THE UNIVERSITY OF HULL

A STUDY IN THE DECLINE OF THE BRITISH STREET TRAMWAY INDUSTRY IN THE TWENTIETH CENTURY WITH SPECIAL REFERENCE TO SOUTH YORKSHIRE

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by

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SUMMARY

Summary of Thesis submitted for Ph.D. degree

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on

The Decline of the British Street Tramway Industry in the Twentieth Century with Special Reference to South Yorkshire

The history of British street tramways is surveyed and contrasted with other urban transport modes from 1860 to date and the generally accepted reasons for the industry's decline summarised. These theories are then tested, illlustrated and amplified by three case studies of tramways in South Yorkshire, namely the small Dearne District, the medium-sized Doncaster and the major Sheffield undertakings. The history of each system is detailed with particular attention being given to later developments. In each case contrasts and parallels are drawn with competing modes--either motor buses or trolleybuses in this area--and with tramways in other parts of the country. The Dearne District tramway was loss-making throughout, and the reasons for inadequate receipts and/or excessive working and capital costs are examined, particularly by contrast with the competing and profitable Yorkshire Traction bus company, which ultimately bought out the tramway in 1933. The Doncaster tramways were more successful, alternating between profit and loss, but after World War I were subject to severe external restraints--such as stagnation in the local economic base and private motor bus competition--and also suffered from rapid deterioration of capital assets. Each of these difficulties is analysed and the eventual successful replacement of trams by 1935 by (mostly) trolleybuses described and discussed. Sheffield's tramways were financially viable up to and including World War II, the reasons for this including the virtual elimination of private motor bus competition, Sheffield's topography and the heavy traffic typical of a city tramway; a particular contrast is drawn with Manchester, where tramway abandondonment became policy much earlier. The financial and in particular the planning reasons why Sheffield's policy changed after 1945 are then

examined. Tramway replacement was completed by 1960. The analysis is supported throughout by detailed financial and operating data derived from archive sources; a detailed bibliography concludes the thesis.

ACKNOWLEDGEMENTS

Countless hours have been spent in libraries and archives in the course of researching this thesis, and the same helpful attention has been received in each. This is true of the Birmingham and Manchester Central Libraries and of the Local History Libraries in Doncaster and Sheffield. I am particularly grateful, however, to the staff at the two Archives Offices where much of the research was done, in Doncaster and Sheffield. The Doncaster premises are happily still open, but unfortunately the South Yorkshire Record Office has been closed and its contents transferred to the care of the Sheffield Archivist, though regretably without free access. It was Mrs. Short, the South Yorkshire Archivist, who drew my attention to the material on the Dearne District and was thus instrumental in starting the project off, and so I owe her a particular debt. I would also like to thank Mr. J. A. Sykes, formerly Traffic Superintendant of the Yorkshire Traction Company, for sharing the results and sources of his own research, as well as making me welcome on several occasions at the Company's offices. The same is true of the office staff of South Yorkshire Transport in Doncaster, who not only provided research material but an office to read it in. I am also grateful to Mrs. Phyllis Humpidge for the gift of some material belonging to her husband, Chaceley Humpidge. I have been fortunate in receiving helpful guidance over many years from Professor John Saville of the Economic and Social History Department at Hull; he has always been ready to spare time from a very busy schedule. My wife and family's support and understanding should not be forgotten. Finally, generous grant aid towards University fees has been received from the Northern Dairies Educational Trust and is gratefully acknowledged. (Richard Buckley)

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LIST OF ILLUSTRATIONS

LIST OF ABBBREVIATIONS USED IN TEXT

B&DETC	Barnsley and District Electric Traction Company Limited
B&DTC	Barnsley and District Traction Company Limited
BET	British Electric Traction Company Limited
DDLR	Dearne District Light Railways
JOC	Joint Omnibus Committee
KVA	Kilovolt Ampere
LCC	London County Council
LGOC	London General Omnibus Company Limited
LPTB	London Passenger Transport Board
LUT	London United Tramways Company Limited
M&STC	Mexborough and Swinton Tramways (or Traction) Company Limited
NECC	National Electric Construction Company Limited
PTE	Passenger Transport Executive
PSV	Public Service Vehicle
RET	Railless Electric Traction Company Limited
UDC	Urban District Council
WRCC	West Riding County Council
YTC	Yorkshire Traction Company Limited

Abbreviations used in Appendices, Footnotes and Tables are noted individually.

