men but expressed the view that it was those same companies that had the worst reputation for training. He hoped that recent interest in training capable people would help and noted that railways were vast multi-functional businesses that had a reputation for propelling to the top levels their best people. 'An open career for the talented', he observed, noting he had used a dictum used earlier by Napoleon (though not about railways).

Fay's comments were, in hindsight, prescient as well as forthright and could easily have been made half a century later given the slow progress. He saw the need for huge change and wanted to do the best he could to inspire the next generation to carry it through. A good start for the RSA.

During another lecture that year, Roger Gibb of the GWR put forward the view that railways would be run a great deal more efficiently if goods were charged by the wagonload rather than by weight. It is interesting that the need was expressed to the RSA as early as this, when the railway had to put up with the prevailing complex arrangements for at least another half century. Railway amalgamation, electrification and a goods clearing house for London were also solutions offered and taken up eventually in one form or another. You heard it here first!

Commuting and overcrowding

One of the biggest problems facing the industry was overcrowding. Railways had not been conceived with commuting in mind and, indeed, that term was more or less unknown in Britain until after 1946, although regular daily travellers were much in evidence by 1909. Today, these teeming hordes will nearly all be 'season ticket' holders, though the near universal use of seasons is a quite modern phenomenon. Suburban traffic was often tolerated by the Victorian railway with little enthusiasm; fares were low for the short distances involved and the poorly-utilized trains interfered with the longer distance and more lucrative market. Once pressure of traffic required it, the only answer was duplication of existing tracks; when this had been done, the capacity unleashed made it possible to provide many new stations and to expand suburban services hugely. From then, nearly all companies carried a steady stream of daily commuters, those serving the cities carrying the heaviest loads. Once the railways had provided infrastructure sufficient to facilitate commuting, the traffic responded. Frequently entirely new communities sprang up and existing villages were transformed, absorbing large numbers of new people who wanted to live there but work elsewhere in towns and cities. The results were highly inconsistent. In London certain lines such as the Great Central carried unfilled trains in the peak, while others were overfilled scandalously or attempted impossible timetabling with notorious consequences, the South Eastern & Chatham being regarded as the worst offender. The Great Eastern succeeded in running services with commendable punctuality, but overcrowding on certain routes was hideous. Carriages were then all divided into compartments with ten or twelve seats and other occupants had

to stand, clinging on as best they could; thirty people in a compartment was not unknown and Jack Simmons reminds us that on the Walthamstow line it was accepted that boys travelled on the luggage racks.

The traditional solutions that offered themselves included the lengthening of trains and provision of additional tracks (tripling or even quadrupling original routes). The problem was urgent—between 1900 and 1913 traffic originating on season and workmen's tickets had doubled. But, in addition to building more lines, new technology was now becoming available in the form of reliable electric traction. Major construction works, or the adoption of new technology, were far from straightforward. From a financial standpoint the investment had to pay for itself, notwithstanding that the additional capacity was used only for about four hours a day. To make investment worthwhile, wider savings had to be sought and this was often complicated, as generic solutions were not readily feasible. For example railways serving prosperous parts of London felt it easier to justify investment where full fares were the norm and new leisure traffic was expected. On the other hand certain lines were used by people the preponderance of whom used (cheap) workman's tickets and who did not use the railways for leisure, making it far harder to make a financial return. The Great Eastern, by the way, was one company which felt that it could not afford to invest in widening its north east London lines and resorted to subtle but effective ways of improving services with more intense headways, more intelligent scheduling and far shorter turn round times, a strategy considered rather successful*.

Electrification and the multiple systems

In adopting new technology, there was little existing experience to draw on and there were many different emerging systems to choose from, factors tending to engender caution. Some attempt was made to draw from experience abroad, notably America and Europe, but the British did prefer to develop their own answers, partly because British conditions were thought to be unique.

The Americans had been fortunate in having a large number of street tramways that called for electrification, and that had given them not only valuable experience in electrical operation but had created an industry which produced tried and tested equipment. The circumstances in America put them ahead in many other aspects of electrical engineering, particularly that of availability of supply, and they had fewer problems with sourcing electrical supplies large enough to operate a railway than existed in the UK. Despite early British enterprises such as the City & South London Railway, the earliest lines to be electrified (or built new as electric lines) all followed American practice that was well suited to dense urban locations with heavy traffic and simple service patterns of frequent trains. Main line electrification, with tracks shared with goods and steam-hauled services and a lot of different service patterns, was a very different matter. The outcome was that in the UK a large number of different systems were tried, in most cases each quite uncoordinated with any other and built with little opportunity to gain experience and expertise.

The earliest systems were so-called low voltage direct current (dc) operations, supplied at voltages ranging from 500 to 650 using either a single or twin conductor rails or overhead wires. Alternating current (ac) transmission had been pioneered in Europe and indirectly created conditions for deployment in Britain of overhead lines delivering high voltage at between 3 kV and 6.7 kV ac at a variety of different frequencies. In order to combat transmission losses, several railways tried high voltage dc distribution, at 1200 or 3500 volts, usually with overhead lines, but in one case with side contact conductor rails. In all, nine different arrangements had been introduced by the forthcoming war, some mere variations on others but together making it hard to contemplate future through running.

Unique to this period was the NER's electrification of the Teesside (Shildon–Newport route) in 1915 using a 1500 volt dc

* See Bonavia, *The Economics of Transport*, Cambridge, 1936 edition

overhead line system. This scheme was mainly delivered to electrify the movement of coal and required electric locomotives to be provided; having gained experience it was hoped to develop the concept for proposed electrification between Newcastle and York.

It will be seen that the introduction of electric working required a large number of additional skills to be available, all new to the industry. New engineering skills were needed to install and maintain train equipment, overhead line, current rails and substations. In addition, five of the systems required the railway to build and operate their own power stations, as there was then no universal source of suitable electricity. Perhaps curious to modern thinking, a number of entirely steam-hauled railways already owned and operated power stations for lighting purposes, such as the Midland whose Kentish Town power station illuminated St Pancras passenger and goods stations. A number of railways had power stations at docks and two of the newly electrified railways drew traction power from these; the remainder bought power from commercial supply companies. Supplying and distributing power required many new skills, in many cases drawn from the engineering industry, either on a permanent or consulting basis. The subject of further railway electrification was a lecture topic of the RSA in its third Session, and the then current issues were set out by the Metropolitan Railway's general manager, Robert Selbie, who had just duplicated his lines between Finchley Road and Wembley Park owing to substantial growth in traffic largely resulting from earlier electrification.

Electric train operation also required a special pool of drivers to be identified and trained at a time when industrial relations were already fractious; these separate grades were usually called motormen and had a complex relationship with the existing steam men. New train operating methods were needed too; with locomotives jettisoned, and train performance improved, timetables could be far slicker.

Monopolies and stagnation in growth

The UK railways in 1909 had a practical monopoly of transport beyond local bus, tram and goods carrier services in towns. Despite regulation designed to minimize the perceived adverse effects of monopoly, the official returns suggest that railways before the First World War (as it is now known) were in tolerably good shape. Most were returning a reasonable profit. At the time railways were considered by many to be well run as businesses, though public perception about services varied. In later years, commentators have hinted that perhaps there was a degree of complacency, and that alarm bells had not been heard ringing. There were also critics at the time, who were concerned that the railways were focusing on the wrong methods and this was allowing costs to rise, and profits to fall, quite needlessly. The consequences of this were not yet apparent, but there were going to be some if attitudes did not change. As early as 1902, comparisons were being made with American railroads; these had become very profitable by constant attention to costs, efficiency and strategic amalgamations that offered more scope for optimizing fares and rates. American practice was to enhance train loadings, while the British were content to run more trains, a much more expensive way of carrying additional traffic*.

By 1911, both passenger and freight growth was levelling off and some railways were clearly heading for trouble: for example, the Great Eastern noticed a serious decline in its London suburban traffic. The NER had already had to deal with a crisis when its mineral traffic declined and the managing director, George Gibb, took the view that his senior managers 'had too narrow an experience' and brought in outsiders. The policy appeared to work and some of them subsequently did well†. In particular the NER brought in statistical methods to measure performance, helped by the economist George Paish‡ (economics was

* See, *The British Railway Position*, George Paish, The Statist 1902.

† the NER's Ralph Wedgwood, Eric Geddes and Frank Pick, for example.

‡ George Paish (1867-1957) was a financial journalist and economist. He was credited for having an extraordinary ability to compile and analyse quantitative statistics and studied and wrote about railway statistics in particular, not just in UK. He became an adviser to several railways and later special adviser to Lloyd George.

a very new subject then). The NER was well ahead of its time, but other railways (in some cases a little late) came to accept that proper traffic analysis was essential. The newly-formed London School of Economics was enthusiastic in demonstrating the value of economic theory for railways; its director was the RSA's first President and the NER's economics-inclined Gibb its second. Clearly there was a skills gap in the areas of economic theory and use of statistic within many of the railways, and as early as 1913 A.E. Kirkus of the NER gave the RSA a talk on ton-mile statistics which was no doubt appreciated at the time. (Kirkus later became Director of Statistics at the Ministry of Transport.) Most railways initially hated being told to use ton-mile and passenger-miles measures, though they all came to do so. (The chairman of the London & North Western—hardly a small enterprise—is found telling a parliamentary committee that in his opinion statistics on passenger and ton-miles were 'worthless and absolutely useless': a striking example of the dinosaur at work) This was cutting edge stuff, even if by today's standards it may sound a little dull.

Industrial unrest

Staff relations during this period were poor. In 1907 the government had required each railway to establish a number of 'conciliation boards', which were supposed to provide a forum for discussing grievances, but the staff thought they were making matters worse and they wanted to discuss grievances nationally. This request was refused and on 18th August 1911 the drivers went on strike, paralysing the entire network. This unexpected move caused government to panic and insist on the railway companies granting the staff's wishes for discussion. The climb-down created new support for the railway trade unions, perhaps sensing their new-found power. Suddenly railways needed the new skill of trade union bargaining, in order to mitigate further damaging unrest. It was during the 1911 Session that RSA students debated issues around staff conditions, so the subject was evidently topical.

The First World War watershed and its aftermath

Whatever emerging plans the railways had in 1913 were shattered when the war broke out the following year. All the railways were put under government control, managed through a Railway Executive Committee, though ownership remained with the companies. In return for putting the railways at the government's disposal, they were guaranteed net income each year equivalent to that received in 1913 (which happened to be a good year), so the railways were reasonably content.

Heavy restrictions were placed on passenger services and marketing effort went into reverse. Priority was given to troop traffic, trains hauling military equipment and certain other priority traffic, and in fact traffic increased rapidly owing to wartime demands. Huge strain was put on the network, not helped by having to release staff, rolling stock and equipment for military service; the staff acquitted themselves well, with over 5000 decorations awarded including six awards of the Victoria Cross. In all, 184,475 staff were released (about 30 per cent of the total, but comprising nearly half the railway staff of military age), together with 600 locomotives and the requisitioning of carriages for ambulance trains. Many road delivery vehicles (about an eighth of the fleet) and horses were requisitioned. In the early days of the war, nearly the whole of the railways' road delivery fleet was commandeered to move officers' luggage alone!

Railway ships were commandeered with their crews for use as hospital ships or used for troop movements (the first ship carrying the British Expeditionary Force was a railway ship) and there are various stories of bravery. One resulted in Captain Fryatt of the Great Eastern Railway shipping division having a memorial erected at Liverpool Street for having shown considerable bravery in front of the enemy. (He had seriously annoyed the German navy by successfully evacuating British troops, the enemy determining to sink him and his ship *SS Brussels*. He managed instead to escape the first attacking submarine and run down a second; he was later captured by accident and on being recognized as something of an irritant was summarily shot, in

contravention of the accepted rules.) Of course this is only one example of tremendous bravery shown by many railway staff. It is pleasing to see this memorial still on display and it is quite separate from the Great Eastern's main war memorial recording the deaths of many hundreds of its staff—by an unhappy coincidence of fate the unveiler of this latter memorial, Field Marshal Sir Henry Wilson MP, was shot dead by Irish dissidents on his way home from the ceremony on 22nd June 1922 (a further plaque to that effect is placed nearby). Other railway ships were involved in skirmishes, some being equipped for the duration with a single gun, more as a token of defiance than anything else. The GWR's steamer *SS Ibex* was on a routine Channel Islands run and managed to score a direct hit on a U-boat that appeared unexpectedly one night; the Captain received an award of £500 from the Admiralty for his trouble—a great deal of money then. On another occasion *SS Ibex* spotted and reported another U-boat which the navy destroyed.

It was during this war that Britain's worst railway accident occurred; it was not directly a consequence of the war, though prevailing restrictions meant that the full horror of the incident was not apparent. The scene was the block post at Quintinshill, on the West Coast main line ten miles north of Carlisle, between Gretna and Kirkpatrick. There was no station but the post was equipped with crossovers and loop lines on both 'up' and 'down' roads. The date was 22nd May 1915; it was early morning and the weather was clear. A goods train was already occupying the down loop ('down' being the direction away from London) and a down local train was moved onto the up line to allow the first portion of a late-running London–Glasgow Express to overtake without being delayed. On the up line an up freight was moved into the up loop to allow a troop special train conveying the 7th battalion Royal Scots Regiment to pass it. Very little notice had been given about this train and had more warning been given matters might have turned out very differently. There were thus three trains standing at Quintinshill signal box, all within view of the signalman, with two further trains approaching, one from each direction. What should have happened is the passing of the down express, followed by the release of the down local (standing on up line), then the passing of the up troop special (which should have been stopped at the previous box) thence the release of the two goods trains.

Owing to slack working in the signal box by the signalman and his relief, and failure to adhere to the rules (or to look out of the window), the down local train was forgotten. Up signals were cleared and 'line clear' improperly given to the next box, allowing the troop train through. The outcome was a fearfully violent collision as the troop train on a down gradient and under clear signals ran at full speed head on into the local, throwing wreckage in every direction and blocking the down line. The carnage was terrible. But the down line signals had already been cleared for the express, which, within a minute, ploughed into the wreckage at nearly full speed and also killed many people on the track trying to rescue the survivors of the first crash. The coaches were predominantly wooden, some of them had old wooden underframes, and many were completely smashed; the 600 ft troop train was compressed into less than a third of its length. The coaches were largely lit by oil or compressed gas, which the locomotive fires ignited, creating a huge inferno that took 23 hours of fire-fighting to extinguish. Eighteen carriages were entirely consumed.

In and around the piles of wreckage it was estimated that 227 officers and men perished on the troop train, with a similar number injured. For practical purposes this wiped out battalion HQ and the whole of A and D companies. A further 10 deaths (and at least 60 injuries) occurred on the other two trains. The Board of Trade inspecting officer's report placed the blame largely upon the signalman, though the fireman of the down local had also failed to ensure his train was protected in accordance with the rules which, had he done so, would have avoided the collision.

Of wider importance the accident report urged the introduction of all-steel rolling stock with electric lighting that avoided

all use of inflammable oil and gas, as well as the provision of additional fire fighting equipment. The Board of Trade had few legal powers to compel existing railways to do its bidding but after the war new stock used increasing amounts of steel until the 1930s when nearly all carriages had steel panelling with electric lighting provided by batteries and dynamos connected to the wheels. It was not until the 1950s that gas lighting was finally eliminated and all-steel construction became usual.

Railway maintenance was placed under huge strain during the war and infrastructure and rolling stock both suffered in terms of quality and availability. General maintenance standards fell as staff were pulled away to serve on the front line or because railway workshop output was switched to war production activity. For example, one typical railway workshop was required to go into lorry production, producing 11 lorries a day under subcontract to Leyland Motors. Many assets were also exposed to more wear and tear than they were designed for. This became obvious where traditional flows altered hugely under wartime conditions. The remote and rural Highland Railway, for example, was placed under massive strain by the crucial need to service the navy's Grand Fleet at Scapa Flow. The network shape was ill-designed for the vast new flows that began to operate from ammunition factories, such as at Gretna. This required new or altered connections at a number of places and slick and intense working at previously sleepy outposts. All this caused tremendous upheaval within the industry, with new skills having to be learned on the job. Many women were brought in to fill posts, though they were discharged after the war.

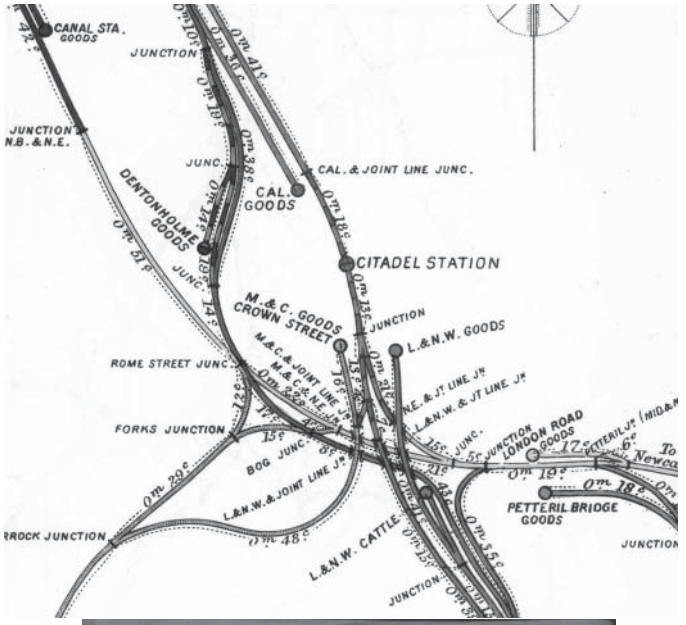
Afterwards, demobilization generated a further logistical hiatus for the hard pressed railways of which the mention of the hurried need to collect 125,000 army horses from France and convey them to British auction depots would make a story in its own right. Staff numbers were slow to restore to pre-war levels, twenty per cent of locomotives and ten per cent of coaches were out of use awaiting maintenance, there were 80,000 wagons short and a large but unquantifiable level of deferred maintenance of track and structures. Commentators suggest that the government owed the railways upwards of £150 million to put them back into the same state they were in at the start of 1914 (perhaps £6 billion today), but such assessments are fraught with difficulty. The railways did not see compensation in a particularly helpful or complete form and the backlog took some years to be absorbed.

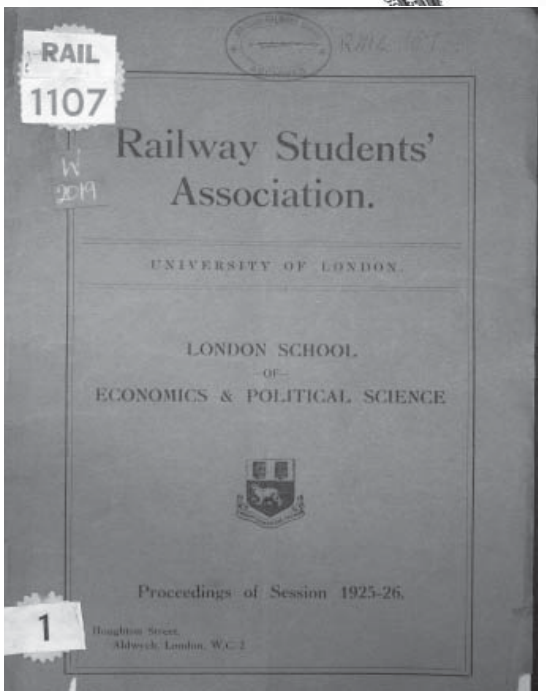
The economics of railway operation were so distorted during the First World War (WW1) that it proved impossible to remove government control within the existing structure. Wages and other costs had doubled during the war period but government had only allowed a 50 per cent increase in fares and charges, so the railways could not fail to lose money (the losses were £10 million in 1918—perhaps £400 million in today's money). While under government control this did not matter, as a special scheme of remuneration was in force, but railways needed to be restored to a sound footing before this contribution could be withdrawn. In 1920, charges were further increased, but costs were escalating faster and there was still a gap. The interregnum resulted in increasing government 'compensation' as it was seen by some. Government support for private industry in those days was regarded with huge distaste, and the 1921 payment of £51 million was regarded with public horror (even if the railways were being short-changed by government in other areas). Politically a permanent solution was becoming urgent.

The railway problem was a significant element in the creation of a new Ministry of Transport in 1919; the first task was to identify a workable plan to get railways out of government control. It was becoming clear to government, and some parts of industry, that there were too many railway companies and that duplication of services and competition between them was very wasteful (a contrasting dogma to that of today). The question was, to what extent amalgamation should be encouraged, or whether nationalization was called for. The latter option was felt a step too far and return to private sector control was agreed, initially to a network amalgamated into seven groups, but as the

scheme finally emerged from the new Ministry the number was reduced to four*. It was not possible to implement any scheme of amalgamation until the government had addressed the statutory charging regime and found a mechanism to relate charges to fast-changing costs, an issue still masked by wartime compensation arrangements. There was also severe opposition from the owners of the more profitable companies. A grouping was expected to produce much needed economies in operation, though proponents were hazy about how. By mid-1921, operational costs began to fall but there were still problems about how to fix fares and goods charges before handing the railways back.

The charges issue was ferociously complicated and required a huge amount of work, not finalized until 1928. It was based on 1913 rates with a host of adjustment processes. Further uncertainty arose from the creation of an independent rates tribunal whose decisions on any fares and charges issues would be final, but could not be anticipated. Economist Derek Aldcroft subsequently speculated that this approach set the scene for a mismatch between railway income and costs that dogged the railway for decades. The legislation finally passed as the Railways Act 1921.





Top right
Railway Clearing House diagram of railways around Carlisle in 1912 showing nine railways serving the district, including three joint committees. Eight goods yards may be noted, all competing. This was an extreme case of rail over-provision caused largely by local geography.

Bottom Right
The first bound set of *RSA Proceedings*. A fairly complete set of this valuable resource is available at the National Archives.

* The initial plans included provision for separate Scottish, North Eastern and London Groups.

Chapter 3 – Railways 1921 to 1939

The railways and the country

'The multiplicity and variety of reduced passenger fares caused much confusion and "their existence engenders the belief that in the purchase of an ordinary ticket (the passenger) becomes the victim of extortion". It was often the case that passengers on the same train, travelling between the same places, were booked at half a dozen or more different fares.'

These words could have been written at any time over the last few years and perhaps they have. The passage actually originated during evidence to the Royal Commission on Transport in 1929 and is given here to show that however profoundly our railways have changed there are some strong recurring themes, and opportunities to learn from the past as well as identifying perhaps unfixable issues. The statement was made as railways tried to stem traffic loss by discounting tickets, many hedged about with unpopular restrictions about which trains could be used, and in a very crude way began to pioneer yield management, well ahead of the 'cheap' airlines, popularly attributed with having done so.

The railways did not embark on this complex strategy with much enthusiasm as without modern technology it was difficult to manage. They did so because the entire structure of the industry was steeped in systems, regulations and legislation that harked back to Victorian times and during the 1920s the world began to change very rapidly, but the systems were hard to change and the rate of change was not apprehended. Rates (passengers and goods) could not be increased very easily, so charges for traffics that were amenable were discounted in an effort to retain what was considered at risk, even if it was not always profitable.

The 1920s could be regarded as the time when railway began to lose its monopoly status, a process well advanced by 1939. Why this happened, and the railway's response, set the scene for the next forty or so years and created underlying issues not really fixed until the late 1960s.

The problems of organization

Government control of the railways ceased at the close of 15th August 1921 and the following day the old companies resumed the traditional policy of trying to make a profit from their assets. It was the start of the holiday season and the reintroduction of heavily marketed cheap tickets and extra trains was extremely welcome, with trains immediately packed to excess. Margate became so overcrowded with excited weekend trippers that people had to resort to the beach to sleep, as all accommodation was taken. But all this was achieved in trying circumstances with worn out equipment, rising prices and the distraction of reorganization looming.

Three of the 'big four' railway groups came into being on 1st January 1923, the Great Western enlarging slightly sooner. Organizationally, four monoliths were created and little thought appears to have been given at the outset as to how these vast conglomerates could be managed, or indeed if enterprises this size could be managed effectively at all. (In 1925, the LMS proudly proclaimed it was the largest joint stock company in the world*.) The speculative savings were very slow in coming, and old company loyalties made integration of cultures extremely tough work. Frank McKenna (*The Railway Workers 1840-1970*) explained to his readers that, when he joined the LMS in 1946, local staff loyalties were still to the pre-1922 companies, and he noted that Mike Higson, who worked at Lancaster shed in the 1950s, was still encountering these pre-grouping factions over thirty years after amalgamation on paper. Given the amount of reorganization that has occurred on the rail network subsequently, there does seem to be a pattern in underestimating how hard it is to re-orientate traditional loyalties demanded from generally blameless employees, even though the trains continue to roll.

The GWR was least affected by the grouping as it effectively

* LMS Control – brochure for Wembley Exhibition 1925, page 4.

carried on the old regime, simply taking over a number of Welsh lines; this strong sense of continuity possibly explains why, even under British Rail, it was the most stubborn region to change its ways. The LNER mitigated the conflict (for a while) with a decentralized arrangement based on the old companies. The Southern took several years to decide on a strong general manager who could attempt to weld the constituents together*, and the similarity in the London-centric traffic of its components perhaps made this job less daunting than it might have been. The LMS—the largest company, with over 270,000 men—really struggled to alter entrenched views and finally brought in an industrialist from ICI to force through some progress; this was Josiah Stamp, an economist and business administrator. Stamp was not the only man to be brought in from ICI to 'sort out' deep seated railway problems. Preceding Dr Richard Beeching by 35 years, Stamp favoured American methods and introduced a powerful executive committee to spread what on any other railway would be the load carried by a single general manager; implicit in this was that the job on the huge LMS was too much for a single man. The concept came with the American term 'vice presidents' for those on the executive committee†, Stamp himself becoming president of the executive (he later became chairman of the board as well, an exceptionally unusual move).

Other railways saw no merit in such an arrangement and Walker (general manager of the Southern) shared with colleagues his belief the LMS methods did not work. This did not discourage the LMS from bringing in American experts, such as a 'methods' man to try and simplify the administrative paperwork. The problems of organization dogged all four railways and, although all of the general managers (and Stamp) became RSA Presidents after it resumed activities after the war, none of them chose to dwell on their organizational problems—very different from post 1948 when it seemed that organizational problems dominated thinking.

The big four groups functioned with large boards of directors none of whom were involved in day-to-day activities, this being the job of the general manager who did not usually sit on the board. Railway directors were influential people, often directors of other companies too. It is noted that in 1938 24 railway directors were Lords and 11 were MPs. They looked after the wider interests of their companies. The LMS came to differ from the others upon Stamp's assumption of the chairmanship in addition to his chief executive role, but these general structures held sway throughout the life of the big four and placed immense responsibility upon the general managers and their chief officers. As an aside, it is probably worth emphasising that in the era under review railway directors had become considered 'sound', and perhaps numbered fewer than 50. Prior to the grouping, there had been some thousands of directors of generally indifferent quality. Someone observing their comings and goings was moved to reveal to a parliamentary committee 'it is safe to say that in the vast majority of cases they are selected for every other reason than because they have expert knowledge of railway business'. On the whole, grouping had probably improved the quality of people at director level, and in its turn improved the quality of management.

The commentator C.E.R. Sherrington thought that UK railway organization was becoming defective in that the functional structure tended to separate spending departments (costs) from revenue-earning departments (income). He thought each side of the business 'ploughed its own furrow' rather than matching income against costs as close as possible to the point at which each arose, which was a better way to ensure that activities were profitable and supportive of meaningful planning. Relating income to costs was about to become a huge problem. Both annual passenger and freight revenue peaked in 1923 at £94 million and £109 million respectively, declining steadily until the Second World War (WW2). Costs initially continued to rise and then remained fairly static until the depression, when enforced cost-cutting caused wage reductions. The impact on each rail-

* Herbert Walker – RSA President 1928/29.

† Bonavia – *The Economics of Transport*, 1936, p78 indicates the VPs covered Commercial, Operating, Finance and Research but these posts varied.

way was dire, but overall profits were static (and modest) until they collapsed in the 1930s. The commuter railways fared best, but the LNER was teetering on bankruptcy for many years and paid virtually no dividend during the whole of its life, even on preference shares.

Against this adverse background, keeping up with passenger expectations was difficult. The writer Hamilton Ellis described the LMS in the 1920s in critical terms, having become 'a shabby and even dirty railway … with maintenance down to the safe limit; breakdowns not infrequent and punctuality, especially of the West Coast expresses, was bad'. The analyst Philip Bagwell noted that the starting point was never promising, but that constant shortage of money meant that until 1938 there was actually considerable disinvestment as the funds available were failing even to match depreciation. Allowing for the fact that there was positive investment in the high profile areas of long distance operation and some electrification, it implies the good bits got better and the bad bits somewhat worse. Railway managers of the day were not so concerned about disinvestment (reduction in asset value), observing that better asset utilization was the whole point of the grouping and it would have been extraordinarily careless if it had not happened*. Nevertheless one would have expected investment in some areas to rise significantly as passenger expectations rose in concert with mounting competition, while by 1938 the only too conspicuous shortcomings of north London suburban services was shocking, especially on the LNER where gas-lit coaches survived until the 1950s. They had wanted to invest, but had not the resources to do so.

Generalized cost control was something the railways were all reasonably proficient in; but, as competition mounted and income came under pressure, so budgets needed to be tightened further and this began to draw attention to areas of waste and the need to change some working methods. The LMS under Stamp's centralist regime came to be regarded as quite good at reducing budgets and focusing upon the important areas of delivery. All railways had to cope with the 1930s' recession and, to protect jobs, the trades unions agreed to a temporary reduction in wages (also imposed on management staff); perhaps, had unemployment not then been so rampant, this would have been more difficult.

LNER chief general manager, Sir Ralph Wedgwood, made some illuminating comments to the RSA in his Presidential Address in 1926. He regarded the pre-war railway as essentially 'Victorian' and preoccupied with operational matters. He thought lack of competition contributed to this, though noted that there were some pooling arrangements already set up to reduce waste. Post-war it was found that costs continued to rise steeply, competition was now evident and the conditions within which railways operated were completely different, in particular general trading conditions were very volatile. Wedgwood thought competition helpful in getting the railways to focus on the traffics it was better at handling and not being unhappy with giving up traffic where competition was futile. An aspect that did concern him was the improvement in freight train loads that were being achieved only by reducing journey time and worsening punctuality. He thought the policy wrong and that customer service ought not to be sacrificed in order to meet purely internal measures. He was also concerned that there was a general increase in passenger traffic caused by wider economic conditions which was masking an underlying loss of market share; he suspected that suburban traffic outside London was dropping alarmingly. This needed analysis of a kind quite new to the railway industry. Early work in this area had already caused innovation through the introduction of more weekly and shopping tickets. All the indications were that Wedgwood's thinking was new, and RSA students were hearing it for the first time.

Holidays and excursion traffic and other special traffic

In 1909, Britain was almost alone in running excursion trains and apart from the war years they were extremely popular, though

* Bonavia, *British Railways Between the Wars*, is helpful in setting out each view on this.

from the late 1920s this 'cheap' traffic began to be eroded by road competition. Excursions were basically special trains with very attractive return fares and an interesting objective that would tempt people to take a day out (occasionally longer); objectives might be a place of interest, a seaside resort, racing or other sporting event and occasionally even mystery tours. They were a good way of drumming up traffic the railways would not otherwise see, and often operated on routes where there was plenty of spare capacity, using cascaded rolling stock that had already paid for itself. It made an important contribution to revenue; in 1909, for example, the LBSCR was issuing roundly 1.9 million excursion tickets a year, accounting for about an eighth of its passenger revenue. By the late 1930s, the Great Western alone was running something like 25,000 excursion trains a year and it had become a huge operation. Notices of these were printed in over 250 newspapers each week and it is reported that this was supplemented by 250,000 letterpress posters and several million handbills. The clerical work needed to support all this (and the preparation of the special tickets and organization of the trains and crews) was enormous.

Sir Ralph Wedgwood told the RSA that he felt there was still a considerable way to go to perfect excursion traffic, especially for longer distances. He referred to the recent introduction of a competing London-Leeds coach service which the LNER was monitoring but whose passenger numbers were tiny. There was also a growing market in char-a-banc tours competing with excursions. This was a pointer to the way things were going and railways needed to take measures to protect their lucrative longer distance traffic. An interesting opinion expressed by Wedgwood was that increasing speed was probably unnecessary and uneconomical (just 12 years before the LNER won, in August 1938, the world speed record for steam haulage at 126 mph, still unsurpassed today).

Holiday traffic was different. Here the railways capitalized on the introduction of statutory holidays allowing people to go away for a week or a fortnight, usually Saturday to Saturday. People wanted to get away from the cities and the Victorians promoted the development of numerous holiday resorts, usually at the seaside. Rail was the only realistic way to travel and this generated a huge need for holiday trains in the summer season. Resort stations were built, or much enlarged, to cope with the succession of lengthy trains that would arrive with incoming holiday makers. In some cases the stock could be cleaned and stored until later in the day when it took departing holiday makers home, but because most holiday resort boarding houses and hotels switched guests in the morning it was sometimes the case that trains arriving with a load on one Saturday had to lay over an entire week before getting a return load. An RSA lecture on traffic operation in 1953 lamented the high costs this imposed and wondered if resorts could do more to ease the burden. To promote this traffic the railways came to advertise travel to holiday resorts heavily.

Bank holidays provided special problems and one RSA speaker noted that, based on the 1930 Easter holiday, the number of trains from London serving Margate immediately prior to the holiday was expanded from 17 to 47 and daytime services to Bournemouth to 33 trains (about three times the usual number). One particular train (the 9 a.m. Victoria-Folkestone) was arranged to operate in no less than six portions to carry the bloated traffic! The speaker was inclined to the view that boat train traffic was the most awkward, passengers having vast quantities of luggage and corridor trains being required to meet requirements of shipping lines and provision of refreshments (with some Pullmans just being introduced). Fortunately the shipping lines arranged all the seat booking and reservations. School traffic was vast with 500 colleges and boarding schools in the Southern's area all tending to want trains at about the same time and with large quantities of luggage involved. The speaker observed that the children, being from the wealthy classes, expected a high quality journey and sometimes Pullman cars were provided.

Holiday and excursion traffic are mere examples of the huge

effort railways made to carry special traffic of all kinds (in this context it means traffic beyond the ordinary scheduled services). A presentation by a Southern man to the RSA in 1931 was most illuminating. Apart from race gatherings and sports meetings, the railway was expected to deal with military movements, agricultural shows, school vacations, hop picking, and ocean liner traffic. The scale of such operations may be a surprise to those who rarely see special trains today, and the underlying organization was substantial, requiring additional stock movements, crews, cleaning and so on. Race traffic on its own was a huge business, with 18 racecourses in the Southern's territory alone. Excluding Ascot and Epsom, racing took place on 140 days during the previous year, requiring 857 special trains carrying 367,000 passengers. Ascot and Epsom required special treatment; on Gold Cup day, 18 specials were run from Waterloo in just two hours with exclusive first-class accommodation and all were dealt with at a single platform at Ascot. The empty trains had to lay over and, when the sidings were filled, the down line to Virginia Water was blocked and the empty stock moved onto it, one train behind the other. In due course the stock was moved onto the up line ready to move into the station, one train at a time, to collect the up special traffic, normal services being resumed over the down line.

The 1930 Schneider Trophy race off Spithead provided another opportunity for innovation. Not only were numerous special trains run to Portsmouth, but much-reinforced ferry services were run to Ryde, using the Southern's ferries, and Ryde Pier (owned by the Southern) was converted into an immense grandstand for which the railway provided seats at an all-inclusive price including travel from London. In addition, the Southern arranged to hire small ships to act as ferries to take people from Portsmouth to various liners at anchor in the vicinity and which provided additional grandstand space. If the traffic was there to be had, the railway had it, profited from it, and had the organization to deal with it.

Incidentally, the railways' own staff created a travel need in its own right. At Swindon works in the 1930s, for example, the 12,000 staff all had a holiday in July which gave rise to a demand for 26,000 staff and dependents to proceed to holiday resorts. To cater for this load and avoid swamping ordinary services, the Great Western typically arranged for 30 special trains to operate. This operation (started in 1846 on the GWR) was echoed by some of the other railways.

Of course, the network also had the capacity to deal with it all, though later commentators suggest that the underlying economics of a vastly underutilized fleet might have been suspect. British Railways carried on the practice, where spare stock was available; for example, it was usual to put on trains with van accommodation on London-Brighton cycle race days to capture the return traffic with accompanied bicycles, now impossible with dedicated operators and fixed fleets where cycles in volume have to be turned away, with potential loss of revenue. A very different business model indeed.

Shipping services were part of the holidaying scene, though also carrying regular business traffic, and volumes had risen to about 2.5 million by 1937, after which traffic tended to stabilize. In 1931, the Southern put on purpose built car carriers, the 'autocarrier', with a capacity for 25-30 cars, starting a trend which in later years became a huge business*. In 1926 the LMS, jointly with SAGA†, created the Société Anonyme de Navigation Angleterre-Lorraine-Alsace shipping line (more conveniently shortened to ALA‡) to operate a Tilbury-Dunkerque service. In 1928, the Southern stepped in to replace the LMS and services were shifted to Folkestone. In 1936 the Southern and ALA co-introduced train ferries, which included garaging for cars: 21,000 cars crossed the Channel in 1935, doubling by 1938.

A sideline of the holiday business was the provision by each of the railways of holiday accommodation in the form of camp-

* The carriage of accompanied cars was started by railway ships as long previously as 1898, but it only developed very modestly.

† This is not the over-50s holiday organization. It means the Société Anonyme de Gérance et d'Armement, a French shipping line.

‡ ALA was taken over by British Rail in 1977 and became part of Sealink.

ing coaches. These were provided on obscure pieces of railway land near suitable holiday resorts and comprised withdrawn wooden coaches, perhaps with some compartments knocked or connected together to produce something slightly more comfortable than the alternative of a tent but not much larger. Sometimes the coaches had bogies removed but some were left on wheels on short pieces of track, or even on placed in yards or at ends of little-used platforms. The craze began in the 1930s and the GWR alone converted 65 old carriages in the period 1933-39 and had them delivered around its network; camping compartments were still available for rent even as late as the 1960s*. Rates were typically £3 or three guineas a week and the railways usually required a minimum number of railway tickets to be purchased. Descriptions of holidays indicate that a typical family would be met at the local station by the station master who would escort them to their coach and show them round and go through the inventory. Water was sent up from the station in churns and at some locations local firms would deliver groceries. Children could enjoy playing with the communication cord, for few of the carriage fittings or equipment would have been removed; some children were able to befriend local railway staff and were allowed to ride on locomotives or watch the signalman. Camping coach holidays appealed to a nation where staying in boarding houses was thought a luxury and the railway benefited from the coach rental and, of course, train fares paid that they might not otherwise have had.

Modernization

We saw that prior to WW1 a number of railways had introduced electric services on their own lines, principally in small areas with dense traffic. The NER alone had plans for main line electrification, but they had been shelved. Each railway had adopted its own system, each more or less incompatible with any other. Following amalgamation in 1923, the multiplicity of systems was an irritation. In addition, service experience had been gained about the benefits of each, and in any case the technology had moved forward. Simply to pursue electrification on the *ad hoc* pre-war basis made no sense in the new world. Although some formative systems were extended under the amalgamated companies, these were all really completions of, or additions to, pre-war schemes. With the exception of the developing Southern Railway 3-rail dc system out of Waterloo, any idea of developing the other systems was dead.

The Southern reviewed its two systems of electrification (and yet a third intended for the former SE&CR lines) and concluded that it should extend the electrified network on the 3-rail dc basis and that the newish LBSCR ac overhead system should also be converted, which was achieved during 1928-9†. The Southern under Walker became an electrification enthusiast and saw it as a panacea for dealing with hugely growing commuter traffic at moderate cost. On the important lines it was coupled with the introduction of power-operated colour-light signalling that allowed the main lines to be used to maximum capacity with some cost reduction. The dc system was ideally suited to dense suburban services but, owing to the low voltage adopted and heavy requirement for substations, it was not the obvious system of choice for a main line. However, once the suburban network was complete then extension of the system to the heavily used, but more far flung, destinations became practicable, with (for example) Brighton reached in 1933, Portsmouth in 1937, Bognor in 1938 and Maidstone in 1939.

The Southern might not have attempted some of these during this era had not there been some government intervention. First, agreement was reached in 1929 to abolish the unpopular railway passenger duty (a tax on rail travel outside suburban areas); the railways were instead required to invest an equivalent amount of revenue in capital projects, the Southern deciding to

* The holiday coach was a profitable, though restricted, use of old stock. It was also possible for the public to buy old coaches. In the 1920s, on payment of £20, the railway would supply and refurbish an old coach and deliver it to a local goods yard with the restraining bolts loosened, from where the purchaser could remove the body and take it away. Many summer houses and beach huts appeared this way.

† Some of this overhead network was only four years old.

invest in limited main line electrification. Secondly, in 1935 the government made cheap (but not free) finance available through a treasury-backed finance guarantee scheme and £28 million became available via a Railway Finance Corporation for defined capital works including the above electrifications.

Walker gave his Presidential address to the RSA in 1928 and it was fascinating. He noted that shareholder returns were falling as were levels of passenger traffic, but on the Southern his suburban electric lines had beaten recession. He observed that it was not just the daily traveller to whom he was indebted, but their wives and families who also chose to use the network, not every day but nevertheless often and not in the peaks. Peaks were a problem as their maxima defined the capital expenditure needed; since the war the peaks had unfortunately become shorter and more intense, he thought because of the general introduction of the 8-hour day. He was grateful that the economics of electric traction were simple, with most costs more or less directly related to train length which was not the case with loco-hauled trains. It was therefore possible to run more (but shorter) trains to maintain the attractiveness of services. His marketing efforts were therefore turning to those necessary to increase off-peak loads that could be carried at very little cost. He was particularly enthusiastic about the huge reductions in average journey times that had been delivered as electric trains had high rates of acceleration. They were cheaper to operate, as a central power station of (say) 20 MW was sufficient to operate a network where the installed capacity of the trains was four times as much, impossible where each locomotive had its own power plant. He hoped he had given students something to think about.

It was not that other railways did not examine electrification, for a great many schemes were looked at, some of them repeatedly. One problem was the shortage of electricity in Britain compared with (say) Switzerland, Italy and Scandinavia where plentiful and cheap hydro-electricity was available. British railway companies usually had to generate their own power (or buy in from a very limited number of large power stations) and this heavily constrained network development and reduced the savings available. The prospect of a high voltage electricity distribution grid emerged during the 1920s and was pretty much complete by about 1935; this development somewhat altered the economics and practicality of electrification. In addition to the investment demands electrification imposed, the UK had what was claimed to be an unlimited supply of comparatively cheap high quality steam coal available; with many fairly new locomotives and a questionable business case for electrification there did not appear to be much advantage in changing over from steam. Certainly commentators at the time were not critical of general traction policy, only those deciding to comment many years later. The LMS and LNER looked at main line electrification in several areas and commissioned detailed reports. The LNER scheme from Kings Cross to Leeds was financially attractive based on savings alone, but quite unaffordable for a company that could not raise credit. The LMS scheme from Crewe to Carlisle and Liverpool was less expensive but produced only a 2½ per cent return, not enough to pay for the interest charges. A Great Western scheme in the West Country foundered because the seasonal traffic meant the overall revenue was not there to justify the expenditure. Suburban schemes were looked at endlessly and either the traffic was too low to justify the cost or the finance could not be generated. It was only after 1935, when cheap government-backed money was available, that the LNER pressed on with its Shenfield electrification scheme, while other LNER branches were electrified on the London Transport system with through running introduced*.

A government committee (the Weir Committee) reporting in 1931 examined the development of electrification and concluded that all future electrification should be undertaken using

* In addition to the Railway Finance Corporation already referred to, a London Electric Traction Finance Corporation was authorized to raise £40 million against a Treasury Guarantee to develop and improve transport in the London Area and this introduced inter-running of London Transport trains over main line tracks. These corporations and their debts survived nationalization and the debts were finally written off in the 1960s.

overhead live wires on the 1500 volt dc system, except where it was by way of extension of an existing 650 volt dc 3-rail or 4-rail system, and this remained the policy until the 1950s. It also promoted the idea of complete mainland electrification in order to achieve maximum economic advantage. The costs would be a staggering £261 million on the railway works alone, but it was expected to generate a yield of about seven per cent. The Central Electricity Board (a public corporation) would also need to invest £80 million to provide supplies via upgrades to the national grid. (To give some idea of scale, this aggregate is represented by about £17 billion at today's prices.)

The timing was dreadful, as the country lurched into a severe recession with rail traffic falling, and the Railway Companies Association thought the scheme was, in any case, extremely risky with the base assumptions constantly changing and the estimates far too approximate. They wanted government aid (rebuffed as 'degenerating into a poor law frame of mind that will … undermine enterprise') but it was considered impossible to raise this kind of money in the circumstances. Post-war commentators regard this as a missed opportunity but, at the time it did not generate informed adverse criticism. Lord Stamp also drew attention in 1933 to the fact that the railways had obligations to the independent Railway Rates Tribunal which regulated fares levels and required railways to keep costs at a minimum. Their attitude towards electrification-derived additional costs was a complete unknown and imposed a risk in the calculations of additional revenues that electrification would otherwise be expected to create. Perhaps valid as criticism is that Weir lumped the whole rail network together, so the suggestion included many hopeless cases that overlooked some very good electrification opportunities on certain routes; these were not identified and given the necessary investigation, except perhaps on the Southern.

The subject of electrification was topical throughout this era and the RSA hosted a debate on 'further electrification' in the 1929-30 Session. Despite Stamp's caution, the LMS was wearied by the inefficiencies of steam operation; loco coal might have been purchased as a cheap commodity, but they thought the 27,000 wagons needed to shift it each year was excessive as it would only take 7000 wagonloads sent to power stations to generate all the additional electricity needed for electric train services (which would also release 2800 coaches). However, electrification was thought a high risk at the time.

Dieselization was also looked at by all the railways. They observed the gradual dieselization of passenger services on American railroads (freight was much later), propelled forward by the combined interests of their powerful automotive and oil industries and the need to overcome practical difficulties such as supplying locomotive water in difficult territory*. The American approach involved high speed streamlined units and was not readily adaptable to the British network. The GWR and the LMS built some diesel railcars and the latter invested in a number of diesel shunting locos with which they were very pleased†. It might be of interest to note that diesel shunters appeared in America from 1925 but even a decade later only numbered around 100, rising to no more than 400 by 1939. The LMS purchased over 50 in the period 1935-39, so this was quite a serious comparable advancement given relative network size.

The Second World War postponed development of dieselization; the railways were just relieved they were not reliant on foreign-sourced diesel, which became difficult to get. There was also in Britain no ready source of suitably large, tried and tested diesel units, which were much more expensive than steam locomotives, many of which were quite new. Britain's railways also lacked the expertise to build and operate diesels. Nor was wider British industry much better prepared, though towards the end of this era it was turning to diesel construction for the export market. This lack of expertise was of course as much the consequence of limited enthusiasm for diesel as it was a cause of it.

* A useful setting out of the American position is given by H.F. Brown, *Economic Results of Diesel Electric Motive Power on the Railways of the United States of America*; Inst. Mech. E. 11 January 1961.

† The LMS principally introduced shunting diesels to allow more widespread single manning, the reduced staff costs justifying the much higher construction cost, though they did have single manned steam shunters in the 1930s.

In addition to the traction issues, thoughts turned to how operations could be improved. The LMS's Ashton Davies gave his contribution to the RSA in 1927 and thought traffic could be handled better and more cheaply by gradually upgrading the network to produce efficient track layouts, simple and efficient signalling and communications, effective train control and better data, so that endemic problems could be identified and addressed. These doctrines would seem to have equal application today, suggesting that, in terms of basic railway operation, most lessons had already been learned (with some subsequently forgotten and learned afresh).

Modernization of methods resulted from competitive influences too, as George Pape from the Southern indicated in a lecture in 1927. The old LSWR suffered from the introduction of competitive electric trams and motor buses and in 1902 improved its services in order to maintain the attraction of its own services. To avoid hauling unnecessarily long trains around during the day, it hit on the novel idea (for loco-hauled stock) of rearranging trains into two identical portions so that one could be stabled off-peak with the other nevertheless retaining all facilities. This concept was followed through with its electric trains, with the further refinement that they could couple up in any combination of 2, 4, 6, 8 or 10 coaches. This approach was subsequently adopted by other railways and is, of course, quite normal today. Pape despaired of passenger behaviour, noting particularly how people cram in at the London terminal ticket barrier end, seriously slowing down boarding and ultimately reducing capacity and delaying departure of outbound trains. He was impressed by operations at Liverpool Street and thought there were lessons to be learned more widely. He was also keen on colour-light signalling and drew attention to the huge problems that London's famous heavy and frequent fogs caused in semaphore areas, a problem almost impossible to imagine now. He wondered if RSA students had any suggestions to make about dealing with fog, and further London traffic growth, and thought that suburban trains ought to be switched to new tube lines serving areas the passengers actually wanted to reach, rather than subjecting them to the horrors of the London terminals—in effect he was suggesting one or more Crossrails for precisely the reasons the present scheme is formulated. There are perhaps no really new ideas for arranging railways.

Technical research

All the main line railways did technical research of a kind, though in a piecemeal low-key way. The LMS was unique in propelling all aspects of research to a far higher level and in 1930 bought in Brig. Professor Sir Harold Hartley from Oxford University as vice president of research, putting a marker down about how importantly research was viewed. He was *de facto* head of scientific research but evidently had a good relationship with Stanier, the Chief Mechanical Engineer (CME); on other railways technical research, such as it was, was largely led by the CME. A formal research department was created in 1933, one outcome of which was the opening of the LMS research laboratories at Derby on 10th December 1935. These were far ahead of anything the other railways managed and, upon nationalization, was adopted as the British Railways research laboratories and, later still, the Railway Technical Centre, completed in 1967*. Some of the output was invaluable and world-beating, especially in the field of wheel behaviour and riding quality.

The Great Western had a well earned reputation for building relatively efficient and speedy locomotives and was happy to send its engineers around the world to identify best practice, a strategy that appeared to serve it well†. It built Europe's first locomotive testing plant at Swindon in 1904, upgraded in 1936;

* BR opened rebuilt research laboratories at Derby in 1964 and also concentrated the headquarters of its workshops, supplies and finance departments at Derby in order to promote communication and administrative efficiency.

† It is widely known that the main line railways exchanged a few locomotives in 1925 and the Great Western machines outperformed those of rival companies on their own ground; the rivals then set about incorporating Great Western features in their own machines, to the advantage of the industry at large. In any case, the engineers in one company frequently moved to others during their careers, again spreading best practice.

the facility allowed locomotives to be steamed and powered up to the equivalent of 80 mph on a static test rig using rollers, with variable friction to represent the loading of a complete train*. In 1936 the LMS agreed jointly with the LNER to erect their own locomotive testing facility at Rugby, also using a static test rig. Although WW2 arrested the scheme, it was pursued afterwards and opened in 1948. It still proved useful during its short life—it was only suited to steam traction—and again proved the value of applied research. In 1933 the RSA was treated to a paper on the subject of railway research by the great Sir Harold himself, and the non-LMS railwaymen present must have been a little envious. Colin Dival† later records that the LMS believed that scientifically-based research would reap significant financial benefits over time. Hartley's former assistant, T.M. Herbert, gave another RSA paper on the subject in 1958, by which time he was in charge; he explained how the laboratories of all the former main lines (notably at Doncaster and Swindon) were being merged with enlarged facilities at Derby. He also drew attention to the new area of operational research which was becoming an increasingly important management tool.