PART I

THE DEVELOPMENT AND DECLINE OF THE BRITISH TRAMWAY INDUSTRY

CHAPTER 1

THE HISTORY OF STREET TRAMWAYS IN GREAT BRITAIN

Introduction

The history of tramways in Great Britain--which is here defined as excluding Ireland[1] in all its parts and also semi-autonomous islands such as the Channel Islands--is largely contained within the century 1860 to 1960. For somewhat more than half of that period the tram was the dominant form of urban passenger transport in this country. Horse buses were unable to compete against the trams, and even the main-line railways experienced considerable problems. From World War I onwards, however, trams faced increasingly effective competition from first the motor bus and trolleybus and then the motor car, with the result that by the end of 1962 there was but one urban tramway remaining in mainland Britain, that linking the sea-side resort of Blackpool with the port of Fleetwood.[2] How this once ubiquitous feature of the street scene became more-or-less a sea-side curiousity is the subject of this thesis. The economic and environmental case against the tram might seem so obvious as not to require comment, until it is realised that the same process of decline did not occur at the same period or on the same scale in many countries, particularly on the European continent,[3] and

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1. It is sometimes difficult to 'weed out' Irish figures from early statistics; where these are included, the fact is stated.

2. For dates of closure of tramways, see Appendix G5.

3. For instance, West Germany had 2,146km of tramway in 1906, 4,000km 1937 and 2,310km in 1966; see Wolfang Hendlmeier, Handbuch der deutschen Strassenbahngeschichte 1 (Munich, 1981), 80.

in some cases has never done so. Today tramways, usually in modernised forms, are experiencing a resurgence world-wide and may well return to Britain's cities too.[1] So although it is no purpose of this thesis to provide a comparative study, knowledge of contemporary experience elsewhere adds interest to the question here discussed, 'Why did tramways decline so rapidly in Britain from World War I onwards?'.

This opening part is not original, relying as it does mainly on published sources. It is intended to provide a brief survey of the history of tramways in Britain, with an emphasis on economic factors; after that, the reasons suggested in the existing literature for the decline of tramways are described and discussed. The main body of the thesis provides a factual basis by which to judge these theories, using as examples three tramway systems in South Yorkshire.

Horses in the Street: Urban Transport to the 1880s

The first attempt to offer a public transport service within a town is generally credited to the French mathematician, Blaise Pascal, who introduced a coach service in Paris as early as 18 Mar 1662. This was initially popular with the upper classes, but had soon to be withdrawn for lack of custom. It was too early for viable public transport since the wealthy had their own carriages and the poor could not afford to pay a fare.[2] It is significant that the first successful mode of urban public transport, the horse bus, relied very much on a middle class clientele.[3]

As an alternative to their carriages, the rich could hire a sedan chair a business which appears to have become organised rather like a taxi service at an early period. In Berlin sedan chairs were working from three official

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1. See for example, R[ichard] J. Buckley, 'The Sheffield Supertram--on line for the nineties', Modern Tramway (hereafter, MT), 48 (Nov 1985), 362-6.

2. Charles Klapper, The Golden Age of Tramways (hereafter, Tramways) (1961), 279.

3. John P. McKay, Tramways and Trolleys: the rise of urban mass transport in Europe (hereafter, Tramways and Trolleys) (Princeton, 1976), 12.

stands in 1688 and in Leipzig a sedan chair company was formed in 1703.[1] Chairs were used in London and some British provincial towns too,[2] joined in London from the early seventeenth century by hackney carriages--or Hansoms--and four-wheel 'growlers',[3] but these were still not 'public' in the true sense.

By the eighteenth century long-distance road transport was provided by stage coaches, which ran at fixed times and carried passengers between stated places, usually inns, and several miles apart.[4] Short-stage coaches were in use in London by the early nineteenth century, accomplishing, for instance, the five miles between London and Paddington at a fare of 1s. 6d.[5] The next development was a vehicle which picked up or set down anywhere on the route. One such was a hackney coach inaugurated by a Manchester toll-keeper, John Greenwood, in 1824 or 1825. This ran at stated intervals for a fare of 6d. and exploited the developing market of the newly suburbanised middle classes.[6]

The first horse bus is generally ascribed to Jacques Lafitte, who introduced eighteen-seat vehicles to Paris in 1819.[7] The name 'omnibus' itself derives from the service started by a M.Baudry in Nantes in 1826 and so christened by him after the sign of a local hatter named Omnes which read 'Omnes Omnibus', or 'Omnes for all'. It appears to have been Baudry's 1828

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1. Anon., Die Strassenbahnen in der DDR: Geschichte, Technik und Betrieb (Stuttgart, 1978), 9

2. In Torquay, for instance, where bath chairs and donkey carts were also available for hire in the mid-nineteenth century; see Fisher Barham, Torbay Transport (Falmouth, 1979), 7.

3. T. C. Barker and C. I. Savage, An Economic History of Transport in Britain (hereafter, Transport in Britain) (3rd ed., 1974), 125.

4. Edward Gray, The Manchester Carriage and Tramways Company (hereafter, Manchester Carriage Company) (Rochdale, 1977), 7-8.

5. Barker and Savage, Transport in Britain, 125-6; decimal price equivalents are given in Appendix G1.

6. Gray, Manchester Carriage Company, 7-8.

7. Klapper, Tramways, 279.

Paris service which was imitated in England.[1] This was in 1829 when George Shillibeer started London's first bus service between Paddington and Bank.[2] In view of the earlier activities of men such as Greenwood, it is doubtful whether Shillibeer quite deserves the prominence he has been given in transport history; and it is anyway the case that both men soon found themselves faced with numerous competitors.[3] This had certain beneficial effects, in that it forced fares down and the standards of vehicles up. Shillibeer had initially charged 1s., but London fares fell progressively to 6d.,3d. and even to 2d. and 1d. stages, thereby generating even more traffic.[4]

Early Manchester buses seem to have seated only eight inside,[5] though Shillibeer's first bus crammed in twenty people. This was later reduced to twelve, with three more on top beside the driver, and finally increased again to a total of twenty-two passengers by the use of top-deck seats.[6] The latter ran along the sides of the vehicle and were very awkward to reach which, combined with the uncomfortable accommodation inside, explained why the new designs proved formidable competitors. Greenwood's son was challenged by a Scottish firm which arrived complete with new three-horse buses seating forty-two, seventeen inside and the remainder on back-to-back seats along the middle of the top deck, an arrangement known as a knife-board. The greater comfort made these buses popular and the higher capacity allowed fare reductions to 3d. inside and 2d. outside.[7]

Competition must have made life uncomfortable for the proprietors, so the result was usually agreement between them to divide routes[8] or to

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1. McKay, Tramways and Trolleys, 10.
2. Klapper, Tramways, 280.
3. For Greenwood, see Gray, Manchester Carriage Company, 9
4. Barker and Savage, Transport in Britain, 126.
5. Gray, Manchester Carriage Company, 10.
6. Barker and Savage, Transport in Britain, 126.
7. Gray, Manchester Carriage Company, 13.
8. Ibid., 14.

amalgamate into larger concerns such as the Manchester Carriage Company, of which Greenwood[1] was one of the founders in 1865. They had ninety-one buses,[2] but in the capital the London General Omnibus Company (hereafter LGOC) had 610 buses out of the 810 running at the time of its formation in 1856.[3] The process of improvement and renewed competition continued though, stimulated in the metropolis by the London Road Car Company, which in 1880 introduced garden seat buses,[4] of which it had 275 by the 1890s.[5]

Turning to horse tramways, the first in the world is generally taken to have been the New York and Harlaem Railroad which opened for traffic in November 1832.[6] American sources do mention a line in Baltimore as early as 1828,[7] but little appears to be known of this. As a matter of fact the first passenger carrying railed vehicle in the world ran on the Swansea and Mumbles Railway--which certainly in later years was very much akin to a tramway--in 1807, but this was not on the street.[8] Undoubtedly street tramways themselves came to England from America,[9] brought thence by an entrepreneur with the somewhat appropriate name of G. F. Train. He opened experimental lines in various parts of the country and in the capital, but

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1. Bringing with him, incidentally, an early form of tramway which he had established in Salford in 1861. This involved ordinary horse buses running on flat metal plates, the vehicle being kept on the 'track' by a small guide wheel running in a central grooved rail. See ibid., 16-21,27 and 29-30.

2. Ibid., 22.

3. Barker and Savage, Transport in Britain, 127-8.

4. i.e. with top deck seats facing forward as on modern buses.

5. Barker and Savage, Transport in Britain, 128-9.

6. R[ichard] J. Buckley, A History of Tramways: from horse to rapid transit (hereafter, History of Tramways) (Newton Abbot, 1975), 9.

7. Frank Rowsome,Jr., Trolley Car Treasury, technical ed. Stephen D. Maguire (New York, 1956), 20.

8. Buckley, History of Tramways, 8.

9. Though a Mr. Curtis had started running road/rail vehicles on the harbour railway at Liverpool the year before; see J. B. Horne and T. B. Maund, Liverpool Transport 1830--1900 1 (hereafter, Liverpool Transport 1) (1975), 19-22.

only two had a permanent existence, including the initial 1860 route in Birkenhead. Tramway development thereafter was slow, the only really important advance coming at the end of the decade with the start of the tramway system in Liverpool. A private bill was necessary to authorise a tramway and real growth was not possible until the passage of a general enabling act, the Tramways Act 1870. Lines in London opened in that same year and by the 1880s all large and many smaller towns were equipped with horse tramways.[1] By 1890 these employed 27,719 horses and 3,801 cars running on 948 miles of track and had an income of nearly £3.25 million.[2]

Many problems were experienced with the design of an effective rail compatible both for trams and for other road traffic, but the grooved girder rail still used today was generally employed after about 1880. The typical British horse tram was double-decked, earlier versions having the knifeboard and later ones the reversible garden seats on top; single-deckers were used as well.[3]

Generally speaking, where horse buses preceded horse trams, the former gave way to the latter. In Hull, for instance, horse buses were running three services along Anlaby and Beverley Roads and Springbank by 1871. The tram system was started in 1875 and completed in 1877; by the end of 1878 serious bus competition was eliminated by the failure of the Hull General Omnibus Company, whose assets were purchased by the tramway company.[4]

The reason for the economic success of the horse tram was that rails provided a much better surface than the unpaved or setted streets of the time, whilst the low rolling resistance of metal wheels on metal rails meant that horses could cope with greater loads.[5]

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1. Buckley, History of Tramways, 11-12.