One area in which there was only desultory research, and even less action, was in reducing accident rates by improving and introducing so-called automatic train control systems (ATC) to reduce the number of collisions (many ultimately caused by passing signals at danger). We have already noted that the GWR alone introduced such a system over most of its network, but elsewhere virtually nothing had happened. During the 1930s, railway collisions averaged 80 a year; in the period 1930-38 they caused a total of 111 deaths of passengers and 85 deaths of staff, though the fatalities also included a small number resulting from serious derailments. It is hugely significant that during the whole of the independent lives of the big four railways only 34 passengers were killed on the GWR (in just five accidents), while the others were responsible together for 500 killed in 67 accidents. This ought to have sent a much more urgent message about the value of introducing a warning system to help drivers, who kept a lookout as best they could in trying circumstances.

Both the LMS and the Southern looked into the Strowger-Hudd ATC system in the early 1930s, as eventually did the LNER. The Southern felt investment was more usefully spent on colour-light signalling and as policy did not pursue ATC. The LMS thought it useful and wanted to develop it, but despite continuing collisions in which the LMS were subject to some criticism it was not actually installed until 1948, and then only on the self-contained London, Tilbury & Southend Line. The Strowger-Hudd system worked similarly to that of the GWR but involved magnets—a permanent magnet 'armed' the warning but an electro-magnet situated 50 yards farther on, energized only when the distant was clear, sounded a 'clear' indication and cancelled the warning before any braking action had begun. Unlike the GWR system, when a driver cancelled warning a reminder indicator was displayed.

The problem of competition

It is not that the organizational structures of the railways were themselves the cause of emerging business difficulties, more the suspicion that the structures made it much harder to spot faults and identify new opportunities, or respond quickly to external events. The railways had come out of WW1 with considerable deferred maintenance, a statutory charging regime which much constrained initiative, a continued obligation to carry unsuitable traffic under their common carrier obligations, and an arbitrary financial starting point that was little short of guesswork. There was also the 'grouping' and huge task of reorganization this required. All of this gave the railways huge internal worries that went on for many years. Not very much thought had, in consequence, been given to external factors.

A debate held by the RSA in 1912 asked whether expertise in railway salesmanship was of any importance on a network that

* The French had built a large testing plant at Vitry in 1934 which was occasionally used by British railway companies to test their locos.

† Institute of Railway Studies and Transport History, University of York, paper called '*Down the American Road, Research on the LMS 1923-47*'.

was for all practical purposes a monopoly. Perhaps such expertise was not important in 1912, but by 1923 things had moved on and the railway needed to sell itself very hard and had not perhaps the skills to do so quickly. Suddenly (or so it seemed) the railway was no longer a monopoly. The end of the war had generated a huge quantity of surplus motor transport together with discharged men looking for work and prepared to go into business; the Ministry of Munitions alone released 20,000 road vehicles and the number of goods vehicles doubled between 1919 and 1921. Road transport law had moved on to encourage road traffic and a programme of road improvements had been announced. Car production was increasing following the wartime discovery of production line work and in some quarters there was the money to buy personal transport; in addition car costs were falling rapidly as production increased. The number of private cars rose from a quarter million in 1921 to a million in 1930 (doubling again in the next eight years).

Bus services had traditionally been very local affairs, largely because they were horse drawn and the early mechanical ones were not suited for long distance work. After the war mechanical traction was far more reliable and a number of territorial bus companies began operating services that penetrated country areas and provided an alternative to some rail journeys. Growth was rapid, aided by local companies being swallowed up by larger conglomerates. Midland Red, for example, had only 92 vehicles in 1919, but by 1938 was running 1224; that company was part of the British Electric Traction group. By the early 1930s most towns and moderately sized villages had access to bus services which not only provided competition for relatively short distance train journeys but in some cases better served population centres than some of the stations.

Modern analysis of surviving contemporary documents suggests the railways should have done more and done it sooner. The GWR produced station returns and performed annual traffic censuses that suggested that, between the wars, traffic at almost all branch line stations fell by at least 50 per cent, and often by 80 per cent or more; stations that were barely profitable in 1923 must have been plunged into loss. Traffic loss varied according to the convenience of the station to the locality it purported to serve and number of trains that went somewhere people wanted to go. On both counts many stations did not fare well, and the response of making tickets cheaper did not often help. The implication was that the average trainload was fewer than 10 people, and often fewer than five! Compare this with the loading of (say) the *Silver Jubilee* express that averaged 90 per cent load factor, all at premium fares, and we see a real problem about how railways were focusing on how best to serve the public and how to identify profitable from unprofitable results from averages that masked trends. It was another quarter century before someone even began to address the issue*.

The freight story was depressingly similar, except for mineral traffic which was not really suited to road haulage at that time. Before WW1, road haulage was scarcely a practical proposition over any distance. The number of road haulage vehicles rose rapidly; by 1930, there were 350,000 goods vehicles on the road, and by 1938 half a million. Most vehicles were owned by operators moving or delivering their own materials (some of which would certainly have gone by rail previously). About a fifth were general hauliers able to undercut rail for the easy traffic, but unlike buses there was little consolidation. The apparently cheap (but selective) rates quoted for road haulage were regarded as unfair, if not unscrupulous, but even partial regulation in 1933 hardly eliminated such methods. In 1925, the RSA was given a lecture about the effects of competition and the issue of road and railway charges, and this seems to have been the first occasion when concern was expressed to RSA members about what was happening.

Not all the emerging problems were related to competitive influences; just as worrying was the beginning of Britain's slow decline in many areas of heavy industry and the slow but in-

* A useful observation about this issue is given in *Journal of the Railway & Canal Historical Society* Vol 35 Pt 10 (December 2007), *Beeching was too Late*, Peter Butterfield, p793

evitable diminishing volume of the heavier loads which railways were best suited to carry. For example, between 1923 and 1937 coal for export halved; meanwhile, coal brought into London by rail remained static while that coming in by sea doubled. This should have meant the railways trying harder to retain the remaining traffic.

More grievances

The end of the war created all kinds of anomalies in the wage structure as special war bonuses were phased out. The railwaymen reacted by demanding a standard wage for each grade, irrespective of company. The companies disagreed and the outcome was a national rail strike beginning in September 1919 involving all grades and with the footplate staff (who were among the better paid) supporting the other staff in a fight of unprecedented loyalty. Meanwhile the army (from which many railwaymen had only just returned) patrolled the railway to prevent sabotage and tanks even patrolled the larger installations, presumably more as a demonstration of power than with much else in mind (railways were still under government control). The railwaymen won, with a standard 8-hour day and more or less standard conditions across Britain. The companies reacted by reducing staff to recover some of the additional wages and the difficulties that the 8-hour day produced in some of the rostering. Things were tense on both sides.

Railway amalgamation created a further period of uncertainty and there were redundancies. Many staff were uprooted in order to maintain positions in the new companies which their date of seniority entitled them to, but in new areas. It was not altogether a happy time. McKenna considered this uneasiness a contributory factor in so many railwaymen joining the 1926 General Strike and paralysing the rail network. He observed that those who refused to take part had their record cards stamped 'remained loyal'—little compensation for the title 'blackleg' given to them by their colleagues. It took many years for loyalties to recover. The general strike caused many firms carrying goods to try out road transport for the first time and there was some surprise at the amount of goods (and even minerals) that were shifted in these unhappy days. A proportion of this traffic never returned to rail, with road carriers using this unexpected opportunity to promote road transport to British industry as a credible option.

The railways' response to mounting competition

We have already noted that competition to the railway monopoly was an unexpected consequence of a whole range of factors coming together at once between around 1919 and 1922.

By the time railways had recognized that emerging competition was potentially a mortal threat, matters had already become difficult. The reaction may perhaps be described as a fivefold response, but perhaps falls short of ever having been a strategy.

Marketing

Perhaps the most important requirement was to develop the art of marketing and bring it to a professional level. An LSE-trained GWR representative was moved to give the RSA his thoughts on railway salesmanship as early as 1926. He thought there were two aspects to this: canvassing, on the one hand, and advertising, on the other. He thought the railway had people who were not bad at canvassing for traffic, but was quite critical of the training they received; he thought that with so many different things to sell some specialization would have been useful.

So far as advertising was concerned, he thought that some of the early Victorian posters were brilliant, being of high quality, simply laid out and with the essence of the message obvious from the headline. It had not been long before railways could be found producing cluttered layouts making the message difficult to decipher and with the attractiveness of the offer seriously diminished by being poorly printed on poor quality paper. Moreover, railways had got themselves into the habit of hedging round their offer with interminable and wordy conditions that passengers found off-putting. He wondered why railways

seemed to make things so apparently complicated and unattractive: the very opposite of what they ought to have been doing to attract new traffic. Fortunately he considered that, of late, things were getting better, but constant attention to detail was called for. Similarly there had been a real attempt to try and make timetables and similar material much simpler to use. Another revelation shared with RSA students was that passengers did not actually travel for the sheer pleasure of paying 1½d a mile, so advertising needed to press home the attractions to be found at the far end of the journey—he thought this was sometimes overlooked. Another revelation was that so few railways seemed at that time to make any real attempt to match the cost of advertising with the additional traffic it generated; the GWR did it (they had 43 headings into which advertising was classified) and they thought it a useful means of determining whether expenditure was too much or too little in each class. He also suggested that advertising that appealed to children was very productive in grooming future travellers, and observed the romance associated with certain named trains which he thought a powerful anchor to draw in traffic (he cited the *Flying Scotsman* as a tremendous marketing opportunity for the LNER and observed this was something its predecessors had quite failed to recognize).

Publicity was an area in which the LMS perhaps excelled: they even published books on the subject of salesmanship and advertising in 1938 which covered freight as well as passenger salesmanship. The LMS was fortunate in having Ashton Davies on its team who seems to have been a natural marketer and through his 'tell your friends' campaign in the LMS magazine he was an early proponent of what later became known as viral marketing (he became RSA President in 1937). It was Davies who first recognized that the LMS should make it easy for people to park at stations and introduced parking spaces to make it easier for people to leave their cars safely. However, all the railways became more commercial as they apprehended their long held monopoly falling away, using emerging techniques such as radio broadcasts, lantern slides and film as well as gingering up more traditional media such as posters, timetables and handbills with photographs and professional artistry of a very high quality.

The Underground Group had already shown before WW1 that posters designed by professional artists were successful at generating traffic. After the war, the LNER was the first main line to produce really appealing and memorable posters and gained quite a reputation; the LMS followed quickly and produced some design classics. The Great Western was exceedingly slow to catch on, and Roger Wilson in *Go Great Western* observed that 'it cannot be said that Paddington rose to the [marketing] challenge with any degree of determination'. He suggests that Great Western publicity was approached in an amateurish way, and that its publicity department merely farmed poster work out to printers who drew upon retained artists and had no real feel for the task. What else could they do without the in-house skills?

The LNER had developed its own in-house expertise while the LMS, having recognized a deficiency, appointed an outside specialist to commission artists. It was not until the 1930s that the Great Western methodically appointed high quality artistic work and then the impact was mitigated by the use of indifferent printing on poor quality paper organized by the railway's own stationery department. Unfortunately, the function of publicity was still seen by that company as a mere cost where economy was the most important factor, rather than an essential means of securing future revenue. The GWR was better in other areas and produced a host of materials, from jigsaws to bookmarks and history books to maps, that kept the railway and its interesting destinations uppermost in the public mind. A feature of the 1930s was the huge boom in tourism from abroad, which resulted in an expansion of the publicity machines of all the companies anxious to tap into this market, one outcome of which was the placing of advertisements abroad, coupled with an expansion of ticket outlets, and the printing of the more relevant railway publicity in (for example) Dutch and

German; sometimes railways embarked jointly in arranging foreign publicity.

In some areas of marketing activity the railways acted as one. The slogan 'It's quicker by rail' was adopted by all companies, as were a number of others, including 'A penny a mile' to exemplify the cheapness of third-class tickets. There was an RSA lecture in 1928, given by no less a person than the LNER's assistant general manager, who chose as his subject the topic of selling transport. There was also a timely address in 1929 on the problems of selling rail transport, which highlighted the mounting importance of the subject and its complexities; this was given by John Elliot from the Southern when he was working for Walker (general manager, Southern and RSA President that year) and, taken together, these lectures perhaps are an indication of what was worrying senior staff at the time. It justifies the conclusion drawn by Wedgwood that the railways were now focussing on where the business was coming from, rather than how it would be carried.

Ashton Davies gave the RSA some revealing thoughts during a 1938 lecture; he was by now an LMS vice president with commercial responsibilities. Davies took the view that in the earlier years of the twentieth century Britain had been the workshop of the world and people wanting things came here to buy. Industry as a whole became one huge shop and the skills of salesmanship were lost, the railways being equally contaminated owing to their monopoly situation, but certainly no worse. In 1928, a government committee complained about the lack of appreciation of sound sales principles in industry and this slowly shook things up; by 1938, Davies was suggesting that railways were now well ahead of the game and firmly understood issues around competing modes and availability of discretionary income as it affected inclination to travel by particular modes, or at all.

Within the LMS, the recognition of the need for professional salesmanship was partly effected by restructuring, so that a new chief commercial manager would be the 'advocate' of the public within the railway administration, responsible for ensuring that the right 'products' were available at the right price at the right time, and that the individual in contact with the public must be a salesman, born or trained. This is exciting stuff, and would pass muster today. He completed his oration with a series of questions to the audience, all railway staff, and all judged by him to be salesmen to some degree as they impacted on the product or the customer. What do you really know about your company and its facilities? What sort of effort do you make to sell your firm and its products to your friends and neighbours? What sort of salesman are you?

In addition to the more mundane aspects of marketing, the railways sought to maintain a high press profile, partly by means of what might be called marketing stunts. The LNER was enthusiastic in this area and by way of example installed radio receivers on both the up and down *Flying Scotsman* on Derby Day 1929, so that the official results could be distributed to interested passengers on special cards. By June 1935, the LNER also operated a cinema van in King's Cross–Leeds expresses. Other revenue-earning activities included provision of a typing service by the LNWR on its London–Birmingham service, an umbrella hire service by the LNER and the operation of vending machines on a number of corridor expresses, initially by the GWR in 1930 and then on a large scale by the LNER. The GWR became quite involved with remote local communities and in some places it was possible to place orders from a shopping catalogue and collect their goods from the station a few days later; it was also possible in some instances to arrange for weekly groceries to be delivered by train.

The GWR was keen to promote sight-seeing in London and to make it easier decided to operate its own fleet of sight-seeing buses, beginning the tour at Paddington where the vehicles met the relevant trains. The LNER promoted visits to the otherwise undistinguished town of Milngavie, near Glasgow, where in 1929 the engineer George Bennie erected, at his own expense, a massive 426 ft long monorail over the LNER branch line upon which it was intended to test the propeller-driver 'railplane'.

Although it cannot be said that this eccentric idea didn't work at all, from a technical and economic viewpoint it was disastrous and was one of several reasons why this once rich entrepreneur died penniless in 1957. The LNER was able to make some money out of the attraction while it was drawing headlines, but it soon went out of use and was demolished for scrap in 1956. Overall it must be said that the railway publicity machine came to be of a very high order.

Traffic Analysis

Perhaps second in importance was for railways to engage in statistical analysis of their traffic to a far greater degree than hitherto, doing what the old North Eastern had recommended two decades earlier. Proper analysis would help to identify where to reduce costs and journey times, improve loadings and eliminate waste. Again, the LMS seems to have bitten this bullet quite enthusiastically and did traffic analysis on a scale almost unthinkable without electronic computers; this showed conclusively which flows were changing and where. The highly centralized LMS does seem to have reaped some benefits from its unusual organization. Sherrington observed in his *Railway Economics* that, as railways grew larger and with managers ever more distant from the front line, they became increasingly reliant on statistics in order to manage their business. The issue was not the collection of them, but the appreciation of which were the critical ones and their presentation in a form which allowed correct inferences to be drawn and decisions made. Apparently, there was evidence that some statistical information was presented so poorly as to be useless—or highly misleading. He thought that, of the huge range of data available, the ton-mile was the most valuable one for most goods transport. This was eventually accepted by everyone, but each railway had to arrive at this conclusion in its own way. We have already noted that the RSA was treated to a lecture on ton-mile statistics in 1913, and as a measure of the importance of the subject another paper was presented on statistics in 1925. A useful secondary measure related to the average wagon loading which was really a proxy for efficiency.

The 1925 Lecture (presented by Kirkus, the 1913 lecturer) provided an opportunity to explain that scientific management was very much a matter of applied statistics, the more so on railways where much of the work was not done under immediate supervision. Students were told the North Eastern had begun using ton-miles and wagon-miles as the basic measure of activity in 1902, with suitable statistics for passenger traffic coming along later. After the war the creation of the Ministry of Transport created a need for far more statistics and for them to be harmonized across the railways, factors enshrined by law in the 1921 Railways Act; fortunately the railway general managers fully cooperated in this process so that measures used for one railway were directly comparable with another (a facility not always possible today). For passenger traffic the passenger-mile was the fairest measure of transport usage, but actual passenger journeys were useful for certain purposes too, especially traffic density. Kirkus reminded students that in America statistical methods had allowed aggressive targets to be set for improving efficiency; for example, over 15 years American trainloads had increased by 83 per cent whilst in the UK they had remained static.

While Kirkus thought the UK had much to learn about statistical methods of management, he applauded more widespread use of calculating machines. Larger railways would have found it virtually impossible to function without adding machines; electrically driven machines were introduced in the 1920s—many capable of printing out calculations, the larger ones doing several calculations simultaneously in separate columns. The GWR magazine noted that the new railway returns required by statute caused one set of records alone* to rise from 12,000 documents a month to 112,000 which would have brought the office to a standstill had not a Burroughs calculating machine been brought to bear—even so, to manage this load four boys were occu-

* This was the Engine Driver's Daily Record

pied continuously in managing the forms and entering the data. Given the hundreds of statistical series to deal with, the job was vast. Hollerith machines* were in use in places as a means of actually analysing data automatically, but this required punching data onto cards first (a smart boy, it was said, could easily punch 500 cards an hour). Kirkus was keen to point out that enhanced punched card methods of statistical analysis were used on French railways and might be worth looking into. Incidentally, Wedgwood, when addressing the RSA, was equally keen on statistics but thought the ton-mile measure too crude, preferring ton-mile per engine hour as a better measure of efficiency. RSA students had plenty to chew on.

Davies's lecture in 1938 is more specific about LMS traffic analysis and demonstrates how it fed into the 'right time right price' culture that was being developed. In 1923, excursion passengers numbered 41 million, but this rose to 162 million within ten years; at the same time 'ordinary' bookings reduced from 152 million to just 23 million. It was suspected by some that the one traffic had merely converted to the other, with resultant financial loss. In fact detailed and quite difficult analysis showed that the loss of traffic on ordinary fares had largely transferred to road, while the excursion traffic was much longer distance and sold to a different market; much of this traffic was new and the correct policy had in fact been followed. However, evidence had emerged that longer distance traffic was beginning to decline and this led directly to policies of reducing longer distance ordinary fares and going for faster long distance services, despite higher costs and short term income risk. Subsequent analysis showed that these policies had the desired effect (long distance numbers rose by a third) and receipts recovered and began to increase, more than covering reduced ticket prices. The railways had at last discovered how data could be made useful.

An issue that dogged railways for many decades was that of being unable to relate the whole costs of running sections of railway to the income those sections generated. This was arguably only of concern in relation to the lighter used sections of line, mainly the branches and other feeder lines, but sometimes simply just stations. It was felt that some of these poorly earning assets actually produced a net loss, but this was a very difficult matter to establish beyond doubt with the methods available at the time. The RSA was given an entire lecture on the topical subject of feeder lines in 1932; its title 'The Branch Line Problem' spells out how these lines were then viewed. The railways sought economies in their operation and the Great Western even introduced some diesel railcars in an attempt to reduce costs. Some of the worst cases resulted in withdrawal of passenger services or complete closure, a process that really began around 1930. One of the reasons that railways were slow to take more drastic action was the belief, from an accounting point of view, that small losses on these branches were more than compensated by the revenue from through journeys that would be entirely lost through closure. This was a subject that would rear its head during the 1960s closure programme and even today leaves some nagging questions. The art of data collection and traffic analysis had to develop rapidly during the 1920s and 1930s and there was not much outside expertise to draw on; it all had to be developed in-house.

Joining the competition—Buses

Another important strand in the strategy to defend the industry against the impact of competition was to join it. By engaging in some of the competing businesses themselves, the railways hoped to recapture at least some of the revenue the industry was losing to road. Most of the main line railways had engaged for many years in the operation of small numbers of motor buses, but these were entirely devoted to the operation of railway feeder services, in some cases as an alternative to the provision of more expensive branches or light railways. The Great Western was an enthusiastic bus operator, having 34 buses in 1904 and about

* These machines allowed cards upon which data was entered by means of punched holes to be sorted according to selections set up by operators, hugely speeding up data analysis. Its inventor, American Hermann Hollerith, is said to have had the idea from observing punched holes in railway tickets.

300 in 1928. Although there had been mounting bus and tram competition in urban areas, it was really in the mid 1920s that it became a more widespread problem.

The railways responded to this by entering the wider bus business themselves, for which they needed statutory powers which they obtained in 1928. They immediately began buying into the larger bus companies, obtaining substantial interests in many of them. Initial policies were as unclear as they were varied. The LMS, for example, acquired the whole of Crosville Motor Services in 1929, together with some smaller companies, and even started running some of its own services afresh in Scotland. The Great Western bought part of the National Omnibus Company's services in the West Country and merged them with its own local fleet to form a joint subsidiary known as Western National; by 1933, the Great Western had stopped running any services on its own account though the other main lines continued operated a dwindling number of connecting services, by 1938 probably numbering little more than 100 vehicles.

Eastern National and Southern National were further examples of joint subsidiaries being formed out of the National Omnibus Company, this time set up jointly between National and the LNER and Southern companies respectively. By the mid 1930s they had invested £10 million buying into the bus industry, by which time 33 companies were involved, including famous names like Ribble, Southdown and Eastern Counties. However, once things had settled down, the railways did not normally command controlling interests, buying typically 49 or 50 per cent of the voting shares. This was partly because of undertakings they had given to avoid any accusations of running local monopolies, and partly because they considered that to protect their investment the immediate management of a bus company was best undertaken by busmen. Evidently scared of mucking things up, a GWR manager quipped 'find out what our road transport people are up to and stop them', while Herbert Walker of the Southern even told the railway representatives on bus boards to 'think' like busmen, not railwaymen. The only exception to this rule about non hands-on control was when Gilbert Szlumper of the Southern himself became chairman of Southern Vectis Omnibus Co for a while. In many cases the railways bought up the shares jointly. The LMSR and LNER predominated, though the Southern and GWR operated some West Country companies jointly; this was especially true when bus companies operated in areas served by several railways and was intended to spread control evenly. In some cases routes were switched between bus companies to constrain operations within the area of one or a group of railways.

An RSA lecture on road and rail competition given by the GWR's superintendent of road transport in 1930 acknowledged the impact more flexible bus services were having on rail, but thought that the railways' recent acquisition of road powers should lead to a definite strategy. He proposed co-ordination of timetables, more efficient interchanges based on stations, inter-available tickets and closing certain station or sections of line where the bus was the better option. This all has a familiar ring!

Even without 'controlling' interests, the railways did exert influence on the operation of the companies' combined fleets of some 19,500 buses, said to be 47 per cent of the UK bus fleet. Apart from migrating their own services into the more efficient bus companies and reorganizing services, several strategies were adopted to reduce wasteful competition. In this respect the arrangement probably helped support some slight thinning out of the rail network that began in 1930 with the closure of a few of the very least used stations and a small number of highly unremunerative branches. Later commentators suggest that the railways could have done more through their ownership of bus companies to integrate transport connections and reduce competition, but there was evidence of timetable coordination and ticket inter-availability, and it must not be forgotten that the railways were the largest single beneficiary of bus company profits which may have outweighed individual instances of apparent waste. In town areas, the railways set up joint committees with many municipal bus operators, the outcome of which was that

the railway bus operators effectively ceased to compete within those city boundaries while municipal operators did likewise outside the cities; the committees also promoted some transport integration where practicable. Such strategies, pragmatic and useful at the time, would probably be illegal today.

In 1930 a new scheme of road licensing came into force. Henceforth buses, bus operators and drivers and conductors required to be licensed, the effect of which was to improve standards of professionalism. New regional bodies of traffic commissioners supervised all this. Importantly both bus and coach routes had also to be licensed and the commissioners could restrict or encourage competition in terms of frequencies and fares as they saw fit, in the wider public interest. When proposals for route or timetable changes were made they were published and the commissioners would hear objections. The railways used this privilege freely in order to protect their own train services, and this is said to be one reason for the slow development of scheduled long-distance coaching.

Joining the competition—Goods

The new road transport powers of 1928 also gave a fillip to the railways' own road services, the legal position of some of which had been questioned. The railways' management of road hauled goods was complex as the peculiarly British service of collection and delivery (to and from railheads) was generating an apparent loss of over £1 million by 1937; however, it was felt that overall rail-hauled goods was profitable and that, if they reduced or stopped collection and delivery, then they might lose a lot of rail traffic to road hauliers for the trunk haul. Detailed analysis was evidently lacking, but continental railway systems were beginning to introduce such services, suggesting it was regarded by customers as useful. There had already been innovation. In 1928 the characteristic railway container was introduced in an attempt to reduce the irritating and expensive business of transhipment of small loads of goods *en route*. These were not the first containers by any means but they were the first built to a standard size agreed by all the UK railways and were also suited for mounting on road trailers for final delivery or delivery to a rail depot. Although of standard size, there were several types for different use; for example ventilated or refrigerated versions were available. These remained a common sight on the rail network until the 1970s when (to the extent surviving traffic required containers) they were displaced by the new and somewhat larger international stackable containers.

Once the railway had wider road powers, they immediately began to protect their precarious position. In 1933, the four main line railways jointly bought the large and respected road transport operators Carter Paterson and (via its owners Hays Wharf Cartage) Pickfords, both of which had been around from Victorian times and with whom the railways had been on friendly terms; these hauliers already provided some railway cartage services, for example. This was quite an investment, setting them back £3 million, or £150m at today's prices; the carrier Chaplins was added in 1936. There was soon evidence of some railway influence on these businesses and Pickfords further developed their parcels business in conjunction with the railways' own parcels services and built new depots on railway land; they also ran some touring buses. In 1940, Thomas Cook & Sons (the famous tour and travel agents) was acquired by Hays Wharf and came under railway control, giving the railways a larger network of showrooms and sales outlets.

The RSA's 1930 lecture on railway road transport (already referred to) was given when road haulage strategies were still unfolding. The lecturer considered that, in reality, the vast bulk of freight was secure and that only 6¼ per cent was actually likely to suffer from road competition, of which a third had already been lost; his analysis was that it was a matter that required study but not panic. Subsequent events might perhaps suggest that more vigour would in fact have been helpful. The analysis already done was to study road transport methods, particularly pricing and preferences for full loads, but the railways' reaction to these discoveries was quite slow. He did observe that hauli-

ers had engaged widely in parcels traffic but had come unstuck upon discovering that small parcels were as much an irritation to them as the railways found them to be.

Joining the competition—Air and hotels

In 1934, three of the big four railways went into the airline business, jointly starting Railway Air Services Ltd in conjunction with other air pioneers subsequently bought out by the railways; the LNER alone steered clear, probably because they could not afford the investment. In addition, several railways separately bought into individual airways services that suited them. The railways embarked on some interesting tactics to arrest development in competing business, for example by threatening to withdraw vital rail ticket concessions from travel agents offering to book tickets on non-approved airline routes.

It was early days for the airline business, and traffic was hardly huge; receipts from air transport grew from a £6500 loss in 1933 (when the Great Western tried it alone) to £51,000 profit in 1937—modest, but a platform upon which to build. The GWR's pioneer service operated between Cardiff and Plymouth with the plane, flight crew and engineers supplied by Imperial Airways but traffic staff and marketing provided by the GWR. The flight cost was £3 10s single (£6 return) and at the Plymouth end passengers were taken by bus to Plymouth station, providing an integrated service. The plane also carried express mail, making a virtue out of the long alternative journeys by road.

Hotel interests were reviewed. New hotels were established to stimulate holiday traffic, such as Gleneagles in Perthshire (1924) which promoted golf. The GWR opened the Manor House at North Bovey in 1929, and the LMS opened the Welcombe at Stratford upon Avon in 1931. Unproductive hotels were closed; between 1923 and 1937 the total reduced from 84 to 74.

Savings

In addition to revenue-generative ventures, the need for savings was becoming critical.

New technology

The introduction of new technology to reduce costs was difficult without investment. A popular approach, where justified, was to introduce electric traction or power operated signalling (or both) which produced large savings on operating account for a given amount of traffic. In many cases, capacity was also greatly increased, which allowed more attractive services to be operated, stimulating even more traffic. The Southern took the most consistent and aggressive approach towards introducing both electrification and power operated signalling, though the LMSR and LNER looked closely at a number of schemes (with some introduced in Manchester and Tyneside). Of course, the Southern was in a different position to other railways with its dense London network and high commuter usage—in 1923 the Southern generated about twice the proportion of revenue from passengers (at 62 per cent) compared with the other three railways.

Certain railway activities were not amenable to drastic cost reduction. In particular the railway canals continued to be a drain on revenue, though losses were reduced from £152,000 in 1923 to £64,555 in 1937, accompanied by a small reduction in mileage to under 1000 miles. Mechanization had a part to play, and by that means it proved possible to reduce the reliance on horses for road transport and shunting, enabling large numbers of farriers and stables to be dispensed with. 19,213 horses on the books in 1923 had been reduced to 13,122 by 1937, but it was not until 1956 that horses were pretty much entirely superseded (though isolated examples of horse shunting continued until as late as 1967, when 'Charlie' was retired at Newmarket on 21st February). The abandonment of horse power is a good example of switches in skills taking place in a comparatively short time over the industry's long history, the upheaval being quite large in requiring mechanical know-how to be found on a large scale. The inter-war drop in the number of horse-drawn vehicles of over 10,000 was made up by an increase in only 7600 mechanized vehicles. This Modernization was not without its

problems. Depots usually had spare horses and carts, drays and vans available to deal with problems or unexpected traffic, but expensive motor vehicles were more scientifically allocated and staff had to manage more carefully. On the plus side, motorization allowed much greater cartage delivery areas to be designed, with consequent operational savings and the ability for vehicles to be moved around to deal with peaks.

Amalgamation did achieve cost savings, though they were patchy. The LMS, for example, found it was possible to reduce its locomotive stock by a quarter by 1934, with consequential savings in workshops and spares inventory, together saving £2 million a year. However, taken together, such activity required a whole range of new skills that had not naturally been commonplace in the railway industry hitherto. Gourvish in his *British Railways 1948-73* hints darkly that there was a body of opinion that suggests more effort should have been expended reducing costs on amalgamation in 1923, and that railways had been too slow recognizing that competition was looming. Having said that, during the period 1923 to 1937, the overall number of staff in the industry fell from 669,648 to 574,521, or 14.2 per cent.

Pooling

In a further attempt to reduce wasteful competition the railways entered into a number of voluntary pooling agreements where substantial 'flows' of various traffics were pooled and shared out on an agreed basis, allowing cost reductions to be made and some joint marketing to be undertaken. Some pools (usually very local) had come into being even before WW1. Three huge, voluntary pools were set up in 1932, with others following. The pools included passenger and freight traffic between (for example) London and Scotland (LMS and LNER), London and Birmingham (LMS and GWR) and London and West Country (Southern and GWR). A 4-railway pool was set up in 1934 covering all railway parcels traffic. Amongst other things, the pools allowed switching of traffic between different companies, trains, stations and staff and were very unpopular with the trades unions as savings in cost inevitably translated into staff reductions. (Josiah Stamp publicly stated there were 35,000-40,000 staff to be saved by the LMS-LNER pool alone*.) Pooling had a huge impact, and by 1934, 53 per cent of all rail receipts came from traffic pools; the road was set for the complete abolition of inter-railway competition, at least at a practical level.

Though not strictly 'pooling', there was agreement amongst all the railways that cross-London carriage of so-called 'smalls' was hugely inefficient if done by rail, it often taking a whole day to transmit an item, at disproportionate cost. By 1930 it was agreed to transmit such traffic between originating stations and concentration points (generally one or two per railway) entirely by road, regular vans being operated for the purpose.

Freight savings

A lecture to the RSA in 1931 suggests the GWR was a little ahead of the others in managing freight movements, a source of vast cost. The GWR was especially concerned about 'smalls' which was a definition applying to small loads not commanding use of a single wagon throughout a journey and therefore requiring trans-shipment during the journey, with concomitant delay, cost of storage, manual handling and risk of pilferage or damage. In 1930, the GWR introduced a concentration scheme where 'smalls' traffic was concentrated at just 12 stations rather than 62 as hitherto, saving 650 wagons, six million wagon-miles and making huge cost savings. The success of the scheme partly required minimum distances to be set for journeys by train, it being expensive to take goods to a concentration depot simply to bring them back to somewhere near their point of origin. Of course, the amount of railway cartage transport went up in consequence of this concentration, so some railway freight never actually saw the inside of a train. In other cases, train traffic was rearranged simply to focus on fewer points of transhipment, itself generating a reduced need for manual handling. This

* *Wages and Profits on the Railways*, pamphlet by Labour Research Department, December 1932

innovative approach was later to be applied to other kinds of traffic. Nevertheless, the average speed of most freight trains remained hovering at an unimpressive 1 mph or less, and the average truckload was under three tons (in vehicles mostly capable of carrying 10-14 tons). The UK was falling behind in freight movement. In 1930 German trains hauled twice the British average net load, and US trains hauled six times the load. British wagons had a lower capacity and even so were more poorly loaded. Marshalling was a real hindrance; sometimes wagons were remarshalled two or three times in different yards in the same city before the load actually went anywhere, in part because of the pre-grouping duplication of facilities, but as much because the railways were slow to fix the issue.

The London problem

As already mentioned, when railway grouping was originally planned there were to be seven 'groups'. One of these was intended to be a 'London group', comprising all the London local lines, principally those of the Metropolitan, London Electric, Central and City & South London Railways, but possibly certain other lines; detail was insufficiently worked up to be able to say exactly how this would have worked. This combination was eventually deferred, but all but the first railway was already part of the non-statutory 'Underground Combine'* which also operated the majority of the bus services in the region; it was not a complete monopoly, but it was extremely influential.

Just as was happening on the main lines, margins were thin, capital charges high and it was extremely hard to raise cash for new investment, which in any case had a long and unpredictable payback time. A huge issue, recognized before WW1, was that without a monopoly the risks were just too high that some unscrupulous profiteer (today we would be required to use the milder word 'competitor', but we see just such action in cities outside London) would turn up and at minimal cost would skim off the profit.

The government of the day watched all this during the 1920s and concluded that London did indeed need a transport monopoly in the London region, as this was the only way to get 'best value', to use modern currency, and protect revenues to the extent that *private* investment would be forthcoming. And so was born London Transport (LT) on 1st July 1933†. It emerged as a statutory corporation with monopoly rights covering an area of 1986 square miles, over three times the size of today's Greater London, and an area even then comprising 9.4 million people. It had private shareholders inherited from its predecessors, but they had no day-to-day influence. All capital investment had still to be raised privately and there was no government funding provided for.

An interesting twist was that as part of the legislation a statutory pool was created within the London area for all passenger traffic carried locally, whether by rail, Underground, bus or tram. LT and main line revenue was pooled and then distributed according to a formula. This encouraged cooperation between the different companies and allowed various main line branches to be electrified on the LT system, all parties benefiting from the increased traffic generated. This enterprising approach was unfortunately cut short by the Second World War.

Although the formation of LT did not create the administrative economies hoped for, which should have sent a warning to later legislators, the monopoly (and the pool) was thought quite successful and endures with some modification today in Transport for London. It is fascinating to see that in London a transport monopoly is regarded as a 'good thing' and is simply not questioned, while in other major cities moves towards a monopoly is regarded as anathema (those there were have been dismantled) and attempts at transport cooperation for the public good regarded with great suspicion by the competition authorities.

* The Underground Electric Railways Company of London Ltd.

† The statutory name was the London Passenger Transport Board.

The 'Square Deal' campaign and co-ordinated lobbying

Road competition in the freight area was rampant in the 1920s and came from operators mainly owning a very small number of vehicles. Railway lobbying about the alleged unfairness of all this was evident in the early 1930s and 'Fair Play for the Railways' was just one campaign railing for the 'need for equal treatment with the road transport industry', pamphlets being widely distributed and even available at station ticket offices.

Goods operators were subject to licensing from 1934; 'C' licences were issued to operators carrying their own goods, while 'A' licences were issued to so-called public carriers. Both categories provided competition for the railways, but 'C' licence operators would ultimately make their choice on the basis of comparative cost and convenience. 'A' licence operators could more or less charge what they liked to get the business, while rail borne goods was subject to the extraordinarily complex and inflexible system of freight rates over which railways had inadequate control (other than by offering cheap but not always profitable rates). The 'A' licence operators often used unscrupulous and unbusinesslike methods to skim off the easy traffic, leaving the railways with the costlier and more awkward loads that pushed up average costs.

By the late 1930s, a crisis was looming. In 1938, net revenue fell by a quarter, causing great alarm, and a coordinated campaign was launched that November. The reaction was to demand a 'Square Deal', as the campaign was called, where railways might be released from what they regarded as an oppressive and inflexible pricing regime.

The business model was wrong. Regulation had been applied in a different age and in a way designed to make a monopoly behave like a public service supplier, but railways were manifestly no longer a transport monopoly and competition was becoming more aggressive every day, leaving the railways little room to manoeuvre. The railways had been expected to generate a 'standard revenue' each year under the 1921 Act, anticipated to yield £51m; by 1938, it had dropped by a third, leaving a huge financial hole which the railways could not lawfully fill*. The government expressed sympathy and indicated that they would address the issues this raised. We will never know the outcome because war broke out before firm proposals emerged. It did not augur well for conditions after the war when competitive conditions could only have got worse and the railways would be run down again.

'Fair Play' and the 'Square Deal' were by no means the first occasions of co-ordinated action, and the Railway Companies Association (which originated in 1854) had always batted for the industry as a whole. A joint press organization was established by the Association in 1928 to make sure that the most important messages were co-ordinated; known as the British Railways Press Bureau, it also produced an annual facts and figures booklet and other information of interest to the press and the wider public. It is of interest to see how the railways, though independent of each other, so often moved as a pack and spoke with a single voice; the industry certainly recognized, even then, that the competition was not between each other but was with different transport modes (but not yet the car).

The railways (effectively coining the name British Railways, 15 years before nationalization) had no choice but to lobby for their cause. In 1932, the active road lobby formed the British Road Federation, soon to become a powerful force. This came about by their desire to steer the government away from the introduction of a licensing system for goods vehicles, only partly successful as a watered down scheme was introduced in 1934, under pressure from the railways' attempts to reduce what they saw as road industry abuse and lawlessness†. The Federation was

* At this time road charges were pretty much related to the cost of moving the goods, which were not accepted if it were not economical, while rail charges were still regulated, with charges related more to the value of the goods which had to be carried however inconvenient. Road carriers were also in a better position than rail to make carriage dependent on having a back load, while railways had to ignore this possibility when they accepted carriage in forward direction.

† Curious to record that the main driver for the anti-licence campaign and the formation of the BRF was the Underground's Frank Pick (a member of the Federation and long term road transport campaigner who evidently disliked the power of the main lines). A thorn in the side of the Ministry of Transport he was

jealous of perceived advantages held by the railways and pushed hard for more and better roads and development of motorways. They were good at marshalling what they presented as 'facts', but the Ministry of Transport was not convinced they were really doing much more than pressing their own self interests. The BRF did much in the 1930s to highlight the need for motorways and better roads in general, and was instrumental in the creation of trunk roads in 1936, described by some as nationalization of 4500 miles of road.

The road lobby was especially keen on the progress being made by the Germans, and the Automobile Association was proud to have one Joachim von Ribbentrop (then German Ambassador) join them in 1937. During that year a delegation of 255 people (including 58 MPs) went to inspect the German autobahns, the trip being substantially paid for by the Third Reich; the highlight of the trip was not the state dinner to which they were accorded but the laying on of a special train to take them to the Olympic stadium in Berlin to witness Herr Hitler meeting Signor Mussolini, an option which one participant thought had been quite popular amongst the delegates.

The outcome of this was immense pressure to build motorways in the UK, with the propaganda evidently having had its effect. That the Ministry was extremely sceptical about a motorway programme (perhaps the officials had not been invited on the visit) hardly lessened the pressure to spend money on roads. Their preference was for widening existing routes because they didn't think the traffic was anything like sufficient to justify motorways.

The railways, it seems, not only found it extremely hard to compete with these antics but almost certainly failed to guard their already precarious position against the inevitable. Even assuming they had won 'Square deal', it would not have been enough to handle ongoing pressure from the road lobby for motorways, but the outbreak of war (with a certain irony) postponed the issue for the duration, and enthusiasm for German methods did somewhat wane*. The railways should have been ready to address road lobby pressure once hostilities ceased: they were not. Plans for some motorways, including what would be recognizable today as part of the M6, existed even in 1938, and tentative plans for a very complete motorway network were hatched certainly no later than 1943.

awarded a position on the new London Passenger Transport Board on condition he ceased his lobbying activities, whence he resigned his BRF position.

Inter-war traffic

Something has already been said of the efforts the railways were making to secure new traffic and to adapt the existing traffic to the new circumstances, especially in altering passenger fares and goods rates to keep up with the markets the railways wanted to keep. Nevertheless, there was only so much that could be done within the existing framework of statutory limits and the working of the Railway & Canal Commission, which could arbitrate when suggestions were made that rates were unreasonable and make generalized orders to increase or reduce fares if the railways could show that the cost base had changed, which was not done very often. Beyond that, it cannot be said that railway operating practices or the type of traffic using railways had changed profoundly from the days of 1909.

Railways had thus to continue carrying the awkward loads and serving the denser passenger markets, while the road competition skimmed off potentially valuable traffics that were easy to switch. On the goods front, railways were asked to carry some impressive loads, boilers and power station parts were especially awkward and were sometimes out of gauge. Meticulous planning was required in such instances, usually with huge pieces of machinery mounted on special wagons, often loaded off-centre so that they overhung the adjacent running line on one side only (where there were no bridge piers) and required a possession to be taken of the adjacent line as the train progressed along

* A senior Ministry official, commenting on the German people's enthusiasm to sell land voluntarily to aid autobahn construction, was minded to query what significance should be attached to the word 'voluntarily' in the context of a totalitarian state.

the route. Another example of how railways accommodated clients' inconvenient needs was farm removal. A case is recorded in 1937 of a farmer removing from Towcester to Newark with his entire possessions, including 500 animals, his household chattels (which occupied four containers) and 20 tons of farm implements. The railway was told that the journey had to be completed between milking time on one day and milking time the next. Such removals were hardly everyday events but they were not unusual.

Other animal-related removals included conveying all the paraphernalia to and from various agricultural showgrounds around Britain for the many regular shows; this included shifting large numbers of highly prized and temperamental animals and everything had to be delivered and removed in precisely the right order. Railways also became very proficient at carrying circuses around the country; this required special staff to be involved with the planning who understood the requirements of some very unusual animals and equipment, though stowage was generally done by circus staff. Processions of bizarre animals would often be walked from the station yard to and from the circus location. On the whole, these animals were accompanied, well trained and less inclined to make a break for freedom than occasionally happened with farm animals, with resulting havoc. Consignments of bees were inclined to escape occasionally, sending staff for cover until a local bee-keeper could be obtained. These examples are given purely to indicate the diverse and unusual tasks that could face railwaymen across the country at any time, and the resourcefulness that was necessary in a profession where it was regarded as impracticable to train for every conceivable eventuality, a situation which is rather different today.

Hop picking represented railways leaning over backwards to capture a highly specific market. During the height of summer perhaps 40,000 people would descend, mainly from the towns, into the hop fields to do the picking; this required a great deal of train planning, as pickers and their families were encouraged to travel by special trains of suitably ancient third-class stock, sometimes stored specifically for the purpose. The Southern regarded this as such a large business that they managed a co-ordination centre at Maidstone, where trains could be planned around the various hop fields dotted around Kent and Sussex. Most passengers originated from the East End or south-east London and were carried in special early trains leaving London Bridge with their various belongings that were packed in luggage vans. Staff regarded the pickers as rather unruly and trains were often delayed.

Passengers on the various holiday resort trains were easier to deal with; while volumes varied enormously they were largely predictable. Perhaps the most famous was the Southern's Atlantic Coast Express (the ACE). Even in winter, it ran to 13 coaches and uncoupled *en route* into some nine portions serving various destinations along the West Country coast. On summer Saturdays, traffic was so heavy that the ACE actually comprised four separate trains in procession. The late 1930s were, of course, the time that the 'crack' expresses and the famous holiday trains became regarded as a glamorous and sophisticated means of travel, a feature that is surely a testament to the ability of the railways' ever more competent marketing machine. Whether this represented reality is at least to be questioned; but judged by the less demanding attitudes of the time, rather than with today's critical expectations, it seems to have represented good progress against difficult odds. Memories are selective and it is convenient to label this period a 'golden age', but it must be remembered that this hype related to a handful of carefully managed trains that were given priority through the system and in no way represent the norm. The totality was somewhat variable in quality and the lower end (starved of investment and evidence of innovation) was not much to be proud of.

The 'crack' expresses were heavily promoted and all sorts of enhanced services were provided in addition to relatively quick timings. Attention to detail included expanded *à la carte* and set menus and an enhanced wine list with some prestigious vin-

tages; it is recorded the *West Riding Limited* cellar included no fewer than five different kinds of champagne and nine brands of mineral water.

The *Flying Scotsman* was perhaps the first train to receive attention; this was actually two trains simultaneously leaving King's Cross and Edinburgh Waverley at 10 a.m., though there were through portions to Glasgow and Perth. During the 1920s, there was an agreement with Anglo-Scots rival LMS not to compete on speed and the LNER decided some innovation was necessary, introducing new stock in 1928 that included a cocktail bar, ladies' retiring room and hairdressing room with barber; the train was scheduled to run non-stop between London and Edinburgh, but this was a sales gimmick as the old timings were retained and for a while, when the train ran with a duplicate a few minutes later, only one part was non-stop. When the competitive timing agreement was abandoned following the pooling of Anglo-Scottish revenue, some of the other innovations seem to have disappeared and in 1938 modern, lighter coaches were introduced.

The first of the prestigious streamlined trains was the LNER's *Silver Jubilee*, introduced on 30th September 1935, with dedicated articulated coaching stock. Demand for this high-speed, high-quality service was immense, despite a surcharge of 5s (first-class) and 3s (third); there was rarely a spare seat. The Newcastle-London run was accomplished in four hours, running non-stop south of Darlington. Its success surprised the LNER, and later commentators observed that, on the basis of the supplementary fares alone, the cost of the train was paid for in just two years. Unsurprisingly, it was followed up by the *Coronation*, in 1937 and in the end there were five special sets of luxury rolling stock shared between the various streamlined services. The LMS was not to be outdone and introduced its own streamlined train, the *Coronation Scot* in 1937. At first, standard carriages were used (given 'high speed' paintwork) but in 1939 brand new luxury vehicles were built; these were hardly used as the train was sent to the World Fair in America that year and, frightened of damage, the coaches were left there during the war.

The special trains needed to charge premium fares as weight had to be kept down. The *Silver Jubilee*, for example, comprised only seven (later eight) vehicles with 122 seats (in compartments) and a further 76 in the restaurant cars. It was then the practice for passengers to occupy restaurant car seats only while actually dining, the latter taking place during (usually) two or even more 'sittings'. Pressure on space soon meant restaurant car seats had also to be used to supplement seating, though it is not clear how this was managed. In the kitchens cooking became all-electric and a refrigerator was provided. When the *Coronation* was introduced two years later, it came with an air conditioning system, thought to be the first on a British main line railway, though the engineers complained about its weight which partly offset the advantages of light weight bodywork.

There was no shortage of innovation brought on by the discovery that speed and quality generated revenue, a far cry from Wedgwood's 1926 observation to the RSA that it didn't really matter very much.

The inter-war era spawned huge spacial change. The most obvious is perhaps the development of vast suburban areas around major towns and cities. The railway industry produced a mixed response to this. The Southern, for example was extremely keen to tap into this new traffic, and knew that if it coordinated urban construction with new railway facilities, with fast and frequent electric trains, they would gain new and long term season ticket traffic. The response of the other railways was patchy; railways grabbed traffic where this was easy, and were happy to build new stations where land was gifted by house builders hoping to improve their own prospects, but one is left with the feeling railways scarcely put themselves out. On the freight front railways sought to provide new facilities where feasible, and new industrial 'parks' were sometimes very well served: Park Royal in west London, being one example and Slough another.

Chapter 4 – Railways under Government Control

Second World War and Government Control

The Second World War between 1939 and 1945 (WW2) placed similar demands upon the railways as the first had done just 25 years earlier; again the railways went to war with asset condition usually acknowledged to be reasonably good. Discretionary transport was discouraged and the railways were handed over to the war effort, again being placed under government control (also extending to 600,000 privately owned wagons from 4000 different owners). Once again, maintenance was necessarily reduced as staff were called away and engineering focus was diverted. Over 100,000 railwaymen were released to join the forces (about 16 per cent) and another 90,000 enrolled in the home guard. Workshop capacity was seized in a big way and at one point 20,000 workshop staff from 35 London Transport and main line railway workshops were engaged purely in war work. These staff found themselves producing an eclectic range of equipment, including tanks, aircraft, midget submarines, landing craft and barrage balloons, in addition to more mundane output such as guns and spare parts. The LMS alone built over 2000 tanks and was given the job of designing a new medium tank*, of which it subsequently built several hundred and managed the procurement of many others from other sources. One speciality of the Southern was production of fast motor boats. In addition, a huge additional burden was placed upon the network and its rolling stock (freight and passenger usage went up by a half and two thirds respectively). Just after the D-day invasion, there was a 4-week period when 17,500 extra troop and stores trains were run, besides 113 trains simply to carry military mail and 300 ambulance trains conveying wounded troops from ports (the railways produced a number of these trains, kitted out as mobile hospitals). 200 new stations were opened to serve wartime factory workmen. Some railway property was requisitioned (for example, 17 of the railways' 53 hotels, including the Turnberry, which became a hospital with its associated golf course converted into an RAF flying school). Many of the railways' 130 ships were requisitioned, often the captain and crews volunteering for war work. 23 requisitioned ships failed to return. Matters were not helped by several particularly severe winters; in that of 1940, 1500 miles of lines were blocked by ice and snow.

One huge difference in this war was the introduction of aerial bombing, with railway infrastructure a popular and visible target that required a vast organization on hand to undertake emergency repairs on an enormous scale. Severely damaged property was often demolished and not always replaced. Much property and most infrastructure was temporarily repaired, with permanent repairs coming along later, occasionally years after the war was over. As an indication of the scale of the assault, the railway was damaged by over 1000 V1 flying bombs alone, and they were not even directed at railway property. The railways' huge road fleet was essential; at one time the whole cartage fleet was commandeered to deliver Anderson shelters, carmen taking the iron sheets to the exact spot in the garden where the shelter was to be erected. (The distribution of shelters from factories was a vast task handled almost entirely by the railways using special trains and their delivery service.) At night, road vehicles were sent to rendezvous points where they were available for use taking track and emergency equipment to sites of bomb damage.