2. Figures from D. Kinnear Clark, Tramways: Their Construction and Working (hereafter, Construction and Working) (2nd edition, 1894), 24-5; Irish totals included and also some lines or cars not horse worked.

3. Buckley, History of Tramways, 13-16 and 19.

4. R[ichard] J. Buckley, 'Horse Tramways in Hull--1', Tramway Review (hereafter, TR) 14 (Autumn,1982), 204, 205, 209 and 210.

5. Buckley, History of Tramways, 7.

The three-horse forty-two seat buses used in Manchester seem to have been exceptionally large, certainly by the closing decades of the century. From the 1880s London bus companies re-equipped with new garden seat buses with proper rear staircases and platforms, but with a capacity of only twenty-six.[1] The same two horses could haul a forty-six seater tram,[2] the higher capacity of which was also assisted by two features of its design. Trams had brakes, whereas buses usually relied on pulling up the horses, which meant trams were safer for heavier loads. Tram wheels were also small enough to go under the body, giving extra width inside. The result was that more people could be carried per vehicle and the fares could be lower, which in turn created more traffic, helped the outward spread of towns and cities, and thus stimulated traffic and revenue still further.[3]

A comparison can be made between the North Metropolitan Tramways Company--the largest in Britain with forty-nine miles of route[4]--and the LGOC. In 1891 the North Metropolitan earned 13.74d. per car mile run and its direct running expenses were 9.55d., leaving a surplus of 4.19d. If other expenditure such as rates and licences is added, the total was 10.27d. per car mile, still leaving a surplus of 3.47d. The LGOC, on the other hand, took only 8.49d. per car mile in the first half of 1891, whilst its expenses were 9.16d., resulting in a deficit of 0.67d. Clark states that expenses were particularly high in 1891 due to a rise in the price of forage, an increase in wages and to unfavourable weather.[5] No doubt this accounts for the LGOC's deficit, but the point to be drawn is that trams could bear this, whereas buses could not. For whilst horse buses cost only slightly less to run than trams, their earning power was much less, reflect-

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1. Chas. S. Dunbar, Buses,Trolleys and Trams (1967), 32 and 34.

2. Klapper, Tramways, 280-1.

3. Buckley, History of Tramways, 8.

4. Clark, Construction and Working, 52.

5. Ibid., 56; it is probable that he underestimates the buses' expenses, for there appears to be no equivalent to the rates etc levied on the tramways.

ing, of course, the latter's much smaller capacity.

The North Metropolitan was undoubtedly one of the most successful horse tramway companies, though back in 1880 the Glasgow Company had been earning even more at 14.47d. per car mile. However the twelve mile South London Tramway Company's system was probably more typical of smaller ones elsewhere; their receipts for 1891 were 10.42d. per car mile, expenses were 9.86d., leaving net receipts of only 0.66d. Clark also quotes the inevitable exception, which perhaps proves the rule; again in 1891, the Birmingham Central Tramway Company's buses were taking 11.33d. per vehicle mile and its horse trams only 9.24d. The explanation is probably that the latter were a very small part of this Company's business, even as opposed to buses, which ran 506,196 miles as compared to 131,528 miles for the trams in that year.[1]

Not all horse tramways were successful, of course. In fact, many smaller ones never paid a dividend, such as the Ipswich[2] and Keighley[3] lines, though they may still have proved useful to the travelling public. Nor was road competition entirely eliminated; the Ipswich Company had to reduce its fares after the introduction of a new bus service in 1898, for instance.[4] In one case at least road competition forced a horse tramway company into bankruptcy, though it was done not by the heavy and lumbering omnibus but by light one-horse wagonnettes which easily outpaced the trams on the flat streets of Kingston-upon-Hull.[5] Another well-known failure was

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1. Ibid., 86, 74-5 and 80; the Glasgow results do not distinguish between trams and buses, but there were only twenty-two of the latter as against 178 trams.

2. R. Markham, Public Transport in Ipswich (Ipswich, [1971?]), ch.2 (n.p.).

3. J. S. King, Keighley Corporation Transport (hereafter, Keighley Transport) (Huddersfield, 1964), 14.

4. Markham, Public Transport in Ipswich, ch.2 (n.p.).

5. Buckley, 'Horse Tramways in Hull--2', TR 14 (Winter, 1982), 248.

that of the London-based West Metropolitan in 1894.[1]

Economic difficulties were one reason why the search for a mechanical alternative was begun at an early date. The main problem was the cost of horsing. Each two-horse car needed an average of eleven horses to keep it in service, five pairs to work in shifts and one spare in the stables.[2] Thus a huge number of horses was needed for a relatively small fleet of cars--in 1898 the North Metropolitan, for example, had 673 cars and 7,167 horses. The latter cost from £20 to £50 each and lasted about four years in service, six months less than a bus horse. Some companies attempted to cut costs by reducing the horse:car ratio; for example, the Dewsbury, Batley and Birstall cut it to 8:1, but the only result was an increased turnover of horseflesh and a consequent rise in horsing costs to 69 per cent of total expenditure as opposed to the average of 55 per cent. Anything which promised to reduce these high costs would be welcomed. In any case, horses were unsuited to tramway work. They were subject to disease and in hilly districts unable to cope with severe gradients, which often had to be left unserved until the advent of mechanical alternatives. In the larger cities, too, the horse tram had reached the limit of its range; given that people would only spend, at most, one and a half hours each way a day travelling to work, at the horse's six miles per hour this was a limit of nine miles.[3]