Like WW1, the new war generated many acts of heroism characteristic of railway staff when up against adversity. Perhaps typical of the attitude was that of the train crew of a 51-wagon ammunition train approaching Soham in June 1944. To the crew's consternation, the truck immediately behind the locomotive was found to be on fire whilst loaded with 40 live 500 pound bombs. Clearly something needed to be done to stop a horrendous catastrophe that would, had the whole train gone

* The new design was for the Covenanter A13 MkIII type, or (Cruiser Mk V). The LMS designed the body though Nuffield designed the turret. The first 100 vehicles were made by entirely by the LMS, with later orders shared with English Electric and Leyland Motors.

up, have destroyed the whole town and many of its population. The fireman, Nightall, managed to uncouple the blazing wagon and returned to the engine, after which driver Gimbert pulled it away from the rest of the train, hoping to leave it somewhere safe. Unfortunately, the wagon contents then exploded, leaving a 20ft crater, completely destroying the station and damaging 700 houses. Nightall and the signalman were killed but, incredibly, Gimbert survived his terrible injuries and lived until 1976. Both trainmen were awarded the George Cross* for their selfless action, which averted a far worse disaster; they also received the LNER medal and a memorial was later placed at the reconstructed station. Locally based American troops, by the way, helped the railway staff sort out the aftermath and the line reopened within 19 hours—there was a war on.

The efforts made by railway staff to operate trains in appalling circumstances, and of the engineers to repair bomb damage in hours that under other circumstances would take weeks or months, are remarkable. It is perhaps a suitable point to mention that the railway had, and in many ways still has, a formidable reputation for pulling together in adversity and achieving the impossible. The unusual and the challenging make railway people foremost in 'rising to the occasion'; and, whilst in wartime there was a national pulling together, this ought not to diminish respect for an industry that can do this, and indeed to find a way to make more use of it. Take the recent floods in Cumbria that struck on 20th November 2009. To help the community Network Rail designed, built and opened within just ten days an entirely new station at Workington North to help link together a community that had been divided by collapsed road bridges—the rail bridge survived; the local train operator organized a free train service to connect both sides of the town and the neighbouring community. Telephones serving 11,000 people were also restored by using the same bridge. This is a far from isolated example of what the industry can do even now.

An unusual insight into war service recruitment was the selection of Sir Charles Hambro, Chairman of the GWR. Improbably, Hambro, a merchant banker, found himself working in the upper levels of the secret Special Operations Executive (SOE), a wartime organization intended to carry out insurgent operations in enemy territory, to create inconvenience to the enemy or loss of morale. He did good work in Scandinavia, where his family came from. In 1942, he was placed in charge of this substantial military organization on the grounds that if he could run the GWR, he could run anything. Alas, this did not prove his forte, and he moved to other secret work during the war, some in the USA, and was given the rank of air commodore to help him in his duties. He remained chairman of the GWR throughout, which by comparison he must have found a tad dull. The SOE, incidentally, had an arrangement with the LMS for supplying track and rolling stock to help train SOE agents how to blow up enemy track and trains, in which it became highly proficient†.

Returning to the wartime maintenance problems, the government set up a trust fund into which money equivalent to the level of deferred maintenance was deposited, but it proved very difficult to spend after the war owing to the austerity conditions that applied, and the backlog went on for years (costs also outstripped the amount available). By war end, track maintenance was two years behind, with extensive speed restrictions everywhere; other assets also suffered from heavily deferred maintenance and there was little renewal. Passenger vehicles were poorly maintained and there had been few new ones; 13 per cent of the vehicles were not fit for service and nearly a quarter of the fleet was over 35 years old. Withdrawn catering vehicles were fitted out as ambulance trains, vehicles for breakdown and repair trains or converted to mobile canteen vehicles for dock workers, staff performing remote duties or for use in troop trains. Many refreshment rooms were also closed so staff and scarce food could be focused on the busier centres. Both passengers and staff remained stoic—business as usual despite

* Britain's highest civilian honour. Five railwaymen have been awarded the George Cross and 28 the George Medal.

† See: *SOE, The Special Operations Executive 1940-46*, M.R.D. Foot, BBC 1984

bombs raining down and damage everywhere. At Ashford, the catering assistant recalled a bomb landing and destroying the back of the building, but after a few minutes tea was still being demanded by customers.

The wagon position was worse, and of the 563,000 privately owned wagons that had been pooled with the railways' own vehicles, over half were over 35 years old and in terrible condition. The locomotive position was less dire as 1300 new locomotives had been constructed, but the majority of locomotives were actually coming towards the end of their lives. In addition, costs had shot up but the government vacillated about increasing fares, just as had happened after WW1. Shipping services were badly hit too. 51 railway ships, with many of their crews, had been sunk or irreparably damaged during the war. Not all of these were lost on active service. The GWR's *St Patrick* was dive-bombed on a routine run to Rosslare killing the captain, 18 crew and 11 passengers; the ship sank in just six minutes. During this horror, steerage stewardess Elizabeth Owen repeatedly swam into submerged cabins and rescued several trapped passengers, becoming the only railway woman to be awarded the George Medal. It borders on incredulity that it was possible to restore the majority of shipping services after the war, though for a time shortages of ships became obvious at the height of the summer season.

Railway Air Services and other airline companies in which the railways had an interest were much curtailed once war had broken out, but over the first three years still managed to clock up four million aircraft miles on the seven routes still operated. Railway-owned aircraft and crews performed government and military work, including flights to France before it fell in 1940. An air ambulance service was even operated to isolated islands in northern Scotland. Ordinary services were not developed after the war, as the government had indicated its desire for state control of major air transport services, and in February 1947 the railway's interests all passed to the new British European Airways Corporation*. The name Railway Air Services (but only the name) ended up with British Rail, but did not survive privatization.

The war in any case created a huge maintenance and repair backlog that made the railway look shabby and had a serious impact on train service volume and quality. Whether or not there had been harmful disinvestment between the wars is still an area of debate, but it seems likely that some assets were not replaced when they might have been, thus storing up trouble not evident at the time. The war manifestly created disinvestment (Aldcroft estimates £200 million at least) and coupled with more intensive network usage and reduced maintenance the railway ended up very run down, perhaps to an extent where recovery was going to take at least a generation to sort out.

Matters were compounded by a tremendous shortage of some materials and rationing of others, such as steel, as the country diverted production into exports, required to pay off its debts. Shortage of steel impacted on rolling stock construction and bridge and rail replacement. Oddly, it was a shortage of hay which briefly created a huge headache for railways with their vast numbers of horses. Gold was in such short supply that on nationalization, in order to provide new passes for senior staff, gold company passes had to be called in for recasting. It was several years before restrictions on materials could be removed and the railways were freed to buy what they actually needed, instead of enduring annual allocations.

Nationalization policy and the Transport Commission

Nationalization was on the cards from late 1945 and once again proved a huge distraction as the railways at first mounted an unsuccessful campaign to change the policy, and then knuckled down to making it work. It was not just railways either, all inland transport was going to be affected. Policy formation and organizational design was incomplete even whilst the bill was being prepared and the whole process was hurried. Ministers

* British European Airways became part of British Airways in 1974.

made astonishing statements about the improvements the public would soon see, drawn from the 'immense' resources of the new structure, despite knowing the resources were in a terribly run down condition and there was no actual plan to address the issue. Looking back, it was a triumph of hope over ignorance and optimism over evidence.

The structure of the new nationalized industry was complex; the world had little experience of creating so large a structure—the employees numbered over 873,000 (four per cent of the UK non-military workforce) three quarters of whom were part of British Railways. The wellbeing of Britain's inland transport was entrusted to a British Transport Commission, numbering just five (soon reduced to four) full time members appointed by the Minister, and 69 support staff, soon rising to over 150. The BTC* was essentially the owner and policy maker for inland transport.

Economist and senior civil servant Reuben Kelf-Cohen† observed that the immense job taken on by the Commission, even if it had been allowed to make progress without any change in course, might have been achievable only over a period of some twenty years (not the two years which ministers had freely referred to). He harked back to the seven years needed to forge together the LMS after 1923, and the Commission was three times that size and in any case required far more upheaval, with less clarity of purpose and relatively fewer resources at the top. He doubted in fact that the desired outcomes had ever been achievable and that in reality the Commission was ungovernable. He reminds us that Lord Stamp had said in the context of the LMS that 'the efficient management of any concern really rested upon what could be supervised by the brain of one competent person' and that if there were doubts about the LMS then the Commission was in difficulty. It was not that large organizations as a class were ungovernable, but the best examples were those that had a clear purpose, had grown organically and where everyone knew where they stood. To create something entirely new with an unclear purpose and where huge geographical upheaval was called for was apt to be problematic.

The Commission was required not only to fuse together and update the railways, it was to manage many ports, the former railway ships and hotels, virtually all canals, about half the UK bus fleet and the whole of the road haulage industry carrying traffic over 25 miles, which would require taking over many thousands of private hauliers as well as running the former railway-owned haulage fleets, themselves substantial. The Commission would have a monopoly in road haulage and railway operations (and canal infrastructure) but had powers to enter into agreements with other ports, coastal shippers and bus operators. Financially the Commission's activities were to be regarded as a single organization (in effect promoting cross-subsidy) and it had merely to 'break even'.

The arrangements at the next level down were, in the light of experience, unhelpful. Responsibility for the operation of each individual transport mode was placed under the control of statutory executives. Lord Hurcomb, the first BTC chairman, was at pains to point out to the RSA‡ that the number of executives was variable at law and this was quite deliberate as the work would only be understood as a result of experience. Initially the executives covered railways, London Transport, docks & inland waterways, road transport and (from 1st July 1948) hotels. In fact, in the light of experience road transport was split in 1949 between a Road Passenger Executive and a Road Haulage Executive; in each case these executives initially took charge of the railways' former road transport interests such as the bus companies, Pickfords, Hays Wharf Cartage and Carter Patterson, though acquisition soon enlarged the portfolio. It was not helpful that the executives were accountable to the BTC but were themselves legal bodies appointed directly by the Minister, not the BTC. This immediately became a fruitful source of conflict

* It is convenient to abbreviate British Transport Commission to 'BTC' where the governing body is referred to, but 'Commission' where the organization as a whole is intended.

† *Nationalization in Britain*, MacMillan, 1958

‡ RSA proceedings in October 1948

and confusion and a rich vein for commentators to draw from. The Railway Executive naturally considered that its members had been appointed by the Minister as the best people to run the railways while the BTC, having all the financial responsibilities, did not agree with this analysis.

That the BTC struggled to achieve anything in its early years is well known. Simple improvements took years to implement from first mention to anything happening. Coordination schemes were started, faltered at Minister level, and were overtaken by events. Charges schemes took years to prepare and a similar time to implement, or were watered down. The Commission went immediately into loss. Most importantly, public confidence was lost as the exuberant political promises were simply not delivered.

Many commentators felt the people at the top were the wrong people for the job and were poorly equipped; others felt the conflicting objectives were the issue; some felt it was the structure of the organization which paralysed activity. Lack of political support cannot have helped (ministers were slow to respond to some of the painful decisions they were asked to make), but a change of government in 1951 put many policies into reverse as the dogma of 'coordination' (whatever that was felt to mean) was superseded by the dogma of 'competition'. The Commission was thus told to cease further coordination and settle down to selling off the newly formed road haulage business (at the end of 1951 it had acquired 3766 undertakings). Proving impossible to find buyers it became policy to sell off just so much as would allow a competitive market to open up (hitting BTC revenues badly as it did so). Such was life at the top.

The problems of the nationalized railway

At the most crucial stage of 1940s policy formation, railway antipathy to nationalization meant that their preferred territorial approach was not given its proper weight and a highly centralized, functional approach resulted, requiring a huge upheaval in middle to senior grades.

To reduce the disruption that would result, the railways were to be divided into regions, roughly equivalent to the existing railway structures except in Scotland, where a new region would take over the LNER and LMS Scottish lines (they each had unique structures in Scotland anyway so this was not particularly disruptive). The LNER was split into the Eastern and North Eastern Regions, reflecting their separate organizational areas, pretty much reflecting the old Great Northern and North Eastern Railway areas. This meant that operationally existing practices would continue substantially uninterrupted, at least for a while (it is implied that regions were not necessarily regarded as permanent arrangements, and they were not then statutory). The other executives were also divided on a regional basis, waterways had five and road transport over ten; this overlapping of areas complicated management of a structure seeking 'integration'.

Perhaps predictably, subsequent upheavals produced a tendency to leave the railway regional structures alone and they lasted for half a century, making the elimination (or at least harmonization) of the amalgamated railways' working practices often quite difficult; some regions were notoriously stubborn to change their ways, and each having their own regional colours based on old company loyalties may not have been helpful.

So far as the railways were concerned, the first problem was separating out a huge number of non-railway activities that had to be isolated and passed to one of the other executives. All the bus interests went to the Road Transport Executive as did some but not all of the road-hauled freight operations; thus long distance movement, including Carter Paterson and Pickfords, went to Road Transport, while collection and delivery activities remained with the railways. Hotels were hived off to the Hotels Executive, together with the restaurant car operations and station refreshment rooms. Joint lines were not to remain joint, and each was eventually migrated to one region or another, or to London Transport. The railway canals were transferred to the Docks & Inland Waterways Executive, together with the newly acquired canals and some of the railway docks but not all of

them; the so-called packet ports remained under rail control. In fact, separation of the transferred railway docks from the rest of the network proved to be a very complex process. Perhaps surprisingly, railway shipping (still a major activity) remained with the Railway Executive, reflecting a mood at the time that a ship journey was a mere extension of a rail journey.

The organization created some interesting new tensions. For example the old railways knew that train catering was in itself loss making, but felt that it was so much a part of the journey expectation that it helped sell tickets, making the overall business of travel profitable (in other words it was a cost of sale and made a 'loss' in the same way as the train guard made a 'loss', or painting the carriages made a 'loss'). This was fine as long as the whole activity sat in one place. When catering moved to Hotels, the problem arose that the railways' net revenue went up, as they no longer carried the loss, while the Hotels Executive now picked up the entire loss that train catering made with no means of compensation. The latter really only wanted to run and modernize the vast hotel operations, the custom through which was increasingly less dependent on rail travellers and called for major attention. The issue was thorny enough for a proposal to be drawn up to transfer rail catering back to the railway, but it stalled at ministerial level; hotels and rail catering were unfortunately then linked inextricably through the sourcing of food and the laundering of linen via huge railway-owned laundries. Fortunately, station refreshment rooms were profitable, but on-train catering had a difficult time, not helped by withdrawal of services during the war and the difficulty in getting it going again (and food rationing did not help).

Inevitably, this initial organization was not entirely satisfactory and there was constant fiddling with the executives, the regions and the BTC's statutory objectives. It was finally acknowledged that the two-tier arrangement itself did not work, and with the exception of London Transport the executives were abolished in 1953 with all activities controlled directly by the Commission via management boards. (Abolishing the executives reduced some of the cross charging issues just referred to.) The railways were required in due course to set up area boards, which in practice were based on the six regions, making them permanent. The area boards (unlike the executives) were selected by the Commission and had substantial autonomy, with planning responsibilities as well as oversight of the regional general managers. This achieved the objective of overcoming the stifling effect of a centralized management but further tended to perpetuate the old company (and some pre-grouping) practices for a further decade. There was talk of these area boards eventually becoming the medium to integrate transport locally but this was never pursued.

The new bodies were so preoccupied with organizational issues that it is not really surprising to see that these featured quite strongly in the RSA programme in one way or another for some time after the 1947-8 lecture programme. It was hard to explain that the Railway Executive operated on a strictly functional basis but the geographical regions were overlaid on this structure, each with a chief regional officer who was not actually 'in charge' in the traditional meaning of the word—he was more a co-ordinator. Then there was the awkward relationship with the Commission itself whose only real sanction against separately-appointed executives was to withhold money—and the Commission did not delegate very much spending authority. There are stories that relations between the bodies became so strained that the Railway Executive actually published two sets of minutes, one in detail for its own use and another for the Commission containing as little detail as it could get away with. The Commission was frequently infuriated by the Executive's often perverse actions, though no doubt well-intentioned.

Against this background, it is now necessary to examine the problems faced by the railway and its staff and how the matter of solving them was approached.

Financial structure

It is sometimes mistakenly thought that when railways and other inland transport was nationalized that some kind of

government financial support was intended. Far from it. The shareholders of the former privately owned companies were compensated with British Transport Stock and this was guaranteed a fixed rate of interest (government backed); this was something which some of the former shareholders could only have imagined in their dreams. This stock therefore required servicing from Commission revenue to the tune of nearly £32 million a year, with no facility to reduce payments in bad times. This outflow at first represented some nine per cent of rail traffic revenue of £346 million with operating costs of £322 million, so even in year one costs exceeded income by eight million, which did not augur well. Nevertheless the architects of the Commission felt that income and costs could be juggled to turn out in balance each year. New investment would be paid for by issuing new stock, merely putting up interest charges to meet the additional burden (implicit in this, is that investment would not be made unless it produced a return equalling or exceeding this extra financial cost).

This was hopelessly optimistic. It proved exceedingly difficult to raise charges, and costs rose rapidly. Only in one year (1952) did the books balance and from 1954 the deficit was out of control and accumulating at an alarming rate—in 1957 it had hit £160 million. The government, perceiving it was not entirely blameless in having delayed some politically awkward fares increases, allowed the railway to park some of this in a suspense account where it would not rack up additional interest, and eventually made some supportive grants to reduce the mounting number, but clearly the issue was unsustainable and created an atmosphere where almost any strategy that could stem the loss was regarded perhaps less critically than it might have been in happier times. This was not altogether helpful, as we shall see.

It is against this demoralizing background, coupled with the run down nature of the network, that the railways sought to make improvements whilst enduring much vocal criticism. It was not a good advertisement for long-sought nationalization (though the alternative might have been even worse) and fostered an attitude hardly conducive to encouraging rail travel against mounting competition and the beginning of the motorway era (regarded by the car lobby as a better use of money than pouring it into 'inefficient' rail). Vast change was called for in a vast organization, but it was not until the early 1960s that good things seemed to happen, though the changes were sometimes painful.

In 1956 the financing of capital investment in nationalized industries was altered. Instead of issuing new government stock, the Treasury decided to make direct grants available, subject to making an annual charge in lieu of interest. Although this was arguably more flexible, it put the railway's capital expenditure plans more under the government microscope and made funding more suspectable to government financial and political volatility.

Incidentally, detailed UK motorway planning had already begun by 1951 yet its eventual competitive effect appears to have caught the Commission completely by surprise. Given that its chairman, Lord Hurcomb, had previously been permanent secretary at the Ministry of Transport and that the impact of road traffic competition was already clear, the lack of planned response prior to motorways coming on stream in the late 1950s is symptomatic of how slow the organization was at responding to external factors. It is a mistake better not repeated, and it is fair to say that planning today is better than it was during the 'fifties.

Traffic

We saw that before the war traffic growth was at best tailing off and in some areas it was declining. The 1947 Act did little to remove the railway's obligations to carry unprofitable goods traffic or to remove the burden of unprofitable branch lines, whose lack of use was becoming conspicuous to all and unprofitable beyond any ambiguity, despite lack of accurate evaluation systems. There may have been a gleam in some idealist's eye that under the Commission there would magically arrive some for-

mula for switching road and rail traffic around, so that it was carried at the cheapest price and greatest profit, but in practice the Commission's structure made this virtually impossible; if anything it made the relationship between road and rail managers more distant than it had been previously. The outcome was that competition continued between rail and road, with rail (and its large fixed costs) getting the worst of it. The Commission itself lamented the lack of coordination achieved—and it was in charge! Even if the organization had been able to facilitate coordination there were tremendous difficulties, not least with the trades unions who could see jobs changing and issues arising over pay rates, as railway and (most) road staff were represented by different unions and had different pay scales. The government wanted to see integration (or rather, lowering costs) and chivvied the Commission from above. It would not be fair to say there was no progress at all, but it was excruciatingly slow and piecemeal.

There were successful joint road-rail schemes of varying types in several places, including a joint freight organization in East Anglia (arranging transport by road or rail at lowest cost) and through trains carrying road haulage containers using rail for trunk haul. But there was not the widespread level of benefits once hoped. There were many reasons for this, but commentators have tended to be quite critical of the staff at the upper echelons of the Commission and the executives, together with the organization that had been forced on them. Some of the senior officers were not transport people and were not ideally suited to running these vast organizations; interestingly, some very senior army officers took up these positions, probably in the belief they knew how to manage and organize large bodies of men; but transport people doing constrained day-to-day jobs are not armies focused on military objectives and attempts to introduce a 'general staff' at the top of this huge pyramid probably did nothing to improve channels of communication.

Passenger traffic on the railways at first stabilized after the war and, apart from a brief peak in 1951, then embarked on lengthy decline. Important excursion and holiday traffic went into accelerating decline, first as coach tours and private cars offered more comfortable alternatives and then as airlines made cheap foreign holidays available. Over the first 25 years of nationalization this traffic had pretty much completely disappeared, rendering vast tourist resort stations grossly underused—many were sold off or much reduced in size. All in all, passenger numbers had dropped by 20 per cent on the 1948 figure by 1968, and 30 per cent by 1978. As an indication of the way cars had siphoned off holiday traffic it was estimated that private cars accounted for just 21 per cent of annual holiday traffic in 1950, but this had shot up to 47 per cent by 1960. This was before the airlines created foreign holiday aspirations or made any significant inroads into UK internal travel. In 1959 the airlines were carrying less than one per cent of the passenger mileage of the railways for internal traffic, and that was on an average journey length 100 times greater than average rail journey; this was of course to change relatively quickly.

It was a similar story with freight, with traffic peaking in 1953 at 22.8 million ton-miles, but falling to 14.7 million in 1968, a drop of 36 per cent. But overall, travel had increased, so railway market share had dropped far more rapidly. Rail passenger market share dropped from 26 per cent in 1948 to just 9 per cent in 1968 (and declined further), while freight market share during the same period fell from 49 per cent to 19 per cent. Plus the losses continued to mount. It was not just road competition—the British heavy industry base already in decline before the war continued to decline afterwards at an accelerating pace, badly hitting rail traffic; the slow collapse of the coal industry in particular was a heavy loss.

The 1953 Act (which abolished the Railway Executive) also included provision for the railways to produce charging schemes based more on the *cost* of carrying goods rather than the Victorian notion of charging for the value of the goods. This ought to have been an opportunity to take on the road hauliers, at last, who were better able to charge what the market

would bear. Suffice to say here that the railways were very slow to change and this is regarded as just one further factor that contributed to mounting traffic loss. A 1955 charges scheme moved a little way to improving the position by substituting 'loadability' of goods for value in many cases (a better proxy for real cost); even so, some goods would still make a loss if the maximum charges were levied (in practice most goods was carried at lower charges). The scheme was modified by the Transport Tribunal with maximum charges reduced in a number of cases and other complications which meant that to an extent confusion still reigned and charges were still not competitive. The railways may have been slow to react to opportunity, but were by no means alone in sharing the burden for inaction.

Modernization

There was both good and poor development work done under the Railway Executive.

The passenger business

Passenger coaches at nationalization were inevitably a varied lot, with many old and desperately out of date (over 12,000 or one fifth were over 35 years old). The Executive therefore embarked on a programme of introducing a large number of new coaches, the BR Mk I. An opportunity was lost to take the best of the old company designs and instead the existing LMS design was updated to produce a workmanlike, but not very forward-looking, vehicle. The bogies gave reasonable riding up to about 70 mph but were rough above that, unfortunately not profiting from some pre-war knowledge on, for example, the LNER. A different bogie design was tried subsequently, but it was not until the 1960s that bogies satisfactory up to 100 mph were reintroduced on the Mk II stock. Nevertheless British Railways effectively managed to replace its entire coaching stock within about 15 years, a pretty creditable performance from its workshops.

The Freight Business

In 1948 the railway found itself with over 1.2 million wagons under its control, divided into 480 different types (and this excludes departmental vehicles). About half of these were the old and decrepit former privately owned vehicles for which a colossal £44 million was paid in compensation. A plan was soon hatched to reduce the number to 150 different types (itself a huge number), but it was not immediately conceived that under unified control a far smaller fleet might have been appropriate. Nevertheless, new and better wagons were designed and a programme embarked on which delivered 200,000 new wagons over the six years from 1948 that allowed scrapping of most out of date vehicles, many of which had been purchased at far more than their worth. Unfortunately, this programme proceeded in isolation from any long term vision about rail traffic and vast numbers of unbraked 4-wheeled wagons remained that were apt to misbehave at speed and derail. It was another 10-15 years before the future of freight was firmly under control.

Freight modernization was painfully slow. Two rather interesting papers were delivered to the RSA that shed some light on freight development over the period. Most stations dealt with goods traffic and had yard layouts often separating out coal, which was unloaded by merchants into nearby staithes for their own onward supply, and other goods that had to be unloaded by rail staff, usually for short term storage in a small warehouse or goods shed. In a number of cases, fixed cranes (often constituting an obstruction) had been replaced by more versatile overhead cranes but little other improvement had been made. At medium to large goods sheds the ubiquitous 2-wheeled barrow had given way to some mechanical handling equipment, including petrol or electric trucks where there was space. Goods were even carried around on pallets, following investigations into how they were handled and how staff could be better utilized. The RSA was told that the LMS had an unwelcome opportunity to completely review practice when their Lawley Street (Birmingham) goods station burnt down in 1937. Following research they

completely rebuilt the facility, abandoning the traditional platform so they could load wagons straight from road vehicles. After the war, this arrangement was found to work well and the Railway Executive adopted the concept as standard. So far as unloading was concerned it was impossible to adopt the same approach as it was impractical to marshal the road vehicles optimally (even if they were all present exactly when needed). It was decided to install conveyor belts, which took goods to sorting platforms where they were correctly stacked for loading onto the distribution trucks. This multiple handling was regarded as an annoyance and research continued into optimal methods of goods handling.

For smaller goods stations and yards, the between-wars practice was to aim for every station to be served by a daily goods train with the objective of next day delivery, at least where feasible. At very small stations, a single station 'truck' delivered and collected any goods (of which there was usually little) that was loaded or unloaded over the following 24 hours. The trucks (usually a covered wagon, or van) were transmitted to larger centres by train according to a schedule and the contents had usually to be hand sorted for onward transmission. During WW2 the Great Western developed a better system called 'zonal' collection and delivery, an extension of the benefits gained from mechanizing road transport. The company was carved up into a number of zones with the largest zonal station becoming a railhead, in some cases with next largest stations becoming one or more sub-railheads. Each railhead made up one wagon for every other railhead (or sub railhead), which substantially reduced the local freight train movements. Freight was despatched from, and received by, the railheads by motor lorry visiting each of the stations for local sorting, storage, collection and delivery, as before. Station yards had usually to be retained for coal, horse, livestock and exceptional traffic, but the system was considered an improvement and reduced engine and train movements, wagons required and staff. This system was evaluated by British Railways and was soon extended across all regions. It was also found under BR that many freight services could be rerouted, avoiding traditional company barriers, and in fact it had proved possible to close a number of local yards.

The traditional mode of freight operation was for traffic arising at many yards in units of anything between a single truck and an entire train having to be delivered to other yards in units also ranging between a truck and a train, but not necessarily in the same quantities or formations as they were when they started. Accordingly, the vast majority of trains needed to be made up and broken down *en route*, often several times. This was done in marshalling yards, where unfortunately there was a great deal of dead time. It was calculated that the average 'cut' of wagons (the number of wagons that could be shunted as a single unit) was just 1½, so the amount of shunting was colossal. The location of many yards harked back to pre-grouping days, while modern needs required larger yards in different places, but fewer of them. There were over 2000 marshalling yards at time of grouping. From the late 1930s, new yards were laid out on a 'hump' basis where wagons could be sorted with far less shunting than previously, and marshalling was therefore much quicker. The ideal yard was gravity-only, where even the shunting loco could be dispensed with, but there were few of these. Even in BTC days, it was recognized that breaking up trains was expensive. The RSA was given an example where ICI (a huge fertilizer distributor) was sending out trainloads that all had to be broken up for nationwide delivery; discussion with ICI resulted in new delivery rotas where trains were delivered intact to local distribution centres at a lower price to ICI and a lower cost to the railway. Everyone understood that trainloads were good.

Nationalization did provide opportunities for rationalization and, as deliberate policy, it was found possible to reduce separate long haul goods trips by road (under several owners) and rail and to put it onto relatively fast trunk-haul freight trains. The Road Haulage Executive also assisted with the railway cartage service reducing (overall) the number of road vehicles making collections and delivery in local areas.

Traction policy

Traction policy was entirely lacking at the start of 1948. With an urgent need to replace worn out and poorly maintained locomotives, the Railway Executive embarked on a fairly substantial programme of steam locomotive design and development that turned out 2500 locomotives with no clear idea of what the railways had to achieve; this policy was simply imposed by the Executive on the regions, to the mounting disquiet of the Commission itself. Bonavia refers to the proponents of this approach as the 'Steam Lobby' and is confident that it was a new feature not present in the old companies. On the plus side, the new designs (which accounted for only 1000 of the total) were cheap, simple, easily maintainable and liked by the crews. The construction programme was justified by the Executive on the basis that it was a stopgap and avoided the hugely expensive reorganization of the motive power depots and other infrastructure designed for steam. Nor were there yet suitable diesel designs available. The Commission was suspicious of this. Coal (particularly good steam coal) was in short supply owing to export requirements, and by the 1960s suitable locomotive coal was said to be likely to run out (in 1946 the coal position was thought sufficiently precarious to convert over 1400 locomotives to oil-burning, though the new BTC soon converted them back). There was no evidence that diesel traction was even being pursued as a development programme. Neither BTC nor the Executive knew what sort of railway they were planning for (and therefore what numbers of what type of unit were actually needed long term). How long was the stopgap that was being filled anyway? None of these locos actually had a life greater than 17 years though built for forty.

Immediately before nationalization, the LNER had plans to dieselize the East Coast main line, while the GWR had two gas turbine locos on order, the LMS ordered two main line diesel-electrics from English Electric, and the Southern had a diesel mechanical machine on the way, these last examples all to test new technology. This is no evidence of any lack of interest in new methods of traction by the pre-nationalization railways, especially given the difficult economic conditions and shortage of materials at the time. These test locomotives were mostly delivered under the new Railway Executive regime, but were not really regarded as much more than a distraction; only the LMS diesel-electrics were really successful but this did not change the new pro-steam policy. Towards the end of the Executive's reign, new traction methods (notably lightweight Diesel Multiple Units) began to be examined but it did not lead anywhere immediately, to the Commission's further annoyance.

It is worth observing that in America steam locomotive construction ceased altogether in 1952 and for some years had been massively reduced. However, conditions there were entirely different to Britain and diesel fuel was extremely cheap. (The cost of fuelling a diesel fleet was just double the cost of providing water alone for the US steam fleet!) By 1957, some real issues had arisen with their diesel traction and it was thought that it had actually increased operating costs. The indications were that dieselization was indeed not something to rush into, though perhaps a lack of commitment was evident in Britain.

Grand Modernization Plans

The Commission began life with high hopes of efficiency and the adoption of modern methods and equipment. Although there is abundant evidence that its preoccupation with organizational design and lack of clear leadership were factors in achieving so little in the early years, external factors also had a hugely debilitating effect on overcoming wartime decay and sapped the morale that should instead have flourished. Authority to spend money was limited by the poor economic conditions and it remained extremely hard to obtain vital materials, such as steel, owing to ongoing export commitments required to pay off government war debt. The 1952 annual report (four years into nationalization) records:

The effects of limitations upon either capital investment or use of materials have been constantly felt since the Commission took over the railways

in 1948, and have enforced in many directions a policy of 'make do and mend' which, whilst it may have been inevitable, has proved harmful both to efficiency and economy.

The start of a new era under these straitened circumstances could hardly be auspicious. In the period 1937 to 1953, commentators have estimated that failure to reinvest in the network caused disinvestment of about £440 million (at 1948 prices) which is actually a third of the value put on the network by the BTC architects (suggesting the BT Stock was somewhat overvalued). However one does the sums, it represents a huge shortfall in asset replacement and this needs to be considered against the 'new' money that was invested in the next decade, most of which, strictly, was 'catching up' rather than 'new' (though the interest that had to be paid was new).

It was not until the Railway Executive was abolished in 1953 that there was more vigour in identifying a future for the railways; by then, mounting losses beckoned major change. This resulted in the 1955 railway modernization plan, predicated on an investment of £1.24 billion over 15 years, described as double the requirement merely to renew and maintain the network on the existing basis. Subsequent commentators were horrified at the lack of rigour involved in the analysis and the acceptance that £600 million would need to be spent anyway, implying no change to the network or the type and volume of service.

The stated objectives were to improve passenger services to make them fast, clean, regular, frequent and more punctual and, where not presently the case, to make them economic or transfer them to road. Freight objectives were faster and cheaper movements providing direct transits for main streams and attracting more full-load traffic that would otherwise pass to road. The financial detail was critical in all this and, put simply, it was that the improvements would generate sufficient new revenue to exceed increased borrowing costs as well as the prevailing deficit, such that the railways would have no deficit after 1962 and be generating a surplus reaching nearly £45 million by 1970; this, of course, was the element that appealed to the government.

The main features of the plan were:

1. *Improvements to track and signalling – £210 million*

   Included accelerating renewals, increasing line speeds to 100 mph, new flyovers, colour-light signalling and AWS.

2. *Substitution of steam traction by electric or diesel – £345 million*

   This programme fell into two parts: electrification schemes (excluding rolling stock) and dieselization of the remaining network.

   London Midland Region

   Manchester to Wilmslow and Crewe
   Liverpool to Crewe and Euston

   Eastern Region

   Southend (from Shenfield), Clacton and conversion of Liverpool Street lines to 25kV ac system (already in hand and costs not included).
   Enfield to Chingford, Bishops Stortford, Hertford
   Fenchurch Street to Shoeburyness
   Kings Cross and Moorgate to Hitchin & Letchworth
   Main Lines (Chelmsford to Ipswich and coastal lines and Kings Cross to Doncaster, Leeds and possibly York)

   Scottish Region

   Glasgow suburban lines

   Southern Region

   Ramsgate, Dover, Folkestone (and Hastings dieselization) and elimination of steam traction

3. *Upgrading passenger rolling stock and stations – £285 million*

   New carriages and refreshment cars, introduction of Diesel Multiple Units, reduced carriage fleet and modernization of stations, depots and parcels handling.

4. *Remodelling of freight services – £365 million*

   Modernization and construction of 55 new marshalling yards and freight wagons and improvements in freight handling. This included fitting of vacuum brakes on all stock and increase in running speeds.

5. Miscellaneous improvements - £35 million

This heading included improvements to the railway's packet ports to upgrade facilities, accommodation for increased technical staff, provision of modern office equipment and computers, increased welfare facilities etc, and research and development.

The 1955 modernization plan actually had its origins in something hatched during 1953 when a number of 'good ideas' were examined and worked up into a modest £500 million series of proposals, including a range of initiatives, from electrification, to more fanciful schemes such as provision of helicopter terminals. By 1954, the urgent need to do something was clearer, in particular with freight, the solutions to which were described at the time as drastic. The 1955 plan, as it finally emerged, was received by government with a degree of enthusiasm, as it was believed it would put the railways on a sound financial footing.

The plan was a huge landmark. It was breathtaking not because of the content (the need for drastic improvement was there for all to see) but because of the unprecedented demand it made on the planning processes of an organization that had never tackled anything on that scale before; indeed it is unlikely many (if any) organizations in the world had much experience of planning on that scale. It effectively doubled the book value of the railways—already vast.

There was little internal expertise in planning and project managing on such a large scale, with no new technology to assist, questionable data to work from and with no clear long term vision of what the railways should be doing in the context of competition or government policy. Of obvious importance was the complexity of comprehending how these individually developed components interacted with each other, the reliability of the assumptions made and the risks involved if they were wrong. (Risk management was not a developed process at that time.) However, the pressure for drastic action was overwhelming.

With the benefit of hindsight, the modernization programme showed itself to be flawed in a number of ways, mainly in consequence of the shortage of planning and analytical skills just described. The forecasting was in fact adrift, some of the assumptions were indeed questionable or wrong, the financial work overlooked certain fairly crucial issues and in strict accounting terms were open to question, and the interrelationships between schemes were not fully taken into account. Bonavia, later supported by Gourvish, considered that it was not a 'plan' at all, but merely a modernization policy. This is not the place to dissect the things that went wrong, but merely to point out that with finances getting worse, and external conditions changing, the plan was 'reappraised' in 1959 before more direct government intervention in 1960 effectively stopped it dead. Incidentally a subsequent Select Committee report that reviewed all this found the government equally to blame for allowing the plan to proceed with all its shortcomings; the government may well have been seduced by the promises of cost savings but itself had no adequate evaluation criteria for these kinds of large projects—prior to the nationalization frenzy, why would it?

Illustrative of the unforeseen problems that were encountered is that by 1958 freight traffic fell so that the railway's financial losses rose from a forecast £55 million to over £90 million causing a degree of panic, not only of the shortfall but of some of the assumptions underlying the plan. Line closures had been slow (only 300 miles since 1954) owing to the statutory processes required, though 400 stations had closed. Reappraisal included scaling back of electrification, rationalization of parcels business, reductions to the freight programme with more focus on block trains and containerization. Remaining investment would be accelerated with main objectives achieved by 1963 rather than 1970, focusing on the main issues (for instance wagon numbers would be reduced by 1963 to a level not originally envisaged until 1974).

The Commission was open to some criticism that at least in part hinted at a shortage of strategic skills to manage a plan of that magnitude following a period of scrimping and saving. Project management, cost control, financial (business case) anal-

ysis and proper project scoping would appear to have been areas of particular weakness. Lack of adequate technical expertise in regard to the new technologies required may have been another. The devolution of responsibility to the regions reduced the degree of coordination at the very time there perhaps needed to be more of it. Close government interest in where major orders went was an unhelpful feature; it was one of many factors that discouraged adaptation of American diesel designs, though their sourcing would have presented major problems. A straightforward desire to test a number of different diesel locomotives resulted in a headlong rush to move into the technology too quickly (following several years of inaction), each region favouring its own designs and orders going to manufacturers not of the railway's choosing and whose products regrettably proved too often highly unsatisfactory.

Some things went rather better and, following satisfactory adoption in France, the policy decision to switch new electrification schemes to 25 kV ac (rather than 1500 V dc) was applauded. There was also some progress with wagon rationalization and improved utilization, allowing 1,107,000 wagons in 1953 to be reduced to 946,000 by 1960, a 15 per cent reduction. After 1960 modernization plans were pursued on a far more rigorous basis and were much better coordinated, resulting in the go-ahead of the West Coast electrification scheme, amongst others, and the introduction of dieselization with rather more reliable designs, some of which are still with us.

In the late 1950s, the loss of financial control coupled with doubts about the soundness (costs) of the Modernization Plan caused a government review to take place of the Commission's organization in general and the whole future of the railways in particular. The review, led by industrialist Ivan Stedeford, was uncomplimentary about the Commission and its labyrinthine structure, and was critical about the cost of the railways; the committee had been one of the responses to the arrival of a new government with Ernest Marples (from road builder Marples Ridgeway) as Minister of Transport. The evidence sought by the committee allowed scope for anti-rail lobbyists such as the Railway Conversion League to get an airing—their proposition was that conversion of the entire rail network to high speed motorways or ordinary roads would be cheaper than modernizing the rail network and provide greater benefits. The committee was not persuaded, though rail-road conversion remained on the political radar for at least another twenty years. More usefully, the committee signalled the end of the unwieldy British Transport Commission though some of its other conclusions were considered controversial and publication was hugely delayed.

Industrial relations during this period was strained. There were lots of issues that emerged, but poor pay and conditions was a factor and parity in rates between men doing the same work but for different Executives (eg cartage men) were challenging areas, the latter not helping the cause of integration. A major issue for locomotive men was their desire for 'lodging' turns of duty to be abolished, a campaign starting in 1945 but impossible to resolve before the Commission came into being. That after nationalization the railway unions found the government (effectively) as their employer no doubt introduced a degree of political posturing that would have been harder under private control. The worst of the strikes was the 17-day stoppage by footplatemen from 26th May 1955 that nearly brought Britain to its knees. Another strike, involving both main rail unions, had been called the previous November but the government had been more conciliatory and it was called off after a route to resolution had been identified (which resulted in a pay increase). What the unions might not have known is the level of resentment built up within government circles by having a gun held to its head. The industrial turmoil is now known to have been a major factor in the government announcing the beginning of the motorway construction program and more visibly switching support to roads, ultimately to the railway's detriment.

After WW2 the government recognized that the existing congested cities had little growth potential and supported the development of new towns on (substantially) green field sites. The

first of these was Stevenage in 1946 and over fifteen emerged over the next thirty or so years. In the main, public transport provision was dire and they were either poorly connected to the rail network, or not at all. The motor car was viewed as the future, at least in they eyes of the architects. Neither the Commission nor the government seem to have done very much to link these large emerging population centres with the rail network. This was a huge missed opportunity, and one which put their successors to cost and trouble providing (less satisfactory) facilities much later. It is almost as though railways had been written off already.

Beeching and the need for change

Before dealing with the arrival of Dr Beeching, it is worth noting a prescient article in *British Transport Review* in April 1956 on the subject of unremunerative passenger train services. The author (who was the district passenger manager at Sheffield) writes in exasperated tones about the lack of action in closing down unremunerative services. His view was that the so-called 'stopping' services (ie not inter-city or suburban) made up 40 per cent of the loaded train miles and as an entity were entirely responsible for the railway's huge and mounting losses. A substantial number of these services cost more than five times to operate than the receipts they generated and there was no prospect of them contributing revenue, even if costs were halved and revenue doubled. Government policy had shifted (he asserted) to one where natural competition was expected to provide the most economical transport options for the public; however, he considered that the prevailing consequence was that these services were effectively cross-subsidized by the profitable parts of the railway and merely made those harder to sell by inflating prices. Providing more modern traction, that was still loss-making, appeared perverse. He speculated on the reasons but concluded that ultimately drastic action would be needed. One reason that he identified for the vacillation has been referred to in an earlier section—that these lines provided feeder traffic to the main lines which would be lost altogether if the feeder closed. He thought this was nonsense and drew attention to many examples where passengers already changed modes at station, especially commuters, *providing* buses were directed to station forecourts and timetables were co-ordinated—surely a lesson today. With the Commission having vast interests in the bus companies, he considered that co-ordination should be possible and that buses would provide a cheaper (and in some cases better) option than a branch line train.

This article is mentioned to indicate that the nature of the branch line problem was understood by 1956, largely because (at last) the Commission had succeeded in building up a traffic costing service that was finally producing some useful and worthwhile analysis. The magnitude of the losses that were concentrated in the stopping service sector was probably suspected previously, but was now there for all to see. Despite this, very little was done about it; route mileage was reduced by about eight per cent in the years 1956-62, and stations (passenger and freight) culled by 14 per cent (to 6728). With losses mounting alarmingly and the modernization plan in trouble, the good Dr Beeching was asked to sort out the problem and was appointed chairman of the BTC and chairman designate of its successor, the British Railways Board. He was an industrialist who came in from ICI but was not a complete stranger to the issues as he had served on the Stedeford committee which had reviewed the BTC's structure in 1960.

Beeching's main conclusions were that services that merely contributed loss should be shut down and that the productive railway should be better fitted for modern requirements and should be modernized. There was a middle ground where new working methods could turn loss to profit or even new flows of traffic introduced. Beeching understood that the railway was actually very good at handling certain types of traffic, but was not necessarily so appropriate for many of the historical flows and needed to change radically to play to its strengths. He was quite unsentimental about the inevitable reduction in mileage

that would result and believed other modes would handle the traffic better and that the government would be a great deal more supportive of the rest of the network if it could be returned to profitability, as instructed. To facilitate the process, the Commission would be abolished—it was hardly regarded as a satisfactory management tool despite occasional successes—and a new British Railways Board (BR) created with more realistic objectives and fewer of the wholly out-of-date carrying and charging restrictions that harked back to a much earlier age. Nor would there any longer be the distraction of the canals, buses and road transport groups which were hived off separately (the BRB retained shipping and hotels as it was awkward to separate them, and also kept other oddments like museums, films, police and Thomas Cook & Sons, though within a decade the latter was sold as a profitable going concern to Midland Bank).

The so-called Beeching report was the result of intensive internal study and had a mixed reception, not least because the list of stations to be closed was set out in detail, tending to divert attention from the investment elements. At the time of the report, twice as much revenue derived from freight as from passenger services, though both service types made a loss after all the indirect costs were added in. The worst culprits (by a long way) were the stopping passenger services and wagonload freight, with so called 'sundries' coming in as the next worst loss maker. The only freight traffic that was actually profitable was coal (there were then 620 collieries, all but 20 rail connected). More detailed analysis revealed some insidious areas of concern. Seasonal traffic, such as holiday traffic, that appeared profitable on one set of measures was producing appalling utilization on another. Without even looking at the fixed infrastructure that was needed for only one day a week during the summer season, the amount of rolling stock it required was substantial, all having to be maintained and staffed, and this was despite the halving of the summer peak over the previous few years; some 6000 coaches had only been used on 18 occasions the previous year, 2000 of which had only been used on 10 occasions. Wagon utilization was no better, with most of the huge number of wagons spending most of their time stationary. Far from utilization getting better, terminal time had actually gone up from 9.96 days in 1948 to 12.51 days in 1963, and that excludes standing time in marshalling yards *en route*. The report suggested passenger coaching stock could be reduced from 22,500 to around 3000 and multiple unit vehicles from around 11,000 (many new) to 1200 or so.

The retained network was to be developed to handle the dense traffic to which the railway was best suited. This included development of 'liner' container trains and introduction of block trains for coal and dieselization of remaining passenger services, including widespread introduction of DMUs on remaining local services. The report contained no specific plan for development and electrification is not mentioned (electrification and other schemes already in hand would continue). There was more work to be done.

The Beeching report is really the blueprint for the compact and business-led railway of today, serving traffics best suited to the railway and in many ways requiring rather different skills to the traditional ones, though at the operating level some things remained unchanged owing to the long life of the equipment provided. Beeching proposed mileage reduction from 17,800 (over half of which carried just 4 per cent of the traffic) to about 8500 miles.

Although Beeching is usually vilified for 'inventing' rail closures it should be said that between 1948 and 1962 route mileage fell from about 19,500 to 17,500 miles, about ten per cent. Passenger stations fell from 6685 to 4712, a drop of 30 per cent. That Beeching subsequently accelerated the process and put some structure behind the strategy is the real point. Pre-Beeching closures, incidentally, included some significant pieces of railway, such as the old Midland & Great Northern Line from Leicester to Norfolk in 1958, which probably (or, at least, should have) indicated to the Commission that main line closure could be undertaken without the world ending.

The second 'Beeching' report

It will be seen that although there were good words said about modernizing the retained network, the 1963 report was thin on detail about improvements, but detail-rich about the areas for closure and withdrawal. Accordingly, it is often viewed today as a rather negative document. However this was purely because the loss making elements were relatively conspicuous while the analysis required to identify the development potential was a time consuming exercise, some lessons having been learned from the miserable experiences of the 1955 plan. It took two more years for the detail to emerge in what might best be regarded as Beeching Part II.

The second report 'The Development of the Major Trunk Routes' was eventually published in February 1965, just three months before Dr Beeching returned to ICI. The thrust of the report was that 3000 miles of the 7500 miles of retained trunk route should be earmarked for intensive development (by 1984). The process had not gone well. There were huge arguments about the various assumptions that had to be made both at a national level and at a route level, hardly surprising given the crude techniques available and the soundness of the data available.

The routes actually selected for development included: London to Brighton, Portsmouth, Bournemouth, Plymouth via Bath, Swansea, Didcot and Birmingham, Rugby and Birmingham, Manchester and Liverpool and West Coast route to Glasgow, Edinburgh and Aberdeen, Peterborough, York and Newcastle (and then Carlisle), Derby via Birmingham and Nottingham via Grantham, and a small number of cross country routes. The plan was partly inevitable given electrification was already proceeding on parts of it. Policy changes had a further impact over the following few years, but inevitably (because the routes were busy anyway) it remained something of a foundation stone and was pushed forward to an extent. Clearly Reading to Exeter via Westbury, Midland main line and East Coast direct to Edinburgh are significant later adjustments. Just as importantly, relegation of remaining trunk routes to secondary status was also a significant piece of network definition, for example Southern route to Exeter.

Given the techniques of the day, the report was a fair analysis of what had to be done, and it did set subsequent modernization policy, within inevitable and ever-changing financial limits. It is, looking back, regrettable that the first (and perceived to be negative) report is really the only one that most people were aware of. Lessons there for how the vital job of public relations is handled that are just as valid today.

It was also during 1965 that, to reflect in the public mind the concept of modernization, the style 'British Rail' was formally adopted, together with new colours and graphics and elimination of separate regional corporate identities in public communications. A criticism, if one were to be made, is that station modernization took very low priority indeed, unless reconstruction was unavoidable for other reasons. Station modernization had not been a priority since pre-war days, and remained relatively in the doldrums until quite recent times.

Transport as a social necessity

At the time that British Railways identified the option of drastic network reduction, nobody was overly concerned about the social contribution the threatened lines made. Neither the new British Railways Board nor the government had concerns or obligations to meet wider social objectives, and it was felt that the fairly small numbers of people forced to abandon the railway would easily convert to the bus network. Where demand was there, operators would want to run additional services, would they not? However, an issue arose where adequate alternative bus routes did not exist and where those transferring from rail were in such small numbers that bus operators were disinclined to make improvements.

In such cases Transport Users' Consultative Committees, which investigated closure proposals, could point out that 'hardship' would result. It was then left to the minister to decide what, if anything, was going to be done about it. Hardship was a very

flexible term, and rather subjective. Its use was as much related to the volume and quality of argument of those objecting than to whether passengers would suffer real hardship or not. Whether a closure would impact adversely upon the inhabitants of a marginal parliamentary seat was also highly relevant in interpreting 'hardship'. Depending on the force of argument and the wider political situation, the minister could either refuse to authorize closure (in whole or in part) or could require alternative bus or rail services to be provided or improved, at (ultimately) the railway's expense. This was not a very satisfactory arrangement. Both hardship and the adequacy of alternative services were difficult to assess and the loss of through ticketing and connectional arrangements and possible inadequacy of (for example) waiting and sheltering would all impact on inclination to use alternative services, before even considering actual service quality. Many dozens of railway replacement services were introduced but very few endured, and there was no real attempt to provide any long term degree of service adequacy or security. Nor were most of them ever shown in railway timetables, keeping services a secret. The rail replacement services became the responsibility of the National Bus Company upon its formation and soon became merged in their wider operations, making their monitoring even harder. In that respect, reduction to extinction of replacement services was little different to what had been happening on the rail services superseded, or on branch lines that had yet to be culled. Rail lines could be run down to one train a day at an inconvenient time, with no sanction other than commercial loss to the railway, as it was only complete closure or withdrawal that triggered any formal process—a position that is still technically the same today, though in practice franchise agreements ought to prevent this happening improperly.

Although the railways later came in for some criticism for their attitude to these replacement bus services, this is at least in part unreasonable. The reality was that all rural bus services were suffering from traffic loss, and retrenchment was happening to networks everywhere. When the BTC was abolished, the bus groups were placed in the hands of a statutory Transport Holding Company, required to operate services on purely commercial lines and shorn of any responsibility to coordinate. Transport integration was off the agenda (it had been weak anyway) and the companies were more focused on retaining diminishing traffic, even if it meant competing with branch lines that had the same problem. In 1963, many rural bus services were running at a loss and inevitably service reductions to reduce losses made them more unattractive, driving traffic away even faster. By 1971, it was thought that nearly 42 per cent of the rural population had no access to anything more than bicycles and owing to bus service reductions relied heavily on neighbours with cars. As bus services were (now) entirely private entities, there was, of course, no sanction that could be taken or formal inquiry that could be brought to bear. The decline was brought about primarily because of the availability of the private car, precisely the same reason that had caused rail traffic to decline. The mantra suggests that car purchase is 'aspirational', and often unrelated to public transport alternatives; unfortunately, as car usage rises, public transport quality often suffers in order to match falling revenue, tending to accelerate further switch to the car for those who can and reducing the quality of life for those who cannot. Bus operators (as with British Railways) tended to allow cross-subsidization to maintain rural services where possible, but when finances were bad, loss making bus routes were far more conspicuous as revenues and costs per trip were easy to ascertain. Bus traffic fell by a third between 1953 and 1968, without commensurate savings, so as time progressed drastic action became necessary in the bus industry too. The most useful contribution during this time was a change in legislation in 1966 allowing double deck buses to be one-person operated, which allowed significant cost savings to be achieved, but it did not really alter the declining trend.

Perhaps the architects of the 1962 Act should have foreseen some of these rural difficulties. In any event, by 1966 the rural 'problem' had manifested itself and the Labour government

(which had just achieved a working majority) felt moved to try and help, the outcome being the 1968 Transport Act. This had several impacts on transport. On rail, it authorized the transport minister to make grants to cover the losses of individual rail services where the minister considered it desirable for social or economic reasons. The grants were payable in up to three yearly commitments from 1st January 1969.

In practice, a large number of remaining intended line or station closures fell into this 'socially necessary' category. At first, each separate 'socially necessary' line had its own level of grant established. (Most isolated station closures had been achieved by then.) This soon became quite unwieldy and the 1971 annual report sets out 217 such services totalling grant of £65 million. The majority of these would probably have ceased to exist had not grants been made available. Having obtained grants on a social basis it then became politically difficult to withdraw them. In 1974, the grants were consolidated and became known as the Public Service Obligation (PSO) grant, which carried through right up to and beyond privatization, largely devoted to the regional railway network and effectively today rolled up into the subsidies still given to rural train operators. In fact, the Labour government had already indicated to British Railways during 1966 that they disagreed with the closure policy and slowed down the process. It is therefore an unfortunate outcome of history that many lines that had already closed certainly would not have done had they presented themselves later in the process, while some of those still open today and which contribute little to communities would certainly have closed had they been examined earlier. A comparable process was followed with the bus network, with local authorities given budgets to allocate to operators to help support important rural services and reduce the pain of ongoing losses. Nevertheless, rural bus services today are but a pale shadow of those provided in the 1950s.

The formation of the National Bus Company from (in effect) the old railway-owned operators, and the subsequent deregulation and privatization of the industry, have had only a marginal effect on the rural bus networks and even less for co-ordination. It is of passing interest to note that the majority of the privatized bus companies are now all owned by a small group of transport conglomerates who also engage in rail business, so perhaps these companies may be said to have come home again. Today it is competition law that provides a brake on the concept of transport coordination between modes, even where under a common private sector owner.

Before the motorways, the railways sought to befriend car drivers by offering a 'trunk haul' option. This one is dated 1956. The return fare was £9 or £10 depending on day, and included one passenger.

Network size

It was around 1968 when Transport Minister Barbara Castle wanted to switch policy to network improvement rather than endless rationalization. At BR's suggestion, the final rail network size was determined as around 11,000 miles; the difference between that size and the notional 8500 mile 'commercial' railway was effectively the 'social' railway supported by grant, as just explained. It was still necessary to make closures, as the existing network was still around 15,000 miles; these processes rumbled on in a desultory way until about 1975, leaving a handful of exceptional and contentious cases left. The most notable of these was probably the Settle & Carlisle closure proposal; suffice to say here that the person put in to close it found matters not as they initially appeared and with competent marketing (coupled with fortunate economic upturn and an appreciation of its value as a diversionary route) the issue of closure was finally abandoned in 1989.

Attention then focused on systemwide cost reduction by track simplification and various other measures that drastically reduced operating costs. For example, new signalling was found to manage train paths more efficiently, allowing the faster freights to travel around with far fewer loops and track infrastructure than before. Much track was singled in the belief it would be perfectly adequate for all time, and track mileage therefore fell from 33,976 to 23,518 over the period 1968-1990 (a fall of 30 per cent). Unfortunately, this initiative haunts today's managers, now trying to put back double track to cater for rising demand; this is often not a problem, but sometimes high costs can be incurred where land has been sold (or built on) or unsuitable bridges and structures have been erected.

Freight services

The wagonload traffic fell dramatically after 1962. In that year there were 5175 stations handling freight, but by 1968 this had been culled to 912 and ten years later it was under 500. At first, traffic serving the smaller or more far-flung stations was diverted to a much smaller number of large stations as part of a concentration process; from these larger depots, inwards and outwards goods traffic was sent by road. This reduced trains and costs. In parallel with this, the number of marshalling yards fell from 602 in 1962 to 184 in 1968 and 79 in 1979. There was a huge drop in the number of private sidings, falling to perhaps a tenth of their peak, most closures carried negligible traffic. There was a commensurate drop in wagons. In 1968, there were still 437,400 wagons, dropping to about 240,000 in 1974, half still with no power-operated brakes and only five per cent having modern air brakes. To give an indication of the huge changes taking place, by 1990 there were a mere 21,970 freight wagons (virtually all air-braked), though this excludes many modern privately owned vehicles that British Rail had encouraged customers to build. Most of these vehicles could run at 50 mph or more.

The nature of freight changed drastically. Train-load traffic was never alien to the railway, but it was historically the exception. In 1959, a block train service was run overnight between London and Scotland, named the *Condor*. This carried the small railway containers then in use (there were about 35,000 containers in use at that time) and it was regarded as a success. A feature of this service was a charge per container, irrespective of contents. In consequence, several more trains of the same type began operating on other routes. In 1962, a 'Speedfreight' service was introduced between London and Manchester, using new 10-ton containers carried on high-speed 4-wheeled vehicles. There was a definite strategy for converting inefficient wagonload traffic into trainload traffic, with the first 'company train' contracts announced in 1963 and with two thirds of freight tonnage converted by 1972; these bald figures disguise the loss of some loads while new types of traffic were gained, partly as larger wagons with heavier axle loads became available.

So-called 'liner' trains were mooted during the modernization plan and were intended to provide a nationwide service. These were designed to convey a new type of international container that was seen as the way to facilitate the transport of goods around the world, drastically easing the problems of handling and moving loads between transport modes. Containers were to be carried on specially constructed 62ft vehicles mounted on bogies. This activity took a long time to get off the ground and the first 'Freightliner' (London-Glasgow) only began in November 1965, on an experimental basis. This was a clear success and BR decided to press ahead with the 'liner train' block-train concept as fast as possible, requiring substantial investment in new terminal facilities. Roll out was dogged by industrial disputes and late delivery of terminal equipment, but was eventually reasonably successful. One issue was the matter of making Freightliner terminals open to any haulier, not just vehicles operated by BR; the National Union of Railwaymen took some persuading that it was in their longer term interest to co-operate, as BR's road vehicles were also staffed by NUR members.

In parallel with this, negotiations with the Coal Board and Central Electricity Generating Board resulted in the idea of adopting so-called 'merry-go-round' block trains running continuously between pit head and power station, with new 32 ton high-capacity wagons able to discharge their load on the move. This was akin to using the railway as a giant conveyor belt. There were some territorial issues about who was going to invest in the new plant but eventually sense prevailed and this very cheap mode of operation became the norm for that type of traffic. The first such train served West Burton power station in 1965; it was followed by quite a few others, including some serving cement and steel works and certain commodities like iron ore. This kind of block train concept was exactly what the railway needed and it is significant that train-load traffic rose from 31 per cent in 1968 to 86 per cent only ten years later; in 1979 the number of wagons had fallen to a low of 137,600. Unfitted freights were finally phased out and traditional guards' vans eliminated; guards rode in the rear driver's cab of the locomotive, or were not carried at all.

From the railway's point of view, reduction of unprofitable freight was greatly assisted by the 1968 Transport Act, though BR was critical at the time. Until this Act came into force, the railway was still saddled with the so called 'sundries' traffic (predominantly freight in units of under a ton, but sometimes individual consignments were heavier), together with what was left of the old collection and delivery service and the residue of wagon-load freight. The new Act established a National Freight Corporation (NFC), which created a subsidiary called National Carriers Ltd (NCL). The latter took over sundries and collection and delivery work from BR, while the NFC additionally found itself parent to British Road Services, Pickford's and other Transport Holding Company freight bodies. Sundries traffic was removed from regional control and established as a Sundries Division in 1966, in which BRS Parcels* participated, the idea being to use road or rail for the trunk haul, whichever cheaper. In the run up to implementing the 1968 Act, the Sundries Division became an autonomous unit reporting to the BR Board, including all terminals, road vehicles, staffing and sales responsibilities. Financial responsibility was substantially passed to depot level, where decisions could be made about the mode used to convey goods, staff having the ability to negotiate prices for rail cartage with the regions or BRS Parcels as required. Perhaps unexpectedly, sales increased through this strategy, arresting long term decline. In November, the division was transferred to the new company, anticipating take-over by the NFC on 1st January 1969. NCL took over roundly 25,000 staff, 9600 motor vehicles and 23,000 trailers from British Rail, and many railway premises. The activities were known to be loss-making and grants were provided for a time thought sufficient for NCL to turn the business round (or at least stem the losses)†. The company did not finally

* This was a Transport Holding Company subsidiary, once part of the old BTC Road Haulage Executive.

† Losses at transfer were £25 million a year and the grant was £16 million (1969) and £13.4 million (1970)

go into profit until 1977, after radical changes had been made. The NFC complained its performance was severely hampered by NCL and the heavy liabilities it had inherited from BR, where they appear to have been less visible. The railway was delighted to be rid of the responsibility for the historic and burdensome sundries traffic, while still being paid to carry quite a lot of it at profitable rates and leaving NCL with the shortfall.

NCL's initial brief was to operate a door-to-door service for small and middle weight freight and its mostly ex-railway fleet was the largest in the country. It consigned a great deal of trunk-haul freight and parcels by rail (contracting with BR to haul 1.1 million wagon journeys in 1969) and began chartering overnight trains; much traffic was also placed in containers and despatched by Freightliner, soon making up 10 per cent of Freightliner traffic and becoming its largest customer. In fact the NFC was required to use rail for trunk-haul loads where economic, but road haulage dominated. Another of the other predominantly rail-based activities taken over by the NFC was the 'Tartan Arrow' overnight parcels service from south-east England to Scotland, based on dedicated containers and wagons. This had been an independent road-haul venture, but British Rail (jointly with the Transport Holding Company) obtained ownership in 1967 and transferred much of the business to rail; although the initiative showed promise, it provided only lacklustre performance and was closed in 1976.

The NFC was a substantial organization at its peak and was sold off in 1982 to its management. There is little trace of the railway connection today, but remnants of the NFC are identifiable in DHL-Exel and Lynx Express, bought by UPS, and the name Pickford's is still around.

In order to promote its liner trains, BR set up a company called Freightliner Ltd in 1965 and trainload container traffic was thenceforth moved under this brand name. Until 1969, BR invested £25 million in terminal facilities, locomotives and vehicles, mainly wagons with low decks to take 8ft containers. Under the 1968 Act control of Freightliner Ltd was split with the NFC which it was envisaged would handle the road traffic movements to and from the rail terminals; BR retained ownership of the rail vehicles. BR was uneasy with this relationship, having only a minority shareholding, and felt that the NFC had too much control, given that the point of the exercise was trunk haul by rail, though it was not until 1976 (and against bitter NFC opposition) that this aberration was corrected and the company returned intact to BR control.

Coal was traditionally a hugely important part of the railways' business, but the use of coal for the home and industry (ie excluding power station and export coal) had begun its slow decline in the 1930s and diminished rapidly after the war. The Clean Air Act of 1956 and, from about 1970, a move towards central heating, dealt a mortal blow to the business, the speed of whose decline seemed to be regarded as a surprise by the railway; another bad smog in 1962 accelerated the distaste for coal. Many stations had coal yards from which local merchants received coal in bulk and arranged local domestic delivery; during the 1960s most bulk deliveries to station yards switched to road from rail-fed coal concentration depots, allowing tracks to be lifted and parts of station yards to be turned over to more useful car parking. Rail delivery to stations had pretty much ceased by 1970 and, as domestic coal fires diminished towards oblivion over the next couple of decades or so, the remaining station-based coal merchants disappeared, abandoning their coal bunkers in the station yards and allowing car parks to be extended further.

A word should be said of seasonal traffic, of which there was at one time a vast amount to carry, all perishable, and all compressed into short cropping seasons, many of which inconveniently overlapped. Many fruit and vegetable items were taken by rail up to the early 1960s, but within ten years it had substantially switched to road (releasing a huge number of very poorly-utilized wagons). The traffic was partially geographically based: Penzance for broccoli, Tamar Valley, Swanwick and Wisbech for strawberries, West Yorkshire for rhubarb, for example. Many areas were famous for watercress (often packed on

passenger trains). Many imports were handled and distributed from France and the Channel Islands. Potatoes were another important commodity at one time. The intensity of seasonal traffic was so high that it spurred British Transport Films to make a film about the broccoli traffic in the 1960s, recently released on DVD; its content is rather more interesting than the title suggests, and the scale of the operation and logistical requirements are thought-provoking.

The Railfreight era

The RSA was able to enjoy its October 1985 Presidential Address, given by Railfreight Director Colin Driver, who provided a number of valuable insights into plans for the freight business. The most challenging issue was the government objective to produce a five per cent return on Railfreight assets, amounting to £37 million a year (and described as 'very demanding').

Driver observed that were several areas of rail competition, notably coastal shipping (mainly coal and oil products) and pipelines (for oil products), with inland waterways making selective but small inroads. Nevertheless, road was the main competitor and the one Railfreight was going head-to-head with. He concluded 'if we do not change—we are dead' but warned that simply copying the competition was equally suicidal. The railways now had to recognize that the road sector broadly set the charges that could be levied for many products (whether by road or rail), but rail still carried its own unique cost structure. What rail had to do was to carry the commodities it was best equipped to carry and to do it better and, if possible, cheaper than road, and to satisfy the new needs of customers and not the traditional ones.

Driver set out a number of points, beginning with why road transport competition had 'suddenly' increased:

- The manufacturing industry was completely changing to meet an expanding and more affluent market, and this afforded an opportunity to take transport issues into account whilst planning new facilities, giving road an opportunity that would not otherwise have arisen.
- The motorway system had been introduced and grown rapidly, drastically reducing costs and improving performance quality.
- Many legal restrictions had recently been swept away, making road haulage cheaper and an easier business to enter.
- There had been a great leap forward in truck technology, improving reliability and with reduced weight allowing heavier loads to be carried within gross vehicle weight (and truck gross weights had increased from 32 to 38 tonnes).

To cope with this, the railways had to fight back hard.

There had already been change. There had been £1.6 billion investment, made partly with grant aid only available to the private sector, thus over 90 per cent of non-wagonload traffic was now carried in privately owned wagons and 98 per cent of that tonnage between private sidings and depots. The process had begun of dividing the Railfreight assets into small subsets 'owned' by the market sub-sectors (eg oil and petroleum) so that they had complete control of their operations and costs and could negotiate local charges and possibly organize their own local working practices (a thorny issue). This was attempting to replicate on rail what the road business was doing, where many decisions were made at local depot level. The process was reaping results: train miles per wagon had risen by 40 per cent, cost per train mile had fallen 70 per cent, but Driver was very unhappy with utilization, where the average daily train crew mileage was only 40 miles, and thought that the next issue to attack. He also thought new technology could do more and was considering how merry-go-round operations could be totally automated.

There were huge business threats (of which prevailing industrial unrest was one). There was structural decline in heavy industry, impacting on favoured rail traffic. Driver was particularly worried about coal being displaced by nuclear power as had happened in France where a 15 million tonne flow had dropped to under two because of nuclear policy (he understandably did

not foresee that coal traffic was about to collapse without any help from the nuclear lobby).

The introduction of air brakes compounded the problems of train formation, as groups of air-braked wagons had to be marshalled next to an air-braked loco, while groups of vacuum-braked wagons had to be shunted adjacent to a vacuum-braked loco. Only a few air-braked wagons were 'piped' for vacuum brake formations and still some wagons had no power brakes at all. This endured until the 1980s when all vacuum braked wagons in normal service had been withdrawn. Trains that were entirely air-braked no longer needed a brake van, which is, of course, the position today.

The spread of air brakes offered new opportunities. In 1974, a country-wide air-braked network was defined and a new service was offered by fully air-braked stock for transmission of freight on a siding to siding basis; next day delivery was guaranteed. In September 1977, the air brake programme was accelerated and this service was christened 'Speedlink', initially operating 29 services a day but soon increasing—it had reached 85 by the end of 1982. Trains could operate at up to 75 mph and wagons were designed or adapted to accept loads on pallets. The service was marketed as 'overnight scheduled services in wagonload quantities' and was an opportunity to encourage business to make use of freight grants of 50 (later 60) per cent to shift goods by rail rather than by road on environmental grounds, much of which went into provision of, or improvements to, private sidings and terminals—by 1986 Speedlink was operating between 65 terminals. Sometimes wagons were collected from, and delivered to, customers and coupled together for a scheduled trunk haul Speedlink service.

By 1984, Speedlink had ousted all historic wagonload business, together with the smaller trainload flows. This strategy was intended to allow remaining marshalling yards to be closed down, with only Speedlink sorting depots surviving.

By 1988, Speedlink had begun to make a loss and in October was fused with Freightliner and International Distribution to form a new freight unit called Railfreight Distribution (RfD), though the Freightliner and Speedlink sub-brands were retained. The following year, the former Speedlink wagonload activity came up for review, a prelude to difficult trading during 1990 and a decision to wind up the network and escape from wagonload traffic in July 1991. For some time, it had been recognized that it was very difficult to make the Speedlink service competitive. Apart from anything else, the costs of marshalling and operating wagonload trains made it very difficult to return a profit on journeys under 500 miles and even then it would require flows of at least ten wagonloads a day; it seemed clear that in a country the size of the UK this presented near insuperable problems.

In his 1985 address, Driver said he wanted to get closer to customers. He (then) had high hopes for Speedlink and introduced the concept of Speedlink Distribution, which was intended to be a 'front end' to the Speedlink network that could manage the whole of a customer's distribution needs, offering 'pick and mix' options including terminal operations, warehousing, wagons, trunk haul, secondary distribution and management. It was an attempt to provide a complete solution for customers, but favouring rail. Inspired though it may have been, we have already seen that it had a short and unprofitable life. In attracting new traffic, he was envious of Germany which had 1200 depots and 10,000 private sidings, compared with a small fraction of that in the UK. Driver had harsh words to those who thought that freight could be carried at marginal cost and offered a colourful picture of the Victoria Embankment upon whose benches slept at night many former businessmen who thought they could attract business at marginal cost! RSA members must have been left in no doubt that Driver was a real freight enthusiast, as well as an enthusiastic businessman.

Freight strategy turned towards more vigorous development of trainload traffic, with more focus on longer hauls. European wagonload services continued to operate (via the new Dover train ferry) and ways were found to switch about 70 per cent of the former Speedlink traffic to other RfD services. Prior

to privatization Freightliner was recovered from the fold and restructured for private sale as Freightliner (1995) Ltd. The remainder of RfD was either merged with the trainload businesses that were being prepared for sale or reserved for separate disposal later.

The core of the modernized freight business was based on moving commodities by the trainload. This was not an entirely new proposition but, because of its obvious attractions, was pushed very heavily by BR from the early 1970s and became the main plank of what, under emerging sectorization, emerged as the Railfreight business. Trainload traffic suited some commodities more than others, with coal, fuel, chemicals, steel, cars, aggregates and various types of foodstuffs predominating; coal was responsible for more than half the trainload traffic (most of it between collieries and power stations). Even in the early 1980s, the prospects of long contracts meant that customers were prepared to buy their own wagons for haulage by BR; this suited both parties as freight grants were available to customers for such investment and it eased BR's capital investment pressure. In 1986, the model was further extended when Foster Yeoman purchased four General Motors high powered diesel locomotives to haul aggregate trains, the locos being maintained and operated by BR.

Valuable power station and steel industry coal traffic collapsed. It was reducing anyway, because of pressure to switch to gas as a fuel and reducing UK industrial production but the coal strikes in 1985 were disastrous for the coal traffic and plunged the Railfreight business into huge loss, with the coal element never fully recovering. Things got worse: overall coal halved between 1991 and 1994 owing to a combination of factors, including electricity privatization (cancelling agreements to provide British coal), the collapse of the coal industry following the difficult period of industrial unrest and the closure of various steel plants. The number of UK collieries fell from 169 in 1986 to just 16 when they were sold in 1994. The railway, having a fixed infrastructure, found it hard to respond, though it did pick up important imported coal traffic from ports to power stations and this somewhat eased the pain. It is perhaps slightly understandable that this was not foreseen.

Profits slowly returned and, in 1988, the trainload elements of Railfreight were divided into several sub sectors, such as Railfreight Coal and Railfreight Metals. Each unit heavily promoted its services and was broadly profitable, especially after further cost reduction initiatives were implemented. By 1990, these services were together promoted as 'Trainload Freight' (distinguishing it from Railfreight Distribution); affairs were promising enough for large numbers of modern locos to be ordered, but the business struggled to maintain profits. Matters were not helped by rail strikes caused by the issue of driver-only operation.

The Trainload Freight business had been managed in three geographical divisions, North, West and South East. In the run up to privatization, the businesses were restructured as private companies, respectively Loadhaul, Transrail and Mainline Freight; to each of these was also allocated some elements of RfD. Although tendered separately, all three companies were bought in February 1996 by North & South Railways Ltd, later renamed English, Welsh & Scottish Railways (now part of DB-Schenker). Freightliner (1995) Ltd was successfully sold in May 1996 to a management buy out. The remaining and highly loss-making bits of RfD were finally sold to EWS in November 1997. As a footnote, it is perhaps worth observing that, even under BR, Transrail thought it could make money out of wagonload freight and re-introduced it under the brand name 'Enterprise'; the philosophy was later developed by their successors EWS Rail who developed the business further. Even today it is possible to buy capacity on scheduled services for small consignments, wagonloads or less.

Parcels and allied traffic

As mentioned in Chapter 1, the railway parcel could be one of a wide range of commodities and things, and not just boxes

wrapped in brown paper. During the 1950s and 60s, most of the obscure traffic, such as fish, milk and horse boxes, were either transferred to the freight side of the business or carriage stopped altogether. In the 1960s, 'parcels' traffic was therefore more closely aligned with expectations of being wrapped packages, with newspaper and mail traffic an interesting adjunct. There were weight and length restrictions and items outside these had to be dealt with as freight 'sundries' somewhere that accepted goods traffic—in fact there was overlap between these areas. True parcels traffic was largely handled at passenger stations and still mainly carried on (or attached to) passenger trains, though where traffic was heavy dedicated parcels and newspaper trains ran.

Standard railway parcels had a difficult time. Between 1933 and 1968, the licensing system for carrying goods by road for hire and reward was very restrictive and the railways were able to object to new 'hire and reward' road hauliers entering the market, which substantially protected their position. Within this framework, the railways operated a vast parcels business using the rail network for most of the haul in passenger or dedicated parcels trains. The service was adequate for the rates charged, regarded by the railways as 'competitive' and by commentators as too cheap. Nor had the service evolved and it had become a loss-maker, despite having pretty much a monopoly of the home delivery market in conjunction with companies like Littlewoods (the catalogue people). In the early 1960s, some 88 million parcels a year were being carried by rail. The parcels business still had its own collection and delivery service in the larger towns, but elsewhere it made use of the Sundries Division collection and delivery facilities, which was perhaps an initiative that could usefully have been extended, with some savings possible.

Parcels were a problem, and could be awkward and heavy. To reduce transhipment issues, the BTC constructed a number of fully mechanized concentration depots, the largest in London being built at Marylebone in 1952, which took much of this awkward traffic away from other termini and reduced transhipment between terminals by 13,000 parcels a day. The parcels service staggered on into the 1960s, becoming Rail Express Parcels as part of the new BR branding, but competition from road-based hauliers was becoming more evident and the cosy relationship with British Road Services was now breaking down, with BRS Parcels offering entirely road-based carriage which was making inroads.

The establishment of the National Freight Corporation in 1969 has already been described, together with its subsidiary National Carriers Ltd. The NFC also inherited BRS Parcels (later renamed Roadline) and the whole of the BR delivery fleet including all the parcels delivery vehicles. BR thenceforth had to hire in its collection and delivery service from NCL, provided partly by dedicated vehicles operating in the Rail Express Parcels livery, but with some collection and delivery services operated by NCL vehicles. BR was uneasy about not being able to have its own vehicles and was suspicious as to whether it was getting fair rates from NCL, when the NFC had its own parcels service which was a competitor. BR had to live with it and, from 1969, had to focus on the trunk-haul part of the journey, traffic continuing to diminish over time.

1969 also saw the end of the restrictive licensing system and it wasn't very long before Rail Express Parcels came under even more intense competitive pressure. In the end, regular parcels traffic was unable to withstand this competition, not on price but on service quality. BR announced it was getting out of the loss-making parcels collection and delivery service in October 1980 and that ended a very long tradition of providing a door-to-door parcels service.

The carriage of railway parcels transmitted in bulk was considered likely to remain profitable and endured long enough for further development, in particular with the promotion of parcels movement in caged trolleys by express parcels trains, including more parcels services and overnight operations. The parcels operation became its own business sector in the late 1980s. To help reinvigorate traffic, Rail Express Systems was set up in 1991 to

consolidate activities of like type, with RES also taking over surviving Post Office traffic and some miscellaneous activities; it was finally sold to EWS in 1996.

In 1963 BR introduced a standard registered package service called 'Red Star' to provide rapid transmission of parcels between designated offices situated at most medium to large stations. Costs were high (a fee of five shillings was levied in addition to carriage at 'Board's risk' rates) but the service was reliable and reasonably successful, parcels generally being conveyed by the train selected by the customer. Red Star also ran international parcels. The Red Star brand continued to enjoy sufficient success to see it through privatization. A turn of fate then saw it reunited with Lynx Express in 1999, initially retaining its Red Star branding, but a later review saw Lynx pull out of rail parcels and Red Star and railway parcels ceased to exist.

The post office continued to use rail extensively. Letters were still despatched principally by special travelling post office vehicles and there were 44 departures from London each night focussing on 8.30 and 11 pm. In addition, mail was carried by certain passenger trains; Post Office staff remained entirely responsible for loading and unloading letters.

Royal Mail letters continued to be carried by special Royal Mail vehicles and (to a diminishing extent) by ordinary passenger train until the 1980s, when decline set in. By the early 1990s, about a fifth of all mail was carried by the special 140-vehicle rail fleet. Emerging competition, reorganization and mechanization of mail saw an increase in road haulage and, although new rail vehicles were purchased in 1995 and were subsequently run by private railfreight operators, relations with Royal Mail became strained, owing partly to the perceived unreliability of rail caused largely by overnight and weekend engineering works, though price was also a factor. After suspension of all services in 2004, carriage by rail later resumed on a limited scale and still operates today, though most business appears irrevocably lost to road. The Railways Act 1993 also removed the historic right of the Royal Mail to compel railways to carry mailbags.

Post Office parcels were collected at various centres around the country and were carried along with railway parcels, railway staff being responsible for loading. Some special parcels trains were operated; others were carried in passenger trains. Royal Mail parcels continued to be carried by rail until quite recent times, though the volume diminished hugely in the 1980s when reorganization of what had then become 'Parcelforce' resulted in much traffic being switched to road. Royal Mail parcels carried in the traditional way ceased during the 1990s, but their parcels are still carried as part of the railway's freight activities (operated by DB Schenker, previously EWS, which bought Rail Express Systems in 1996).

The loss of direct cartage by BR in 1968 seems to have been a factor in the collapse of a useful facility called Passengers' Luggage in Advance (PLA). Hitherto, it had been possible for intending passengers to take luggage to nearly any station and ask booking or left luggage staff to arrange to convey it to their final destination, usually a hotel or boarding house. For a modest additional charge they could have it collected from their home. Passengers carried more (and heavier) luggage in years gone by and it was useful to be able to travel free of this encumbrance, with every expectation of it already being at its destination upon its owner's arrival. Wags sometimes called the service Passengers' Luggage in Arrears, but the service was well-regarded. The service was available at modest charge to anyone buying rail travel at a station that had collection and delivery facilities. The service was also useful for officers' and schoolchildren's trunks and in earlier days PLA traffic was so heavy that special luggage trains had sometimes to be operated. Transfer of responsibility to National Carriers and destaffing of stations made the service unsustainable. The loss of PLA, coupled with the loss of the traditional railway porter, has meant the taking of luggage is not as easy as it once was and space on modern trains can also be a problem. It is interesting to see the recent emergence of a company called 'Carry My Luggage', essentially a logistics company, which will undertake collection and delivery of luggage door-to-

door without going near a train at all; it cannot be said to be an inexpensive option, but railway luggage is no longer as welcome as it once was and several train operators promote the service. The luggage issue is one that perhaps in marginal cases tends to favour private transport and the railway has allowed an advantage it once had all but to disappear.

The mundane subject of passengers' luggage suggests that the railways were still regulating it in the 1960s as they had in 1909, at least on paper. The reality is that this was becoming unsustainable. Over-bureaucratic regulation meant rules were complex, difficult to enforce, resisted by passengers and seemingly arbitrary, as they resulted from local Acts of Parliament that bore no relation to the emerging network. Many of the complications and anomalies were disposed of on nationalization, though personal luggage allowances were set at 150 lb first-class and 100 lb third-class, with tariffs applying in respect of excess weight and distance for anyone capable of travelling around with such quantities. These arrangements endured to the end of British Rail, though quantities were recalibrated to metric equivalents of 70 kg and 50 kg respectively, though with so many unstaffed stations, on-train ticket issue and checking and few weighing machines available, enforcement must have been interesting. Until the mid 1960s, it was possible on arrival at a London terminal (and certain other large cities) to get a porter to convey luggage to the left luggage office and ask them to arrange delivery to any other London station, hotel or other address for a small fee, the railway using its cartage service to effect delivery.

Extra charges for bicycles, perambulators and dogs survived until the 1990s; these are now carried free, if not, perhaps, encouraged. Today there are weight and convenience restrictions for practical reasons, given modern trains have extremely limited accommodation for luggage. Typically an operator allows one piece of 'hand' luggage and two other pieces maximum, and it is carried free, though again enforcement of restrictions must be variable.

Another useful passenger facility was the reserved seat, limited provision for which seems to have emerged in the 1920s. Apart from being a convenience, they generated extra revenue. In the 1950s, passengers could reserve first or third-class seats for a shilling (soon to double) but had to apply personally or by post to the station master at the starting point. Reserved seats had to be occupied at least ten minutes prior to departure, or staff could release them. The station master had the entire responsibility for making the necessary arrangements. It was only during the 1990s that this process became fully computerized and a passenger booking a ticket at any station could also make a reservation, generally now free (there is passenger resistance to what they have come to regard as the entitlement to a seat and a feeling of having to 'pay' twice).

Passenger services

Surviving passenger services post-Beeching altered less drastically than freight, but in certain key areas change was more obvious than in others. The thrust was to try and improve quality in an attempt to match that of the alternatives, and on the longer journeys to reduce journey times to improve market share. In either case, the railway had now fully understood that it had to compete hard with other modes to retain business, if only to contain losses.

An early indication of what was expected was seen with the XP64 experimental vehicles designed to test integral carriage construction and new seating and door layouts. Directly out of this emerged the Mark II carriage construction programme from about 1966 (with air conditioning on the later batches in the 1970s). These carriages arrived at the dawn of 'British Rail' with its blue and grey livery and new graphics.

BR was convinced that higher speeds would generate significantly more traffic and put much effort into the Advanced Passenger Train, a 140 mph design with tilting carriages. Aircraft engineers were brought in to import new thinking and one of the prototype sets achieved a record 153 mph. Escalating costs and all manner of annoying complications created a lack of con-

fidence and project collapse, but as a by-product some of the concepts were incorporated into a railway-designed and built interim high-speed solution called the 'high speed train' (HST), introduced from May 1975. BR was now desperate to react to the attraction of the motorway by increasing speeds and the HST (later marketed as Inter-City 125) was developed and delivered in commendable time, perhaps in part to demonstrate that the aircraft engineers working on APT did not have all the answers. The HST sets were fixed-formation sets with a power car at each end and designed with a top speed of 125 mph. More efficient braking meant that these sets could run on most existing 100 mph rated lines and they have done sterling service on services out of Paddington, St Pancras and King's Cross and cross-country Inter-City services. New carriages (the Mark III) were designed for the HST sets and additional Mark IIIs were built to replace most of the remaining Mark I (and non air-conditioned Mk II) loco hauled stock, most of this being achieved by the mid 1980s (except for a number of catering vehicles).

BR's chief operating manager gave the RSA an interesting insight into the quest for higher speeds in a 1975 lecture. Introducing HSTs was not without its problems: automatic level crossings with differential timings, adequate work for modern but displaced locomotives and the potential for poor train crew utilization being just a few of them. From an operating point of view, it was felt that faster trains would suffer proportionately more from delays, partly because the greater disparately in line speed between different types of traffic was in itself likely to generate delays, partly because the higher top speeds meant any slacks would be progressively harder to recover from, and finally because, as journey times shortened, delays would become more conspicuous. More importantly, the HSTs were a unique and expensive fleet (£1 million a set) with the bare minimum number of units purchased to populate daily 'diagrams'. This conspired to make it more difficult for controllers to deploy spare stock in times of failure or disruption, partly because there was less of it and partly because any spare stock was likely to be rated only for 100 or 110 mph and would lose further time. It was not feasible in the prevailing climate to have expensive trains simply lying around idle. This was a prescient observation that came to apply more and more as fleets became dedicated to particular services (and ever more expensive). The good news was that, with multiple power cars, trains with a single failure could usually get themselves out of trouble quickly and often put in a creditable performance even with half power.

The speaker finished his fascinating lecture with an entreaty for anyone bored to get involved with railway operating, particularly at the high speed end, and promised it would take ten years off their life!

Sleeping and Catering

Trains with sleeping accommodation had also been improved. From 1928, it became possible for third-class ticket holders to avail themselves of the sleeping car, with new quadruple-berth carriages introduced for their use and each compartment provided with a wash-hand basin. Tea and biscuits were provided to both classes. In 1934, the railways were making a supplementary charge of 15s or 20s (first-class) and 6s or 7s (third-class). This was not especially cheap, equating to £40-£50 and £17 or so respectively at today's prices. In the period 1923 to 1938, the number of sleeping cars had risen from 154 to 380. It was not until 1948 that British Railways began introducing 'modern' sleeping cars of the twin-berth variety. From the mid-1960s, new sleeping cars were 'classless', being used in 2-berth mode for second-class tickets and single-berth mode for first-class. It was during this period that trains with sleeping cars were probably operating their largest network, ever reducing journey times subsequently reducing their need.

Just before WW2, the number of catering vehicles had risen to 773, from 516 in 1923, and the number of daily trains providing a restaurant car service was a surprisingly large 870. When war broke out, these services were entirely withdrawn; about half were later reintroduced, although this number proved im-

possible to sustain, given the demand for seating, and in May 1942 dropped to just 65 trains. After the war, more comprehensive services were reintroduced, very gradually, with vehicles brought out of store in October 1945. Many skills peculiar to catering on the move had then to be discovered afresh, not helped by the continuation for some years of rationing. The staff came into their own in the terrible 1947 winter when weather was so atrocious that some trains became stuck in snowdrifts for several days, catering staff eking out food and cooking gas to maintain something hot for freezing passengers*. The catering fleet at nationalization comprised 727 vehicles, two thirds over 20 years old and 135 of those over 30-years old with many rebuilt, sometimes several times. This did not augur well for a slick new service.

A talk given to the RSA in 1970 set out the developments since that time; the lecturer was clearly a catering enthusiast and observed that the on-board catering facilities in the UK then exceeded the whole of those in Western Europe and Scandinavia. It was not until 1953 that a detailed study took place of on-board catering, partly spurred on by the heavy losses being made. This suggested that clearer differentiation was needed between different types of catering service, to which end several prototype catering vehicles were built. From these, it was decided to construct five different types of production vehicle, which entered service from 1956. These were the kitchen car (a whole coach devoted to a kitchen), the kitchen-buffet (a small kitchen and a buffet counter), the restaurant car (kitchen and dining area for at-seat service), the restaurant-buffet car (kitchen and dining saloon and a buffet counter) and a miniature buffet (just providing snacks and drinks). In 1960, restaurant cars operated on many services and served two varieties of breakfast (4/- or 7/6), luncheon (9/6), afternoon tea (3/-) and dinner (10/6) depending on the time of service; morning coffee and snacks could be had in the restaurant car when meals were not being served.

Railway refreshment rooms could still provide packed lunches for consumption on the train for 2/6 or 3/6. The cheaper one contained a pork pie, cheese roll, cake and fruit, while the larger had a ham roll, hard boiled egg, buttered roll and cheese, tomato, packet of biscuits and a chocolate bar. There was also a bag-packed 2/- version with unspecified contents. This was not luxurious but probably represents the 'good value' sought by people at the time. During the 1950s and early 1960s more exotic meals could be ordered by special arrangement. The 'Compakt meal box' could be ordered from 'principal' refreshment rooms for 7/6 upwards, each containing a complete cold meal and a vacuum flask with hot beverage, all neatly packed and easily carried; the boxes were returnable and the implication is that some choice of contents was available. Individual tray meals could also be ordered for parties of 24 or more. There were 72 refreshment rooms on the Southern Region alone in 1960, all but nine operated by British Transport Catering Services, though two operated only on race days and a few did not provide a complete service all day.

Gradual improvements to the level of service given meant that, by 1964, on-train catering no longer made a loss. It was not until around 1970 that the last pre-grouping restaurant cars were retired, partly in consequence of catering services being thinned out as journey times reduced, a trend that was to continue. At that time all normal catering was undertaken with BR Mark I vehicles (there were no Mark II catering cars). Mark III and Mark IV builds included some buffet and kitchen-buffet vehicles. The last Mark I catering vehicles operated on the London-Norwich services until around 2003. Another feature of the 1970s period

* The winter of 1946-7 was very bad with over 50 days of continuous snow in many parts and drifts up to seven metres deep. The worst month was February and many railway lines were blocked, creating shortages of fuel that badly affected electricity supplies and with food stocks dangerously low. The need to keep the railway network open as far as possible resulted in trains getting stuck, for hours or even days on end, and the army was called out to help the railways, including 100,000 troops and unrepatriated prisoners of war. At one time there were 750,000 railway coal wagons alone stuck in snow. The railways never stopped, although locomotive coal was in short supply and many watering cranes were rendered unusable owing to freezing. When the snow finally melted in March, huge damage was then caused by resulting flooding. If the railways had been completely closed, it would have produced an unprecedented national emergency.

was the introduction of the on-train catering trolley which sells pre-packaged food and hot and cold drinks. This increases sales by bringing the food to the passengers and often allows bespoke vehicles to be dispensed with.

A factor in the rail catering mix was the Pullman car. Pullmans, operated and staffed by the Pullman Car Company, operated continuously between 1909 and nationalization except during war years; some trains were exclusively Pullman, while other trains carried just one or two Pullman cars, providing premium accommodation and at-seat dining or other refreshments. Pullmans continued in operation after 1948 on more or less the same basis, though in 1954 the BTC gained a controlling interest in the company and in 1962 that interest passed to the British Railways Board when it became a division of British Transport Hotels; in 1967, it was fully absorbed into rail catering and became a mere brand. (The name is still owned by the industry.)

No new Pullman cars in the traditional style were built after 1952, but Metropolitan Cammell built 44 new cars in 1960—similar to BR Mark I stock—mainly for use on the Eastern Region in trains such as the Tees-Tyne Pullman. In the same year, a revolutionary new type of train came into service—the Blue Pullman. These trains were all-Pullman, but had purpose-built power cars at each end and were capable of 100 mph running; unlike the later HST sets, the power cars included passenger seating accommodation. They entered service (initially) on trains from St Pancras to Manchester (6-car sets) and Paddington to Wolverhampton or Bristol (8-car sets) and operated Monday-Fridays only. The supplementary Pullman fare was significant, £1 to Manchester and 10s. to Leicester, for example, though the at-seat food was cheaper than comparable restaurant car catering. When electric services were introduced out of Euston from 1966 a number of loco-hauled all-Pullman trains operated with new stock of Mark II design; these were, incidentally, the first post-war trains to be all air-conditioned. (At this point all the Blue Pullmans were transferred to the Western Region.) However with ever-increasing quality of ordinary coaches and shortening journey times the Pullman concept was pretty much redundant and declined rapidly, the last train using the term (the Manchester Pullman) running in 1989.

Organizationally, the on-board catering business and station catering were managed as one group, initially by the Hotels Executive and later by the British Transport Hotels division of British Rail. The station catering side did not have a very good pedigree. The business had emerged from WW2 in dingy, run down and hopelessly out of date premises, serving fare that richly reinforced the prejudices of the music-hall comedians making fun of railway food (which even before the war was legendary). Even the RSA speaker in 1970 (who ran the rail catering department) spoke with some hilarity of what had to be contended with, reminding the audience of the unkind newspaper report, when coffee was raised in price from 3d to 4d, suggesting it was the only means of distinguishing it from the tea, which remained at 3d. The first problem was to address the service that was on offer, in order to bring some consistency to it. Typically it was a buffet-bar at the smaller stations and separate bar and cafeteria (and sometimes a grill room) at the larger stations. Modernization was called for everywhere, and self-service was introduced at bars and cafeterias, partly to address the problem of staff recruitment. More effective storage, display and refrigeration was needed (with loss of the famous bell jars in which food was allowed to deteriorate in full public view), together with more efficient sourcing from central depots.

In 1973, rail catering adopted the name Travellers-Fare and, in 1978, as moves began to be made to hive off the hotels business, rail catering at last gained its own professional managers who began to push higher quality into the food offering. Many quite unsuitable refreshment rooms had already been closed (100 closed in the ten years up to 1966) and those remaining were broadly profitable, but tended only to serve snacks. Many Travellers-Fare bars were adapted to appeal to real ale drinkers, at a time when such refreshment was enjoying renewed popularity, and above all the facilities were heavily marketed. In an attempt

to keep up-to-date, Travellers-Fare introduced their own-brand outlets to compete with the high street—Casey Jones (burgers) being regarded as a success. This philosophy has endured—not always with the same success— into the post-privatization era, via the successors of the BR station catering business which was sold as a going concern. It is of interest that the largest rail concessionaire today is bringing in recognized high street brands to stations, in order to remain competitive, as railway own-brand outlets are largely unknown to any but regulars.

Electrification and traction policy

During the RSA's 1963-4 Presidential address, the audience was brought up to date with the position of the troubled modernization plan which was finally beginning to deliver some useful outputs, the more so for the certainty Beeching had provided by defining the kind of railway that was needed. The President had naturally to be tactful in some of what he said.

By the end of 1964, there would be 2650 diesel locomotives in operation, while steam locomotives had reduced from 17,000 (before the plan was in hand) to 7000 with a life expectancy of six to seven years (in the event rather less). The speaker observed that BR had not had a trouble-free time introducing diesels, but in BR's defence he noted that it had 'dieselized' faster than anyone else in the world, even the pro-diesel US system took over 30 years. He acknowledged that there were 25 different types of diesel locomotive in the UK but that, in the light of experience, BR was now pursuing future sourcing with just four types.

Railways traditionally sourced locomotives from their own workshops, but it was felt impractical to build diesel engines and electrical components in BR workshops when an external industry already existed to do so. The question was to what extent should BR workshops build bodies and bogies? Independent UK locomotive manufacturers were worried about diminishing foreign exports and wanted BR to buy from them, in order to support their order books, rather than setting up in a new business. The government took a keen interest. In the end, about half of the bodies were made in BR workshops and half were sourced from outside suppliers. There were some terrible stories about poor quality work being produced by certain suppliers with whom the railway had, in any case, engaged only reluctantly, while others turned out high quality products. It was much the same story with the construction of diesel multiple units (DMUs) where large numbers of types were whittled down to a few successful designs, some made by BR and some outside.

According to the RSA's Presidential Address of 1962-3, BR were pioneers in the use of 25 kV electric multiple units (EMUs) which had evidently given much trouble when introduced in Scotland. A factor in this was stated to be the lack of adequate test tracks in the UK, so it was possible to get experience only after introduction into service. However, the performance of the 25 kV ac locos and EMUs was now exceptionally good and highly worthwhile. The first main line electrification was in hand between Euston and Manchester/Liverpool and looked very promising. A complication in the means of rectifying the alternating current (using mercury arc rectifiers) seemed capable of resolution, with solid state rectifiers now coming onto the market. In subsequent years, the 25 kV system was found to be so satisfactory that the remaining 1500 V dc lines were converted.

Electrification proceeded cautiously after the London-Birmingham-Manchester-Liverpool schemes but gradually, as the business cases became compelling, electrification schemes came forward and today about a third of the network is electrified (with new schemes currently in hand). The principal electrification schemes were:

- West Anglia – Cheshunt 1969, Cambridge 1987 and Kings Lynn 1992.
- East Anglia – Colchester to Norwich 1987 (with Harwich in 1986).
- East Coast Route – Suburban lines Moorgate and Kings Cross to Royston 1976-78, including Hertford Loop.
- East Coast Route – Main line to Leeds and Newcastle 1990 and Edinburgh 1991 (with projection to Glasgow).

- Midland Route – Suburban inner and outer services Moorgate and St Pancras to Bedford 1983. Electrification extended via 'Thameslink' between Farringdon and Blackfriars 1987 (the latter the first large-scale use of dual voltage stock).
- West Coast Route – Weaver Junction to Glasgow 1974, Watford-St Albans Abbey 1988.
- Southern – Bournemouth to Weymouth 1989.

Not foreseen during the RSA address were closures of some existing electrification systems, such as Woodhead (only completed 1954), Lancaster-Morecambe-Heysham (only recently converted to 25 kV) and Tyneside.

Once the orgy of diesel (and associated carriage) construction was over, BR workshops had rather less to do than at any time in their history and huge rationalization was needed; attention focused on heavy overhaul and maintenance, with some construction capacity retained at a small number of sites. In 1962, there were 32 main works employing 66,000 men (already a reduction from 49 assorted works that had existed at the industry's climax). Between 1962 and 1968, three locomotive works and 12 carriage works closed and by 1978 only 13 works remained, all scheduled for modernization. A 1978 lecture to the RSA, given by the new managing director of BR Engineering, was revealing. As early as 1962, workshops were removed from the regions and regrouped into a workshops division; on 1st January 1970 this was reformed into a stand alone company called British Rail Engineering Ltd, partly so that it could develop external work in order to keep unit costs down. Overnight, a whole new set of skills were required by the managers, marketing being amongst the most important. Ten commercial staff were recruited from outside and five were appointed from existing staff. A joint sales organization was created with Metro-Cammell to sell abroad, called BRE-Metro Ltd, it being envisaged that resultant work would be split.

Nevertheless, orders were hard to get and further closures followed. In 1986, BREL was split into BR Maintenance Ltd (focussing on repairs and overhaul), while the rump of BREL (the manufacturing business) was sold with some difficulty to ABB Transportation, later subsumed by AdTranz when Daimler-Benz took an interest in 1996. Doncaster works went to RFS Industries (a management buyout) in 1987. Further closures followed the lack of orders in the run up to privatization and the surviving AdTranz manufacturing and assembly business at Derby and Crewe finally ended up with Bombardier Transportation. Having said that, the vestiges of this once huge industry in the UK are really train assembers, as parts now come from all over the world, many already partly assembled. We are too close to events to judge whether this distancing of heavy construction and maintenance from the operational railway is an improvement or not, but with the huge change in technology it was perhaps inevitable and is certainly echoed in many other countries.

Refinancing

The RSA was treated to a lecture in 1963 about railway accounting and the huge problems of reasonably apportioning costs—quite unlike a manufacturing business. It was noted that in the past there were suspicions about whether this information (even if it had been available) would have been useful. Now, with the financial position precarious, it was regarded as vital.

The railways at that time had a problem. Nobody was quite clear what they were for, the corollary being that, with no clear purpose, it was hard to work out how much the state should pay. When the BTC was conceived, the government genuinely considered that there would be no need for any financial contribution and that the system would be entirely self supporting. This was an interesting ideal, given the poorly set out and conflicting objectives and lack of urgency to define the BTC's purpose in more than vague terms. But the railways did not pay their way. Moreover, government was alive to the fact that railways had become political. Railways touched the lives of so many people that their fate could not be ignored and, in any case, the unions

kept them high on the political agenda. From 1956, the government felt obliged to pour money into the organization to meet the losses and continued to do so thereafter, not always graciously. Inevitably, anyone putting money in wanted to know what they were getting for it; the problem was at first that the railway could not tell them because the financial structures were not designed to do that. So began the lengthy process of reorganizing systems and processes to identify ever more accurately what was costing how much and to put the organization on a more professional footing.

As already hinted, Beeching's appointment might be regarded as the first determined move in this direction, and he identified what the railways were best at doing and which parts of the business should be abandoned. Barbara Castle's 1968 Transport Act was probably the next milestone, when it was recognized that some parts of the railway contributed social benefits that transcended cost. The railway was then effectively divided into the profitable railway (at least as an objective) and the social railway. Since then, the railway has shed all of what had become recognized as its ancillary businesses and now focuses purely on rail travel. It is perhaps interesting how this vast multi-faceted business has, under government influence, been made to focus purely on train operations, perhaps evidence of recognition that railways remain regarded as crucial to the country's infrastructure.

Although summarized in just a few paragraphs, this transformation demanded a huge upheaval in the skills required of those working in the industry; these skills were further redefined by the introduction of new technology which made analysis, modelling and planning much simpler. New skills such as cost-benefit analysis emerged during this period, which allowed social costs to be given a financial value, becoming an essential corollary to bidding for government funding and offering completely new techniques useful to the never ending job of using scarce investment funds as beneficially as possible. The RSA was given a thought-provoking lecture in 1963 by BR's economics officer, who took a somewhat controversial line on the use of social cost benefit, where he made it clear that there were several views about this subject and much room for debate. Though he was very much in favour of the technique, he was unhappy about its use to justify the building of the Victoria Line, partly (he asserted) because of some questionable methodology and partly because it was only deployed after the line had actually been authorized and in his view came up with the wrong answer! (In the event history suggests actual performance rather exceeded expectations.) Again, this was cutting edge material that RSA members were encouraged to embrace and which would have been more or less unknown to rail managers in general.

It was during this period that the railway finally managed to extract itself from the statutory or government-imposed restrictions on fares structures. From the early 1970s, it became possible to shift from the traditional so-much-a-mile approach to one reflecting the value that customers placed on their travel and the actual costs of its provision. This was not an overnight process owing to political sensitivity and the prevailing requirement for price restraint, but it was a start.

Railway managers had to learn to become businessmen, and there was some astonishment that so many of them became rather good at it. It was railway managers who developed the concept of business sectors (introduced 4th January 1982) which finally got rail finances and investment largely under control and at last made it clear what was being provided and at what cost.

The London & South East services responded particularly well to the business led approach. Dense commuter services had come to be viewed as inherently unprofitable, because of the huge infrastructure required to carry peak loadings for about 4-6 hours a day (and only Mondays-Fridays at that); at other times, the rolling stock and infrastructure were relatively lightly used and represented poor asset utilization that could not earn its keep. In the early 1980s, 60 per cent of the whole traffic comprised commuters. This issue was so acute that London & South East services received a substantial proportion of the PSO rev-

enue grant, amounting to over £230 million in 1984-5. In fact, what was soon rebranded Network SouthEast became so aggressive at improving and marketing its product, and in particular its off-peak loadings, that PSO grant was managed downwards and there was a real prospect of its entire elimination (achieved in 1993-4)—something 1970s managers had regarded as fantasy. To varying extents, the theme was echoed in most of the other business sectors, with Inter-City methodically tackling the issue of service quality, to which traffic was appearing to respond.