Mechanical Marvels: Late Victorian Developments

There were really only two successful mechanical alternatives to horse tramways, steam or cable trams. Experimentation with the former began more or less contemporaneously with tramways themselves, starting in Britain with Grantham's car of 1873 which eventually inaugurated the first permanent steam tramway at Wantage in 1876. Grantham used a combined steam motor and

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1. Buckley, History of Tramways, 23.

2. McKay, Tramways and Trolleys, 26, seems to underestimate this requirement when he quotes only five to seven horses per car; of course, where one horse, single-deck cars were used extensively, as they were abroad, this might be true.

3. Buckley, History of Tramways, 24.

carriage, but the more effective idea was a separate locomotive and car, first introduced in 1876. Eventually there were some fifty steam tramway undertakings in Britain, operating over 500 locomotives. Large double-deck cars, usually roofed and seating some sixty to seventy persons, were used. Considerable networks were built up in the area outside Manchester and in the Black Country, though the largest system in one town was the twenty-nine mile Huddersfield system.[1]

Steam trams were clearly not an instant solution to the problems of horse tramway operators. At their peak, in 1890, there were only 553 locomotives in service as opposed to 25,807 horses.[2]

McKay puts the relative failure of steam down to two inter-related factors. First, strict environmental controls were imposed, covering noise and smoke emission, speed and protection from moving parts, all of which could be dealt with successfully, but at a price, which in turn contributed to the second factor; that, by and large, steam trams showed no definite economic advantages over their horse-drawn competitors.[3]

In 1891 some horse-worked tramways had the following percentages of working expenses to receipts; 76 per cent on the North Metropolitan, 82 per cent on the London Tramways and 74 per cent on the Edinburgh Street. At the same time the Birmingham Central's steam trams were running at 70 per cent,[4] scarcely a conclusive advantage and certainly not enough to overcome the environmental disadvantages of steam trams and their higher first cost.

Cable tramways worked on the principle of a continuously moving cable under the street to which cars were attached or detached at will by means of a gripper. The first such line was designed and built by Andrew Hallidie in

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1. Ibid., 27 and 29-31.

2. Board of Trade (later Ministry of Transport) Return of Street and Road Tramways (later also including Trackless Trolleys) (hereafter,Tramway Returns), 1890; Irish figures subtracted from UK totals.

3. McKay, Tramways and Trolleys, 30-2.

4. Clark, Construction and Working, 56, 63, 94, and 79.

San Francisco in 1872. Although very successful in the United States, where there were eventually sixty-two lines, cable tramways found little favour elsewhere, there being but five in mainland Britain, two in London and one each in Birmingham, Matlock and Edinburgh; only the last was a city-wide system, the others being single routes.[1]

The great advantage of cable was its very low running cost. The Birmingham line had an operating ratio[2] of 50 per cent in 1891 and was making a net profit per mile run of 6.50d. as against the same Company's steam, horse and accumulator trams, which returned 4.68d., 1.23d. and 5.25d. respectively.[3] It might have been expected, then, that every man with any financial acumen would have been reaching for his wallet to invest in cable tramways. The difficulty was, cable tramways were extremely expensive to build, which meant that though they might be laid in places where a high traffic was expected, they were no good for more speculative ventures.[4] Nor, in fact, were their low working expenses as certain as all that. Birmingham's working costs might have been only 6.32d. per car mile in 1892-3,[5] but a line in Douglas, Isle of Man was costing 13.64d. per car mile to run only four years later as against earnings of only 8.93d.;[6] one of the two London lines had gone bankrupt as early as 1899 too.[7]

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1. Buckley, History of Tramways, 36-7 and 39-40.

2. Throughout this work 'operating ratio' means working costs as a percentage of traffic revenue. Thus any percentage below 100 indicates a working profit, any above 100 a working loss. This was the convention at the time, although the modern usage is to show revenue as a percentage of costs, meaning that profit is shown by a figure above 100; for an example of this, see a report on the tramways in Nantes in MT 49 (Jul 1986), 243.

3. Clark, Construction and Working, 82 and 85.

4. William J. Clark, 'Electric Railways in America: from a business standpoint' (hereafter,'Electric Railways'), The Electric Railway Number of Cassier's Magazine of August 1899 (hereafter, Cassier's) (reprinted 1960), 521.

5. D. K. Clark, Construction and Working, 85.

6. F. K. Pearson, Isle of Man Tramways (Newton Abbot, 1970), 78; strictly speaking this is outside the purview of this work.