The 1986 RSA President (Gordon Pettitt) gave his Address on the subject of business planning. This was by no means the only lecture around this general subject area given in the 1980 Session and it is interesting to observe how few lectures prior to this era actually addressed business planning in any meaningful way—there were lectures on 'schemes' and accounting and, to a lesser extent, marketing and cost control, but we now had managers who had responsibility for the lot and who took it seriously and with mounting success. This was not a change in RSA policy, it was BR's business policy and the RSA found itself a useful conduit to explaining it to that industry. The lecturer frankly admitted that targets were set by the government in return for the substantial investment and revenue support funding that was given, and this was right. In effect, the government had become the prime customer, but the targets were unachievable if passenger and freight customers were not courted heavily. There remains, of course, still some debate today about who is the railway businesses' prime customer, though in private many operators believe the government is the ultimate customer and this can conflict with passenger needs. All businesses have two customers in the sense that they have shareholders to keep happy; but shareholder motives are usually quite simple, whilst government objectives are often complex, variable and not in all cases at one with maximizing passengers' satisfaction.

This is not the place to dig into the 1986 plan; suffice to say that it involved producing definite and measurable quality increases, with concomitant improvements in revenue, whilst making thoughtfully-considered cost savings and meeting all government targets. Against this background, reorganization and management staff reductions were thought to have weakened delivery and put too many inexperienced people in front line roles. This appeared wrong and Pettit thought more effort should have been expended in rewarding experience. He also thought, as a general principle, staff training on BR ought to have been better and that more organizational change was needed so that those who had the responsibility also had the authority. As Southern Region General Manager, he was able to cite some recent Southern Region initiatives to encourage this.

The 20 year period post-Beeching might be described as one where there was acceptance that, providing British Rail reduced costs to the lowest practical quantity, the government would provide some support. The arguments then rested upon whether British Rail was actually reducing costs enough, and the basis upon which support should be given. The creation of the 'social railway' element was a neat solution but it was inclined to wavering political commitment in terms of detail. The interference with proposed fares levels simply called for compensation, not necessarily given willingly. For the rest, the government tended to prefer making capital grants (or authorizing loans) rather than covering revenue shortfalls, and this tended to support the development of the business-led railway, where capital spent was expected to result in improved revenue performance and make a return, as in any other business. There were periodic revenue shortfalls but these tended to result from industrial action at a time when the industrial scene was lively to say the least. We then see the infiltration of public sector cost-benefit analysis, where social benefits increasingly counted as part of an emerging business case development process and might also receive government support where there were external beneficiaries and money could not be collected through railway ticket sales. That all this happened within a twenty year period in our review of the last century is almost to underplay the huge change it meant at so many levels of the business.

Infrastructure modernization and new technology

The 1963 Presidential Address drew attention to the huge amount of modernization going on. 350 miles a year of new flat-bottomed welded were being installed and BR hoped to increase this volume as new techniques were adopted. At first rails were laid in long-welded lengths, a technique pioneered on London Transport lines in the 1930s; but continuously welded rail was installed in ever larger quantities on the main routes and became the standard from 1965. Welded track on closely-spaced concrete sleepers not only gave a much better ride but largely addressed many rail failures which tended to occur in the region of joints, and maintenance expenditure also fell. Smooth ride has a commercial value too. It was admitted that progress had been rather slow but new designs were expected to be better for it and replacement was to be accelerated.

Mechanization of track work had progressed very slowly after WW2 but mechanized tamping began to take hold during the 1950s, avoiding the huge manpower needed to do this by hand. By 1970, BR was able to report that 20,000 miles had been mechanically tamped and 12,000 miles mechanically lined; work was in hand to develop machines to do both jobs (and more) even faster. New methods of ballast profiling had been required in the light of some difficulties with the new continuous welded rail, though the engineers felt they had control of the potential for track distortion. New track and machinery, and higher train speeds, meant changes to the way track maintenance was approached and the end of an era where it was regarded as acceptable to replace rails or sections of track between scheduled trains. To gear up for the new methods the new civil engineering training school at Watford offered residential courses of between one and 12 weeks, though these covered rather more than track. The courses were also available to overseas students.

At nationalization, the vast majority of signalling was still mechanical, operated from thousands of signal boxes controlling small sections of track and requiring many thousands of staff. Automatic colour-light signalling had been available for main line use from the 1920s and power operated signalling, using miniature levers and still mechanically interlocked, became favoured at about the same time, controlling somewhat larger areas of track and popular on the Southern Railway. Further development, involving route setting panels and relay-based interlocking, was available just before WW2 and was introduced at Northallerton, but development stalled during hostilities.

After the war, most new signalling was based on route-setting panels established at power signal boxes controlling around 10-20 miles of line, though areas were gradually extended. New electrical designs allowed standardization of circuitry, reducing cost and installation times. From 1983, the goal of all-electronic interlocking was achieved with an installation at Leamington. This further increased reliability by eliminating many switching contacts and made interlockings more readily reconfigurable, as alterations to the layout just required reprogramming. At first these interlockings were controlled from standard control panels but from 1989 a new Integrated Electronic Control Centre (IECC) was introduced at Liverpool Street, which set a new standard for centralized control over huge geographical areas. At IECCs all local interlockings were controlled from a small number of computer screens that supervised train movements which were normally set automatically from stored timetable instructions, supervisors only intervening if services ran out of course or extra trains were required.

For over a century trains had been driven with no automatic assistance and with drivers keeping watch on the various signals that applied to their route. Intimate route knowledge was required, as drivers had always to know exactly where they were, despite the appalling view forward from a steam locomotive under power, the more so at night or in fog or other poor weather. Although this was never regarded as entirely satisfactory, and there were numerous accidents caused by drivers missing or misconstruing signals, there was no very easy solution. All four main line companies had identified technologies that were capable of helping but, as we have already seen, only

the GWR pursued widespread introduction. Each provided warnings whenever a 'distant' signal was approached at caution and which applied brakes if no acknowledgement was given. After 1948, BR was slow to improve on this but eventually decided to adapt the LMS 'Hudd' system which, in its modified form, became the standard Automatic Warning System (AWS) still in use today. It was an important contribution in the days of mechanical signalling where the 'distant' signal concept was used and where such signals had only 'clear' or 'caution' aspects. It was a great deal less satisfactory where colour-light signals were employed that could offer one of four aspects and the AWS had to function whenever a red, yellow or double yellow aspect was given; on some parts of the network trains could run quite long distances without encountering a green at all and continual cancelling of the warning signal somewhat detracted from any benefits provided.

After some worrying accidents in the 1990s, a new system was overlaid across the entire network, called the Train Protection Warning System (TPWS). This is an electronic system that correlates signal indications with train speeds and applies brakes where trains are approaching signals inappropriately fast for the conditions. It is regarded as completely effective at speeds of up to 70 mph, and substantially reduces risks of trains encountering danger at even higher speeds.

Radio was being introduced even in the early 1960s and was useful in automated marshalling yards. The real benefits of radios came to the fore with cab secure radio, GSM(R) and tokenless block signalling. GSM(R) provides a secure cab-signaller link, with all kinds of benefits, notably that it can be used at any time and in either direction; previously only drivers could initiate calls by leaving the cab and going to a fixed telephone or walking to the signal box. Installation is in hand at time of publication.

WW2 itself spawned some new technologies useful to the railway. One example was the use of ultra-sound, which could be used to detect minute flaws in metals before they became large enough to be dangerous. This had obvious application in testing rails and wheels where faster and heavier trains were pushing existing methods to their limits. Self evidently a rail or a wheel failure in service has the potential to cause a catastrophic accident. Track could really be inspected only visually, an unsatisfactory process dependent on good light and putting the inspectors at risk. The new track forms and rising train speeds produced a need for detecting track flaws before they developed into rail failures and BR developed and introduced an ultrasonic flaw detection car that could do the job on the move. Today it is possible to check for flaws from a train moving at line speed, vastly reducing the amount of visual inspection needed.

Wheel and axle checking was done traditionally through a combination of inspection in workshops, requiring removal of the wheel, and by frequent in-service checks performed by a wheel tapper. This was a rail worker who walked along the length of a train clouting the wheel with a hammer; if the wheel were sound, it made a characteristic ring, but a cracked wheel or loose tyre would cause a very different sound. Wheel tappers, who also checked axles for hot axle boxes, were a familiar sight until the late 1960s. Where a defect was found, the defective vehicle had to be removed from the formation, hardly a practical proposition today. These days regular testing of wheels can be done automatically without removing wheelsets, and hot axle boxes are detected by trackside infra-red detectors deployed around the network.

Infrastructure modernization includes provision of new stations as well as the modernization of existing ones. It is interesting to observe that the station rationalization (closure) programme was more or less dead by 1980, but almost immediately focus then turned to bringing more traffic onto the railway by meeting demand from new areas, either by provision of entirely new stations or, in some cases, by providing new track as well. Between 1982 and 1985, 56 new stations opened with the pace accelerating; the 1994 BR Annual report noted that 75 new stations were constructed between 1990 and autumn 1994 alone. New branches were opened in a number of locations

around the country. (The majority were freight lines reopened to passenger traffic, but a few were brand new routes.) These included Stansted and Manchester Airports and the so-called Robin Hood Line in Nottinghamshire. Most of these facilities were paid for in whole or in part by third parties, representing a welcome new approach to providing valuable rail facilities.

Shipping and Hovering

BR shipping kept pace with developments until air travel began to make inroads around 1960. This had not stopped the BTC complaining about air competition as far back as 1953, as it suspected traffic was being lost to state-owned British European Airways and that air travel was effectively being subsidized, which was unfair as the BTC had still to cover all its own costs.

The railway shipping services had a good pedigree of innovation, having pioneered roll on/roll off arrangements and use of containers. Some 51 railway ships had been lost in the war, but, by the end of 1950, 21 replacements had been commissioned, with more on order. The total fleet was then 135 vessels, of which 62 operated just coastal, ferry or lake services, but this was still more ships than many shipping lines had. Many ships had high quality overnight sleeping accommodation for the longer crossings and a number of these carried large quantities of post to and from Ireland and the continent.

In 1952, BR put the *Lord Warden* into service as a dedicated car ferry, catering for the growth of vehicular traffic. In 1976 the RSA received a paper on the subject, observing the introduction of the name 'Sealink' in 1970, initially for passenger and car ferry operations but latterly used also for freight; the brand included continental rail partners SNCF (France) and RTM (Belgium). New services were sought and Weymouth-Cherbourg began in 1974. Services were co-ordinated with other shipping services (particularly continental rail operators) to maximize benefits to the market as a whole. Channel Island traffic was served from both Weymouth and Portsmouth and provided a vital link; some ships carried Freightliner containers.

A large number of services was operated from Dover to four continental destinations, providing facilities for Ro-Ro freight as well as passenger and car ferry services. There was also a train ferry, begun in 1936 and still carrying the through 'Night Ferry' London Victoria-Paris train each night; apart from rail vehicles the three ships now operating this service had high quality accommodation for passengers.

Harwich provided a base for North Sea services to Zeebrugge, Hook of Holland, Antwerp, and a train ferry to Dunkerque (started in 1924), carrying cars and Ro-Ro freight as well as sealed rail freight vehicles and containers (the SNCF also served Felixstowe). Then there were the Irish Sea services and a number of ferries, one of the last being that across the Humber, abandoned in 1984 when the bridge opened. The Isle of Wight ferry services were themselves major operations. The number of ships in service in 1976 still numbered 40, though this total had been declining as competition rose (though Sealink had the use of many ships provided by other operators). Finally, the Sealink operation was sold off as a going concern in 1984; the purchaser was Sea Containers Ltd, later active in the rail industry with the GNER franchise*. Partly in consequence of privatization, BR withdrew services using the Harwich train ferry in 1986, diverting traffic via Dover where a more modern train ferry was planned. The speaker reminded his audience that traffic levels comprised five million passengers on foot, one million coaches or private cars accompanied by three million passengers, 250,000 Ro-Ro vehicles, 750,000 million tons in rail wagons, and 110,000 containers—the preponderance brought by rail.

Associated with the railway's own shipping services was the way the railway serviced large passenger ships such as liners with the provision of so-called boat trains. These were a feature of railway operation until the 1960s, when people largely switched

* Sealink was making a small loss owing to industrial disputes and its sale generated £65.7 million that was supposed to bolster BR's investment programme. Unhappily BR was plunged into huge loss that year owing largely to external problems, such as the national coal strike, and the short term benefits of sale were entirely lost.

to cars and coaches to get to ports; in any case such traffic much diminished as air travel took hold, leaving the liners used for pleasure only. Boat train traffic was unusual in that the times had necessarily to vary to suit the tides, which dictated the times of each vessel's departure. This is mostly now a dim memory, though there are vestiges such as the 'Rail and Sail' offer from Stena, offering combined rail and ship ticketing and coordinated train and ferry timetabling.

Partly to compete more vigorously with airlines, BR Shipping was early to engage with hovercraft and built a terminal at Dover in 1966. Hovercraft are neither planes nor ships but at first the technology was supplied by the aircraft industry which was thought subsequently to make the medium unduly expensive. BR made a success of it and coined the name Seaspeed, renamed Hoverspeed in 1981 when Hoverlloyd became partners. This, too, was sold off in 1984. In all these non track-based operations through ticketing was available, sometimes involving bus links too. The technology did not at first exist to sell continental tickets from very many outlets, but a number of continental booking offices existed, perhaps the most famous being that at London Victoria, which could also book foreign rail travel. Many of these through fares still exist by the way and tickets can be purchased at any main line ticket office; they are a very well kept secret.

New Technology and the age of computers

To railway staff today it may be difficult to comprehend how it was possible to administer a hugely larger and more diverse organization without the use of the computer. Nevertheless, it is a fact that large and complex railway organizations were reasonably well administered and that this was not regarded as particularly remarkable (a distinction is drawn here between the art of administration on the one hand and that of management on the other). Successful planning and administration were possible mainly because efficient bureaucratic processes were put in place and were respected by staff at all levels. The concomitant shortcomings were a large administrative staff and occasionally some delay at arriving at decisions; perhaps more insidiously the paper-based processes may have made analysis less rigorous and the sharing of knowledge more of a problem compared with today. (There may be some who think that too much is shared today, resulting in information overload.)

The RSA was treated to a lecture in 1958 on the subject of computers by the BTC's electronics advisory officer. The BTC had just issued a policy document encouraging the adoption of computers where it would be profitable to do so. In autumn 1958, a computer was installed at the British Railways Research Laboratories in Derby, thought to be the first computer in the world to be installed solely for engineering and scientific calculations at a railway establishment. This was not the first BR computer, though, as there were already four others in use for more mundane work, principally payrolls. The Western Region pioneered these with installations at Bristol, Paddington and Reading, the first railway computers in Western Europe. The North Eastern Region had one which was also used by the traffic department. Four more were on order, for the London Midland and Western Regions, and were partly intended for stores control. Meanwhile, huge studies were taking place into the scope for using computers to handle all figure-work including preparation of statistics.

It was emphasized by the speaker that the BTC had been using computers a year or two before they actually owned any. This was partly by using commercial computer centres, such as those owned by some of the computer manufacturers. One very useful job was to calculate the minimum charging distances between every pair of the 6000 or so freight terminals, required for the new charges scheme. This would have taken years to do manually, but was done as a spare time activity by LEO (the computer owned by caterers J Lyons & Co and which put them well ahead of the game of what today would be called 'just in time' business management). Among several other examples given was the use of English Electric's computer 'DEUCE' at

their Stafford works for working out new point-to-point timings for the new generation of diesel and electric locomotives; the man who did the programming happened previously to have worked for British Railways Research. Another outside commission was to use a computer to work out stresses in a new design of concrete box girder. These tasks are, of course, regarded as totally unremarkable today, but were cutting edge in 1958.

A significant objective, even in 1958, was to find a way to use computers to facilitate compilation of railway timetables. As things stood, this was a labour intensive process, more of an art than a science, but one that was critical to successful and waste-free day-to-day operations. It was felt computers would not only produce more efficient scheduling but would vastly reduce preparation time—it took many years for this obvious application to dominate. Another process where computer logic was felt likely to be helpful was the preparation of interlocking charts for signal lever frames. The possibility was even floated of using computers to perform the interlocking itself, now of course, standard practice for new installations.

Scheduling

Timetables for a railway system as complex as British Railways are beyond simple construction in manuscript because everything, ultimately, links with everything else. To draw attention to the clashes and pathing opportunities that exist, it became the practice to construct timetables in graphical form, with time along the 'x' axis and location (mileage) along the 'y' axis, which sometimes accommodated a crude track diagram, so the position of loops, sidings, junctions and bay platforms could readily be seen. Trains in one direction were drawn bottom left to top right and in the other direction bottom right to top left; in each case, the steeper the angle the faster the train, while horizontal lines meant the train was stationary. Different classes of train could be drawn a different way. Seeing the whole picture of an area 'at a glance' made it a great deal simpler to see how additional paths could be inserted and the consequential effects this would cause. Connections were obvious and attempts could be made to accommodate niceties such as parallel pathing across flat junctions and so on, with reasonable allowances for slow freight trains to be pathed so as to be able to use loops if they seemed likely to get in the way of something faster.

A lecture given to the RSA in December 1976 by BR's Chief Operating Manager provided a useful insight into recent developments. For some time, it had been the practice to produce timetables by manuscript revision to whatever had gone before and then to compare the outcome with a master graph to check the proposals would work. Already computer aided typesetting had made this task much easier, with half the timetables for the October change computer typeset and the expectation that the remainder would follow with the next change. This was already saving nearly £100,000 in printing costs. The details of each train were being committed to punched cards, so that changes could easily be made by substituting a card. When a timetable was required, a computer converted the cards to a punched tape that went off to the printers.

The next step was to try and capture by computer the myriad of things a timing clerk had to know, such as the track layout, point-to-point times for every type of train and so on, with the object of the computer calculating accurate and workable train paths and so doing away with the graphs. It was felt a computer could produce optimum paths (and if necessary crew and stock schedules) but in practice it was quite a challenge to teach a computer to do what to a trained human would be obvious. Importantly, the process would be much faster. Freight paths were a problem and the speaker lamented that, during the abolition of steam working, timetables had been split into mandatory and conditional sections, the latter containing three different types of non-regular working; he felt it should be possible to simplify this. Progress had, in fact, been made in automating some of this and he mentioned that the weekly coal tonnages for Drax, Eggborough and Ferrybridge power stations were input each Thursday evening and the computer at Leeds di-

visional HQ produced the programme of trains, locomotives and men's workings that would be necessary the following week. Plans were now in hand to extend this to other areas, but this time to co-ordinate it with the new TOPS computer that would arrange the wagon stock too, and allow real time monitoring. TOPS is the usual abbreviation for the contrived 'Total Operations Processing System', an electronic real-time management system devised by the Southern Pacific Railroad and adapted for use by BR.

The speaker was a TOPS enthusiast and pointed out that during the previous year it had transformed certain freight activities that had previously resisted change. He particularly mentioned the 'tag number' system, where wagons were labelled up with the next yard to which they were destined. These were computer-generated and automatically produced road lists for marshalling yards, so that trains for the next destination could be made up with no human intervention and departure times planned with accuracy. This produced optimal operations and reduced errors; in fact, wrongly labelled wagons could usually be identified by the computers before any delay was caused. TOPS also took a daily snapshot of empty wagons and contributed to a large reduction in the wagon fleet. TOPS was subsequently developed to include locomotive and carriage movements with comparable benefits and in a much upgraded form is still in use.

The speaker was also an operating enthusiast and said that, in his long experience, attention to detail was vital, citing an experience of his when presiding over appalling operation over the (still diesel) Anglo-Scottish West Coast route. He suspected that locomotive failure and other engineering shortcomings were to blame, but when he requested detailed analysis it showed that the real blame was entirely his: poor driver standards, guards' duties poorly carried out, poor station working, unexpected parcels traffic, wrongly thought-out connections, poor signalling decisions and so on. These were tackled systematically and performance shot up. He was very keen RSA members took note and thought the philosophy extended to other sources of irritation, such as cleanliness and refilling toilet tanks. The 'attention to detail' message surely remains as vital today.

Railway operations

It might be thought that the art of railway operating has not changed much over the years—a driver operates a train according to agreed rules and fixed signals along routes set up by signaller. Simplistically this is so, but it belies major changes that have constantly required skills to be reconsidered.

Train movements themselves have been enormously simplified during the century under review. This is partly because perceived complication was felt unwarranted during the period of contraction from the mid 1960s, partly because new rolling stock made some operations more difficult, and partly because it was thought incompatible with speeding up the 'core' services.

For many years, it was by no means unusual to add or remove carriages at intermediate stations (not always the ones at the ends of trains either) and all this was done with loco-hauled stock with screw or buckeye couplers. Locos were often changed along the route. Trains ran in several portions or were split up to operate several through portions. Parts of some trains were coupled to others, and so on. There were even, for many years, 'slip' carriages which were uncoupled on the move and braked by a slip guard to stop at a station where the main portion did not call; these had to be retrieved by light engine and eventually returned to a convenient junction. The network had been much larger, so scheduled connections were prodigious. After WW2, the operations were slowly simplified. Most slipping coaches were not resumed after the war but a few continued on the Western Region, the last operating in 1960. With holiday traffic declining, the need for altering train lengths outside the timetable declined and with branch closures through carriages largely ceased.

A word should be said about the 'through carriage'. Railway people had soon worked out that passengers really did not like changing trains: it created uncertainty and stress, the exchange

stations were not always particularly welcoming and people's luggage was heavy and there was sometimes a lot of it. On the other hand, it was obviously impossible for every station to have a direct service to every other station. The compromise was to have some carriages tacked onto some of the regular trains that went beyond the main destination. In some cases (such as the *Atlantic Coast Express*) trains were broken up on their journey so that bits of them arrived at a wide selection of destinations; operationally the reverse workings were more fun as lengthy trains were gradually assembled and the intervening locomotives had to be got out of the way. In other instances through carriages either carried on as their own train, or were joined onto something else. The *Flying Scotsman* provides an example. At 10 a.m. it left King's Cross. (Sometimes there was a duplicate train a few minutes behind.) At one time when it got to Edinburgh there was an Aberdeen portion which was detached and coupled to one end of the 5.40 p.m. restaurant car express to Aberdeen (a smarter alternative train was used in the summer timetable). A Glasgow portion was also detached and added onto a 5.43 p.m. restaurant car express to Queen Street. There was also a Perth coach worked by a 5.55 p.m. train. Even before nationalization railways cooperated with each other. *The Devonian* was an LMS express that ran between Bradford and Bristol, but at Bristol three through carriages were handed over to the GWR and attached to another train to Torquay and Paignton. This same train carried a through carriage to Bournemouth West (via Bristol) and acquired a through carriage from Newcastle (an LNER Newcastle-Kings Cross train with its own through carriage to Bournemouth Central via York and Oxford). Such operation additionally enabled several long through journeys to be made by merely changing seat.

These operations took place on quite a large scale for about fifty years and, whilst superficially complicated, played to the strengths of the railway which tried to provide some kind of through service where feasible. Train make-up was inevitably complicated by the need to provide first and third-class accommodation in all portions of a train (even single carriages), which is why 'composite' coaches (ie coaches with both classes of accommodation) lasted for so long. This kind of operation happened all over the place and many relatively rural lines, even in the late 1950s, had one or two trains a day which, by some devious means, managed to provide a service to London or other major centres without the passenger having to leave the carriage. The loss of these may have been warranted by the traffic, but may further have isolated the communities enduring the loss. This is mentioned by way of indicating that great importance was at one time attached to trying to meet perceived needs as they were seen at the time; we will leave it to others to judge whether this was efficient. It does not alter the fact that, even today, it is recognized that passengers do not like changing and will endure some delay, and perhaps cost, to avoid it.

The widespread introduction of multiple units from the late 1950s redefined the issue of coupling and uncoupling into (usually) running single, double or triple units which, from the 1970s, began to adopt auto-couplers at the unit ends, improving speed and safety of coupling. The Southern Region and its predecessors had long indulged in coupling and uncoupling portions of its electric trains on a large scale and, although the electric network still does so extensively, even with service trains *en route*, it is not on quite so large a scale as hitherto.

From 1988, surviving loco haulage of passenger trains was altered (usually) to push-pull operation that avoided locos having to uncouple to run round trains, so most passenger working is now operated in block formation whether loco hauled or not; new driving van trailers had to be built to allow driving from the non-loco end of trains. The cost of having inessential spare stock is regarded as prohibitive, so strengthening trains beyond the normal 'diagrams' is now all but unfeasible. Most trains are strengthened at certain times of the day where a short train will do off-peak, and this often happens at terminals. Some routes still operate services that combine or divide *en route* and this has the advantage of reducing the number of train paths required

in the busier areas.

In 1909, all trains were organized as best as possible by tens of thousands of signalmen each in charge of a small geographical area. The only guide to operations was the working timetable and a set of rules setting out train priorities. Every signalman made his own decisions and the result was at best sub-optimal, with consequential reduction of network capacity and unpunctual running, sometimes of legendary proportions. Nobody was actually responsible for taking an overview and primitive communications would in any case have made this difficult.

The earliest 'control' scheme is said to have been introduced by the Midland Railway in 1907 specifically to deal with South Yorkshire coal traffic, though the North Eastern was doing something similar for the same reasons at Newport (Middlesbrough) for iron and coal traffic. In each case the need was to co-ordinate traffic through complex and busy junctions and sidings and this was far beyond anything local signalmen could do. (In fact many trains necessarily operated outside the scheduled timetable and paths had to be found as best as possible.) The newly-introduced telephone was gradually appearing and pencils and notebooks soon gave way to large 'control' diagrams where individual train movements could be followed. A controller was put in charge—a previously unheard of position in the chain of command.

Having found the initial control area beneficial, the Midland extended 'control' to the whole line between London and Carlisle, achieved before WW1. A head control office was set up at Derby, with district controllers at five other sites along the line. By this time, some other railways perceived the need for a better way of doing things and certainly the Lancashire and Yorkshire were early control enthusiasts. After amalgamation, the LMS was well ahead of the game and introduced a very complete system of control that then took on the additional tasks of monitoring carriage and wagon movements and trainmen's reliefs. A division of labour then followed with central control at Derby maintaining a general oversight of the network, together with direct control of express passenger trains, and district controls dealing with everything else.

The GWR introduced control for freight working in 1909 and by 1915 had extended it over much of their network, including a controller dedicated to managing trainmen's hours. As with other railways, passenger workings were included only later. By the Second World War, all railways had adopted a control system suited to their own needs though each was similar in many respects. Some railways still left many decisions to local station managers while the centralist LMS only permitted decisions (for example) about train strengthening to be taken by (or at least with the agreement of) control.

Under British Railways, practices were harmonized more closely across the network, but regional control offices still maintained a certain individuality. The introduction of power signal boxes (PSBs) made control much easier, with signalmen at the PSB able to take more informed decisions; the huge simplification of freight traffic also reduced the need for control in the traditional sense. Control comes into its own during times of disruption, when decisions need to be taken about train working in the wider interests of the service. The introduction of IECCs covering vast areas allowed controllers to be relocated there, further easing communication difficulties.

Privatization introduced new issues, as control of signalling and pathing remained a network responsibility under Railtrack and Network Rail, while stock movement and crew reliefs became a train operating responsibility. These bodies had necessarily to introduce their own control staff, usually at a different location. This was soon found to be perverse and the practice today is to try and co-locate controllers so that train pathing, stock and crew decisions can be made as optimal as possible. Managers today are not necessarily convinced this is the best that can be done, though. The industry must strive harder to overcome one of the disadvantages of fragmentation.

It will be inferred from this that in many ways train operation is somewhat simpler today than was once the case; more imaginative planning is required in order to deploy stock and staff

most efficiently as there is in general so little spare stock and operators are naturally disinclined to pay for leasing stock which is simply standing around 'just in case'. George Muir, during his Presidential Address in 2001, considered that the railway should be considered as an engineering system designed to deliver optimal train paths, but that it was a system placed under significant stress by progressive historical disinvestment intended to keep pace with falling traffic, when in fact traffic levels had shot up. Like many systems under stress, the 'machine' was struggling as essential breathing space was being managed away. There is no doubt that a railway run under these conditions is more difficult to operate than it need be, as the slightest 'perturbation' has quite disproportionate consequences over a wide area.

Law and order

Reference to policing was made at the beginning of this book and it was said that the larger companies all had their own police force. Generally, the public were relatively well behaved and the uniformed police concentrated on patrolling the larger stations and yards, with crowd and traffic control a major preoccupation at stations with crime deterrence in yards. Plain clothes staff dealt with crime detection, some prosecution work and investigation of serious ticket fraud.

In 1923, the railway forces were part of the amalgamation schemes, and some became very large. The LNER and LMS split their forces into different areas at the Scottish border, owing to the different legal systems between England and Scotland. In 1939, the Great Western's chief of police addressed the RSA to say something of railway police history and current duties. The GWR force was comparatively small, comprising 360 officers and men split among four divisions at Paddington, Bristol, Birmingham and Cardiff. The combined strength of railway police at that time was about 2500. He explained that in 1937 railway police brought 13,770 prosecutions, including 4086 for trespass, 3192 for stealing and receiving, 2589 for ticket fraud, and just 826 for damage. He thought railway crime was quite low (though 1920 had been an appalling year for crime)and was astonished at how honest staff were. Pilferage by others was a problem and the police had begun the practice of putting seals on wagons to help pin down where losses were occurring and of making spot checks on consignments, and this was making an impact. A good deal of work took place at the docks, where consignments were often left unattended and where theft of valuables from ships was prevalent. Detective work included misdeclaration of merchandise, fraudulent claims, embezzlement of company money or falsification of accounts, fraudulent travel, trafficking of tickets and mail robberies, to give but a flavour.

In 1948, the railway forces were temporarily brought under the control of a single chief of police, who acted as coordinator. However, the 1947 Act made no further provision for police reorganization, which for a while carried on under regional chiefs under the existing legislation. In 1949, a new 4000-strong British Transport Commission Police was constituted under a BTC Act of that year. Its constables had authority on, or in the vicinity of, the Commission's railways, stations, harbours, docks, inland waterways, wharves, garages, hotels, works, depots or other premises. The force was entirely reorganized into areas in a manner intended to reduce the interfaces with the outside police forces. Thus London and Scotland became police areas in their own right, and there were four other regional areas. London Transport retained its own area, as it was large enough. Each area had its own chief of police responsible for divisional superintendents, CID and an area flying squad. Incidentally there was a time when certain railway supervisory staff were also sworn in as constables to assist them in their duties.

In 1953 the Commission's chief police officer gave an illuminating talk where he described some of the complications faced by transport police that an ordinary force would not face. He used an example of theft. If a shop were broken into, the local force would know very quickly when the crime took place, what was taken and maybe even would have suspicions about the per-

petrator from local knowledge. If railway goods were taken, it would typically become known well after the event when the intended recipient complained that, despite having a despatch note, he had not received the goods—this could take a week or two. It was always possible to identify the train involved (if the missing goods had even made it that far) but a train might have travelled 500 miles and stopped perhaps 20 times where virtually anyone could have had access to an unlocked van… and so on. In the case of parcels, there would not even be a despatch note to alert a recipient to the fact anything was missing. The Commission's police had various strategies for dealing with persistent theft and had a good success rate in the circumstances. He mentioned an alert constable who stopped to question a railwayman who had just left duty and was carrying a cauliflower. Evasive replies caused his arrest on suspicion (he said it had fallen from a railway wagon) and subsequent search of his home revealed an Aladdin's cave of goods stolen from railway wagons. Staff pilfering was unfortunately not uncommon by then.

From the 1960s, the police began to shed responsibility for all except the railway network itself; docks, for example, were lost in 1985 and Sealink in 1989 (both because their new private owners objected to the cost). It has also been reorganized several times, but always on a regional basis, and with the chief of police restyled chief constable; from 1963, the force was renamed British Transport Police. In 1969 (and it is interesting to compare numbers with those given to the RSA relating to 1937), the Police strength was 2366 men and women (175 below establishment) with just 1941 involved exclusively on BR and the balance on London Transport or British Transport Docks. 8816 prosecutions were bought for indictable offences, with 28,325 more for summary offences.

The railway police had already decided amongst themselves to set up a joint training centre at Tadworth prior to nationalization; this opened in 1947 and provided training for the BTC Police until 1968. In addition, officers received specialist training from the Metropolitan Police at Hendon (they had used the facilities of the Met for many years). At this time the BTP force was the second largest in the country. Closure of Tadworth proved temporary and the establishment was later reopened for specialist training, basic training taking place at Home Office training centres.

British Rail was responsible for the force from 1963, and after the privatization process it remained with BRB Residuary, later becoming the responsibility of the short-lived Strategic Rail Authority. From 2003 it was reconstituted under its own police authority and paid for by an industry levy.

The modern railway and its approach

It is clear that railways have evolved continuously over the last century. However, the most profound change probably occurred in the period 1960-1970. Prior to 1960, rail users and many rail staff would have identified with methods and facilities that would have been recognizable fifty years previously. Methods of traction, station facilities, the fares system, services offered to passengers and goods consignors, operating methods and so on had not fundamentally changed over that time, despite piecemeal improvement. After (very loosely) 1970, we see the beginnings of a much smaller and far more efficient network, huge introduction of new technology, a focus on the passenger market with the appreciation that high quality, high speed services are needed, with new traction methods, high-yielding fares systems, more aggressive marketing and customer-focus. Also came the recognition that some parts of the network will always require government support. Despite ongoing change since then, the post 1970 railway is still very recognizable today. The mid-century change, particularly in the 1960-70 period, is hard to understate. Perhaps much of this change was inevitable (we have seen how some RSA speakers alluded to its need), but it is at least questionable if the energy needed could have been found had not Richard Beeching given it the necessary impetus. Beeching, who died in 1985, is not everyone's favourite railwayman, having carried the odium for the conspicuous closure

programme, but his chairmanship was really all about modernization of the bits worth keeping and that is what has brought us to the network of today. Some commentators* questioned ministerial enthusiasm to get many immediately unprofitable lines closed as fast as possible and whether some lines could in fact have been saved with cheaper operation and proper marketing.

Some things have not changed. RSA Members have enjoyed a number of lectures about what passengers' requirements are, sometimes from their representatives, but occasionally from within the industry. In 1981† Alison Munro CBE (Chairman of the Central Transport Consultative Committee) made a spirited plea to railway managers to bear in mind the very simple requirements that passengers have. Commuters wanted an adequate service, a punctual train and a seat in a reasonably clean coach. A recent Royal Commission had just been told that passengers' priorities in general were for reliability and then information (especially went things went wrong), followed by a host of quality factors, such as clean seats and pleasantly staffed and well-maintained stations. The fact that this was not what passengers (and especially commuters) were getting was principally the explanation for the feeling that fares were going up and quality worsening, giving rise (she asserted) to the feeling that railways were not seen as good value for money, with the resulting discontent such a view engenders. This was a theme other lecturers turned to as well.

It is clear from other RSA lectures that were batting for the passenger that these 'simple' requirements have been pretty consistent over the last half century, though it might be asserted that expectations have also risen in the meantime, making the challenge harder. Munro was particularly critical of station waiting facilities and cited those at Clapham Junction as being an object lesson in surroundings calculated to sap the morale of staff as well as passengers! (Conditions are slightly better today, but wholesale reconstruction is the only long term answer and this is at last recognized by government.) Inadequate passenger information was an annoyance only increased by being obscured through the use of 'tired cliches'. She could not understand why, during disruption, the information that was available in the new control centres could not be shared effectively with those who could convey it to passengers and felt that the railway lacked effective procedures to deal with things out of the ordinary in a way that passengers received timely and relevant information. It is interesting that, three decades later, some of these fundamentals are still huge issues and provide a real challenge for those coming into the industry to grapple with.

One factor that seems to have become more evident in the 'modern' railway is the propensity for senior managers to embrace change and be enthusiastic about it, an attitude that was perhaps slightly easier to support with the smaller and less cumbersome business structure. Geoff Myers, Board Member for Marketing, in his Presidential Address in October 1980, thought railway people had been trained to challenge adversity and for that reason tended to make do with outdated systems and obsolete equipment, each factors that diverted management time and effort. He thought the private sector would throw out systems that were not fit for purpose and replace equipment sooner to keep whole life cycle costs down. He was certain that BR's product innovation process had to accelerate, as existing products such as Golden Rail holidays, Red Star and Speedlink were doomed unless they changed; new products had to be developed to remain competitive, each having a long lead time. Events have proved him spot on. Myers had an interesting insight on management processes and thought that technology should be used to enable a large organization to appear like a small one (bringing local managers closer to customers) as well as sorting out endemic problems like managing disruption. He also wanted to see more 'positive and courageous leadership' [not more management] and perhaps BR was lucky to share in some of this.

* See Fiennes *I tried to run a Railway* and Hardy *Beeching, Champion of the Railway*

† RSA Bulletin No 30. Munro had an interesting career that started as PA to radar-inventor Watson Watt, passed through under secretary at Ministry of Aviation and from there to head mistress of St Paul's girls school. A constant thorn in the side of BR whilst at the CTCC, she was created DBE in 1985. She died in 2008 at 94 and is no relation to her namesake currently running the HS2 company.

Of course, we now have a privatized railway network and it will be interesting to see the analysis made by future historians about how private sector business practices have actually impacted on change over and above that which would have happened anyway owing to (for example) increasing technological obsolescence.

Colin Driver's address to the RSA in 1981, about how the passenger business was managed on the Eastern Region, shows how the focus was changing. Very little was said about the assets, the entire thrust being about managing within budgets and the marketing effort required to meet targets. High speed trains had generated an increase in traffic of 25 per cent more passenger miles, complaints had dropped and costs had been cut. There were service managers for each group of services, and they stayed close to their customers. He was delighted to have been able to react to the 1980 Transport Act which had deregulated coaches; with new rail services, fares and better marketing, he had effectively run the new commuter coaches off the road. Customer focus was the watchword and he was pleased that technology had enabled even booking clerks and travel centre staff to adapt; they 'really are no longer accountants who issue tickets in their spare time', he averred. He thought the region had been moderately successful in refocusing marketing effort to the most profitable areas, even if this disadvantaged some individual customers. He thought that future rail marketing should be based on six principles:

- differentiate or die,
- dominate the market and keep it,
- relentlessly pursue the basic strategy,
- carry out ruthless analysis to increase marketing productivity,
- take tactical initiatives, and
- systematically adopt new marketing aids and techniques.

The above he summarized as 'successful businesses act, unsuccessful ones react', a mantra that applies equally well today.

On the subject of trying to keep one's customers (and remembering Fay's comments in 1911 about passengers' inclination to be ungrateful) an interesting excursion was made by the Southern Region in 1962 when its general manager* distributed to passengers a slightly contentious booklet called 'Want to Run a Railway?', teasing its customers with the question 'Perhaps you think you could run the Southern Region better than we do?' This surprising booklet comes across as a tad defensive at a time when railway staff worked hard but reliability was not what it might have been. Nevertheless, it was an opportunity for the region to explain some of the intricacies of running a railway, and possibly generated some sympathy. The experiment was not repeated, but the Southern did subsequently issue free 350-page 'Travellers Handbooks' containing much information about how the system operated, as well as a large travel guide section. It was a visible attempt to communicate with the customer, an activity best described as sporadic.

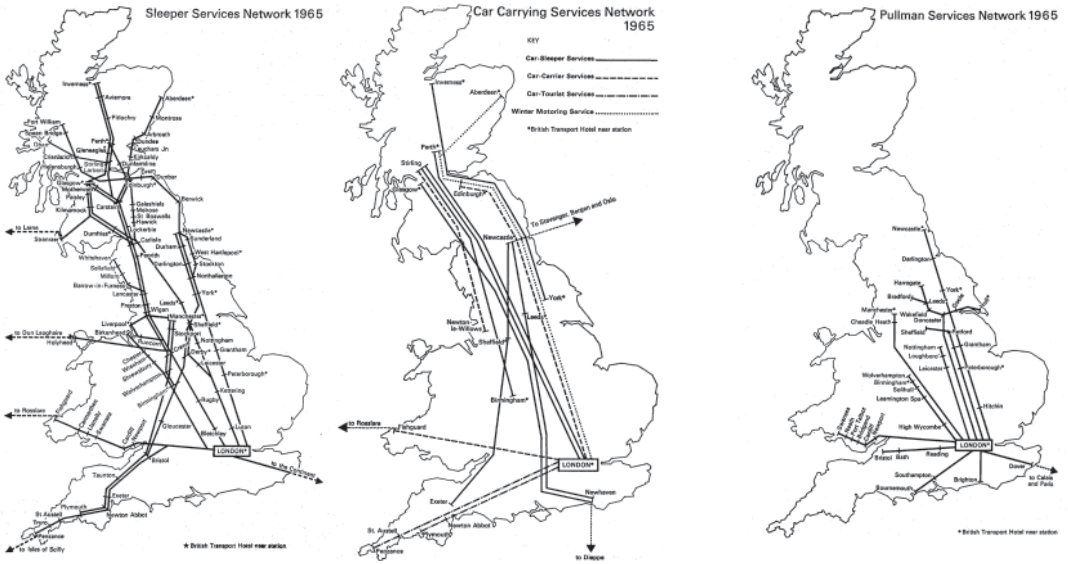
The Southern was also an innovator in trying to improve difficult passenger and staff communication. Around 1966, the Southern introduced a new grade of area manager, a non-uniformed grade in charge of groups of stations, who were expected to be out and about talking to passengers and local station managers. As many stations were destaffed and operations were simplified, the job became in effect equivalent to that of today's group station manager, but at the time it helped improve performance. In 1980 the area manager at Waterloo gave the RSA an enlightening lecture on his duties, and it worth noting he had 800 staff to help him (including 100 guards, 130 parcels staff, 12 managers and 32 supervisors). He had some strong views about certain things, and a propensity for too much supervision was one of them; he thought it slowed down action. Lack of success in recruiting the best sort of person was another issue. He believed his job was about providing leadership and motivation—staff looked for leadership, common sense, fair play and a propensity to keep any promises that were made. It would be good to imagine that RSA students took this to heart and do just that today.

* RSA Past-President C.P. Hopkins

The loss of the old station master (a process that started in the mid 1960s and was all but complete by about 1972) marked a huge change in the way the railway was managed. Apart from anything else, it withdrew a valuable two-way link between the railway and the community it served and withdrew a considerable opportunity for innovation and on the spot decision making. With railway modernization and rationalization, and to some extent because of the railway's changing role, this change was perhaps inevitable. Several commentators speculated on the wider reasons which included:

- Simplification of track layout, reducing risk of operating incidents.
- Vast reduction in number of signal boxes to supervise.
- Automation of level crossings.
- Operation of unit train formations and elimination of spare stock, avoiding need for shunting.
- New methods of communication reducing need for on the spot people.
- Elimination of all goods work and outsourcing of surviving parcels collection and delivery work.
- General destaffing of stations and centralization or outsourcing of other activities (eg seat reservations, travel enquiries, cleaning, cash handling).
- Automation of ticket offices.
- Automated payroll and direct payment to banks.

The loss of the SM role, surely one to which many railwaymen would have aspired, accelerated management separation of train movements (control and deployment of drivers, guards and rolling stock) from station operations. The latter became known as 'retail' by analogy with the service obtained in a shop, and confined itself to ticket selling, provision of information and customer care). This was later to simplify the process of rail privatization via the preferred methodology of franchising, reliance being placed entirely on modern communication methods to mitigate the loss of 'on the spot' staff who can make train movement decisions.



Railway Services for specific markets - 1965

Chapter 6 – The Dawn of a New Era

Privatization and the future direction of rail

Rail privatization was on the cards during 1991, when the government made it known it was looking at a number of possible options. One was to sell off BR as a going concern (like British Telecom). Another was to sell it off by geographical region (the regions in fact which BR had just abolished) to create something akin to the pre-1948 position. Another was to sell off the new business sectors (though they might not all be attractive). The last option was to separate track and train, making the railway network more like the road, but inviting the comment that it might be 'unwieldy and unresponsive'. Each had advantages and disadvantages and no decision had been made.

The Conservative manifesto prepared for the April 1992 general election indicated that the decision had by then been made, if elected, to adopt the fourth of these methods, apparently under Treasury pressure. British Rail would retain control of the track, but train services would be franchised by a new regulator who would also ensure open access arrangements to anyone who wanted to run trains (for which it was imagined there was a huge demand). Freight and parcels would be sold outright. It is a matter of record that there was a working Conservative majority at the election and that the Railways Act was passed in the first parliamentary session. The 1993 Act was not prescriptive about exactly how privatization might evolve beyond setting up a franchising authority to operate the franchising system, rather than having it as part of the regulator's duties.

The privatization of Britain's railways provided a number of opportunities for discourse at RSA lectures.

Dr John Prideaux (then Chairman of Union Railways but formerly managing director Inter-City) gave his Presidential Address in 1992, on the eve of publication of the Railways Bill; the subject was putting innovation into evolution. His insightful discourse observed that, although the railways had a huge inheritance which clearly influenced actions and behaviours, it had not only changed enormously over time but would need to continue to do so. Managers had to avoid being hidebound by this inheritance and retain an open mind and flexible approach to what could be done. He gave a number of examples, beginning with the panic in the District Railway boardroom in 1903 when it was found the lucrative messenger boy traffic had disappeared, owing to more widespread use of telephones; within a few years the District Railway (now the Underground's District Line) was nevertheless soon filled up to high levels of crowding. More recent examples included huge shifts in passenger travel patterns, though trains were still very busy, and in the nature of freight being carried, substantially retaining ton-miles but on far fewer wagons. The railway, despite appearances, could be highly adaptable.

Prideaux's thesis was that evolution was inevitable but that rail managers ought to be able to shape the direction. That direction should itself be shaped by the interests of railway customers—if they are not satisfied customers will (ultimately) go elsewhere. An understanding of who the customers were, what they wanted, and how they judged the railway's success in delivering service were all vital. An understanding of the costs of delivering what was wanted (and how they were likely to change) was the final ingredient in setting up a direction in which a railway might evolve. There were dangers. Radicalism did not sit easily with evolution and he cited the damaging 'build new' fad of the early 1960s, when many perfectly serviceable buildings and structures were torn down to be replaced by new ones that were nothing like as good, or just unsuitable, and did not in fact endure (this was an issue much wider than railways of course—remember the tower blocks?). Illustrative as this paragraph is penned is the current proposal to recover and rebuild the Euston arch, whose demolition scandalized many people in 1962.

Prideaux was upbeat about privatization, noting it would produce clarity of purpose and a degree of transparency, apart from

anything else. He referred to suggestions that freight traffic in the new regime was to be 'subsidized', but explained that this was already the case, because the 1974 Railways Act had defined the network as a passenger network and freight had only to pay the marginal costs of use. Privatization was a means to an end. The end, he thought, was a number of smaller organizations with simple objectives. The challenge, he thought, was the management of track access and transparency of costs. Another end was the removal of the artificial spending limits imposed on BR; that could only be good.

He thought Britain was very lucky in having railways that provided fairly direct routes between the major cities (unlike some other countries). The inter-urban traffic was nevertheless heavily weighted towards journeys to or from London (Inter-City) or Birmingham (Cross Country) and he felt that more should be done for some other centres. He favoured, on the basis of studies, not a high-speed railway but a constant-speed railway, where significant time savings could be achieved by eliminating bottlenecks and restrictions. An exception was East Coast where there was much more longer distance traffic which could be converted from air, and of course the Kent high speed line to the channel tunnel.

Innovation in the use of people struck him as a vital contribution to the evolution of rail. He reminded his audience that psychologists believed people only use ten per cent of their potential, so if we could get a little more than that then the results would be significant. It was also about getting people to work well together to the common cause. 30,000 people moving in 30,000 directions was just noise, but if they were all going the same way they could achieve marvels.

BR Chairman Sir Robert Reid (Bob Reid II) observed during his address to the RSA in 1993 that public comment about railways tended to be very narrow and focused mainly on performance, ignoring the real challenges of running a massive and complex network and being intolerant of failure; frustrating as this was, it was the lot of the railway manager to strive to give high performance outputs against adversity. That's what railway people did. Another old theme was that of endemic change, a railway characteristic caused at least in part by a constantly changing world. He was enthusiastic about the Board's 'Organizing for Quality' initiative, observing 'it was vital to break down the essentially monolithic BR structure', and that it had released huge local talent that had already had a marked effect on improved performance. (Trade Union leader Jimmy Knapp at another RSA lecture had a rather more jaundiced opinion about this.)

Reid tactfully discussed the issues that imminent privatization presented. On the plus side, he felt that the franchising system would build on BR's new organization in creating manageable business units focusing on specific markets, which he had already concluded was a successful strategy under BR. Indeed, we know that franchises were largely created from BR sectors and sub sectors. He was sanguine about the separation of track and train, the opposite of the prevailing policy, but observed that there was already considerable internal trading within BR and the business could probably handle more if it had to. He was very uneasy about loss of unitary command and control and hoped the new structures concentrated on 'pursuit of the solution' and not 'the allocation of blame'. Readers will have their own views about whether these concerns were justified or not.

An issue he was worried about was training and development in the new structure. Several measures had been taken to introduce a new competency-based staff qualification regime that would provide mobility within the new industry. He thought that training had in the past been weak for front line staff in demanding jobs, particularly for supervisory staff. The new regime, coupled with new standards, had been linked directly to BR's performance objectives and coupled with more local control had already resulted in improved performance. Nevertheless, he lamented that more had not been done and he remained horrified by the reliance on overtime.

Reid indicated that the experience that he had found most memorable was having to stand in the dock in the high court to

be handed a *guilty* verdict directed at the organization of which he was head following the serious Clapham train crash, caused by faulty signalling work. This followed a long period of organizational shock—of a type he thought that people outside the industry would never understand—which was a human response to such a dreadful event in an industry in which staff had previously been so proud (this was similar to that pervading London Underground after the King's Cross fire).

He was concerned about future investment, noting how tempting it was to aim it at high-profile objectives when, in fact, railways needed considerable steady state investment to maintain asset condition, citing 45,000 bridges and 1000 listed buildings as assets tempting to ignore, but only capable of giving service for so long without attention. He lamented the mischievous (or incompetent) use of statistics in an attempt to damage the reputation of rail, noting one in particular hurled at the railway that, if rail freight doubled, it would take only five per cent of freight off the road, not a very good return. This disguised the fact that the figure included all 'white van' local delivery and distribution work, with which rail did not compete. If the figures were confined to heavy goods vehicles (carrying rail-friendly loads), he thought it would take 45 per cent of such vehicles off motorways and hugely reduce fatal road accidents apart from other environmental improvements. All statistics needed to be viewed with suspicion and an eye to the underlying data.

Reid wrapped up his lecture by noting that the Railways Bill created enabling legislation which allowed policy to evolve. This was understandable but created huge uncertainty that took its toll on performance and staff morale, and frustrated essential planning. He hoped that the period of uncertainty would be short. The replacement of unitary command, 'where the decision process is clear and fast', by a disaggregated situation governed by contracts would be apt to make decision making neither as fast nor as direct; it was vital to create a spirit of co-operation and mutual help if the rail industry as a whole were to play its most effective role in the community—he warned about the relationships degenerating into mindless conflict. In any event the new industry would still need to invest in assets, invest in people, avoid unproductive and debilitating conflict and maintain progress towards a 21st century vision.