7. Buckley, History of Tramways, 40.

A great many other techniques were dreamed up over the years. Those which at least worked included town gas, compressed air and, later, petrol engines; those which did not included ammonia gas and clockwork propulsion.[1] None was really commercially viable, however. There was one further alternative, though, which continued to tease inventors with its possibilities--electricity.

The Development and Establishment of the Electric Tram
The 1890s to World War I

The world's first practicable electric locomotive was demonstrated by Werner von Siemens at the Berlin Industrial Exhibition of 1879, and two years later the same inventor opened an experimental electric tramway in the Berlin suburbs. The main problem with applying electricity to tramways was how to transfer the current safely to the moving vehicle. All the pioneer lines used live rails, so they could run beside the road, but not in it. Such an early experimental electric line was Volks Railway along the seafront at Brighton, opened in 1893 and still running today.[2]

To avoid the current supply problem many experiments took place with accumulator-powered trams, but about the only long-term use of such cars in Britain was along Birmingham's Bristol Road between 1890 and 1901. Problems included the weight and smell of the batteries and lack of speed.[3] Moreover, their early commercial promise was not borne out by results. The Birmingham line started well with profits of 5.25d. per car mile, but in each of the two following years there was a loss, of first 2.14d. and then 0.17d. per car mile.[4]

One of the very first practicable electric street tramways in the world was opened at Blackpool in 1885. This used a central conductor laid under the rails in a narrow channel known as a conduit. Later developments elsewhere made this a most efficient mode of operation whose main advantage was the avoidance of unsightly overhead wires. However the expense of

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1. Ibid., 32-6. 2. Ibid., 46-9. 3. Ibid., 52-3.

4. D. K. Clark, Construction and Working, 85.

installation meant that few towns except the largest could afford to preserve their amenities in this way. London was one, where the London County Council (hereafter,LCC) eventually operated 123 miles of tramway on the conduit system. About the only other example of its use in Britain was at Bournemouth.[1]

A variant to this open conduit was the so-called closed conduit or surface contact system. In this case the underground cable was connected to a series of studs in the road surface which were energised by a magnetic skate carried on the tram. Hastings, Lincoln, Mexborough, Torquay and Wolverhampton used variants of this device, but none were either safe or effective, the last user being Wolverhampton in 1921.[2]

The key to successful use of the overhead conductor wire was the spring-loaded under-running trolley, an American invention and introduced into England by the Thomson-Houston Company on an experimental line at Roundhay, Leeds in 1891. Already operating horse or steam tramways then started to be electrified, two of the earliest being the South Staffordshire line between Walsall and Darlaston in 1893 and Bristol's in 1895.[3]

D. K. Clark gives an interesting comparison between the South Staffordshire and other Midlands tramways, reproduced overleaf in Table 1. If one compares the expenses of the North Metropolitan--8.34d. per car mile in 1890[4]--one sees that at last a worthwhile gap had opened up between the operating costs of horse tramways and a powered alternative. The new South Staffordshire line was running at nearly three pence a mile less than the best steam tramway, far and away below the electric accumulator system, and even a few decimal points below cable traction. The comparison is not entirely fair, for a new electric system would inevitably have lower repair costs than, especially, the old and worn out steam lines. But even given

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1. Buckley, History of Tramways, 56-7 and 64.
2. Ibid., 63 and 65-6.
3. Ibid., 58-61.
4. D. K. Clark, Construction and Working, 56.

TABLE 1

COSTS PER CAR MILE (IN PENCE) FOR RUNNING AND REPAIRS FOR SELECTED TRAMWAYS IN 1893

Charges	South Staffs.	Birmingham & Midland	Dudley & Stourbridge	Birmingham Central Company			South Staffs.
	Wilkinson Locos	Kitson Locos	Kitson Locos	Kitson, Falcon & Beyer Peacock Locos	Electric Battery	Cable	Electric Overhead
RUNNING:							
Wages	1.83	1.99	1.45	2.14	3.37	1.54	1.93
Fuel	2.34	1.81	1.94	1.92	1.76	0.60	0.48
Stores	0.33	0.30	-	0.27	0.68	0.19	0.43
Water & Gas	0.28	0.11	0.35	0.18	0.12	0.03	0.08
Sundries	-	-	-	0.09	0.17	0.05	0.06
REPAIRS:							
Wages & Materials	2.26	3.62	4.83	2.19	5.49	1.81	1.08
TOTAL	7.04	7.83	8.57	6.79	11.59	4.22	4.06
MILES RUN	337,423	256,077	112,299	1,225,996	140,993	641,161	262,694

SOURCE: D. K. Clark, Construction and Working, 638.

that, the fuel costs presented later by D. K. Clark were surely conclusive; the average cost of steam power was 2.00d. per car mile, of accumulators 1.76d, of cable 0.60d. and of electricity only 0.48d.[1]

The cost advantage of electric traction had earlier been appreciated in the United States. After noting that revenue rose after electrification, W. J. Clark passed on to the 'remarkable and unexpected' fact that operating costs fell at the same time. In fact, experience showed that if electric car mileage were tripled, power expenses only rose by a factor of two.[2] He quotes the example of a small Eastern city.