John Nelson* spoke to the RSA during 1994 on the subject of 'quality', and sought to demystify a number of jargon-ridden quality-related terms by putting them in language railway people could relate to. His advice about delivering quality was to listen to customers' needs and keep resulting processes simple. That, in a nutshell, was total quality management (TQM), a popular improvement process around at the time. He thought railway people actually enjoyed complexity and this was sometimes a barrier to making things better. Of a number of successes he reported was the fact that, although fares had risen by much more than inflation, the service improvements had been so marked that the regular passenger surveys were reporting a major improvement in the 'value for money' scores. He found this most heartening when coupled with increased ridership resulting from aggressive marketing (despite a recession). Certainly there is a lesson for today where 'value for money' scores are relatively poor and struggle to move.

Nelson gave a number of examples where huge improvements had been achieved and indicated it was down to a number of interrelated factors. Amongst these were clear objectives from the top, broken down into achievable targets at various levels, coupled with measurement systems that produced accurate progress reports. The secret was then leaving it to local staff to implement or adapt processes locally according to conditions. He thought that this approach had equipped the railway for privatization, which was inevitably going to be heavily influenced by contractual and financial targets much more than in the past. As part of this, he was not only comfortable with the amount of change, he wanted more people doing more of it, provided it contributed to improved performance.

* Group Managing Director (South & East) British Rail.

The privatization process was effectively completed in 1996. The government required all infrastructure maintenance and track renewal work to be split into a number of geographically-based renewal and maintenance companies, which would perform services under contract to Railtrack, the new infrastructure owner. (It may have been a desire to 'airbrush' British Rail from history but more likely a necessary prelude to possible infrastructure privatization.) The maintenance and renewal companies were all required to be sold, leaving Railtrack (in the event also privatized) effectively without an engineering function, an issue later to become a source of great criticism and requiring Railtrack's successor to create an engineering function and bring maintenance staff in-house. The rolling stock was distributed amongst three leasing companies set up in shadow form under British Rail and then sold. 25 passenger train operating companies were progressively carved out of existing operations and run in shadow form until sale.

By way of postscript, the last British Rail passenger units to be franchised were West Coast and Scotrail at midnight on 31st March 1997. The latter was transferred to National Express Group and hundreds of people flocked to the 23:30 Glasgow-Edinburgh train, considered then to be the last nationalized passenger service in the UK, though the last public sector arrival was that night's Fort William-London sleeper which reached Euston at 10:30 on 1st April. By quirk of coincidence, one Scotrail employee had started his career in the private sector, having joined the LNER as a store boy in 1947. Now a booking clerk, the about to be re-privatized employee remarked that 'It didn't make much difference when British Rail was nationalized. I only hope privatization won't make much difference either'. When receiving an award plaque from Scotrail MD (and RSA Past President) John Ellis, he did concede that under BR services had improved and everything was a lot cleaner. Of course, subsequent events have seen two franchises that were in difficulty returned to the public sector, though only on a temporary basis.

Training for change

Although there is some evidence of structured career planning for railway officials before the First World War, it was the amalgamations in 1923 that created giants where the senior managers were far removed from their juniors, especially new entrants, and some kind of structured process was required to manage advancement. We have already identified the first tentative signs of formal recruitment and training in 1909, and paternalism within the industry became more complete after 1923 as did the need for formal training for the few who were expected to be high fliers. These included the railway courses at the London School of Economics (supported by the RSA) together with Manchester University and some other centres. The objective was to give staff 'an intelligent comprehension of what is involved outside their own immediate purview'. Advancement was more or less assured for those staff that were selected for the traffic apprenticeship scheme, the seeds of which were sown by the North Eastern Railway and subsequently developed by the LNER, credit for which may be ascribed to its Assistant General Manager, Robert Bell, who was especially keen to recruit graduates. Bell had a high intellect coupled with dry humour and somehow knew a great deal about all the graduates; those that survived his sorting of the sheep from the goats had a great future ahead of them. The railwayman and author Michael Bonavia observes the extent to which ex-LNER men achieved high office and ascribed part of this to the excellence of the traffic apprentice scheme. For example, they provided half the technical officers for the Transportation and Movements Division of the British army during WW2 and half the senior management of British Railways after 1948, dominating control of the British Transport Commission. It is hardly surprising to see the traffic apprentice (later management training) scheme become standard BR practice, and it must be said a number of apprentices subsequently left the railway and became highly regarded businessmen.

The other railways also recruited traffic apprentices, but not

anything like as systematically or in so large a number as the LNER. There were (rare) critics. Stuart Joy* suggested that apprentices saw a great deal on their various attachments but the information was out of date by the time they actually achieved high office. He wondered if distant memories of Whitemoor Yard, Bradford Valley Goods or Crewe Works imposed an unnecessary brake on thoughts of grand strategy and whether the scheme tended to produce managers anxious to solve yesterday's problems rather than those of tomorrow. In any event, it was clearly a tough call keeping managers of these vast businesses up to date with the latest problems, opportunities and business methods.

Frank Pick† gave his presidential address to the RSA in 1930 on the subject of Education for the Railway Service. To the modern reader it seems a bit general but he had some strong views about certain aspects. He felt that statistical analysis was all very well, but if one had no idea why certain trends were being followed the exercise was utterly useless. The Underground had expended much effort to establish why certain trends were as they were, bucking more widespread trends. For example, he found that certain traffics were rising more than expected (not useful in itself) and identified that flat-dwellers showed a greater propensity to travel for leisure than others, which was useful information not previously apprehended. He felt that railway subjects should not be taught in isolation but as mere specializations of more wide ranging subjects, giving students the necessary breadth of knowledge to put material into context—he thought that some of the LSE Railway courses could be restructured along these lines. He forcefully stated that he did not think the narrow technical education of railwaymen at that moment at all prepared them for the prevailing financial crisis and the industry should have done better. He openly accused the railways of inertia.

The LMS was the first railway to apprehend the need for some kind of wider school of transport and chose a location at Osmaston Park, Derby. The primary purpose, it was said at the time, was 'to blend the wisdom of the veteran with the enthusiasm and adaptability of the recruit and therefore raise the standards of railwayman craftsmanship'. The school was located at Derby as it was considered fairly accessible from all parts of the LMS system, and was housed in a new purpose built building containing a full range of facilities including classrooms, a lecture theatre, bars, lounges, libraries, bedrooms, kitchen and dining room. The training facilities included an elaborate model railway for use as a training aid. A soldier was put in charge, Brigadier Manton, perhaps reflecting the belief that the Army was the only body with experience of teaching men working in a disciplined and regulation-rich environment, but who needed to develop strong man-management skills and use their common sense in emergencies.

The school had a short initial life, being requisitioned for use by the Royal Engineers when war broke out, and was well suited to training their railway specialists in conjunction with a local military railway. Afterwards, it was returned to the LMS and was selected by the new BTC as one of their principal training centres. It was adapted in the 1950s to train people for the roll-out of diesel traction and, by the mid 1970s, the centre was entirely turned over to technical training for BR. It was modernized in the 1990s and the old civil engineering training centre was relocated there from Watford. Other railway training facilities were also relocated to Derby as rail privatization proceeded, and the Derby centre became The College of Railway Technology, a stand-alone corporate organization. It later became the focus of the rail training organization Catalis, though the building itself has recently been separated from the company and functions as the Derby Conference Centre and is open for other uses in addition to rail training. The art deco building itself is now Grade II listed.

The imminence of war caused the LMS to take over a large country house near Watford, called *The Grove*, in 1939. The whole of the LMS headquarters staff from Euston was shifted

* The Train that Ran Away [A Business History of British Railways 1948-1968], Ian Allan, 1973 pp32-34.

† Managing Director of the Underground Group, in London.

there one weekend, large numbers of huts being erected in the extensive grounds to accommodate the number of people. The LMS railway control office also moved there to be less susceptible to attack, and this required extensive communications to be provided. Once normality resumed after the war, the premises were retained, but as staff returned to London the huts gradually went, some departments remaining at the house until the 1960s. When the BTC was formed, *The Grove* was used from 1951 as the management training centre of the Road Haulage Executive, but the development of road haulage was strangled by the 1953 Transport Act and the demand for new and better-trained managers did not develop as planned. In 1957, the BTC began using it as its work study training centre (work study was an emerging science in the UK at that time). In 1962, the premises were inherited by the new British Railways Board, initially for computer and productivity training and later as BR's training centre for management services; finally, it was used for management training. This enlargement of scope required updating the facilities and the addition of an accommodation block. Management training ceased during the 1980s and the premises and land were sold, some for construction of the M25. The civil engineering training centre on a different site within the grounds was transferred to Derby in 1996 and saw the end of any railway use. The main building is now an up-market hotel and restaurant complex set in spacious grounds*.

The LNER also opened a training centre at Faverdale Hall, Darlington in 1946, which was referred to as the 'All Line Commercial School for Advanced Railway Studies' (the RSA had an official visit in 1947, where they were made very welcome†). This premises was originally purchased by the North Eastern railway in 1913 but used residentially prior to WW2. It was inherited by the BTC and adapted as a residential training centre for all regions, still focusing on commercial activity‡. There was another LNER school at Darlington, known as Grantley, used as their 'all line' school for railway operating. Additionally, there were LNER schools at St Ronans, Hadley Wood, Scarborough and Edinburgh§. By 1950, Faverdale had become the British Railways Staff Training College and shared the principal and the workload with nearby Grantley; its workload was mainly to train supervisors and instructors, but the establishment was also used for industrial relations work.

During the 1930s, the Southern Railway had operated a training school of sorts at East Croydon, which seems to have been focused on railway operations; it is likely each division had its own training centre. After WW2, the Southern decided it needed its own staff college and selected *Gorse Hill*, a country house near Woking; it took up its first course in January 1947. After nationalization, the former main line railway staff training establishments were generally adopted by the railway regions and continued to function as before, addressing the needs of future managers. *Gorse Hill* was therefore adopted by the Southern Region and additionally became a commercial training school, rivalling that at Faverdale.

Although the college was actually called the British Railways Staff College after 1948, it was not until 1951 that it ran its first all-regional course (for cartage and terminal supervisors). Senior management training was a different matter. It had been recognized as important by the BTC soon after its formation and at first they turned to Henley Staff College, an independent training centre founded in October 1945 and now one of the older business schools. Initially, training was not immediately part of any structured development scheme and had been used by the executives without any guidance from the BTC itself, even though the Commission was investigating, painfully slowly, the best way of developing staff¶. One of the things the college

* http://rastall.com/grove/uptodate.html

† See *RSA Railway Students' Papers* 1948-9 p37.

‡ Faverdale Hall was sold to Darlington Corporation in 1963.

§ St Ronans became the Eastern Region Telecommunications School but also provided general clerical training. Other post war centres are known at: New Lodge Windsor, Edinburgh, Urchfont Manor Wilts, Holly Royde, Burton Manor, Pendley Manor, Dillington House (Somerset).

¶ An investigation was put in hand by John Benstead, BTC Deputy Chairman and former General Secretary of the National Union of Railwayman, to identify BTC training and development needs. Benstead was RSA President 1949-50.

tried to achieve was sharing ideas and experience between managers of similar levels within very different industries, a concept later pursued by both BR and London Transport; those who have attended such courses, especially at very senior level, regarded them as very helpful.

It was several more years before the need for a dedicated college for senior railway managers began to take hold. The facilities at Derby, Watford and Woking were explored but progress was slow. Some activity was finally fuelled by Stanley Raymond (a Road Haulage Executive staff man, with knowledge of the benefits of training at *The Grove* and later to become BR Chairman) who held the revolutionary opinion that good managers were by no means born, but they were *trained.* A British Transport staff college was required. Woking was selected and the BR staff college closed as such in 1958, the new British Transport Staff College opening in refurbished premises in August 1959.

Despite the dissolution of the BTC, the new staff college continued in business serving the new Boards, and especially the needs of the British Railways Board, until 1982 when the needs of the business had changed. During this time it achieved a high reputation and had no difficulty in attracting outside companies to come in and use the facilities. After closure, BR transferred the training requirement to outside suppliers, initially Ashridge. LT set up its own management training facility at Walton-on-Thames, no longer functioning.

The traffic apprentice scheme was usually well regarded and was fully adopted by British Railways after 1948. There was evidently some loss of direction, though, and in 1953 Railway Executive Member, David Blee, lamented the quality of staff coming forward for the scheme. He observed that the railways faced a tremendous challenge and they needed the best talent possible in the commercial area. He felt they were (at least in part) not attracting the best people in industry. He also had some concerns over training methods. The field of knowledge required of railway managers in those days was vast and he understood the need for some distillation of the facts, which he described as 'an ordered distillation of the significance of things', which is probably as true a need today. He also understood how communicating what was essential was a real problem in a large organization (and he applauded the work of the LSE in disseminating the teaching of modern methods).

The BR traffic apprentice scheme was further developed and fine tuned after 1963, being renamed the BR Management Training scheme, a more accurate (and descriptive) title. Virtually all senior managers necessarily partook in this scheme unless they were appointed from outside the industry, and most speak highly of it. This was the culmination of various improvements made in the last days of the BTC, when recognition was finally given to the issue that it was not promoting the best people for the higher posts from a pool of staff that in any case was not always methodically recruited as the best available in the first place. Rapid change was difficult in the cumbersome BTC but there was an improvement in development of engineering graduates and the revolutionary concept of regular staff appraisals, so progress could be recorded for use in job planning.

When BR took over in 1963, the appraisal system was intensified and further changes were made, including introduction of sharing of career information between regional and HQ managers in order to determine career development paths and succession planning. Training was available as a formal part of the development process, Woking being used for senior managers and the school at Derby for middle managers. Courses were also available at the Administrative Staff College at Henley and university summer schools were also used freely. It is not feasible to consider every subsequent change to the management development process, beyond observing that the drastic business changes over the next 20 years put increasingly sharp focus on the need to recruit the best staff and to equip them as well as possible for their future role of facilitating yet more change and constantly learning new business skills.

Tentative conclusions from a century of development

What might one learn from this brief review of the railway industry over the last century? The most striking thing is perhaps the amount of change that has taken place in that time. It is difficult to imagine that anybody working in the industry in 1909 could conceive that the vast, profitable and nationally crucial railway businesses could become so marginalized and reduced in scale. Nor could they have seen how the road transport sector has taken off. Large-scale air travel could scarcely have been thought more than a dream. Who could foresee abandonment of domestic coal mining? These are just a few examples of change for which people were not prepared, and that cannot have attuned them later to embrace change vigorously enough when it was called for, let alone anticipate it. What does the next century hold?

Curiously, technology change was to a large extent expected, even if it was not adopted on a scale or as vigorously as needed. Electric traction with multiple unit operation, air-braking, colour-light (and power operated) signalling and automatic warning systems are all examples of technology that existed in 1909 and could have been developed faster. Today's technological detail may be unfathomable to our 1909 friends, but not concepts except perhaps in realm of communication. However if we were to start from 2009 rather than 1909, we are conscious of a huge number of possible directions things could go. Which path do we follow?

A person joining the railway in 1909 would probably have expected the railway to provide interesting employment for life, with each company exhibiting paternal instincts towards its staff that were fed, watered, entertained and often housed using company resources. Even in 1948, tremendous effort was put into designing a new railway organization that was expected to endure indefinitely, perhaps for ever. People accepted jobs on the basis of organization charts that appeared to offer definite routes to promotion that could almost be planned for a lifetime. Yet within 15 years it was all torn up, to be replaced by an entirely new organization. In successively shorter intervals of time thereafter, each new organizational design was soon scrapped and replaced by something newer (and maybe better, but not always), and the bulk of the industry was changed almost beyond recognition, outsourced, disposed of or just closed down.

So, are we to conclude that this process of change will for some mysterious and arbitrary reason just stop? Does anyone seriously believe that, as they enter the industry today, and are promised 'certainty' and a 'career structure', that, based on what has happened in just the last half-century, in twenty years time the industry will look the same? If so, on what evidence? Fortunately, railway work seems destined to require people who are experienced and knowledgeable, so certainty of employment within the industry as a whole is a reasonable expectation, with the work continuing to be interesting and challenging. As to the size and shape of the network, how it is operated and who runs it, we should be less certain; and, as to the character of the industry at the end of the next century, it is very hard to speculate, but a possible and reasoned scenario is set out later, putting down a marker.

Something that does come singing out from the RSA Proceedings is how inward looking the industry has been. There is virtually nothing on the external factors that impact heavily on how railways will develop. There is virtually nothing about road or air transport competition, the political environment, emerging technologies, macro-economic conditions, how to seize new opportunities like the new towns (which almost ignored railways), or many other factors in which railways might have been thought to be monitoring assiduously. Neither has very much been found in obvious railway resources. One is forced to conclude that until modern times railways have been almost entirely reactive, and have suffered for not being more attuned to external events. They have rarely anticipated them.

A huge change is government assumption of responsibility for the railways. During the period 1909-1947, it was not felt the duty of government to provide cash to private industry

or (generally) to run things, but railway reinvestment became progressively more difficult, at least in part because of macro-economic conditions and in part owing to inability to adapt quickly enough. The railways worked well together, in the national interest, with a huge margin of cooperation between them. It can be done.

Nationalization created all kinds of new difficulties (not least in reorganizing vast numbers of people) and, although it is thought the new machinery should have done better in the early days, the economic conditions were bad and the relationship between the railway and its government masters took at least a decade to mature—after all the civil servants had no experience in dealing with the huge issues nationalization presented either. For example, when nationalized industries came into being in the late 1940s it was a decade before ministers felt that they had some kind of responsibility to answer to Parliament for those industries' actions. Today, there is no doubt that the transport minister is intimately connected with all that happens, and expects to be held accountable. A further change is obviously the comprehension that railways are national assets (suspected, but unproven, in 1909) and that government funding is provided in support, some partly directed at parts of the network that are not profitable.

Nationalization was regarded after quite a short time as rather a disappointment, failing to live up to the socialist ideology that it would provide better pay for the workers, lower fares and a better service for passengers—doing all three was an impossible challenge, but it proved difficult for the first two decades to do more than one. The fact that from the 1970s the railway began more rapidly to come to grips with the wider challenges, inadvertently equipped it for privatization; at first, this was also regarded by some as a bit of a disappointment, but as happened with nationalization, once the structure settled down most things work pretty well. We are too close to events to tell whether it could be regarded as a resounding success, but the best bits are quite good and there is no rush to turn the clock back. The point is that even since 1996 there has been a great deal of change, much of it not expected.

The real question is can we do even better? There is little appetite for more change, but given what has happened in the past to relatively stable organizational structures one must at least ask how long the present structure will endure. Another century? Unlikely. Fifty years? Well not on the basis of anything that has happened before. So, within what sooner period will the next round of major changes occur? What skills will a new organization require? What issues will a new organization be expected to address? What can new entrants to the industry do now to prepare themselves for inevitable and perhaps exciting future change, because it may well be those people who will have to lead that change? If consolidation is ever on the cards, then it will be a challenge to put the bits back together as skills are now so+ dispersed. Where would such new all-round railway skills come from?

These questions cannot be answered here, but you can be sure that they will be asked (if they are not already being asked) and that answers will have to be found.

There are a few other conclusions that might be drawn out of the narrative.

- It is vital to keep on top of business practices.
- It is crucial to keep on top of the market.
- Technology change is inevitable and ongoing, but does not necessarily turn out as expected or as quickly as needed.
- Collaboration and sharing of ideas and best practice has served the industry well in the past and has been regarded as a sensible thing to do even with no external compulsion. One can't afford to leave such sharing of know-how to chance and a formal means of sharing knowledge is useful. It is interesting to see how Network Rail has a huge initiative in place to try and spread best practice, but that only affects one of the dozens of organizations involved in the industry.
- The political dimension should not be underestimated

and has been responsible for a great deal of the change imposed.

- Certain aspirations, such as transport integration, appear to be unachievable in practice (so far)—this is a real challenge.
- However solid an organization structure that is put in place, it is always possible to do better and it will not in practice endure.
- However people view the permanence of their career path when they join the railway, it will not work out like that because of the constant pressure to change.
- Training is vital and an understanding of the nature of the jobs with which one interacts is very helpful.

Change happens. The only question is, how to prepare for it when it does and play ones hand to best effect?

This 1949 montage of staff deploying their railway skills shows activities virtually all of which are now just distant memories. Today's railway still has its own skills requirement, but evolution will continue++.

Chapter 7 – The 2009 Perspective

Martin Shrubsole

The question of 'railway' skills

As the RSA moves into a second century of 'Developing Railway Professionals', it is timely to ask 'what are the professional skills needed to deliver an effective rail network in 2009'? The question once posed, it is immediately apparent that many of the skills are common to those required by other industries, and indeed all forms of 'business': financial control, man-management, quality control, market awareness and sensitive pricing, etc etc.

Are there then no skills, no areas of applied knowledge that are peculiar to the rail industry? Is the 'Railway Professional' only called upon to deploy techniques and expertise that are common to other modes of transport, or indeed other industries? Are there no challenges unique to the management of railways, whether different in substance, or only in degree? Put another way, is the railway professional a distinct breed, needing bespoke grooming, or merely a conceit on the part of those many who happily serve the appetites of the 'iron way'?

It would appear that the instigators of what is now the Railway Study Association were convinced that there was a specific need for sharing and promoting an understanding of the particular challenges inherent to running an effective railway system. The fundamental association with the London School of Economics suggests that there was always awareness that railway management is not just a matter of making the trains run (perhaps even to time); rather it is about deciding which are the right trains to run, given all the pressures of government and governance, the nature of the potential markets and the availability of alternative suppliers, the cost structures of the rail mode, and the imperative need, by one or other yardstick 'to make it all pay'.

In relation to the achievements of the RSA in the past, and the potential role it can still play in the future, it is instructive to imagine how a railway manager from before the First World War, having benefited from the schooling offered by what was then the Railway Students Association might assess the challenges involved in managing a railway business in 2009; which tasks have immediate counterparts, which are fundamentally unchanged, and which are peculiar to the 21st century?

At the superficial level, the 2009 railway would look very different to our transplant. Judged on the basis of the hardware deployed, and therefore the techniques employed in manufacture and maintenance, there is little in common. The following observations might perhaps be offered.

Rolling Stock

Rolling stock makes little use of wood, and much of steel and other metals; passenger vehicles use integrated stressed structures, rather than separate chassis supporting individual bodies; seating plans take advantage of the ability to dispense with internal structural divisions, and ventilation has been superseded by air-conditioning. Freight cars tend to cater for specific commodities, and are geared to larger consignment sizes, with structures geared to maximising payload to tare ratios, and easy mechanized loading and discharge. There is, however, now readier perception of the conflict of priorities in the relationship between axle-loading, train-speed, rail weight, and track-degradation. Whilst the separation of track and train managements may make fundamental research of wheel–rail issues more difficult, it does provide a context where low track-force bogies and lighter axle-loads can be incentivized by differential pricing for access.

Track

The track gauge remains the same, although there is increasing interest in ensuring that the space between tracks—the 'six-foot'—should be increased. The bull-head rail, with chairs

and wooden keys, laid upon wooden sleepers, and jointed every 60 ft or less, has been replaced with heavy section flat-bottom rail, welded in long continuous lengths, held to concrete sleepers by a variety of elastic clips. These changes, which permit both higher train speeds and heavier axle-loadings, have required new techniques of fabrication, assembly and installation. Maintaining those tracks has brought new equipment, designed to maintain more track, to more rigorous standards of alignment, ostensibly to achieve less disruption of traffic, and certainly to use less labour. More significantly, permanent way-work, although on occasion still making demands on significant manual effort, has changed its focus from a dependence upon artisanal skills to the management of complex machines, and the application of sophisticated measurement and analysis tools. Pressure for maintenance and renewal work to interfere less with scheduled services without loss of productivity has also meant a quiet skills revolution has been necessary.

Signalling and Control

The primary function of signalling systems remains to assure that trains in motion are kept rigorously separate, except where they are required to come together by design. 'Armstrong' operation of points and signals via mechanical lever frames in successive signal boxes still remains, but increasingly only at places where kit still has un-expired life, and the benefits of re-investment are low; at such locations the skills of the signal maintainer of 1909 are still prized. More generally, system development has pursued several parallel goals: colour lights, AWS, TPWS and various forms of cab-signalling have sought to minimize the risk of the train regulator's message being misunderstood, or misapplied; track-circuits, axle-counters and GPS technology allow more accurate placing of individual trains on the network, whilst multiple-aspect systems have allowed safety and acceleration and intensification of service to proceed in step. These developments all require technical manufacturing and engineering skills that would not have been recognisable to 1909 managers. The development initially of relay interlockings and power operated points, followed by computer applications such as solid state interlocking and automatic route setting have offered scope for consolidation of more control into fewer locations. In consequence, the span of control that can be exercised by a single signaller has been expanded to the point where the tactical acumen demanded of a 'panel' or work-station operator is technologies apart from the dexterity and strength required in the manual signal-box. In effect, the capability of the technology carries with it the potential, on the one hand, to make the man too remote from the network he controls, and, on the other, to overwhelm the human operator, whether when systems are running normally or when, in times of failure, there is a need to revert to basic railway disciplines. It is a balance still to be tested in each new application.

Communications and Computers

Development of computers and fast telecommunications, including the internet, has offered the railway the same challenge as other industries: how to avoid being data-rich and information poor. Indeed, it must be questioned whether, without word-processing and e-mail, both media for enabling endless rethinking and re-drafting, a privatization model of the complexity willed by the 1993 Railways Act would ever have been possible. Against this dreary thought, the same technologies have permitted (in principle if not always in practice):

- the public timetable to be accessible to all households with computing power, and accurate up to 12 weeks ahead;
- real-time displays on most stations of the progress and punctuality of passenger trains;
- short-delay tracking of freight trains and individual consignments/containers;
- short-notice seat reservations and home sales of tickets.

Management Control

Management accounting and control can now rely on data

being assembled and collated in days or hours rather than weeks, and sophisticated models permit passenger revenue allocation on shared routes—together with new forms of gamesmanship to get the biggest share. Availability of data and processing power enables compilation of accurate delay and performance statistics, and the operation of performance regimes, whilst freight traffics can be assessed for revenue yield against asset turn. Accepting the invariable risk of analysis paralysis, such systems give an insight into the viability of rail business that can only have been longed for by even the most numerate of 1909's railway companies; however the critical skill remains the interpretation of what can be garnered.

Traction

In traction, the debate about the relative merits of the autonomous locomotive (these days diesel rather than steam), as compared with that tied to the perceived benefits of electrification, remains open and contested. The green credentials of electric traction, and the comparative ease of achieving distributed power through the use of multi-motored multiple units, appear attractive, but still do not overcome the high initial first costs of putting up the wires. Where the issue is one of exhaust emissions and carbon footprint, electrification is only as clean as the plant that generates the power, even if there is the potential for that power to be independent of fossil fuels. In the short term, whilst the political will and financial resources for electrification are mustered, technologies such as 'gen-set' locomotives, and sophisticated adhesion control systems may well result in larger capability with reduced fuel consumption and emissions. In this area, perhaps more than any other, the most powerful drivers for change are likely to be external to the British railway scene, as fuel availability and prices respond to other countries' political imperatives.

In practice, it is probable that our time-traveller would rapidly come to a conclusion that, whereas all these technological marvels might extend his capability, they do not change the fundamental challenge of managing a railway system, a business that is heavily constrained by the inertia and innate inflexibility of the technology that is also its strength.

He would be only too well aware that the use of the guided steel wheel on steel rail permits large volumes of goods or passengers to be moved quickly and safely, with comparatively small expenditure of direct propulsive energy; this truism explained, in 1909, much of the location and development of industry and settlements not just in the UK, but worldwide. If taxed to consider it, our time-traveller would acknowledge that rail technology has other defining characteristics, including that:

- No train can operate before it is provided with an adequately robust route, and track that is not unduly graded or sinuous.
- A train is long and heavy, accelerates slowly, and takes considerable time and distance to stop itself.
- Most trains can run at speeds, relative to stopping power, such that if a line is obstructed, a train driver has neither the visibility nor the time, between the first sight of an obstruction and arrival at that obstruction to decelerate the train to a stand.
- Trains generally have no capability to change track or line of route of their own volition, or to take evasive action to avert a mishap, without the intervention of an external directing mind.
- In order to operate more than one train, a railway requires a pro-active system for regulating the spacing between trains. This may be 'administrative' (e.g. 'one train' working, or 'timetable and train order'), or 'engineered' (for example with trackside controlled fixed signals) to ensure that any one 'block' of track can only ever be occupied by one train, but is not an 'optional extra'.
- Railway equipment is of bespoke design and manufacture, and generally engineered to stresses that imply a lengthy working life, with limited scope for changes of mind.
- Railway economics implies that most, if not all, capital equipment must be in place, maintained and staffed, else

there can be no capacity to earn. Furthermore, the relationship between the major, and comparatively fixed, costs of equipment and the comparatively smaller avoidable/variable costs associated with any one traffic add financial inertia to the technical inertia.

Our railway graduate of 1909 would be only too aware these are the elements that define the capability, and the capacity, of any rail system, and that it is that capacity that defines the possible in respect of a schedule or timetable. Furthermore, he would understand that any single element might constitute a 'bottle-neck' resource that constrains the absolute limit of both capability and capacity. Above all, he would appreciate that imperfect execution of any one task within the delivery process can create a vulnerability that the whole system will be de-stabilized, and therefore that delivery of any regular train service required teamwork, of a precision that is equivalent to a single directing mind; and therefore depends upon the calibre and commitment of the manpower deployed, whether directing mind, or ground-level executive.

Conditions of service, in terms of hours of duty, physical labour content, concern for individual safety, pay, and social support, are radically different from those enjoyed in 1909, but such is the case in most of the working world. The managerial challenge is to ensure that the social demands that are peculiar to the 24/7 nature of railway work, set alongside the content and interest of individual tasks, are appropriately matched to the levels of remuneration. With increasing demand for technical qualification as a pre-requisite for employment (whether in driving, operational, or engineering disciplines) the quest for quality and certification creates scope for shortages, and for those that have the qualifications to seek out, and migrate to the highest bidders. The 'work-life' balance may be a hackneyed concept, but it is a factor that cannot be ignored. To take a simple example, maintaining 7-day capability on the basis of an assumed appetite for overtime loses its effectiveness where skills can command a market-based price, or where the job content is disproportionately stressful in relation to stimulus or 'job-satisfaction'. The managerial task of recruiting, and retaining, right staff for right jobs has not changed in nature, but is probably significantly more challenging, particularly in an industry that may retain its internal self-pride, but has lost the pre-eminence as an employer that it had in 1909.

Mastery of these distinctive railway insights and operational skills are as important in 2009 as would have been the case in 1909. However, the change in business context over the intervening century means that what sufficed in 1909 is only a small fraction of what is demanded in 2009.

In 1909 the railway was still by far the dominant supplier of overland transport services, even though, within the hundred or so main-line companies that served Britain, there were hierarchies, whether in respect of the speed of trains, the comfort of carriages, or the dividends paid to shareholders. Such differences might reflect the priorities of the company's directors and management, but often the determining factor was whether the prospectus against which the relevant railway bill was promoted had been realized in practice. Some communities were but poorly, or indirectly served, because the traffic available would not sustain more than the minimum level of service for one company to acquit itself of its 'parliamentary' and common carrier obligations. Even in most of these cases, there was no ready alternative source of transport, and so no yardstick against which to judge the quality, or even the appropriateness, of the rail service. In such a case, and given the complexity of the service that was provided, one could understand the pride of achievement in running a system that a latter-day Dr. Johnson might also have characterized as 'like a dog's walking on its hinder legs. It is not done well; but you are surprised to find it done at all'.

The railway of 1909 was very much still the market maker; the capability of the railway to move large quantities at speed, and at costs that were low compared with most previous technologies, had opened up markets for the extractive industries, and shaped both the location and scale of the larger manufac-

turing industries. In so doing, it had created routes and services that attracted other traffics: agricultural produce, foodstuffs, textiles, and all forms of sundries and parcels. This ability had in turn profoundly impacted upon the shape and size of towns and cities, making it possible first for large populations to be fed remotely from the land, and then subsequently for suburban populations to live remotely from their places of work. For the manager of 1909 the challenge was to make the railway better at doing what it could.

The railway of 2009 is a market taker, and today's railway manager must acknowledge that, with very few exceptions, every service he can provide could be provided by an alternative supplier and, most frequently, by another mode. In freight, the rise of road transport has provided a means to serve many of the markets created by rail, more flexibly, and, in some instances, at lower cost. It has also enabled industry to locate away from proximity to the (relatively few) railway lines or waterways. Similarly, and determining the scale of rail passenger carryings, the rise of the private car has permitted travellers to choose times of travel unfettered (ostensibly) by timetables, and perceived as costing no more than the marginal cost of fuel. Speed between major points has become decisive only where it contributes to an overall lower door-to-door journey time, and, in the course of the 20th century, the benchmark for that speed shifted from the train to the airliner.

Railway management skills (which must be more than, but cannot ignore, operational skills) must therefore be deployed on two fronts: that service which is provided must be done excellently, and decisions about the service to be provided must be informed by considerations of what a railway does best… or worst. Put another way, the management focus has, insofar as legislation and government policy permit, to be selective and concentrate on making the railway better at doing what it should—and disengaging it from doing what it should not .

Decisions about what business to be in are invariably driven by the numbers of profit and loss. Probably no subject affecting the railways has been more debated in the life span of the RSA, or indeed since the peak of the 'railway manias' and the associated financial skulduggery. Early railway regulation legislation imposed certain requirements relating to the reporting of activity, and also imposed progressive obligations by way of 'parliamentary' trains and the common carrier obligation. In an era when railway promotion was seen by some as a licence to print money, and by others as offering railway companies potential monopoly power, these were tolerable or, depending on point of view, desirable conditions of trading; the means of insisting that the railways, where they created prosperity, did not have the chance to charge 'gouging' rates, or decline to bear inconvenient risks.

It is perhaps significant that many lines that received parliamentary approval proved uneconomic to build, or were perceived by their promoters as having inadequate earning power against rival promotions (for example, five of the six lines promoted to link London with Brighton) and that as early as 1850 Parliament passed an Abandonment of Railways Act. This allowed parties that had obtained parliamentary powers to obtain permission not to proceed, and to make recompense for land compulsorily purchased, only provided that the line had never opened for traffic.

Where lines did open, most were initially of a scale where it was quickly apparent whether the sum of revenues earned could meet the costs of operation, maintenance, renewal and service of capital (including the payment of dividends). Subsequent mergers and consolidations meant that the final assessment of profitability at company level was not an indicator of the value of individual traffic flows or lines of route.

In the first decade of the 20th century the North Eastern Railway, that had found its profitability deteriorating significantly over the previous 30 years, sent two study parties to the New York Central to discover how far an improvement in accounting practices might act in controlling expenditure. The NER's capture and use of data relating not just to ton-miles

and train-miles, but also to ratios such as 'ton-miles per engine hour', average train-loads, and receipts per ton-mile, helped it to drive up the output it was getting from its locomotives, wagons and crews, as well as informing decisions on the capacity of new builds of wagons. It must have been sobering to discover that the average payload per goods train in 1900 was no more than 44tons, and for mineral trains 92tons. This compared with a then US norm in excess of 250 tons, and suggested that payloads per gross train mile had a lot of scope for improvement.

Between 1909 and 1988, statistics, transport economics, railway accountancy and rates or charges feature in some 31 addresses to the RSA. Over that period the focus shifts gradually from indicators that track the use of assets to attempts to understand the relationship between different levels of costs and the rates that were, could be, or ought to be charged. In the latter years of the 'big four' companies, such statistical insights helped freight traffic managers to understand the potential benefits of bigger trains behind bigger engines, in a context where published rate structures limited the scope for using pricing as means to encourage efficiency, and the common carrier obligation was seen to preclude any option of pricing off wholly unattractive traffic.

The received wisdom seems to have been that freight, still seen as the main business of the railway, and likely so to remain, should be priced according to 'what the market would bear', but with the aim of maximising the tons lifted, in the face of steady declines in the volumes of minerals and raw materials to be moved, and the growth of road transport as the supplier to smaller markets. The effort at an integrated transport policy under the control of the British Transport Commission, following on from the 1947 Transport Act, was also focused very clearly upon devising a freight tariff structure for all transport modes that would reflect the costs of providing a service.

The challenge, and potentially crippling weakness, of such an approach is the extent to which the cost of moving (say) a single wagonload derives from a small element of specific costs (such as wagon provision, and possible specific loading and unloading costs), coupled to allocations of a share of the costs of locomotives, train crew, track, signalling and management. In the jargon of the '50s, this was to identify the cost as divided into direct and indirect costs.

Today it is apparent that the notional cost (whether per wagon, per tonne, or per train) derived from such a calculation is but a contrivance, 'true' only for one set of circumstances, and otherwise, particularly when converted into guidance tables of acceptable minimum rates, liable to distort management priorities. On the one hand, such calculations help to give comfort to any who might wish to believe that system capability and costs are not capable of much change, in the face of changes of traffic volume; on the other hand there is the temptation to judge individual traffic flows as desirable if they generate revenue that exceeds (however barely) the assessed direct costs. The concept of making a 'contribution' to indirect costs is a trap *if* it leads to a plethora of traffics that can pay for the marginal costs but do not buy the main book. Not without cause did senior freight managers of as late as the '80s reflect on the irony that, whilst their authority directly to spend was strictly controlled, and limited to petty cash, their ability to affect the yield from rates was huge, and largely unmonitored.

The manager of 2009 must address the skills and disciplines of understanding how individual actions and choices can affect profitability, whether in relation to the earning of more or less revenues, or the incurring of less or more costs. In this the manager has, of course, the benefit of the data that can be captured by computers. Of still more benefit are the energetic debates that have raged, above all since the Beeching era, as to how best to translate cash impact awareness into management practices and rules that will indeed guide the wise without offering perverse incentives to the obedient.

Dr Beeching's reshaping report marks a convenient watershed (along with the key Acts of 1962, 1968 and 1974), because after Beeching it was no longer possible to assert that all railways

were equivalently 'good', and therefore equivalently essential to the well-being of the country at large. It can be argued that some of Beeching's conclusions derived from data now perceived as defective or inconclusive, and that this accounted for some closures now regretted, and other missed albatrosses; it might equally well be true that areas were treated differently according to the ambition or inertia of the key mangers in post. This period did, however, result in a number of propositions that retain their validity today:

- Different parts of the network, carrying different mixes and levels of traffic can be engineered to different standards and to different costs. Changes in traffic levels, up or down, and a focus on issues such as axle loadings and line speeds, can have a material significance on the long run costs of renewals and maintenance; however, minimum levels of provision of track and signalling may still cost more than any probable revenues from users.
- Money not spent on loss making services can be better spent on improving the profitability of 'money-spinners'.
- Train-speed, and even more so service frequency, can attract new custom, and permit higher charges.
- Pricing up when standards of service are raised yields positive gains to both operator and the passenger user.
- Pricing down, in association with conditions and incentives that improve rail asset utilization can create a win-win for freight operator and user.
- Decisions to curtail or withdraw services can always be justified with or without 'partisan' numbers. Where the alternative is external support, the final decision on closure has to be vested with the level of government that can vote the funds. Conversely, much opposition to change can come from bodies that do not have to find the necessary support, and do not stand to get to spend any possible savings.
- The size of the network is best determined by reference to passenger demand (or votes), and 'value for money' from support. In principle, freight can pass over any part of a network, but ought logically to meet any specific incremental costs it generates. It is, however, perfectly possible to commute such incremental costs into other forms of support.
- Freight has no vote, even though no-one likes driving behind a container lorry.
- Railway costs are mostly lumpy, with marked steps. Sweating sets of allocated assets to generate the maximum income (which may include support) usually results in better control and results than trying to determine unit costs. Dedicated fleets, and specific accountability for single activities or lines of route, can achieve control of profit.
- Activities can be moved out of house and sub-contracted to get the benefits of competitive tendering, but only with adequate provision of skilled contract managers and informed buyers, and only where there is clarity about where the final burden of risk will lie.

The period since Beeching can be seen as a succession of initiatives to capitalize upon these emerging propositions. The move from cost centres to profit centres, the iterations of 'sector management', 'organising for quality' and then privatization have all had the effect of providing managers with clarity of (different) purpose, and so the means to trade revenues against costs, at a far lower level and with more immediacy, than their 1909 equivalent. Making the judgements as to whether those costs that have been converted into prices, and those duties that have been rendered into contractual obligations, necessarily result in raised standards of service, greater revenues, lower costs, or an overall better value for money to the range of industry stakeholders will demand ever more refined economic and political skills, to complement all the technical, managerial and operational skills. The constraints of the arrangements in today's contractualized railway have not slowed the rate of change wherein each new perception or specification appears to open up new scope for precision and/or perverse incentive.

In practice, probably the biggest change in the nature of the railway managerial task over the last century derives from the realization that risk, whether financial, operational or to personal safety is an explicit discipline. This has become ever more true as the industry has become overlaid by a web of contracts, supporting a legion of lawyers, and underpinned by a diversity of insurers.

Most of Britain's early railways were built by contractors, working to the specification of promoters, who, in their turn, had the benefit of over-seeing engineers. Although by 1909 the railway companies were still in a position to purchase locomotives, rail and rolling stock from external suppliers, the majority of the key activities had been taken 'in-house', with each company managing its own affairs, and in particular its exposure to risk. This trend continued through the 1923 grouping and through the first half of the life of British Railways. Then, during the '70s and '80s BR was required to divest itself of ancillary activities (such as sundries, hotels and shipping) and then others seemingly more central to its main activities (Freightliner, Travellers' Fare and the workshops operated by BR Engineering Ltd).

Such divestment created new contractual purchaser/supplier relationships but, for the most part these did not detract from the principle that the overall accountability for the safe operation of the system, and the responsibility for managing risk, remained with the boards of the companies, or the British Railways Board. This remained true as BR underwent the progressive changes between regional/functional management, through sector management, to 'organising for quality' and management by profit centre.

This responsibility for safety was always an understood part of the industry, even if, as is well charted in L.T.C. Rolt's classic *Red for Danger*, it was, on occasion only acted upon grudgingly. It was, however, easy to act as if observance of the rule books, combined with common sense and an instinct for self-preservation, would be an adequate safeguard; after all, there were many sets of statistics showing that train was the safest way to travel, even though there were other series that revealed it was not necessarily amongst the safest places to work. The advent of health and safety at work legislation, and the need to make 'safety' a matter of discussion with local representation, started to change this mind-set, but it was the collision at Clapham Junction in December 1988, and the consequent public inquiry chaired by Anthony Hidden QC, that was the catalyst for a sea-change in the approach to managing safety, and to the bearing and allocation of risk. The trauma of the King's Cross fire was the equivalent wake-up call for the London Underground.

Drawing on the recommendations of the Hidden inquiry, the industry drove itself to establish processes for assessing risk, prioritising safety investment, codifying safe methods of working, and ensuring that, at times of organizational change, safety accountabilities were properly transferred to their new holders. All these processes, sometimes derided as the bureaucratization of common sense, would probably be a surprise to the 1909 manager, not least because they were developed within the context where the BRB acknowledged without equivocation its accountability where it had failed.

Critically, good practice has been progressively codified both in the formulation of Rules, and in the creation of Standards, intended to assure consistency, and interoperability in all disciplines. The Railway is not the first industry to have to address the vexed question of who sets such standards, who is accountable for their delivery, and who should police compliance, both before and after privatization. It is likely, however, that these validation processes, in relation to all aspects of operating practice, were probably a decisive factor in the delivery of the massive re-organization involved in privatization, achieved without any of the periods of operational thrombosis that in the USA characterized successively the creation of Penn Central, the Union Pacific absorptions of the Chicago & North Western and the Southern Pacific, and the disaggregation of Conrail into Norfolk Southern and CSX Transportation.

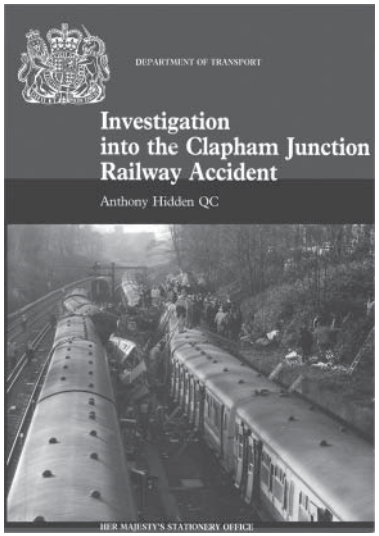
In practice, the biggest change that the privatization of Britain's railways imposes on the skill requirements of the manager of 2009, relates to the management of contracts. As between engineering companies, RosCos, train operators, and Railtrack, the split up on privatization required relationships that had been managed within a command structure to become subject to contractual terms. These contracts, in particular the critical contracts governing track access, have gone through many revisions, partly to remove anomalies of drafting, but also to ensure that a hydra-headed business can still serve its customers with the unity of directing mind that the limitations of the technology require.

The role of the 'informed buyer' who understands the nature of the technology, and how the sub-contractor's actions must be co-ordinated with the system at large, becomes critical. In particular, it requires sufficient understanding of the system's needs that the potential consequence of any failure by a contractor either to understand, or to honour, what is promised can be anticipated, both in the terms of any contract, and in the subsequent management thereof, by both supplier and customer.

That there have been many lessons to learn in relation to contract management, can be tracked through the issues raised by the Hatfield accident, the transition from Railtrack to Network Rail, and the bringing back in house of infrastructure maintenance; the problems with adapting proprietary signalling systems to British practice; the increasing use of rolling stock manufacturers to also maintain their products; and the necessary changes made, over four control periods, to the track access regime.

In the case of track access, arguably the contractual interface upon which the whole success or failure of the chosen privatization model depends, there has been constant evolution, driven by the competing needs of the train operators to supply their customers (and honour the terms of franchise agreements) and Network Rail to get sufficient access to upgrade, renew and maintain the infrastructure. The manager of 2009 can learn much of the principles of the regime from a study of the successive papers and approvals of contracts by the Office of Rail Regulation; he or she can also learn much about the areas where such contracts still leave scope for misunderstanding, or place particular demands on the local contract management capability, or indeed create perverse incentives, by reference to the records of the access dispute-resolution bodies.

Probably more than anything else, the organizational flux of the first century of the RSA has served to illustrate how broad is the range of professional skills required of the railwayman at almost every level: the ability to deliver a complex organic industrial process in a way that is safe, secure, and to meet the tastes of government, the travelling public and the freight customer, and to do it in ways that ensures best returns to all owners, suppliers and stakeholders, is no mean challenge. Providing the stimulus, encouragement and training to give the balance of knowledge, competence and confidence necessary is the very real challenge for the RSA in the century to come.



A simple signalling wiring error resulted in a serious collision on 12th December 1988 and the deaths of 35 people. The subsequent enquiry had a profound effect on railway safety methods.

Chapter 8 – The Railway 100 Years On

Jonathan Roberts

The view from 2109

The shape of travel in Britain

Great Britain's population is 90 million in 2109, comprising the English, Welsh and Scottish nations.

There was no prospect of a general urbanization of the bulk of Britain's countryside during the preceding century. The result has been higher population densities within existing built up areas and some new freestanding towns. There were urban extensions to existing cities and towns, as well as completion of planned growth areas.

Pressures on public transport are greatly increased, because of population growth and sustainability initiatives including continuing action against use of fossil fuels. Also people live longer and have more leisure time. GDP growth has been de-linked from car and lorry mileage. While electric and hydrogen-powered car travel is still the dominant passenger mode in the 10-120 km journey range, overall total usage of public transport has increased from 7.5 billion boardings yearly towards 30 billion—a four-fold growth during the 21st century. Cycles and powered two-wheelers are widely used for local journeys. There is greater allocation of road space for these users, and railway stations have plenty of parking capacity for them.

Freight transport has been transformed, for example with new logistics priorities of shared lorry deliveries for local shops and businesses. This was assisted by widespread 21st century investment in regional and local break-bulk and distribution centres, with the regional sites capable of being served by rail (and some by waterway) as well as road*. Re-investment in town centres was a strong factor.

Rail now makes a greater contribution to transport capacity and accessibility. It focuses on maximising passenger market share, with high frequency 'turn-up-and-go' services on the main inter-urban corridors between city regions, including the high speed network. There are attractive 'metropolis' services within city regions, and for main towns with significant commuting. Main stations are hubs for their wider communities. Urban metro and light rail systems have expanded, along with bus priority routes, guided busways and some trolleybuses. Rail has rediscovered a freight role by carrying high value freight flows to distribution centres.

There are nationally defined timetable patterns, with international agreements on Anglo-Celtic services. Availability of train paths is overseen by an agency of the Department of Commerce, Skills and Access, the Office of Transport Regulation, which also undertakes similar functions in Scotland and Wales. Bidding for slots by operators is encouraged on a best value commercial basis. This conforms to European guidelines.

Changing desires of population

The history of the past century is of further change brought by political, technical, social and economic trends. Change has been the norm in the British Isles since the industrial revolution, which institutionalized the scope for large scale relocation of populations, first from the land to the factories, and then between nations.

Two hundred years ago, in the 1900s, the Edwardian world was the turning point between the previous century of horse and steam power, and the new century of oil and electricity. One hundred years ago, we had moved from coal fires, wind up telephones and early applications of electricity, to electronics, satellites and the internet, and early uses of nanotechnology and genetics.

Socially, from 1909 to 2009, Britain went from a semi-feu-

* An unlikely stimulus for this change was the reclassification of the car journey from supermarket to home as freight movement, with eventual road taxation impacts. This led to greater awareness of the costs of freight transport and a huge upsurge in local van deliveries.

dal nation to self-determination, with individual preferences and priorities. Changes in society, welfare, working patterns, holiday travel and material ownership were echoed by decentralization and diversification, witnessed by massive growth in car and lorry usage. Yet there were counter-currents: fundamental changes away from the solo-industry focus of many towns, a growing inter-dependence between many clusters of communities within city regions, and the continuation of large scale movements of populations.

In the last hundred years to 2109, there have been greater pressures towards integrated communities, with nearly 75 per cent of the British population now within cities and towns of 15,000 population or more, and a further 15 per cent in smaller urban areas over 1500 population. The size of the island of Great Britain is fixed*, so the effects of greater population and urban densities have intensified changes in public attitudes. Management of social freedoms is not new (for example, income tax, equality rights, laws about smoking, accessibility regulations); nevertheless there were growing tensions. The balancing point to be found for every issue was between the preferences of each individual (and of businesses and households) and the collective good of complex communities.

The freedom to choose how to communicate, including selecting any travel method, conflicted with greater environmental pressures to minimize ecological impacts. The freedom was underpinned by an implicit human challenge to secure a net increase in quality of life and wealth†. Environmental choices included using less car and aviation and more walk, cycle, bus or train; or more local travel, or less travel altogether.

Public transport options have been modified over the last 100 years. The 'right choice' of the individual has been made easier by providing facilities which can be used with least hassle and which people feel are naturally a good way to travel, at a fair price, making the 'best' use of different modes‡. As noted already, car is still used widely—an electric or hydrogen vehicle is seen as a 'good' choice for a wide range of journeys. Travel to work is still highly cherished, despite home-based remote workstations and 'visiband' network conferencing.

The rail network at the start of the 22nd Century

What does the network look like in 2109? A century ago, there had been increasing tensions between frequent limited stop and local passenger services; and between passenger operations and freight operations which need extra capacity but at slow speeds i.e. under 160 kph (100 mph). Classic main lines were offering passenger services at 160-200 kph (up to 125 mph), with higher speeds allowed in mainland Europe.

Release of former mainline capacity with the British Isles' high speed network has allowed greater flexibility between different 'classic' passenger operations, and greater flexibility for freight. New pressures were identified with the convergence of high speed lines at cities, and resolved as discussed in the section on high speed lines.