TABLE 2

COMPARATIVE RESULTS OF HORSE TRAMWAYS AND ELECTRIC TROLLEYS IN AN UNITED STATES CITY

Item	1888	1896
Gross Receipts ($)	145,780	521,673
Operating Expenditure ($)	112,647	321,585
Income from Operation ($)	33,133	200,088
Percentage of Operating Expenses to Gross Receipts	77.3	61.6
Miles of Track	18.4	60.21
Gross Receipts per Mile of Track ($)	7,923	8,664
Gross Expenses per Mile of Track ($)	6,122	5,341

SOURCE: W. J. Clark, 'Electric Railways', 522; amounts containing Cents rounded to nearest Dollar.

Electrification took place between 1890 and 1893. Population increased by one third between 1888 and 1896, track mileage by 327 per cent and car mileage by 495 per cent (capacity rose by even more, taking into account the larger size of the trolleys[3]). Gross receipts went up by 357 per cent,

1. Ibid., 638.

2. W. J. Clark, 'Electric Railways', 521.

3. The American term for 'tram' is either 'trolley' or 'streetcar'.

clearly less than car mileage, so receipts per car mile actually fell by 32 per cent. However net income rose by 560 per cent, a 'wonderful gain' made possible by a 43 per cent fall in operating costs per car mile from 23.70 cents in 1888 to 13.64 cents in 1896. If however horse traction had been used to cover the same number of miles in 1896, costs would have exceeded receipts.[1]

The American experience showed that revenue was greatly increased upon electrification. Because electric cars were twice as fast as horse cars, they could run twice as far in the same time; doubling the diameter actually quadruples the area so, in theory, four times the population could be served. Larger and more comfortable cars also improved the service offered at peak hours and were themselves inducements to optional riders to take extra trips to the shops or to places of recreation.[2] It is perhaps difficult to appreciate why this was so today but, as McKay has said, the electric tramcar was revolutionary in that it signalled the change from the walking and horse-drawn city to that of mechanised transportation.[3] It is scarcely surprising, then, that people wanted to ride the cars, even purely for the pleasure of the experience. This is best seen in the custom of riding on open cars during the hot American summers,[4] but Britain had its joy riders too. For instance, Southport Corporation introduced a 'Grand Tour' by toastrack tram in 1914; even in the wartime conditions of 1915 it was taking nearly 30d. per car mile as opposed to the town routes' average of only 10.84d.[5] So W. J. Clark concluded that the increase of gross receipts by electric cars over their animal-powered predecessors was caused by two factors--the increased population able to be served effectively and

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1. W. J. Clark, 'Electric Railways', 522. 2. Ibid., 519-20.

3. McKay, Tramways and Trolleys, 241.

4. W. J. Clark, 'Electric Railways', 520.

5. Henry B. Priestley, 'The Tramways of Southport', TR 16 (Winter, 1985), 107-8.

the increased facilities and inducements offered to potential travellers.[1]

After taking both the increased receipts and reduced costs into account, W. J. Clark concluded that he had made 'the case for electric traction in a nutshell'.[2] His advocacy was supported by the facts. From only 86 miles of electrified track in 1888, American street railways had grown to 914 miles by 1899,[3] that is, from 138km to 1,472km.[4]

The United Kingdom[5] made a promising start in the field of electric traction too, having 71km of electric tramway in 1893, quite respectable as compared with the earlier American figure and more than twice as much as any other European country, except for Germany with 102km. By 1898 however the UK's total had risen to 211km, but Germany now had 1,403km, France 488km and Switzerland was close with 201km.[6]

There were various reasons for this. Extremely high standards of construction were demanded by the Board of Trade, which meant that first costs were high.[7] Contemporary American standards were much more liberal. For instance, ordinary but light section railway track was often used, with the sleepers covered with dirt or macadam[8] (the road surface), and wooden overhead poles were common;[9] neither method was much used in Britain. Nor was the British public as ready to welcome the street railway as their American cousins, a reluctance partly tied up with a class perception of the tram as 'the poor man's carriage',[10] and partly with an aesthetic prejudice

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1. W. J. Clark, 'Electric Railways', 520.