One way to improve freight capacity, adopted in the Estados Unidos, had been to make trains much longer, up to 3 km long, and to operate double-stack containers. However, in Britain freight trains only one kilometre long were difficult to accommodate, because they took up railway junction capacity needed for passenger trains. The loading gauge also prevented double-stack operation.

There has now been a greater separation of the freight network and the high-intensity passenger networks, including total automation of some freight-only lines. Conversely, some new passenger services now serve former freight-only routes.

Following the costly re-engineering to European loading gauge standards of some routes (particularly the Trans-European

* But at risk from rising sea levels.

† Wealth can be defined in many ways – culture, environment, financial and social standing are just four definitions.

‡ Market philosophers such as Adam Smith preceded the famous pioneering 19th Century engineers such as Brassey, Brunel, Locke and Stephenson. The transport 'philosophers' for the 21st century included Eddington, Leitch and Stern, and were complemented by engineers such as Holden and McNaughton.

Network), double-decker passenger trains now run on these lines. There is capacity on these corridors to accommodate future demands without building more tracks. Studies are underway to see if double-stack freight operation will be worthwhile on some British lines.

The rail network itself has grown to 21,900 route km. This comprises:

- the 16,400 km 'classic' network (including London Underground and other urban systems) which existed at the start of the 21st century—though with some subsequent closures where high speed lines replaced the previous route;
- the 2,500 km British Isles high-speed network, where high speed is at least 320 kph on new lines or 250 kph on adapted 'classic' lines, including a second (high speed only) Channel Tunnel, new cross-country and 'London bypass' lines
- this network includes the Dun Eideann-Baile Atha Cliath* 'Celtic Express' railway (Edinburgh-Glasgow-Belfast-Dublin)—whose international freight benefits for through transit with mainland Europe eventually stimulated the conversion of the Irish rail network to standard European gauge†;
- a further 700 km of regional high-speed lines authorized as a sixth (final) expansion phase;
- 500 km of new and reopened freight railway, particularly for distribution flows;
- 1,500 km of new urban rail (heavy and light rail systems), including through tram-train operations;
- 300 km of adapted and reopened shire lines.

New eco-towns such as Bordon Whitehill, and 'gateway' city regions such as Luton Keynes‡, have also required better links, locally and longer distance, and not just towards London.

This chapter is about the primary railway of 2109, but it is worth noting that lines which narrowly survived the Beeching 'axe', nearly 150 years ago, now have a more useful purpose, rather than just remaining as a memory of that era. A few were also reopened in the 21st century. In some cases the beneficiary is freight, taken to regional distribution railheads. Others serve expanded communities, linking these to nearby main towns and cities§. Some of the historic preserved railways, once solely tourist heritage businesses, now find a new passenger purpose, or assist freight to reach regional railheads or to bypass busy city region passenger networks.

Railway performance

A railway is a highly complex industrial organization, many of whose activities are on public display and visible to passenger and freight users and the communities they serve. The result is that people can take a snapshot in terms of performance, and the railway is always only as good as you think it is on the day.

The target is 100 per cent performance, and the 2109 railway budgets for better than 99.8 per cent across the system, on all measures. That performance is looking not just at reliability, cleanliness, punctuality and so forth, but also environmental and sustainability targets, and relevance for regional economic and social objectives.

The system still needs to adapt, to accommodate flexibility and fast response to changes in passenger needs, freight user requirements and further structural changes in city regions¶. The

* Inevitably over the last 100 years with devolution and new nations, there has been more official use of the Celtic languages.

† The first generation high-speed passenger trains to Ireland through the 40 km Portpatrick-Donaghadee tunnel were Spanish-designed 'Talgo' variable-gauge trains, to run over the European 1,435mm and Irish 1,600mm lines.

‡ Formerly the Milton Keynes South Midlands growth area.

§ Eg Tavistock to Plymouth, Caernarfon to Bangor, Penicuik to Dun Eideann (Edinburgh).

¶ Already investment in the next 30 years is foreseen, including supporting the passenger rights of artificial intelligence entities as these join humans and animals in sharing the planet. 'Arties' also offer specialist skills ideal for technical environments including railways. It may be that the growth of human population in Europe slows towards zero by 2200.

continuing effects of climate change are driving expenditure on some urban relocation, with an associated need for new and realigned railways. It will be a further century before climate change is properly under control.

Technology changes drive higher capacity and greater safety

Originally Britain had been the world's innovator for almost all railway technology. Other nations and their industries overtook during the 19th and 20th centuries, until Britain generally bought multi-national products 'not designed here'. Assembly was the norm within Britain with our level of technical skills. The 22nd century once again sees British Isles-based HQs, and research centres for world-class technology at the forefront of cutting-edge designs for intensive railway operations. This is a powerful source of export income in the post-carbon world, and indeed the knowledge and technology sectors have played a vital economic role for Britain in the past century.

A major increase in the railway's maximum capacity over the past century has been achieved by an economic combination of technological innovations. These included cab radio-based and moving block signalling, and automation of train driving on busy routes. This allowed removal of expensive and difficult to maintain lineside equipment.

Closer headways are very important. Train headways of no more than two minutes have been achieved, even on high-speed operations where braking distances used to be long. Remote intelligent monitoring of infrastructure 24/7 reduces risks from external causes. This is a major enhancement of safety. It is part of a systematic regime of preventative trouble-shooting which avoids delays previously caused by breakdown of key equipment such as signals, points or safety-critical train equipment.

Safety has been further improved by closing all level crossings on busy lines, replacing most by bridges, and with automated trackside warnings on other lines to warn of obstructions. Train and station crew are alert to on-train and on-station risks. Ensuring a high level of customer service enhances this and also helps to achieve high performance levels. Train and station managers are multi-skilled—not least, with communications, languages and business topics. Railway business funding of technical and university courses ensures that all interests and opportunities are available and affordable, with time granted for education. The Railway Study Association has become the educational business arm of the national railway industry.

Efficient integrated transport and interchanges

Long passenger trains are the norm to meet current demands on the main routes. There is a practical limit of about 15-16 coaches because of the problems in managing boarding and alighting efficiently with extended trains. Indeed, highly efficient station operations are immensely important. Many stations have multiple entrances and exits to link with their urban surroundings, to avoid congestion points and to enlarge catchments. Provision of additional tracks, platforms and passageways at busy stations has increased capacity, by avoiding delays from single-platform occupation.

Interchanges are pre-planned to reduce transfer times. Passengers are advised which part of the train to travel in for fastest and easiest transfer. All stations are fully accessible, even those on deep tube networks. Train reliability and performance is now better than 99.8 per cent, so passengers trust interchanges of as little as 2-3 minutes where cross-platform connections are offered. This includes cross-platform to local buses in some cases. Intelligible network guides, standardized interval timetables, national 'best-fare' pay-as-you-go cashless travel vending (with bankcards and personal communicators) and comprehensive real time information, all make public transport a trusted experience. The 3,500 km of bus rapid transit is also highly important for urban travel in city regions and is fully integrated with the rail network.

New and expanded parkway stations, mainly on city fringes, have helped to reduce the congestion at city centre stations and also attract suburban motorists to rail. These interchanges can

also be regional economic growth locations, depending on local planning priorities. Although it had been fashionable for a while to object to the provision of additional car parking and new city-fringe stations, the greening of the car and the overall benefits secured by enabling easy transfer to rail finally allowed a new generation of parkways to be recognized as an important gain.

The British Isles' high speed network

The creation of an additional high speed network was feasible, to release capacity on classic main lines for the improvement of inter-urban and metropolis services and freight expansion. The initial network had been backed by government and opposition political parties, while the Planning Act 2008 had created a new process for national infrastructure approval.

It was decided that the British Isles' economic development should not become solely London-centric, so some high speed, cross country links were built in phases as well as the principal routes via London. A London bypass was built for through freight and passenger services to and from mainland Europe and beyond.

Concessions were given on land allocations (although developers were required to comply with public realm rules) as the high speed network was not built using the old franchise system. Such a scheme had helped to finance High Speed 1 between London Betjeman International* and the first Channel Tunnel.

The railway needed to have maximum reach economically and was built in phases allowing incremental additions to the high speed network, with through trains to classic lines to serve other major destinations. Subsequent phases enlarged the network's scope, and a sixth phase of 700 km has just been authorized, focusing on regional extensions to peripheral areas, and where demand on classic lines now outpaces capacity and requires relief†.

The network has parkway and airport stations to attract passengers away from the combination of road and air transport. Regions which were far sighted enough to recognize the opportunity for new economic centres of activity have secured a limited number of high speed 'hub' centres for their region.

Planning favoured high speed rail into existing city centres. Some routes were new build throughout, such as the north-western High Speed 2 from Old Oak Junction to London Euston Cross. Other routes required classic main lines to be upgraded within city regions. A few centres chose to 'underground-ize' or 'metro-ize' local rail, as at the Manchester Hub. Historic rail geography and the desire for direct onward connections encouraged some cities to support new direct cross-centre tunnels associated with city re-investment, as adopted in Lille. An example is the Glasgow north-south main line from Queen Street to Central station, which is 75 years old next year‡. It was opened in 2035 as a symbol of uniting the independent Scots nation.

Already in 2009 there were proposals towards high speed passenger networks serving some of the biggest cities in Britain (later than the French and Japanese). The model that was used was certainly right for the British Isles, using high speed track where possible and then going back onto the old mainlines.

Urban systems

The excellent standards of high speed train services brought into question the quality of the urban networks, and interchanges§. A mirror image of main road congestion is still faced in some locations with constraints on rail capacity, even with investment to address a four-fold increase in use. The reality is that, despite various new towns, in general the historic cities and towns are where the bulk of new populations have clustered.

It is certain that having a much higher quality of public trans-

* St Pancras International was renamed on 28th August 2106, the bicentenary of the Poet Laureate's birth. Goethe, Wayne Osmond and Leo Tolstoy were also born on 28th August.

† Including Abertawe (Swansea), Norwich, and Peairt (Perth).

‡ Ath-cruaidh-rathad-iariann Teis-meadhanach Ghlaschu (ATG) – Glasgow's short central 'railroad' known locally as the 'Electric Banana' to distinguish it from the 'Clockwork Orange' Subway system.

§ It now takes longer from Morden to Euston by the Northern City Line, than London Euston Cross to Birmingham Heartlands.

port is a major advantage for primary urban travel corridors, and for the busiest suburb to suburb flows where historically car was the preferred choice. Continuous pressures on operating costs have also improved the effectiveness and cost base of urban railway operations, improving the benefit-cost ratio for new projects.

New capacity for high speed lines in city regions has already been discussed. In parallel, many urban rail networks expanded over the years, while in some cases there was removal of lightly used urban services to make room for more important flows.

This does not mean that there has been a net transport loss for urban areas, because of re-organization of other mainline services, and a much larger expansion of urban bus rapid transit corridors and light rail. The latter was less affordable and took longer from conception to construction than bus priorities and busways, but has still expanded in busy urban areas, including the tram-train concept. It has succeeded because of the longer term regeneration and development benefits achieved by light rail. However, light rail needed retrospective contributions from developers' rental income, and other city region funding, to help pay for the infrastructure costs*.

The freight railway at the start of the 22nd century

However green a loaded long-distance lorry is, it can never be quite as green as a loaded train, but it can get to lots of places that railways never reach such as the 20th century business parks and distribution centres near motorway interchanges.

Because the railway in Britain abandoned the delivery business so effectively in the second half of the 20th century, there were some critical logistical and investment issues which had to be addressed before rail freight could expand again on a large scale. It started to offer the service wanted by major freight users, rather than telling them to conform to the service the railway provided. This was fundamental to the improvement of freight transport.

Rail freight volumes in 2009 were still hugely dependent on the basic economic building blocks such as coal, aggregates, oil and other bulk, heavy and low value flows. Rail had largely lost the premium and monopoly market flows which had been the mainstay of Victorian railway economics.

The railway 100 years on from that has re-learnt how to attract those flows and get the goods to the customers' destinations, or as close as possible, with the same degree of priority and care as if they were handling important passengers.

Within Britain, distribution within the urban areas from the terminals has produced new lorry traction unit design using electric or hydrogen power and in some cities a 'trolleybus' tractor unit where such systems have been reintroduced. An ISO swap body container 'box' makes it quick, easy and economical to transfer the 'box' between rail and road.

It seems surprising, but it took only a little innovation during the 21st century (but a lot more investment) to offer a new generation of freight trains based on passenger handling principles. It is now completely normal for there to be a freight multiple unit (FMU) which runs at the same speed as passenger trains, and serves its own stations, just as there are passenger stations distributed along the main routes†.

What was needed to transform rail freight in the 21st century?

In 2009, mainline freight was generally financed on marginal costs only, so it could not afford new railways. The only realistic way, initially, to allow for affordable freight expansion, and to take on new types of traffic including distribution networks, was to wait for the passenger service (and the national governments) to pay for extra capacity and aim for extra slots won from the increased capacity as a result of the improvements.

* The English Government Act of 2020 gave metropolitan city regions the responsibility for creating, either alone or with others, a safe and adequate public transport within a 50 km travel-to-work-area, a zone similar in size to that in the London Passenger Transport Board Act of 1931… This contributed to substantial growth in railway use. In 2054 3 billion passengers were carried in a year on Britain's main lines for the first time ever.

† The standard FMU station design is a loop off the main track, where the freight train can stop for five minutes, unload and load 'boxes' at an automatic transfer platform and resume its journey.

Extra capacity on the classic lines was created by the high speed lines, but the main bottlenecks were within and on the fringes of the main cities, where passenger rail has its most intense demands. Freight still needed track capacity for access to break-bulk and distribution depots as well as for through services. Grants for environmental haulage merited payment by governments, and this underpinned a number of capacity investments and line reopenings, assisted in some cases by city region authorities.

Allied to this was the growing issue of shortage of land to re-establish the 21st century version of rail freight terminals, which traditionally required many acres. The conflict between new large-scale freight transfer locations, and planning policies such as brown field land for housing and green belt rules, required a second policy and funding element: explicit government support to see through a new generation of rail freight terminals allied to their city regions.

The third pillar for rail freight re-invigoration was the 2009 precedent in the northern Estados Unidos, then the United States, of a $26 billion purchase of Burlington Northern Santa Fe by a billionaire international financier, Warren Buffett, chairman of Berkshire Hathaway. He caused a sea-change in private sector interest by staking his commitment to the environmental strengths of rail freight in the emerging world of low carbon consumption. Large scale road haulage businesses started to invest in freight railway operation

The fourth, and vital, catalyst for European railways, was the completion in 2018 of the transformation of rail freight ownership from national railways to truly independent private sector operations, throughout the 32 states then within the European Union, including Turkey. Many national railways had dragged their heels* on this change since Europe's first rail freight directive in 2001.

A welcome result of inter-continental rail freight

The opening up of Turkey to EU transport laws leveraged a global change in rail freight, and helped to resolve some of the intractable Kashmiri, Afghanistan and Middle Eastern conflicts. The regional economic gains from several land corridors between the Chinese Nations and Europe via Pakistan, Afghanistan, Iran and Turkey, supported by an international treaty to implement this project, created a fundamental change in well-being for the area's populations†. An early result was direct freight trains between India/Pakistan and the British Isles, and since 2033 between the Chinese Nations and Europe via South Asia, as it was not economic for the Russian Federation's railways to change the gauge on their trunk lines to 1435 mm until the late 21st century‡.

The passenger experience at the start of the 22nd century

The population as a whole now has more reliance on the railway for main corridor communications, and is incentivized financially to use public transport where possible rather than car. This requires a popular and practical range of station and train facilities. They are what anyone would want for the type of journey being made. Commuters may still stand—the economics of commuting cannot allow otherwise even though changing working patterns mean peaks are less concentrated—but everyone knows that they will have a comfortable, punctual and hassle-free journey at all other times, including non-work days. Any

* See the British House of Lords' debate on 23rd October 2009. Then, 21 European countries had still been in breach of a European directive to implement an open competitive rail freight market.

† A similar economic consequence arose with the Europe-Africa rail tunnel between Punta Paloma (Spain) and Cape Malabata (Morocco). That opened in 2025 following a 2003 agreement between those two countries, which led to the 2009 EuroMed Transport Project to cross the Strait of Gibraltar where it is only 300m deep. The tunnel is 40 km long and initially linked the European high speed rail network to Tangier, and allowed Maghreb-Europe rail freight. The Africa West rail corridor then opened in later phases.

‡ Procurement started in 2108 for a Bering Strait tunnel, to link the Americas to Asia and Europe. It will be 90 km long, between Nauken in the Siberian National Republic, and Wales in the Alaskan State of the Estados Unidos. Fortunately, the Diomede Islands in the centre of the Bering Strait simplify the construction logistics by enabling four simultaneous tunnelling points. The Strait has an average depth of only 30-50m. It will open in 12 years, quicker than Japan's 54 km Seikan Tunnel which took 17 years to build between Honshu and Hokkaido Islands.

delay of over five minutes results in a full fare refund, which is to be expected when there is better than 99.8 per cent performance overall.

Travel by all mechanized modes (except cycling and powered two-wheelers) counts against a national carbon budget. Travel is taxed according to the mode used*.

Urban train designs have finally disposed of the 'carriage' concept—there is a 'through train' design with almost continuous visibility from one end to the other. On-train facilities include a power-point and satellite communications at every seat, and plenty of cycle spaces. Premium class and a reservable multi-purpose room are offered on every inter-urban and long-distance train. A pre-purchased or on-the-spot supplement is deducted from the passenger's electronic account. Britain's railways remain the best throughout Europe, for the volume of on-train catering offered.

Most railways run 24/7 except during very major engineering work, and then the business objective is to increase journey times by only 20 per cent as a maximum and fares are reduced substantially. It is preferred to run through trains via alternative routes if at all possible, and there are more of these in 2109. Any replacement facilities are fully accessible and must meet all standard performance measures.

As a result of greater dependence on the railway, this has led to more, not fewer, intermediate stations serving a greater percentage of each corridor's travel demand. This was not an advocacy for the Victorian wayside station but for new stations at defined urban centres, and population growth points, that lacked the facility. The aim was not necessarily to create the fastest journey but to reduce the average accessibility times. A further consequence was for new trains to offer much better acceleration and braking so that overall journey times are maintained or only increased slightly compared to previous services, even if extra stations are served.

A longstanding ambition was achieved by a standard railway timetable in each region and by adding bus services to create a systematic grid of connections at hubs, which passengers can rely on. This has created a transport spine along main corridors, which also increases accessibility and reduces overall public transport journey times.

The new high speed network has allowed expansion of direct services to mainland Europe from a range of cities where a 3–6 hour journey time is possible†. The creation of an Irish Sea tunnel has been justified by reduction of through lorry traffic and air travel, and by a political alignment of the Celtic nations. The new high speed lines also have a role in improving Anglo-Scottish communication. Issues of peripherality have caused remote regions to campaign for their own high speed rail links from the core network, and there has been a positive political response‡.

With much quicker journey times to peripheral territories, there is now only one internal sleeper train in Great Britain, between London and the Northern/Western Highlands of Scotland. This is to be phased out when the Peairt high speed line opens§. There are transit overnight services between mainland Europe and Ireland, Scotland, South Wales and West of England, although these rely on aircraft-style reclining seating rather than a conventional sleeper. The high-speed lines also enable premium mail/parcels trains to carry unitized flows commercially, using the freight stations for distribution.

* For example, GPS vehicle tracking is standard on the roads, and taxes are levied on vehicle owners.

† The British Isles eventually joined Europe's 'Schengen' passport-free scheme, after Scotland and Ireland insisted on the right of their national citizens to travel without hindrance across England to and from mainland Europe.

‡ There was a heated debate in the South West about the best route for a high speed spur to Devon and Cornwall which avoided the vulnerable (and slow) coastal route via the Exe Estuary and the Dawlish sea wall. The A30 corridor north of Dartmoor was eventually favoured, to improve Cornwall's accessibility, with a spur to the Devon coast.

§ Also authorized is a new environmentally-engineered 38 km link from north of Dalwhinnie on the Highland Line to Tulloch on the West Highland Line. The Fort William-Dun Eideann journey will be only two hours, and Fort William-London under five hours.

How was the 21st century railway funded?

The 'classic' system and its improvements

Affording the 21st century 'classic' infrastructure and new trains, and network and technology upgrades, was a 'mixed economy' cost shared between the railway's users and the nations of the British Isles. This is discussed later in this chapter, as is investment in the freight network.

Funding the high speed network

The financial cost of a new 2,500 km British Isles network plus upgrading of existing lines to become feeders to the high speed network, including some 'cross country' corridors, amounted to £300 billion over 100 years—only £3 billion per year*. Necessarily, this involved major international private sector funding as well as from central and devolved governments, and loans from mainland Europe, the Indian Sub-Continent, Far East and South America.

Both of the world's super-powers, the Chinese Nations and the Estados Unidos, and their financial institutions, have been too preoccupied with funding their own continental scale of high speed railways, and other internal projects, to spare much in the last 75 years for investment in the British Isles. The Estados Unidos has major investment priorities in its important southern states, which were formerly the separate Mexican nation before the enlarged federation came into being. Chinese long-term investments in the British Isles during 2000-2040, though, are still paying strong dividends. Middle Eastern nations have been focussed on their own economies during the last eighty years' decline in world oil markets beyond the 'peak oil' years of 2010-2030.

It is worth remembering that funding of the British Isles' domestic high speed network started in a period of world economic recession. The time scales for funding the new British lines required a long term concession model not dissimilar to Eurotunnel (although it was more stable), rather than a franchise. It involved allocation of land zones near to possible stations so that a financial rate of return could be achieved by developments adjacent to the hubs.

It was vital to keep the capital, operating and maintenance cost basis as affordable as possible—a best-in-class objective which was a fundamental target for the new network. This meant taking advantage of 'world class' improvements in the way the railway operated so that the network and its continued expansion were affordable.

Urban system expansion

Urban system expansion has always been difficult to finance, as illustrated by the problems faced by London's original Crossrail 1. That cost £14 billion, excluding the Great Western main line upgrade from Paddington to Reading. Urban funding is also discussed later in this chapter, but it is worth stating now the continuous need for external funding sources from beneficiaries in the city regions, and from city region authorities themselves† ‡. London's NE-SW Crossrail 2 took several phases to fund, with the initial objectives being a mixture of Central London capacity relief and urban improvements in Hackney, Chelsea and Wandsworth§.

The expansion of city region administrations from just London to the largest 15 regions over the 2010-2030 period greatly helped to assemble and channel funding towards public transport improvements. Once begun, this flow of funding could be continued for other sequential schemes with little public or private sector dissention, because the benefits were accepted

* Costs during 2009-2109 have been recalculated at 2009 prices, to compare with previous chapters.

† Eg, the Carbon Tax, City Region Levy, and Business Launch Zones (previously Business Improvement Districts and Accelerated Development Zones).

‡ London's original Crossrail 1 provided one financing model, with one-third from national government, one-half from the city region authority, regional beneficiaries and hypothecated fares income, and one-sixth charged to the national rail infrastructure provider.

§ Better known as the Albert Line, because it parallels the Victoria Line. Its primary justification was to provide distribution from the high speed termini at Euston Cross and Betjeman International.

as worth the initial financial pain—achieving additional capacity and economic growth along with lower carbon consumption.

Funding stations and interchanges

A railway is only as worthwhile as its interface with the rest of the nation—so passenger and freight transfer points must be efficient, affordable and attractive to use. All too often, the 20th century railway had ignored this or limited its investment as other expenditure—on track, signalling and trains—took higher priority.

The aspiration to have better passenger stations was incorporated into reports on an affordable strategy for investment and operating costs, early in the past century. Stations were designed to be hubs, and incorporate interchanges and community and business centres. This started in 2010 after the *Better Rail Stations* Report. Initially funding was built into new long term franchise agreements, with public and private sector sharing the costs.

Instead of investing in commercial developments near motorway junctions, as in past generations, planning policies supported new high density developments alongside these railway hubs. Extensive developer-supported schemes were taken forwards in partnership with local and Communities Agency funding. The idea was developed in subsequent decades, with new zero-carbon townships being located explicitly astride public transport.

Funding passenger trains

Passenger trains are as long and as large as possible, but the bulk of them have to be able to run on existing lines. There are many trains built in the 2060s and still running in 2109 which are themselves only one train generation from 2009! We have seen an increasing demand for the railway at a rate which has made it more attractive to retain and life-extend existing generations of trains rather than just scrap them and buy new.

This means that the average age of trains is older not younger but with a requirement for each basic element, body shell etc., to be capable of total refurbishment or upgrade every 10-20 years.

Consequently the financing of passenger trains remains generally as it has for over a century, with leasing payments to private owners. The longer train design life for use on an enlarging network means that leasing costs have fallen dramatically, without artificial intervention by national governments which distorted the leasing marketplace in the early 21st century.

Funding rural railways

There is no such thing as a truly rural railway in the British Isles now—all of the shire branch lines serve significant towns (with growing populations) and interchanges. Shire line grant-aid has continued to be a cost on the national governments, and this has been coupled with a wide range of regional investment initiatives to transform the former marginal railways into services fit for purpose for the 21st century and now the 22nd century*.

Funding of tram-train solutions, route diversions into town centres rather than peripheral stations, loops for higher frequency services, new halts and interchanges, and limited route extensions, have combined to renew the purpose of these lines†. This funding was also made available for preserved railways that could show a positive contribution to future local transport needs, and for a few new local lines where strong benefits were demonstrated.

These modernized routes are generally making a much greater contribution to total operating and maintenance costs than had been the case in the 20th century.

* A £250 million 'shire lines challenge' grant fund had been established in the 2012 High Level Output Statement, and this became sufficiently popular and successful that further grants have been offered in successive 5 and 10-year funding agreements from national governments.

† Although decades after tram-trains were first developed in Germany, the first English project was the conversion of the Watford–St Albans community railway in 2010. There was a higher benefit-cost ratio and better services and connections, for no net increase in public expenditure.

The view from 2009 – how do we get to 2109?

Anticipating the challenges of the future

The preceding sections have conveyed some possibilities that may occur during the next 100 years. This has put some flesh and colour on the real life debates that will undoubtedly arise and on potential policies and outcomes. Now we need to look at this next century from a 2009 perspective.

The latent danger in looking ahead is of solving past not future problems, in not having sufficient vision to anticipate the extent of future change. It would have been possible to write perceptively, if not accurately, in 1909 about a century of railways and the wider world, through to 2009. But how many changes would have been missed or at best seen as static or evolutionary in outcome, rather than a combination of evolution and revolution?

What, other than the lines of route, the retention of many Victorian stations and some artefacts, now remains from the physical world of 1909? Interestingly a number of skills may still be highly relevant.

It is no easier to write now about the period from 2009 to 2109. The last 100 years have shown enough changes for us to appreciate that we may neither be able to forecast the changes nor to predict the consequences. Although, if we were there, we would probably understand the outcome!

It is important to prepare for the unexpected. World wars changed the course of history and altered the development of the railway. There are looming uncertainties: climate change, weather severity and rising sea levels could all have a bearing on the requirements for railway investment. There has been a steady succession of regional wars and increase in terrorism. Meanwhile Britain looks set to stay within the EU and will be closely bound by its policies and legislation.

What vision is actually possible?

Because of the nature of railways they will continue to be demanded by populations on the move, whether for work, business, education or leisure. Similarly freight will use the railway for movement of raw materials, components and finished goods, including products for consumption.

We can predict how current and foreseeable trends and pressure points may shape the future, and then review the plausible outcomes to identify whether this would be significant or minor in the further history of the railway.

Above all, any predictions must build in durability. Heads and shoulders above other changes in the past 100 years, has been the difficulty of ensuring adequate capital to re-invest in the railway and to enable new projects to come to fruition in a timely fashion. Not all aspirations have been achieved, nor were all evolutionary investments (as opposed to revolutionary) the right thing to authorize. The 1950s' Modernization Plan is one example.

Some changes were the cause, and some the consequence, of railway strategies; others were the consequences of economic and military convulsions including recessions and wars. Occasionally the railway was just a bystander and lost some of its commercial relevance. So how will the railway and its staff and training requirements, sustain and increase their relevance in the next 100 years?

Fortunately, there is a huge amount of data and consultation already underway for 30 and 50 years hence, if not for the full century.

What are the fundamental elements? People and goods, of course, but equally important is their local context, their economic reach, their political framework and their ambitions.

In an alternative world, the Roman Empire might have overrun the whole of the globe by 1000 AD. Alas, despite being a culturally sophisticated civilization, Rome and Constantinople lacked the management and political capacity to adapt with new purposes, technology and skills. There could be parallels…

The continuing challenge for the railway is to adapt

This is the hardest challenge to assess. Any analysis should

consider the railway's ability to respond to changes in social, financial, technical and other factors. Railways have only existed for around 200 years, so, despite appearances of maturity, they are still juvenile compared with civilization and need to carry on growing up and discovering themselves. Remarkably they began while some continents like America and Africa were still partly unexplored—and were instrumental in opening them up.

External factors beyond 2009

The role of the passenger railway has historically been for transport to and from work in towns and cities, and travel on business or pleasure to other stations. There is more frequent, all purpose, travel where networks such as Docklands Light Railway and London Underground exist. The freight railway is now a just-in-time conveyor belt on rails.

The trend in European cities is towards a 24/7 service, yet the British railway still includes night and weekend closures for maintenance, with a philosophy of closing at the railway's convenience not the passengers'. If the railway is to do more for society then it has to change its ways of operations and maintenance, albeit at a cost.

Railways take a long time to re-equip and to change methods and materials. The whole-life environmental cycle of railways needs interventions now in order to achieve outcomes over succeeding decades. If the train offers itself as a natural ally to modern living, it should adapt to lifestyles as they change without having to wait 20 years for new carriages or stations, as in the past. Obvious facilities such as power points in all standard class carriages and better satellite connections need addressing during the 2010s.

Even more commuting is likely and the use of smartcards and other 'new' technology enables easier travel in city regions and beyond. A national public transport card, giving discount throughout the whole system, may prove hugely successful in encouraging people on to public transport.

Urbanization - population projections

The main effect is that of compound growth. A population growing at just one per cent a year will double in 70 years. UK population is growing at 0.7 per cent a year. The UK Government Actuary's department has underestimated actual population growth rates for many years. The latest projections were published in October 2007 and show what may happen if governments continue an implicit pro-migration, pro-population growth policy. There are other projections relying on different assumptions. The Principal Projection shows UK population growing, from around 60 million, by 350,000–445,000 a year*.

Year	Population
2031	70 million
2050	77 million
2081	85 million
2109	90 million

The impact on railways will be a function of population distribution and volume, economic activity and uses of time. A 24/7 society, with more leisure time and a longer-living population, would create strong trends for railways to respond to.

Urbanization - population distribution

The density of existing towns and cities will increase, along with urban extensions, completion of growth areas, and some new free-standing towns.

About 73 per cent of Great Britain's population lives in urban areas of 15,000 population or greater, and a further 14 per cent in communities and towns of 1500 to 15,000 population. Unsurprisingly, the distribution of stations is now concentrated in the larger population groups. Among the smallest urban settlements, the 104 with 1500–1600 population, there are only 12 stations open. Amongst the largest 103 of the 1500–15,000 range, covering 11,500–15,000 population, there are 54 stations open.

* UK Government Actuary estimates for 2031-2081; author's estimate for 2109.

Population of British urban areas (England and Wales 2001, Scotland data 2007)

Area and individual population (millions)	Total
Greater London, Greater Manchester, West Midlands, Greater Glasgow, West Yorkshire, Liverpool, Tyneside, Nottingham, Sheffield, Greater Bristol (>500,000 population)	18
68 cities, towns and urban regions 100–500,000 population (includes Edinburgh and Cardiff)	14
64 major communities and towns of 50–100,000	5
269 towns or suburbs of 15–50,000	7
>1860 communities and towns of 1500–15,000	8

An estimated 142 of the 428 communities with 10,000–50,000 population still lack stations, even after decades of targeted station and line reopenings. In 2009, ATOC published a list of 14 freight-only, mothballed or closed stations or lines meriting reopening to passengers. There is a close relationship between the suggestions and population size. The Rossendale line would serve nearly 50,000 population and Leicester-Burton 87,000.

It is likely that more communities not served by the railway will seek rail access over the next 50–100 years, not least if their accessibility, social and economic roles can be improved affordably.

Within cities and major towns, there are also large tracts of suburban population with limited direct rail access. There may be a business case over the decades for reinstating or extending city region lines as part of a metro-style rail, or light rail network, though the immediate priority will be to have better bus services.

Integrated public transport

If there are higher density cities because development is not being allowed in the countryside, then the greater the population that is located at natural centres of public transport, the less the population needs to use cars or even own cars at all*. The primary targets are to reduce the overall need to travel, and encourage a shift to sustainable travel modes for as much of the door to door journey as is reasonable.

Higher densities can be a positive force for better public transport and better city living, particularly if such stations can become part of the heart of those communities with a total transport offer of good interconnection between electric, hybrid and hydrogen buses, light rail and trains. This enables good public transport to work on a commercial or almost commercial basis.

The bulk of short and medium term improvements to journey times, accessibility and modal shift is likely to derive from quality bus partnerships and contracts (or their successors), cashless pay-as-you-go ticketing, and bus rapid transit and light rail projects, as part of an integrated approach to urban transport and green modes. Better walking, cycle and powered two-wheeler access to stations (and two-wheel parking facilities) will be a high priority. Urban transport planning will continue to be a multi-disciplinary priority.

Cars

In 2009, the motoring world is already investing hugely in electric technology, hydrogen power and hybrid vehicles. Over a decade the total vehicle population will change, and consequently will be far less damaging to the environment. Government policies already support this changeover.

Most future road widening on motorways is by hard shoulder running, with only limited opportunity for more capacity beyond the 2020s.

Road pricing which was commonplace in Georgian and Victorian times with turnpikes is likely to return this century.

The Highways Agency is entering a 'Network Rail' mode following the 2007 Nichols Report, with much higher predicted costs for road schemes. The agency will also be subject to 5-year

* Shared car ownership and more car hiring might be future trends.

capital planning and value for money tests with scheme benefits considered against investment alternatives including rail.

Cycling and walking

Cycling and walking will see resurgence, but this requires changes in public attitudes on how to travel for short journeys and the creation of cycle and footpath networks and pedestrianization on a scale which we have not seen in Britain since the car started to move people off the highways.

Reclaiming highway space in the towns and cities, combined with a financial reluctance to incur further expenditure, will have a limiting effect on the ability to accommodate more car and lorry use and on the future use of those modes. It could also have a limiting effect on additional bus operations. These are the economics of congestion and constraint, not of unlimited capacity—leading to further prioritization of road space.

Air travel

Air travel can be very efficient and is not all bad, providing seat occupation and total numbers on each plane are high. It is likely that politicians will increasingly use carbon tax rules to secure a financial take from air travel, where previously it has been largely tax free, and to stimulate better use of plane and air capacities. In some ways this is no different to taxing car use through vehicle excise duty and fuel sales. The greatest challenges will be managing surface access to and from airports more environmentally, and funding the improved public transport access. More runways are likely only when other options are nearing their limit.

Some detailed technical changes

Railways were historically slow to respond to technical opportunities and technical improvements.

Electrification and other power sources—The petrol and diesel engines were around by the 1890s and motorization of travel was in full swing between the World Wars, yet Britain's railways were still regarding traction by petrol and diesel engines only experimentally during the 1930s. Full dieselization was only begun in the mid-1950s. Britain's railways now need to plan to replace oil as the main motive power.

It is essential simultaneously to fund and skill up multiple electrification projects. The railway also has to be alert to new power technology such as high efficiency lithium tunnel batteries, fuel cells and hydrogen, and be clear on the best way to introduce new traction modes. Nuclear and renewable sources appear to be the main ways forward with electricity generation, until fusion power becomes practical.

In 2009, political aspirations are ahead of the railway's ability to change*. Britain's railways were authorized to electrify one main line and several interurban lines during the subsequent eight years†. The gap to be managed was both technical and financial, notably undertaking multiple electrification schemes simultaneously, and funding this in the depressed economic environment. The Scottish government aimed to electrify all its railways by 2030. Also in 2009, the Liberal Democrats wanted all Britain's lines electrified by 2040, to be paid for by a tax on lorry mileage.

Lower costs—Technical changes are needed to reduce the unit costs of development and maintenance. Network Rail already has modular components for building projects to keep construction costs lower. With the foreseen scale of change and adaptation, there will be a strong incentive for schemes that are capable of easy replication at low unit cost. The introduction of tram-trains, as in Watford–St Albans, also reduces unit costs on community railways.

Safety and equipment accessibility—All improvements, and reviews of existing operations, must take account of an all-embracing safety objective. Obviously good, safe operability and

* As noted earlier, there has been widespread cross-party political support for an initial phase of British high speed lines. The first commitment was a Conservative Party announcement at its annual conference in 2008 at Birmingham.

† This was itself a great step forwards from two years previously, and a tribute to the tenacity of the Secretary of State for Transport, Lord Adonis.

maintainability will be fundamental in all new developments and remodelling.

Signalling technology—Fundamental changes to signalling technology and the removal of lineside equipment are big goals for the next decades. This would dramatically change railway maintenance costs and increase the scope for a high capacity 24/7 railway.

Other measures to increase track capacity—To run longer trains within timetable slots poses technical and practical limits determined by power supply and train design. Station operational parameters for loading and unloading need to be considered to keep station dwell time low.

Automatic train control is already in use on some metro lines and will no doubt be extended to mainline operations as part of the process of securing best use of track capacity.

However, it should be recognized that the greater the technical differences between areas of the railway, the more difficult it is to allow trains to run through to other parts of the system. This is a consequence of the greater specialization of each type of railway operation to maximize capacity and achieve cost reduction.

Furthermore, new technologies will also emerge, and will need assessment and validation for railway use.

Environmental standards—Planning to increase standards and expectations to minimize environmental impact are important. But how do you make a station green when it is a Victorian listed building?

If a train's life is 40 years, how can you make it greener when the environmental policy rules change 10 years into its operations? Do you scrap it, losing its value or do you accept that rail has some environmental benefits and run it to the natural end of its life?

The whole-life environmental cycle of railways needs intervention now to be able to achieve benefits optimally over succeeding decades.

The UK Government's position is to reduce the carbon output by 80 per cent by 2050. The environmental rules, while stimulating a greater use of rail, will impose new costs such as greater mitigation against impacts of new lines. This might even lead to the prevention of some projects. It may also mean alterations to the existing railways, for example noise barriers and so on. The railway needs to be alert to these factors and costs.

Whatever the right economic as well as environmental balance, there is no doubt that 'greening' Britain's railways is an urgent task and one which cannot be an immediate charge on train operating companies because their franchises weren't geared that way. Going forward this will have to change.

The volume of future demands beyond 2009

At present, mainline railways achieve 1.2 billion passenger journeys in the midst of a recession. The London Underground has another 1.1 billion and light rail about 100 million out of total boardings across British public transport of about 7.6 billion per year.

Roundly half of all public transport boardings are made in the London region where demand for public transport has shot up by 60 per cent from the mid 1990s.

Why is London significant? What might this imply for the next 100 years? Firstly, London actually has a very extensive and intensive public transport system. There are over 670 stations and light rail stops in the 650 square miles of London's Travelcard zones, and a dense bus network.

Secondly, getting around London by road is not easy and while public transport might be slower for the whole journey, particularly in the suburbs, at least there is public transport you can use.

Thirdly, the Mayor of London, the chief executive of that city region, has had the power and funding to achieve major changes in public transport such as integrated ticketing. The iconic Oyster enables passengers to own the city and travel at will with low pricing resistance, and allows them to be uninhibited about the transport they use. In future, integrated electronic

ticketing might not even be a ticket; it may be a bank card, phone, organizer or some entirely new technology.

The Mayor also manages demand for public transport through fares and service level policies in a way that is more difficult in other city regions where the bulk of public transport, local buses, is deregulated and out of direct control of city authorities. The level of congestion on the road network is also lower elsewhere.

Public transport, including rail, will need to play a greater role in Britain's main city regions and major towns in the next 100 years. It will be essential to give each city's authorities similar powers to London. They will need to be able to authorize and fund equivalent improvements in their areas, and to work in concert with each other.

Devolution of administration in Scotland and Wales has already shown how strong priorities, defined and authorized regionally, are transforming public transport within the high density areas of lowland Scotland and the South Wales valleys, and elsewhere.

There are already initiatives, in the early years of the 21st century within city regions, towards greater, joint focus on economic development projects and transport improvements. This is resulting in the separation of road travel demand from economic growth. Typically in the 20th century if you forecasted economic growth you were forecasting an equal or faster rate in road travel demand.

During the 21st century, economic growth will need to be sustainable. Where possible, less physical travel in total, and more electronic communications, are better.

Public and green transport, walking and cycling, need to be made more relevant and used for a greater percentage of journeys where it is efficient to do so.

Already rail planners in 2009 are forecasting a doubling of rail usage over the next 30 years, a change which the present system cannot accommodate unless adapted and invested in. Not only will the train capacity and service levels need fundamental increases, but also the handling capacity at major stations needs massive investment.

A further doubling by the start of the 22nd century would demand even greater investment. Realizing this now will help to improve the planning on the first round of expansion. This will only work if there is a comprehensive offer that is accepted and welcomed by all. This points to continued improvement in services, comfort levels, capacity and accessibility.

High-frequency, high-capacity, high-standard, intercity services will be needed at almost metro frequency. Other outcomes could be an improved inter-urban network, with reopening of some corridors such as East-West Rail, and intensive urban services on the main flows within the cities. Some of these urban links may be light rail, others will be bus rapid transit.

The bulk of the railway will remain on conventional lines where, in 2008-09, current usage is: 854 million passenger journeys on London & South East services; 310 million journeys on regional services; 110 million journeys on long distance services; and 103 million tonnes of freight. Consider the scale of changes needed if these flows are quadrupled in a hundred years. There were over 300 million passenger train miles, and 317,000 freight train movements, in 2008-09. Is the same scale of change needed for train movements and track capacity, or do trains get longer and larger, and use tracks more intensively?

Road based freight and car travel will still be dominant for many journeys, despite all railway and government efforts. It must be appreciated that the railway is there to address the greatest flows and the greatest points of congestion. It can never replace a milk float or a rural school bus.

Finance in the next 100 years

The railway has never had 'free money', therefore the financing of the next century's investment is absolutely fundamental. Far too many railway projects have been judged a good thing but have been ruled out on affordability. Except in the case of rural lines and sidings, the past track record of 'make do and mend'

or marginal changes for marginal gain will not be the right approach for a railway which will be four times busier.

Currently the railway is very expensive to run and is capital hungry. It is seldom the most important destination for public funds and has less importance in regions outside London and the Home Counties. A sea-change in railway investment is needed to realize most funding from the private sector.

Funding High Speed 1 (London to Channel Tunnel) was a major task and difficult to achieve. Eventually, it was funded by the collective efforts of the Treasury and Department for Transport with various investments and partners from the transport world.

Chiltern Evergreen is a steadier-state model for commuter lines with a 20 year franchise, explicit passenger satisfaction, and continuing investment and development.

Many of us, as individuals and as households, spend a large amount on travel, not least on cars which are parked a huge percentage of the time as a wasting asset. Being able to attract or divert even a small amount of that spend into rail and other public transport and green modes should enable investment in positive outcomes that the population as a whole could benefit from.

But modern rail needs a bigger stimulus than this. The driving force for the Empire and turning a quarter of the globe pink was commerce; everyone benefited and social reforms were founded on the basis that improvements were affordable and would not dent the profits of commerce. This created wealth which people were willing to invest. Private investment, not Government, paid for the railways.

What is the UK's driving force now?

There has been an overall government policy aim, not yet achieved, to move the balance of rail spending towards 75 per cent farepayer, 25 per cent taxpayer. This has led to concerns that average fares on a 'sustainable' railway are unattractive compared with the cost of using 'unsustainable' travel such as car and air.

Public capital is now in shorter supply. Therefore reliance is needed once more on private capital, but are the large scale investment volumes still available?

Should it be Network Rail or someone else who has the job of designing, funding, building, operating and maintaining the new lines? How do urban city regions acquire powers and additional funding to extend their investment on public transport to natural boundaries? Integrated Transport Authorities can do this by agreement, but at present the government does not necessarily provide a grant. For major schemes there is just a limited and contested Regional Funding Allocation.

Is an equity shareholding in a 'New Lines Company', not Network Rail, a possibility? Of the 20 million households how many might invest? One million? If backed like gilts, there would be stability on the pay-back in the 10-20 years before the investment matures and before a final transfer to a 'public interest' or private company. For £3,000 per household (assuming only half the cost of a new family car) there could be dividend in terms of lower rail fares for the household. What does £3 billion buy for a railway? There would be more to show with urban schemes than with a high speed network.

The problem is that rail is currently seen as useful only for some people, not everyone. The more specialized the service offer, the less willing the general public may be to invest. There are also too many memories of Railtrack.

The construction of the funding equation needs to start with equitable investments that give payback. Perhaps investments need to make railways more relevant across the populous city regions, in order to recreate a modern version of wealth feeding into investment.

A shareholder's ticket of £100,000 gets you free rail travel for life? That could be very nice for a few*! Or what return would you expect in the private sector by investing £30,000? £2000 pre-tax per year? Why not issue a credit note for that amount,

* Eurotunnel was partly funded by investors buying dividends in the form of travel benefits.

cashable against railway tickets for that year. Or take the money, if the railway isn't useful for you. Or is it against all railway and related travel, eg bus and other transport, costs of buying and maintaining a bicycle etc? How can ordinary households participate in making an investment and a commitment, and feel rewarded from the start? Could any such investment be offset against income tax, as with a venture capital trust?

The mainline network is currently being invested in, to the tune of £31 billion in the five years from 2009 for operations, renewals and enhancements*. The cost of maintaining and investing in the existing 15,800 route kilometres is, on average, costing over £425,000 per kilometre in 2009-10, reducing to £350,000 per kilometre in 2013-14. The Office of Rail Regulation (ORR) is aiming for a still lower cost. The government contributed £4.3 billion in 2008-09 through its support to infrastructure.

Over time, the bulk of the cost is being recovered by charging on to train operators and from specific projects, grants and so on. The rest goes on Network Rail's debt burden. All of this has to be shown to achieve a valid rate of return, however you choose to do the measuring. The basis for the rate of return will change over 100 years because of changes in rules and the value of what is important.

Extrapolating Network Rail's cost for 100 years at constant cash values amounts to a total £430 billion, assuming improving efficiency at three per cent annually, to cut costs to around £260,000 per kilometre within 15 years†, and then staying constant. If costs are not controlled, the overall price will increase.

When the network grows and is used more intensively, there will be higher absolute costs offset by increased revenue. Changes such as removal of lineside signalling and introduction of moving block signalling will also affect the cost base.

There is the fundamental question of affording capital investment in the extension of the network, such as the new high speed network and better urban transport systems.

- 2,500 km of high speed lines during the next century could cost £220-330 billion, depending on specification and what existing lines are used.
- Station upgrading for 'Hub' and 'Super Hub' aspirations could be £30-50 billion, if there is a significant upgrade across the existing network.
- 1,500 km of new urban rail (heavy and light rail systems), including some underground lines (eg London's Crossrail 2 and cross-city-centre connections in Glasgow), and new lines serving suburbs and growth towns could be a further £50-70 billion.

This requires new money not taken from the existing network. Options for funding include long-term concessions for high speed lines, city region funding sources such as employed on London's Crossrail, property development planning obligation payments, property surpluses and securitization of future ticket revenues.

Potentially there could be a realignment of today's transport businesses to become more vertically integrated transport and property conglomerates, as they were in the preceding century until nationalization. This allows railway participation in the larger economy instead of a narrow transport function, albeit with separation between operations, property and infrastructure. Widescale investor interest will need to be stimulated from the British and international venture capital sectors.

The ability to afford substantial railway expansion and capacity also depends on paying for day-to-day train operations and maintenance.

These costs, and the train operators' contribution to infrastructure, vary from route to route. Broadly passenger fares raised £6 billion in 2008-09 and there was a government contribution to passenger operators of £0.9 billion, so roundly £7 billion in total.

To illustrate the gaps that need to be covered, consider a four-fold increase in use over the next 100 years, but only a 3½-fold increase in fares, as there may be a policy to lower the cost of

* A further £3.6 billion is to be incurred on enhancements not included in the 2008 Periodic Review.

† Network Rail anticipates less enhancement investment after 2014.

rail fares as a sustainable mode. Fares revenue would rise to £21.5 billion a year by 2109, if passenger travel grew equally in percentage terms across Inter City, London & South East and regional services.

If governments chose to allow rail support to grow at the same rate as population growth, this would be worth £1.35 billion by 2109. But the combined revenue is still less than four times the change in use!

Will costs grow linearly or logarithmically? Can train operators and Network Rail keep down their higher operating costs arising from intensive usage of the system? Further environmental objectives, greater health and safety requirements and fully accessible passenger facilities increase the cost base, despite the strong benefits.

So who will pay?

Overall, railway investment on infrastructure, including related operations and maintenance over a century, could head for £750–£1000 billion. On top of that there are all the train and station operation costs which have to be paid for.

If by then the mainline railway is carrying over five billion passengers annually, and if the costs are all allocated to passengers, what is the fare?

The best possible operating techniques and efficiencies will be needed to ensure railway operations cover their costs, even with more favourable government grant-aid policies than assumed above. Such policies should take into account GDP gain, regional 'gross value-added' benefits and population growth objectives, as well as environmental payback.

Government, at national and local level, will have to take a judgement on the extent of taxpayers' support for such benefits, and allocate such support either directly to the infrastructure businesses and/or the train operating companies.

Legal and contractual frameworks

In a century requiring large scale expansion of railway capacity which necessitates private investment on a grand scale, regulations and contracts have to enable, support and oversee that investment.

Building a new high speed railway network will need long term concessions.

Railways have always been regulated, on economic grounds and increasingly for safety, quality, and performance, as well as environmental and social impact.

Ownership of operations and infrastructure has fluctuated between the private sector, sometimes assisted by state funding, and public sector. Britain was a pioneer in the 1990s in separating infrastructure and operations.

Full privatization of infrastructure under Railtrack was later seen as a step too far, leading to Network Rail's 'public interest' mandate. However, competitive tendering of passenger train service groups has proved successful in the short term. Open access is also allowed, and there is a long term success story with private freight service operations which are only subject to marginal infrastructure cost charges.

Why is there this stability after decades of fluctuation in investment and services, and what is foreseeable in this new century?

First, there is an external regulator, the ORR, which impartially oversees the rules and costs of this 'mixed economy' railway and defends the economic regulation in the public interest. Britain has an investment strategy for its infrastructure, renewed every five years. While subject to renegotiation, this gives a stable trend to infrastructure costs and maintains the pressure to reduce them.

The 5-year 'control period' expenditures are also guided by Network Rail's route utilization strategies (RUS). Their investment proposals accommodate foreseen operational needs, and wider economic and population changes for each route or area.

ORR is likely to enlarge its role to incorporate national and regional statutory passenger groups and their feedback. It might oversee the Rail Settlement Plan 'clearing house' of revenue al-

locations between rail operators. ORR's view on the best value allocation of train slots will be vital when new technologies open up additional slots on busy corridors, and when there is increased demand for more services.

Second, the privatization of train operations has liberated thinking about marketing and commercial yields, including pricing and service changes. In consequence, passenger traffic has boomed. This is likely to continue, even though the nature of the franchised business is in reality highly regulated by national governments and its agencies. It is not a free market!

Much of the operation and management of Britain's railway is also subject to European directives and regulations. This will of course change over time. For example, international passenger train services are subject to open access competition from 2010, creating interesting opportunities for cross-Channel services—and maybe in a future decade for Anglo-Scottish travel. Full economic liberation of rail freight is a clear European Union objective.

Over the next century, there will be a balance between competitive and collaborative obligations depending where each generation's public interest lies.

Britain has found that its competition law can get in the way of logical and beneficial collaboration between bus and rail businesses to offer integrated pricing and co-ordinated services and maybe even shared ticketing. This is perverse and needs to be changed.

The role of the state in detailed railway matters will reduce in Britain over the next decades. Instead of prescribing timetables and train fleet ordering, a greater freedom for operators, once foreseen by the Strategic Rail Authority, should follow the permission for much longer franchises such as the 22 years allowed by current EU law.

Commitment to higher performance, new and improved train fleets, better stations, a closer relationship with the railway's catchments and communities, and with strategic and local planning authorities, will be required in return for a longer franchise. City regions should have powers to specify and procure additional services in their economic catchment, supported by central government.

The Local Transport Act 2008 allows the creation of additional Integrated Transport Authorities, additional to the historic Passenger Transport Executive areas established by Barbara Castle in 1968. These will be responsible for coordinating transport provision in their area.

Major growth areas that may benefit include the Greater Bristol area, and the South and East Midlands cities. Further city region legislation integrating transport and economic priorities is foreseeable, with a new generation of city region mayors with executive powers.

Conclusion

The population growth and new developments at transport hubs will make the railway and public transport much more relevant to communities and the economy. Freight logistics will also look again to the railway. This revolution depends on getting decisions and priorities right in the next decades. Transport investment needs clarity and political support through a period of economic difficulties. Planning and spatial policies have to pay more heed to transport issues.

The turn-up-and-go railway serving the nation's main cities and towns with all its technological advances will make the next 100 years a truly challenging and rewarding period for those involved in the business of railways.

Chapter 9 – Challenges for a New Century

Factors that will need thinking about.

The theme of this book has been about change: sometimes too much, sometimes too little, but always change. Our centennial review suggests that for a huge proportion of this time railways were disinclined to make changes soon enough or robustly enough to avoid trouble from externalities, or the forcing upon them of change in the 'national interest'. All this is said with the benefit of hindsight, but many drivers of change were foreseeable, and some were foreseen. That insufficient action was taken when faced with change ought to be something from which lessons can be drawn.

There are plenty of drivers of change: political, economic, environmental, social, demographic and technological factors are just a start. Any one of these drivers could have a profound effect on the national rail network, over time. To an extent, changes in each of these areas can be forecast, but, realistically, only for a number of years ahead, and with diminishing accuracy as one gazes farther into the future. To anticipate changes with any degree of precision, even forty years ahead, is perilous. But this is simply to look at any one of the many factors that can impact on the future; combine them all and it is very difficult to predict in any meaningful way how things will pan out in as short a period as (say) fifteen years. Who during the privatization process in 1995 expected the traffic levels we actually have in 2010? Then we have 'events' to contend with: entirely unexpected and unforeseeable fractures in the order of things that have massive and uncontrollable impact. The author does not propose to dwell on the possibilities here, but if we are looking ahead a century then it is unreasonable to expect there to be none. In addition, we have to consider that so many 'official' forecasts, upon which good planning depends, turn out hopelessly wrong anyway.

One might infer from this aggregation of difficulties that any form of planning is useless! Not so; the absence of any plan at all is a much worse evil to contend with, and again we have seen, at various times in the industry's history, the existence of no meaningful plan, and the further lessons to be learned from the money wasted and opportunity foregone. There may be no right answer, but a set of tiered but coordinated plans seems to be called for. An outline long term industry plan would have much to commend it, perhaps a rolling fifty or a hundred years, given the long asset lives involved; within this would sit a succession of shorter and ever more detailed plans that takes the industry through to at least annual, and perhaps more frequent, programmes of work.

Despite the doubts being cast upon the efficacy of the current planning framework, it is hugely encouraging to see some of the industry's current projects and development initiatives. We have the large projects, such as Thameslink, Crossrail and the various electrification schemes. It was not always the case that we would expect these to be delivered to time and budget. We have industry-wide initiatives, like the current better stations initiative, which shows what can be done with some drive and enthusiasm, and industry knowledge. There is much other good work too. But these tend to be stand-alone schemes, or reactions to circumstances (or lack of adequate previous planning) and in a growing industry with aging assets and susceptibility to external conditions it does seem that a better longer-term planning framework is called for.

It is not helpful that individual parts of the rail industry, and also its stakeholders, all have different planning horizons and budgetary periods, and these by no means necessarily coincide with each other, or with expected asset lives, political or economic cycles or anything else. Nor do they have coincident objectives in the long term, nor a shared 'vision', nor a shared set of assumptions. In addition, national objectives and those of the private sector will be different from each other. The regulator's outlook may be different from either. Do the TOCs—the

only party talking directly to passengers—do 'long term' at all (by which is meant at least a 40-year horizon)? It is suggested that the industry could do more to work as one single body, as if with one mind, to agree a better planning framework incorporating a long-term vision and shorter-term deliver plans, an activity perhaps linked into exogenous planning processes that could be shared and coordinated with local and regional planning bodies for the greater good. There are huge opportunities for station redevelopment plans to integrate with local authority development plans, for example. An integrated planning framework would also link more transparently with government targets, such as that for carbon reduction, which is presently hard to relate to rail planning activity.

Both British Rail and the SRA had a clear interest in long term planning, and with hindsight it will probably be seen that the SRA was more a part of the industry than it was of government, even if it was not universally liked. The reality is that the industry is at risk of losing control of its own destiny. Despite forceful views held by some individual elements within the industry, it has no directing mind of its own and into the vacuum has stepped the Secretary of State. Is this right, and is it sustainable? Is the Secretary actually, in the long term, the best person to be managing all this at the level of detail needed, and to be planning for all the issues described above? If the answer is 'no', then what is the industry going to do about it? History tells us that 'wait and see' is not the answer. Looking a century ahead, this must change. Younger people in the industry today need to be ready for such a process; waiting for the next set of government orders cannot get the best from the industry or its people.

To effect this, those within the industry will need to be better and more widely informed about emerging externalities, and more knowledgeable about what problems and issues their colleagues in other parts of the industry have to contend with. At present, it is easy to find people in the same office who do not know what their colleagues do, nor even care very much. This will require cultural change, better leadership and better informed managers and staff. It almost harks back to the problems identified by those students who formed the RSA in 1909.

New skills will need to be developed, and it is to be questioned whether the existing structure is the best to do that. This implies change, which will at some point happen, for that is what history tells us. When it does, it is beholden on everyone involved in the process to get the best result; history also tells us this is not a strong area. In particular, it is vital to identify things that work well at the moment, and should be treasured, and things that do not work well that need to be altered, without, in fixing them, wrecking something else in passing. This is difficult: the more so when external advisers, with no knowledge of what is valuable, sell what is no more than a plausible dream to decision-makers who themselves have no idea how things work. If the industry, with its wealth of experience, took more of a lead perhaps this could be avoided, at least in part. We must find a way of valuing experience.

Finally, the following sets out some of the key issues that seem to be the subject of debate today. Some of these are quite old, but most are still being debated actively. An industry that can fully address these will be in very good shape to handle the next hundred years.

1. It is the experience of the last century that railways cannot exist as wholly self-directing private businesses, but are irredeemably considered as a public service, with the rising political interest this creates. Attempts to distance government from railway management have failed, and it is clear that attempts to shift responsibilities to the private sector have not materially reduced government risk in its widest sense. What, therefore, is the best balance to be struck between private and public sector involvement as the next century unfolds? Indeed can any one structure endure, or is constant change part of the solution? Can this be planned for, or are we compelled for ever simply to react to events?

2. The government has exerted varying degrees of influence over railways and their development since early Victorian times, gradually increasing its influence until nationalization. Government influence further increased upon taking more direct control of fares levels, and the beginning of government capital and social funding in the 1960s. This began the process of government asking what it was getting for the money—a question that took some years to answer and which generated some discomfort. Against such a background it is understandable that railway industry structure is determined more than ever before by the Minister. On the basis that, as already discussed, ongoing structural change is inevitable, what can the industry do to offer solutions rather than problems? What can the industry do to discourage the chances of another British Transport Commission, or a Railtrack, being imposed? Both were no doubt the consequence of good intentions, but we do not have the time to waste trying to repair the damage done, or money squandered, in consequence of someone's social experiments. What can the industry do to drive structural change in a sensible direction to meet the objectives of the public at large and inspire confidence of both user and stakeholder?

3. How can the industry adapt its knowledge and enthusiasm towards delivering the '100 per cent railway' as an aid to delivering capacity, passenger satisfaction, value for money and confidence? The industry is pleased with itself to be hitting around 91 per cent reliability, using the public performance measure (PPM); in addition, the trend is moving the right way. Nor must it be forgotten that this is on an increasingly crowded railway. All good so far, but few other industries would be so apparently content with what is perceived as 91 per cent 'reliability' against targets that are already skewed to avoid the impression of 'failure'. It suggests the industry is happy to tolerate 'unreliability' of 9 per cent, which, in commuter terms, is virtually one poorly-delivered trip a week. This eats up capacity, as well as public goodwill, on a rail network where 'value for money' scoring is poor, and ability to deal with delays satisfactorily scoring is worse. The only mitigating point is that rail reliability in the UK has never been perfect.

But we are looking a century ahead. There are people entering the industry today who would challenge the existing target-setting process and think dramatically improved performance ought to be possible; they observe that public expectations are rising and passengers are bewildered by the same things going wrong time after time; they note the capacity being squandered; they note the improved train services (free of 'padding') and connectional facilities that could be made. This at least invites questions about what a 100 per cent railway might look like, what changes it would force us to make to deliver it, and what sort of engineers and operators we need to be training to run it. Such a challenge plays to the strengths of the railway, with its own 'iron way', but it is a tough challenge and may in the end be frustrated by the artificial contractual interfaces rather than operational barriers.

4. What can we do to update the railway 'offer'? For example, passengers travelling by taxi, private car, coach and aeroplane infer from the nature of the mode (coupled with their experience) that they will be conveyed upon a seat, for which no separate charge will be made. The railway industry confers no such confidence, with rail operators pointing out that their possibly-expensive ticket confers no right to a seat, merely the privilege of travelling. The rail industry isn't very good at pointing out that if a car, coach or plane is full then passengers are left behind (though rail may be heading the same way). There are equivalent issues around ticketing; railways simply trying to follow the model used by other modes misses the point. Rail strengths need to be played to, and more imagination is needed to develop and promote a very strong product. How do we make passengers feel welcome, like they

do on a plane or coach, rather than potential criminals as they are obliged to listen to wearisome announcements, that can go on for anything up to five minutes, telling them what they cannot do and what will happen if they try. It doesn't happen in a coach, and it doesn't happen in a shop.

5. Lack of useful passenger information during disruption (alluded to several times during the book) is still a huge issue that the industry has only been able to fix at the margins. 'Dealing with delays', scores a dreadful 36 per cent satisfaction in the National Passenger Satisfaction survey, much of which is the informational shortcoming rather than the problem itself. The issue seems to be not wholly one of information, it is (as Alison Munro remarked in her lecture to the RSA) how to get the right information to the staff on the ground, or on the microphone, just at the point it is needed. We know it is difficult. We know that for at least fifty years, railway managers have wrung their hands and said we must do better. When does the miracle occur? Do we just wait for the delay-free railway? Of all the challenges faced by the rail network this seems the most intractable. Over the next century, it must surely be possible not only to do better, but to excel. Every delay or problem is an opportunity for the industry to turn a potential problem into a public relations success, with passengers actually made to feel valued even if something has gone wrong. Now we know all this, so why is it so difficult, and what are we going to do about it? The miracle is clearly not going to occur any time soon, so positive, co-ordinated and sustained action would appear to be needed instead. Who is going to take a lead?

6. Given that the railway seems likely to become much busier, how can incentive regimes be improved? Presumably we should be rewarding much more highly switch to rail from other modes rather than simply encouraging gratuitous travel, for example? If we stick to the separate infrastructure owner model, how do we align its incentives much more closely to those of the real end user (freight forwarder or passenger)? What does success look like? Can we do better than the amateurish PPM model that persuades us a train travelling at two miles a minute can be 'on time' when its 10-minute window can mean it can be anywhere within a 20-mile section of line, eating up line capacity and occupying someone else's 'slot'?

7. How, as reliability rises, do we counter the possibility of boredom within the staff? Is it realistic to expect them to be superb customer service people for most of the time and competent 'heroes' when something potentially serious goes wrong? On a crowded railway, staff should be able to 'smell' trouble and address things before they become problems (as they used to). Perhaps there is something to be learnt from airlines here? Perhaps something from the industry's own past? Allied with this, how do we counter the down-side of improved reliability, where most staff will never experience the failures they are trained to address, and are unfamiliar with how to deal with them when they happen?

8. How do we get the best from our combined industry knowledge, blending (for example) on-the-ground experience with academic know-how? How do we lock that knowledge into the industry so we do not have to keep learning the same things? How do we make it available to anyone who needs it? Associated with this, can we restore a degree of professional judgement and reduce the over-bureaucratization of decision-making and assurance that adds cost and time without adequate compensatory benefit? Indeed, the illusory benefits of box-ticking may have reduced safety in some areas, especially where staff and contractors do not grasp the basics. Fragmentation has not helped here, but the industry should in the future be leading improved process management, not being a victim of it. The introduction of new technologies will, in any case, require entirely new skills and processes in

many areas, and we need to facilitate this with fit-for-purpose processes and professional judgement. Perhaps the answer lies outside the present rail industry?

9. With the railway being used ever more intensively, how do we manage maintenance and renewal work so that it is conducted safely, more efficiently and with minimal disruption to the network (leading to 24/7 availability)? This would appear to require a transformation in the way this whole matter is approached. We know there are plans. We know Network Rail is striving hard to improve (and with some success evident). We also know the network is getting larger and older, suggesting more future work rather than less. The challenge is how to do more work quicker and cheaper, and keep passengers on the move in the train they have paid for, and not in a bus.

10. The concept of the open-access railway, with anyone able to run their trains where they like, has proved a particularly cautious emanation from the dogmatic thinking at the time of privatization, even though the ORR jealously guards open-access rights. For very practical reasons the concept has hardly taken off in the passenger market, even though it is the only means of access for freight. It raises all kinds of issues about destabilizing delicately balanced franchised operators, and on a railway that is getting overcrowded it raises questions about best use of capacity. Nevertheless, it is perfectly obvious that those promoting and operating open-access services are finding new flows to serve, and provide something the public finds useful, at a lower cost and in some cases better quality than the government-directed services. More imagination is being brought to bear to find new traffic, and although the scale of operations is limited, open-access operations broadly appear successful. How can we best promote this entrepreneurial spirit (whilst perhaps discouraging fly-by-nights) in the face of a system that is moving closer to centralized planning? We need the best ideas and the best solutions, and this is unlikely to emerge from a centralized process; but only a centralized process can produce a coherent plan. What do we do? There are some good ideas out there.

11. Finally, we need to look after the staff. Staff expect a career that will occupy them for a long but indefinite period, perhaps a lifetime. Network Rail may be large enough to develop its staff to their full potential and keep them satisfied (noting sterling work done to plan, recruit and train staff, looking at a 25-year horizon), but what about all the other players? TOCs currently come and go, and the expectation from the staff perspective is that they are just 'passing through'. A few staff have found favour with the owning groups and fallen into entirely new and rewarding careers; the majority have not, and will be passed on from one franchisee to the next. There is a whole series of questions implicit in this, and longer franchises (if franchising is the way to go) would help address issues around loyalty, job security, and training and development. It may not be the only answer, nor does it address the compartmentalization of skills that fragmentation has created. It would be good to see more staff move between different functions (and therefore between employers) to gain experience, but the existence of multiple employers is a barrier to this. The final question must therefore be, over the next century how do we get the best from our staff? Staff who are willing and able, over time, to address satisfactorily all the previous questions.

More Change

All the questions asked above are inclined to defy any simple answer. Each presents a huge challenge on its own, and there are surely more questions that might have been asked. Together, they would seem to suggest that the industry must together do very much more in order to recruit, train and utilize the best minds in the country, and to make sure they stay within the wider industry, unless they stray on a temporary basis to learn how other

industries tackle difficult problems. This is not, of course, to suggest for one moment that the people in the industry today are in any way unsuited, merely that the pressures and challenges will rise and not diminish over time, and that recruitment of suitable people is not getting any easier. Ill-considered reorganization has also seen too much experience walk through the door too quickly and in an uncontrolled way, in some cases only to be repurchased at higher cost later. This is not the best way of doing things. The loss of experience cannot be underestimated, but it appears on no balance sheet and so is easily overlooked. These could also have been the people to pass on the knowledge to the next generation. We could have planned for this.

The pressures likely to arise in the future also raises the question of contracting out, an activity that circumscribes those who are 'railway people' and those who are 'other' contractors. Railways have always used contractors and there is no doubt that, where the market is there, it achieves all sorts of benefits, including cost restraint in areas where there is real competition. Experience with BR privatization, and its London Underground equivalent, suggests that the case is less clear cut when the outsourced work is (for example) highly specialist or where the organization's knowledge goes with it. It can also fossilize trading arrangements where flexibility is called for, reduce organizational flexibility, and destroy *esprit de corps* and loyalty. These factors also do not appear on balance sheets, but in the medium term are factors that hugely impact on the way an organization operates. Contracting has now, and probably always will have, its place, maybe an even bigger one, but we need to be a great deal more imaginative about how this strategy is used. This whole area is ripe for debate.

Today's passengers like to see staff around, and on the long-distance journeys like to be fed, watered and pampered (and preferably without today's huge inconsistencies between operators). With rising social expectations, one would expect people a century hence to be even better fed, watered and pampered, consistent with reduced journey time, so retention of 'hotel' staff would appear to be necessary, even on a railway likely to be far more automated. But passengers (like people at large) come with problems in that they become ill, get lost or lose things, have accidents, include unsocial, rowdy or criminal elements and so on. However computerized a railway becomes, it looks as though the only way of dealing with these issues, which happen quite unexpectedly, is by the intervention of someone more or less on the spot. A train is delayed: a mere computer does not know why there is a delay, it can simply tell that all equipment appears to be functioning. A human controlling mind might be able to use experience or judgement to estimate delay cause, or delay length, but without having the necessary data inputs a computer is less able to organize mitigating actions, and on a crowded railway it is easy for a trivial incident to escalate to hugely disruptive proportions. Remote control is all very well, but on the spot is better. Looking forward to a world that is busier, but more automated, it is hard to foresee that the human element can be reduced, and in some form it may well need to be increased, perhaps substantially. Do they have to be railway people though?

The obvious way of providing human assistance and reassurance economically is to make sure that there are people around on both stations and trains who owe their allegiance to the railway. Clearly standing around doing nothing at all when all is well is pointless and unaffordable. How can we have a pool of suitably trained people around to help identify and sort out problems when they arise, and give good information, but who do something which adds value for the rest of the time? Could station trading, maintenance and car park staff have a role here? If so, could it signal a move from outsourcing, or letting concessions, to more in-house activity, perhaps a shift to providing suitable railway staff to provide 'hotel', retail, meet & greet services and so on, and training them to handle emergencies and other incidents when they happen, and to be eyes and ears to anticipate and prevent trouble. Some operators already use on-train 'hotel' staff this way, and it is also the airline and shipping model. If stations are to be the new centres of communities and trans-

port interchanges, then it is worth a moment's thought about how we staff them; it is worth designing the whole concept anew, including how staffing is organized for the next century. Subcontracting has its place, but where high-quality performance requires command and control of a flexible workforce, things are easier when everyone has the same loyalties and can be moved about.

Technological change can reasonably be expected over the next century. We know it will happen, but over a period even as short as a decade, we cannot know what will happen and when. History tells us that it won't necessarily be what we expect either. But happen it will, and if the past is anything to go by, then there will be a lot of it. Much of it might even be for the good. How do we prepare?

Epilogue

The object of these deliberations is really to help encourage the debate about what the UK will need from its railways in the future, what the issues will be, where the opportunities lie, and what the people in the industry are going to have to think about. The whole book has been an exploration about an industry that has changed hugely, with the inference that vast change still lies ahead. This is an area the RSA will be seeking to support.

The RSA regards its centenary year as one during which the railway can clearly identify a hugely positive future (which was by no means the case, say, thirty years ago). It is a good time to join the railway and contribute. If this book has imparted knowledge and generated thought, it will have achieved its purpose. If it helps stimulate like-minded people to consider how, together, these huge issues can be successfully addressed then, in the manner of those who started the organization in 1909, it will hopefully have made its contribution to those in whose care the railway sits during the next 100 years.

Finally, an RSA lecture given in 1953 by one of BR's chief regional officers is worth an airing to end by, as the change theme is very evident then as well—and how right he was!

On Facing Changes by C.P. Hopkins

I start by reminding you that railway work has really no consistency of background at all, and never has had. There is perhaps nothing in the daily life of a modern civilization that varies from day to day or from month to month so much as the demand placed upon its transport system; consequently, coping with changes has become an integral part of the transport operator's mental approach to his job. He has to cope with change the whole time: with traffic flows changing between peak and off-peak, summer and winter; from a holiday period to one of freight pressure. The only stable element in a railwayman's responsibilities is that there is nothing stable about them.

I put it to you that almost any railwayman and certainly every railway officer of any standing has, in his working life of supervision and control, to cope with a greater degree of change than any other professional. Change is in a railwayman's whole upbringing, and you as Railway Students know as well as I do that if one thing is impracticable in railway life it is to set out, in instructions, manuals, rule books and the like, regulations for dealing with the unexpected. Because exact prevision is just not practicable in our profession, our training is specifically aimed at preparing us for coping with emergencies, absorbing their effects and reducing them to the normal as quickly as may be.

So I put it to you that change for a railwayman isn't the dreadful thing it may be represented. And as proof let us look again at what has happened in the past few years—bearing in mind that a 'few years' represents not a great working slice of railway history.

This was written nearly 60 years ago; there is much that would pass muster today.

Appendix 1 – Abbreviations used in the text

ac	Alternating Current electricity
ATC	Automatic Train Control (older name for AWS)
AWS	Automatic Warning System
BR	British Railways Board 1963-97 ('British Rail' from 1965)
BREL	British Rail Engineering Ltd
BTC	British Transport Commission 1948-63
CME	Chief Mechanical Engineer
dc	Direct Current electricity (sometimes called continuous current).
DMU	Diesel Multiple Unit
EMU	Electric Multiple Unit
ER	Eastern Region of British Railways 1948-90
EWS	English, Welsh & Scottish Railway – UK freight operator
GDP	Gross Domestic Product – Total UK economic output
GER	Great Eastern Railway
GPS	Global Positioning System (satellite-sourced positioning to high level of accuracy)
GSM(R)	Global System for Mobile Telecommunications (Railways)
GWR	Great Western Railway
HST	High Speed Train (InterCity 125) – fixed formation 125 mph trains introduced during the 1970s
ICI	Imperial Chemical Industries (an industrial conglomerate created in 1926 from a merger of four major industrial concerns).
IECC	Integrated Electronic Control Centre (signalling control room)
kV	1000 Volts
LBSCR	London, Brighton & South Coast Railway
LMR	London Midland Region of British Railways 1948-90
LMS	London, Midland & Scottish Railway
LNER	London & North Eastern Railway
LNWR	London & North Western Railway
LSE	London School of Economics and Political Science
LSWR	London & South Western Railway
LT	London Transport 1933-2003
NCL	National Carriers Ltd (a subsidiary of the National Freight Corporation).
NER	North Eastern Railway
NFC	National Freight Corporation
NUR	National Union of Railwaymen
PLA	Passengers' Luggage in Advance
PSB	Power Signal Box
PSO	Public Service Obligation grant
PTE	Passenger Transport Executive
RCH	Railway Clearing House
RfD	Railfreight Distribution – An arm of the British Rail freight business intended for wagonload traffic
RNLI	Royal National Lifeboat Institution
RosCo	Rolling Stock Leasing Company
RSA	Railway Students' Association (later Railway Study Association)
SE&CR	South Eastern & Chatham Railway (a joint committee formed in 1899 of the South Eastern Railway and the London, Chatham & Dover Railway, previously rivals).
SNCF	French national rail operator (Société Nationale des Chemins de fer Français)
Southern	Southern Railway
SR	Southern Region of British Railways 1948-90
TOPS	Total Operations Processing System
TPWS	Train Protection Warning System
V	Volt – a measure of electrical pressure
WR	Western Region of British Railways 1948-90
WW1	The Great War (First World War) 1914-18
WW2	Second World War 1939-45

Appendix 2 – British monetary units and values

There are two aspects about references to money that need consideration:

(a) Prior to February 1971, British money was divided such that the pound (£1) comprised twenty shillings (denoted 's') and each shilling was divided into twelve pennies (denoted 'd'). There were thus 240 pennies to the pound. For most purposes, money was expressed Pounds-Shillings-Pence, in the form £12.15s.10d. Where amounts were under £1 (ie only shillings and pence), this was often written in the form 14/6, meaning 14 shillings and 6 pence. There were some usages, including pricing of railway tickets and the quoting of pay rates for weekly-paid staff, where this form was also used for values over £1, for example 63/6, which represented £3 3s 6d. Halfpennies (½d) and farthings (¼d) existed as subdivisions of pennies, though the latter was withdrawn in 1960 and the halfpenny in 1969.

For accounting and statistical purposes only, pennies were occasionally subdivided into decimal fractions (in the form 1.36d), though this was unusual as the penny was quite a small value already.

The other unit of currency sometimes encountered was the guinea. This had a value of £1 1s (or £1.05 in decimal notation). This obscure unit was very fashionable in posh shops or for professional transactions where businessmen (correctly) judged that by simply quoting a price in guineas, which ordinary mortals might just have been prepared to pay in the same number of pounds, then they could make an additional five per cent, while the moneyed classes wouldn't miss it, and rather expected it! It is a term not usually associated with railway work, and its loss was resented during the decimalization process by those selling to high net worth people.

(b) In addition to how money was denominated, the value of money has changed dramatically over the last century. Making comparisons between values of money over time is fraught with difficulty as retail prices rose out of step with wages and with general economic performance. The following is offered tentatively, to do no more than give an appreciation of change over time, and readers are urged to take their own view.

The following expresses how valuable £100 in 1909 would be at following dates:

1919	£235
1929	£194
1939	£199
1949	£371
1959	£559
1969	£792
1979	£2651
1989	£5504
1999	£7813
2009	£9706

In crude terms, values have increased by a factor of 100 over the century, though not at a uniform rate. The Gross Domestic Product inflator has been used. This sits between retail prices (it is about 20 per cent more) and average earnings, which have shot up much more dramatically and created much more wealth than in 1909 (annual earnings of £100 in 1909 equate to £41,000 today).

Appendix 3 – RSA History and Historical Timeline

The RSA and its activities

The RSA emerged from within the industry itself in order to fulfil a need. During most of its life, it was run and managed by representatives of the industry for the benefit of aspiring managers. Some themes were constant, particularly the arranging of lectures by senior managers within the industry, who have given their time unstintingly. As already hinted, the lectures for many years were intended to train and inform; they were often about what today might be considered rather abstruse areas of activity, but at the time these subjects were areas of great importance. Lectures could rarely be described as public relations exercises, nor in the main would there have been any point in adopting that approach; the RSA audience expected industry-to-industry communication. Proceedings were captured from 1925 and published in annual volumes of papers; these now provide a valuable historical resource.

In addition to the formal papers, the RSA Committee constantly tested new types of activity to promote learning. Typical of these might be discussion groups. As early as the RSA's first session, a discussion was organized on the subject 'Is Profit Sharing possible on railways?' and the Great Western's general manager spoke during the proceedings. Debates became a frequent feature and there was a topical one in the 1927-28 session 'Can Railways Compete with Road Transport', the outcome of which is unfortunately not known. The RSA often partnered with the GWR (London) Lecture and Debating Society to generate lively and informed discussion.

Dining has been an enjoyable feature of the RSA's history. The earliest record of a formal dinner so far discovered was recorded in the *Railway Gazette*. It was held on 1st April 1912 when 50 members dined in the School common room after the annual general meeting. The chairman, C.H. Lees (from the Great Central Railway) remarked not only on the educational content of the debates but how good it was to see staff from all the great railways coming together. Another dinner making it to the records was on 21st April 1923, when the dinner was followed by the AGM and then a concert. A 21st birthday dinner was held in the Midland Grand Hotel (St Pancras) on 7th November 1930, during Frank Pick's presidency. Certainly, after the Second World War, formal dinners were held regularly and in recent years have become part of the rail industry calendar.

Purely social events have tailed off over the years as staff seem ever more preoccupied with work, but they were once a regular feature and formal dances were held, often twice a year from the mid 1920s.

Possibly the greatest opportunity to learn from RSA activities has been through the various visits and formal conventions that it has organized. These fall into two categories, the first being simple visits to railway installations and other places of interest. As far as it has been possible to tell, the first visits were arranged during the 1922-23 session and included two goods or marshalling yards, two docks and harbours and a colliery. While visits have not, for various reasons, featured every year, at least one visit has been arranged in most years and during some sessions a huge programme has been possible; 1931-32 stands out, with a spectacular programme of 17 visits of enormous variety. Some day visits were quite memorable; a visit to Southampton in 1937 included a trip on the Southern's train ferry to Boulogne, stopping long enough for a coach trip to Le Touqet.

The second variety of visit has been the formal 'convention', which has involved a residential programme including bespoke lectures and visits. This started on an *ad hoc* basis when a party visited Germany during the 1925-6 session and travelled to Berlin, Dresden and Leipzig, where a large number of installations was visited, apparently hosted by the railway authorities. This resulted in a requirement for the UK to host a return visit the following year and the RSA was instrumental in making the necessary arrangements. During 1927-28, the French railway au-

thorities invited the RSA to visit a range of installations ranging between Dunkerque and the Mediterranean, and 80 members seized the opportunity. Again, this gave rise to a need for a reciprocal visit the following year. The success of these events suggested that something more regular be arranged as part of the RSA calendar.

It is against this background that the annual convention was born. For many years, these were arranged over a number of days within the UK. The first was held at the University of Leeds between 3rd and 7th July 1930. Four papers were read and a number of visits were made to railway installations in the area. This set a theme for the future and most conventions were held at University premises around the country with a range of local visits. Visits soon began to include interesting local industries not immediately connected with the railway and also a certain amount of leisure activity, during which attendees could relax from the pressures of a tightly drawn up schedule of educational activity. (The first of these seems to have been a motor drive through Shakespeare country during the convention in Birmingham in 1935.) Incidentally, the arrival of an RSA delegation in one of Britain's County Boroughs seems to have impressed the local community to the extent civic pride sometimes demanded the occasion be noted, perhaps being marked by the party being requested to join the mayor for tea or some other formal reception: Birmingham in 1935 and Southampton the following year are examples.

The convention programme resumed after WW2 on much the same basis, early venues continuing to be arranged in the UK. 1953 saw a departure from this pattern, when the convention was arranged in Brussels. Amsterdam was selected as the base for the 1955 convention, with Zurich in 1957. For another decade, locations were evenly selected from centres in the UK, from where there were places of interest for railway students to visit, and western European venues, where alternative approaches to railway working could be studied. European railway authorities usually hosted these events and were proud to show the English around and discuss various technical and operational differences.

From about 1969, virtually all conventions have been held abroad. This is partly a response to the rapidly diminishing number of railway activities there were to study in the UK, and the reducing size of the home network. Modernization schemes could be addressed through day visits. Moreover, demand from the membership was to see how other countries did things. Of particular memory was the visit to Berlin, just after the wall came down, where members saw at first hand much remaining evidence of the trying conditions under which transport authorities had to function in a divided city (including the way the east-west boundary even passed through operational railway stations). The 1992 convention to Vienna included a day trip to Budapest, noted as the RSA's first excursion beyond the Iron Curtain. More recently, the RSA has ventured further afield, visiting Hong Kong and China in 1996 (before the enclave was handed back) and the USA (New York and Chicago) in 1999, the latter memorable for an especially punishing schedule of long days, but with so much to see. Japan followed in 2002, where members could familiarize themselves with the 'to the second' attitude to Japanese railway operation. There have been visits to former eastern bloc countries unleashed from the communist straightjacket and anxious to modernize their transport infrastructure. The unfailing friendliness and hospitality of the Estonians and Slovenians was memorable; it seemed odd, given their background, that they were perhaps a little more comfortable with people photographing railway infrastructure than we sometimes are at home.

Conventions and their more recent offspring, the short study tours, have adopted a format involving an itinerary of presentations by the host organizations, coupled with a succession of visits to various railway installations and the opportunity to sample their rail services. There is usually a formal dinner hosted by the RSA to which are invited senior managers and others who have hosted the visits. Time is often set aside for members

to visit the local attractions and members often arrive before or stay after formal proceedings in order to see more of the country. Sometimes a guest programme is organized, so that members can bring friends or family who might want to visit the country (but who do not take part in the formal visits and lectures). On the whole, it might be said to be truly educational to see how other railways tackle problems that we have at home (sometimes better, sometimes not) and also to see what problems they have which we thankfully do not.

RSA Historical Timeline

1895 LSE opened in October. W.M. Acworth was billed to give series of 12 lectures on railway economics on Thursday evenings.

1897 LSE canvassed the support of the railway industry for establishing Special Courses (about railways) following the success of a series of lectures given by Mr Acworth.

1900 LSE recognized as school of the London University.

1901 LSE began a series of commercial courses aimed at railway students.

1907-8 Number of students in Railway Department reached 235 at any one time and was still rising quickly.

1909 Association formed of railway students, then known as 'The Association of Railway Students of the London School'. A provisional meeting of those interested was held on 23rd February, with first AGM agreeing rules and electing officers on 5th April. Director of LSE was the first President. Membership at close of session was 245 (the vast majority of the LSE railway students). First Address given on 19th October. Membership fee 1s.

1911 RSA stages first 'open' debate amongst its members.

1913-14 Membership stood at 262. War declared prior to start of next Session, but RSA continues to function, though with much reduced attendances.

1916 RSA suspended indefinitely from 29th September owing to wartime conditions.

1920 RSA activities resumed on 19th January when first post-war paper presented. Membership slow to pick up. By this time honorary members were accepted who were useful to RSA but had no affiliation with the LSE.

1922-3 Membership stood at just 112, still all LSE students. Believed first year concert held, and began a regular series of social events. Also, was the first year when sessional visits to installations or places of railway interest began to take place. Subscription now 2s.

1923-4 Subscription reduced from 2s to 1s to encourage membership. Rules changed to reflect the grouped railway companies (the RSA committee was drawn with a deliberate spread across the various companies).

1925-6 First year that ladies were admitted (and seven joined). First year that papers given at sessional meetings were circulated to members (courtesy of GWR). First year foreign visit made, to Germany. Membership stood at over 400. Subscription raised to 2/6.

1926-7 Reciprocal visit to the UK made by German railways, facilitated by RSA. Presidential Address from Sir Ralph Wedgwood drew over 500 members.

1927-8 Another foreign visit made, this time to France.

1928-29 Membership rose to 565.

1929-30 First of what were to become UK annual conventions was held (at Leeds). The format followed the same theme each year with visits made and papers given by local hosts. Membership stood at 478. First year accounts were professionally audited.

Convention in Leeds based at Leeds University, four papers and several visits.

1930-31 RSA celebrated its coming of age with dinner at Midland Grand Hotel, St Pancras. 76 diners were present.
Convention in Bristol.

1932 *Convention in Liverpool.*

1933 *Convention in Cambridge.*

1933-34 First of what were to become regular joint meetings with GWR Lecture and Debating Society, where a current topic would be debated or argued (this was not the first debate though, the first was in 1909 with the LSE Students Union). There were 15 visits during the year and the RSA entertained a party from Swedish Railways. There were 577 members.
Convention in Belfast.

1935 *Convention in Birmingham.*

1935-6 While there were 579 members and 15 honoraries, regret was expressed that average meeting attendances had fallen from 115 to 87. Membership remained static.
Convention in Southampton.

1937 *Convention in Edinburgh.*

1938 *Convention in Cardiff.*

1938-9 Last session before WW2. RSA suspended for duration. *Students' Papers* were at this time produced by the LSE. There were over 20 Vice Presidents after a policy decision to cultivate their number.

1946-7 RSA activities resumed, many people who were members in 1939 rejoining; there were 574 members at year end plus 11 honorary members. Social subcommittee established to revive the annual dances (amongst other things). New rules required three committee members from each of main lines and LPTB. Regional discussion groups began. On resumption of activity there were nine Past and 34 Vice Presidents. It was hoped to establish a number of discussion groups. The Committee was supported by sub committees dealing with finance, discussion groups, social and forthcoming conventions.
Convention in Darlington.

1947-8 Honorary members (with no LSE affiliation) still stood at 11, with 643 ordinary members. The decision was made to formalize arrangements by accepting associate members who were academically qualified and had a transport affiliation, though with numbers restricted. Associate members had no voting powers and couldn't serve on Committee. Evidently this new membership grade became popular. The discussion group proposal had moved forward with the Paddington group meeting regularly through the winter months and a new group (based at the school) coming into being. A weekend discussion group was also operated at the Southern's staff college at Woking.
Convention in Sheffield.

1949 The BTC undertook production of the *Railway Students' Bulletins*, to a very high quality.
Convention in Glasgow.

1950 *Convention in Nottingham.*

1950-51 Number of visits was slowly restricted owing to difficulty in staff getting time off and acceptance of Saturdays as holidays. There is no further mention of discussion groups, but a Swindon branch had come into being, sporting 68 members and having their own papers read. This year closed with 775 members, 46 associate members and 10 honorary members (who had no immediate transport affiliation). The sub committee arrangements had changed with loss of discussion groups subcommittee and the existence of one relating to publicity and development.
Convention in Paris.

1952 *Convention in Scotland.*

1952-53 First foreign convention held, in Brussels.

1953-54 Membership rose to new high of 964. Presentation

to RSA in November 1953 expresses appreciation of the BTC to the useful courses given by the LSE which the industry finds of value.
Convention in Exeter.

1954-55 By this session, the publicity and development subcommittee had given way to a visits subcommittee. Membership stood at 866 members and 185 associates. There is no reference any longer to the Swindon branch.
Convention in Amsterdam.

1956 From around this time, it became the practice for the President (unless otherwise indisposed) to chair each sessional meeting, with VPs standing in as necessary. Prior to this date VPs more often than not chaired meetings, the work being shared amongst them.
Convention in Derby.

1956-57 LSE was obliged by changes in government policy to cease operation of its railway courses, though hosting some University of London extra mural courses in transport. The immediate impact of this was to inflate the number of associate members joining at the expense of full members. The process thus much accelerated the process of changing the RSA from a confederation of LSE railway students to one more generally founded within the industry itself.
Convention in Aberdeen.

1958 *Convention in Zurich.*

1958/59 RSA celebrates is Golden Jubilee. At this time there were 1181 members in total and over 50 Vice Presidents.
Convention in London.

1959-62 It is evident that publication of the sessional papers was problematic, with reference made to volumes (printed by the BTC) appearing at increasing intervals. This got so bad that, regrettably, 18 sessional papers plus some others read at conventions were never published, though a list exists.

1960 *Convention in Hannover.*

1961 *Convention in Oxford.*

1962 RSA reconstituted. At EGM in May 1962 it was agreed to broaden the base of membership. Full membership (referred to as corporate membership) was available to full time LT and BR staff possessing certain academic qualifications. Associate membership was available for a limited period to those who were undertaking a course of study. RSA Committee replaced by a Council comprising six officers and 12 members. Day to day management was to be delegated to five committees (membership, finance, indoor activities, outdoor activities and publications). The Council membership (other than officers) was to be drawn from wider membership on regional basis. New constitution was to have effect from beginning of 1962-3 Session.
Convention in Dundee.

1962-4 Attempt made to continue annual publication of papers. Format still redolent of the quality of publication during the 1950s, but undertaken by new BRB.

1963 BTC replaced by BRB and LTB.
Convention in Manchester.

1963/4 The annual collection of *Railway Students' Papers* renamed *RSA Proceedings*. However a second publication also began, known as the *RSA Bulletin* for provincial members. This appeared quarterly and ran until 1965. Subscription in 1964 had already been set at 5 shillings.
Convention in Basel/Bern.

1965 *RSA Proceedings* now replaced by occasional *Railway Students' Bulletins* from December (which also replaced the Bulletin for provincial members upon which it might have been based). A total of 46 were issued until 1994-95, mainly twice yearly. They varied somewhat in size, and there is some evidence the earlier ones were produced by the

RSA and many later ones by BR Southern Region. Presentation quality was nothing like as good as had been achieved by the BTC.
Convention in Southampton.

1966 *Convention in Liverpool.*

1967 *RSA Bulletin* discloses that there was a regular annual dinner and dance, hosted at London Transport's South Kensington dining club. This year's was in February and 70 members, wives and guests were present.
Convention in Glasgow.

1967/68 Subscription raised to 10 shillings, with the option of a new five-year subscription of £2. Rule 5(iv) accordingly amended retrospectively at the 1968 AGM. The purpose of the five-year subscription was to reduce the number of annual renewals because of the heavy administrative work.
Convention in Milan.

1969 Diamond Jubilee of RSA; commemorative convention in Birmingham with guests from administrations that had hosted previous foreign conventions.
Convention in Birmingham.

1969-70 From this year conventions were generally to destinations on the continent, and occasionally further afield. Name Railway Students' Association became Railway Study Association in 1970 (there had evidently been some bad publicity associated with the title 'student'). At that time there were several committees in existence, including: indoor and outdoor.
Convention in Copenhagen.

1971 Seminar held on *SS Avalon* at Harwich, members being conveyed there the previous day by means of the 'Hook Continental', the Eastern Region's heaviest train. Association became liable for corporation tax on interest from bank accounts, backdated to 1967/68. Indoor and outdoor committees combined into one Activities Committee.
Convention in Essen.

1972 *Convention in Paris*

1973 *Convention in Lucerne.*

1974 *Convention in Vienna.*

1975 *Convention in Manchester.*

1976 *Convention in Florence.*

1976/77 Subscription raised to £1.00, or £4.00 for 5 years.
Convention in Lyons.

1978 *Convention in Utrecht.*

1979 *Convention in Nuremburg.*

1980 *Convention in Antwerp.*

1981 Last convention in the UK, at York. (A planned UK Convention in Glasgow in 1989 was cancelled because of insufficient applications and all subsequent Conventions were held abroad). Since 1989 only Social/Educational Weekends or Short Study Visits have been held in the UK.
Convention in York.

1981/82 Subscription raised to £2.00, or £8.00 for 5 years.
Convention in Vienna.

1983 *Convention in Copenhagen.*

1984 *Convention in Hamburg.*

1985 London Underground Ltd formed.
Convention in Paris.

1986 *Convention in Bern.*

1987 *Convention in Nuremburg & Rotterdam.*

1987/88 Subscription raised to £3.00, or £12.00 for 5 years.
Convention in Stockholm.

1989/90 Subscription raised to £6.00 ,or £15.00 for 3 years.
First Convention in former Eastern Europe, located in East Berlin just after reunification of Germany and hosted by Deutsche Reichsbahn.
Convention in Berlin.

1991 Finance Committee abolished.
Convention in Barcelona.

1992/93 Subscription raised to £12.00 or £30.00 for 3 years.

Convention in Nuremburg.

1994 Activities committee abolished. Railtrack comes into being, together with RoSCos. Corporate membership introduced to replace the former financial support from British Railways Board and London Transport.
Convention in Paris.

1994/95 Subscription raised to £20.00 – discounted 3-year subscriptions withdrawn due to inequitable distortions in a period of high inflation.
Midlands section established on 18th January. Other regions have also been looked at, but certainty of support was lacking. Last issue of the *Bulletin* (No 47) with traditional lecture notes.
Convention in Milan and Genoa.

1995/96 Subscription raised to £30.00 inclusive of 12 issues of Modern Railways. New overseas subscription rate of £40.00 to cover postage costs of Modern Railways. Henceforth Modern Railways became source of RSA's printed record of sessional meetings. The *Bulletin* having ceased, publication of in-house material was transferred to annual *RSA Yearbook*. Majority of rail passenger franchises transferred to private sector. First convention held outside of Europe in Hong Kong immediately prior to reversion to China.
Convention in Hong Kong and China.

1997 *Convention in Porto and Lisbon.*

1997-8 Subscription raised to £35.00 for U.K. members and £50 for overseas members.
Convention in Copenhagen.

1998/99 Subscription raised to £38.00 for U.K. members and £55 for overseas members.
First Convention in USA, New York and Chicago.

2000 *Convention in Amsterdam.*

2000/01 Subscription raised to £45.00 for U.K. members and £64 for overseas members. Association registered for VAT.
Convention in Rome.

2001/02 Subscription raised to £50.00 for U.K. members and £70 for overseas members. New subscription rate of £60.00 for members in Europe to reflect differential postage rates.
Convention in Japan.

2003 *Convention in Berne.*

2004 *Convention in Porto and Lisbon.*

2005 *Convention in Berlin.*

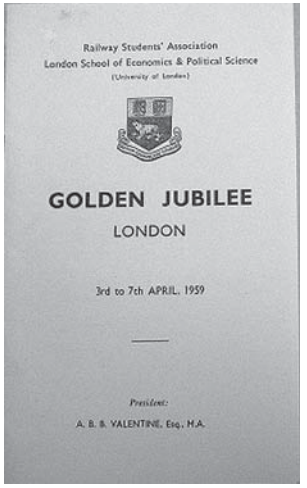
2006 *Second Convention in USA, New York, Boston and Albany.*

2007 Alan Winn retired as Honorary Treasurer after 38 years of continuous service in this post.
Convention in Paris, study tour Estonia.

2008 RSA introduces new branding, better in tune with modern requirements. Planning for the centenary begins.
Convention in Madrid, study tour in Slovenia.

2009 *Convention in Hamburg and Berlin.*

2009-10 *RSA celebrates its centenary year.*


Railway Students' Association
London School of Economics & Political Science
(University of London)

GOLDEN JUBILEE
LONDON

3rd to 7th APRIL, 1959

President:
A. B. B. VALENTINE, Esq., M.A.

RSA Jubilee programme produced for the 1959 London convention, a considerable portion of the 4-page contents was devoted to the extensive dining arrangements.

Appendix 4 – RSA Presidents and Officers

RSA Presidents

1909/10	William Pember Reeves
1910/11	Sir George Gibb
1911/12	Sam Fay
1912/13	Francis H Dent
1913/14	Sir Charles John Owens
1914/15	Robert Hope Selbie
1915/16	William Mitchell Acworth
1921/22	Sir William Henry Beveridge
1922/23	Sir Henry Worth Thornton KBE
1923/24	Sir William Mitchell Acworth KCSI
1924/25	Sir William Mitchell Acworth KCSI
1925/26	Sir Felix John Clewett Pole
1926/27	Sir Ralph Lewis Wedgwood Bt
1927/28	Sir Josiah Charles Stamp
1928/29	Sir Herbert Ashcombe Walker
1929/30	Sir Harry Osborne Mance
1930/31	Frank Pick
1931/32	Sir George McLaren Brown
1932/33	John Sloane Anderson
1933/34	William Valentine Wood
1934/35	Sir William Beveridge
1935/36	Gilbert Savill Szlumper CBE
1936/37	William Whitelaw
1937/38	Lieut. Col. The Viscount Horne of Slamannan, GBE, PC, KC
1938/39	Ashton Davies CVO OBE
1946/47	Sir Charles Newton
1947/48	Sir Alexander Carr-Saunders
1948/49	Sir Cyril William Hurcomb GCB KBE
1949/50	John Benstead CBE
1950/51	John Elliot
1951/52	C K Bird
1952/53	C P Hopkins
1953/54	David Blee
1954/55	Sir Reginald Wilson
1955/56	John C L Train CBE MC
1956/57	J W Watkins CVO DSO MC
1957/58	Arthur H Grainger
1958/59	Arthur Bruce Balmain Valentine
1959/60	H C Johnson
1960/61	J R Hammond MBE
1961/62	A R Dunbar OBE
1962/63	Major-General G N Russell CB CBE
1963/64	J Ratter CBE
1964/65	D McKenna OBE
1965/66	R L E Lawrence OBE ERD
1966/67	John Bonham-Carter CVO OBE DSO ERD
1967/68	Michael Robbins
1968/69	R A Long
1969/70	J L Harrington OBE
1970/71	Leonard Neal CBE
1971/72	Ralph Bennett
1972/73	David Bowick
1973/74	David Binnie
1974/75	David Binnie
1975/76	David Kirby
1976/77	James Urquhart
1977/78	Cliff Rose
1978/79	William Maxwell
1979/80	Robert Reid
1980/81	Geoffrey Myers
1981/82	Bill Bradshaw
1982/83	Cyril Bleasdale
1983/84	Dr Tony Ridley
1984/85	Maurice Holmes OBE
1985/86	Colin Driver
1986/87	Gordon Pettitt
1987/88	Sir Robert Reid CBE
1988/89	Sidney Newey
1989/90	Chris Green
1990/91	Bill Clarke
1991/92	John Ellis
1992/93	Dr John Prideaux
1993/94	Ivor Warburton
1994/95	Prof Brian Mellitt
1995/96	John Nelson
1996/97	Stig Svard
1997/98	Chris Green
1998/99	Alan Williams
1999/00	Bob Breakwell
2000/01	Chris Leah
2001/02	George Muir
2002/03	Adrian Shooter
2003/04	Mike Parker
2004/05	Adrian Lyons CBE
2005/06	Ian Brown
2006/07	Robin Gisby
2007/08	David Franks
2008/09	Jim Steer
2009/10	Richard Brown CBE

(Honours are indicated at the time the person to whom they were awarded held the RSA Presidency; several Past Presidents were subsequently awarded honours or additional honours)

Richard Brown CBE
President during Centenary Year

Chairmen of the Association

	From	to
William Tetley Stephenson (initial)	1909	1920
Philip Burt	1920	1924-5
A.J. Jenkin	1925-6	1928-9
Herman Bailey	1929-30	1934-5
	(He resigned 1935)	
Laurence W. Orchard	1935-6	1949-50
(After the war T. Wing was created Deputy Chairman as Orchard was initially still overseas).		
D.H. Coombs	1950-1	1951-2
S.E. Bellamy	1952-3	1962-3
F.S. Heckman	1963-4	1966-7
Anthony C. Forman	1967-8	1978-9
Frank Gladwin	1979-80	1987-8
John Gough	1988-9	1996-7
Chris Heaps	1997-8	2002-3
Richard Malins	2003-4	2008-9
Camilla Allison	2009-10	current

Honorary (General) Secretaries

	From	to
Roger Gibb	1909	1910
(resigned because of ill health)		
W. Ingleby	1910-1	???
A.J. Jenkin	By 1916	
(when RSA suspended).		
Wartime break		
J.H. Condy	1921-2	1922-3
C. Thurston	1923-4	
W Fanthorp	1924-5	1928-9
A.F. Wallis (Joint) at least	1928-9	1937-8
(no second Secretary 1935/6)		
Laurence W. Orchard ???	–	1934-5
(then appointed chairman)		
S.E. Bellamy (Joint)	1939-7	1949-50
C.A. Nisbet (Joint)	1938-9	
(superseding Wallis)		
Wartime break		
S.E. Bellamy (Joint) and		
C.A. Nisbet (Joint)	1946-7	
S.E. Bellamy	1947-8	1949-50
E.R. Woollatt	1950-1	1961-2
V.H. Ramsey	1962-3	1963-4
Charles Cave	1964-5	1979-80
Brian Rowley	1980-1	1982-3
Charles Cave	1983-4	1984-5
Claire Wickes	1985-6	1990-1
(having previously understudied Cave)		
Steven Saunders	1991-2	current

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