2. Ibid., 522. 3. Ibid., 519.

4. Conversion tables for Imperial and Metric measurements are provided in Appendix G1.

5. Figures from this source include Ireland.

6. McKay, Tramways and Trolleys, Table 5, 72.

7. Robert W. Blackwell, 'Electric Tramways in Great Britain', Cassier's, 285.

8. Lemuel W. Serrell, 'Building an Electric Railway', Cassier's, 309.

9. Ibid., 311.

10, Blackwell, 'Electric Tramways in Great Britain', 302.

against overhead wires.[1]

From the commercial point of view, British electrical suppliers were less monopolistic than those on the continent and thus less able to exert pressure on municipalities. The most important factor delaying electrification was the provision of the Tramways Act which gave municipal authorities the right to purchase a tramway after twenty one years. This meant that companies were unwilling to invest in new technology, whilst there was at the same time a pressure towards municipalisation of public utilities. However, until 1896 Parliament prohibited municipal operation--an exception had been made for Huddersfield, where no company was prepared to lease the lines--so the delay and uncertainty was bound to continue until this policy was relaxed. When it was, the stage was set for the establishment of municipal tramways, which became the norm in the British industry; by 1911, for example, they carried four times as many passengers as the private companies which had been the erstwhile monopoly carriers.[2]

Electric tramway companies did, however, exercise something of a pioneering role, being free of certain municipal hesitations. One of the greatest tramway entrepreneurs was J. Clifton Robinson, who was instrumental in electrifying the Bristol, Middlesbrough and London United Tramways (hereafter,LUT).[3] An even more important influence on local transport was brought to bear by the British Electric Traction Company (hereafter, BET), formed in 1895 by Emile Garcke to build up the capital to take over existing tramways and to promote and develop new ones.[4]

Certain of the tramways acquired were purchased by local authorities, but even so the BET eventually controlled and electrified the lines of some thirty-seven tramway companies and had schemes, which were aborted for

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1. McKay, Tramways and Trolleys, 168.

2. Ibid., 168-9, 171, 173 and 184-5.

3. Blackwell, 'Electric Tramways in Great Britain', 285-6.

4. J. A. Sykes, Yorkshire Traction: early development (hereafter, Yorkshire Traction) (Barnsley, 1982), 7; for a fuller treatment of the BET see Roger Fulford, Five Decades of B. E. T. (n.p., 1946).

one reason or another, for many others.[1] In 1913 the BET was said to control 400 miles of tramways and light railways.[2] It also owned some electric supply companies, four overseas electric tramways and the Immisch Electric Launch Company and had substantial interests in Raworth's Traction Patents Limited and in the Brush Company. Many of the BET's subsidiaries were wholly owned, but others only partially so. All shared the same registered office in London, and the Company's executives were each directors of several of the subsidiaries joined, in the case of partially owned concerns, by local directors. One of the seven BET secretaries also served a number of the subsidiaries. The British Electrical Federation Limited was formed in 1907 to enable member companies to purchase supplies in bulk, all the chairmen and managing directors being on its council.[3]

From the turn of the century there was a boom in electric tramways. In 1898 there were about 150 miles of electrified track and some 500 cars.[4] By 1903-4 the figures were respectively 1,462 and 7,132 and in the ten years up to World War I they increased as indicated in Table 3.

The difference from the horse and steam era is even more remarkable, as shown by Table 4 (also overleaf). One fact this shows and which supports the American evidence is that far more people rode by tram in the electric era. Whereas track mileage and fleet size increased more-or-less in step (the number of cars per mile of track was 4.27 in 1878 and 4.94 in 1908-9), each multiplying roughly tenfold, the number of passengers shot up by about eighteen times. Looked at another way, the number of passengers per mile of track nearly doubled, from 578,575 in 1878 to 1,081,600 in 1908-9, and the number per car rose from 135,496 to 218,802.

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1. Wingate H. Bett and John C. Gilham, Great British Tramway Networks (hereafter, Networks) (3rd ed., 1957), 192.

2. South Yorkshire Record Office (hereafter, SYRO), 8/UD28/3, Minutes of Proceedings of the Light Railway Commissioners' Inquiry (into the Dearne District application) 26 Feb--10 Mar 1914 (hereafter, Proceedings 1914), 628.

3. Bett and Gilham, Networks, 192-3.

4. Buckley, History of Tramways, 61.

TABLE 3

GROWTH OF ELECTRIC TRAMWAYS IN THE UNITED KINGDOM
(INCLUDING IRELAND) 1903-4--1913-14

Year	Track Miles	Cars
1903-4	1,462	7,132
1904-5	1,780	8,292
1905-6	1,994	9,276
1906-7	2,195	10,369
1907-8	2,286	10,908
1908-9	2,360	11,361
1909-10	2,429	11,749
1910-11	2,467	12,120
1911-12	2,518	12,435
1912-13	2,546	12,773
1913-14	2,595	13,196

SOURCE: Tramway Returns

TABLE 4

GROWTH OF TRAMWAYS IN BRITAIN
ALL FORMS OF TRACTION

Year	Track Miles	Cars	Passengers
1878	237	1,012	137,122,364
1888	815	3,207	404,255,947
1898	938	4,850	802,060,275
1908-9	2,362	11,676	2,554,740,243

SOURCE: Tramway Returns

The increase in passengers carried was partly due to the factors noted by W. J. Clark--the wider area served and the greater attractiveness of tram travel--but also to two other changes to which he gave little or no attention. First of all, the supply of transport was much increased by electrification. This was due to obvious things like higher speeds and the larger capacity of electric trams and to less obvious improvements, such as the ability of electric trams to surmount hills too steep for horses.[1] Second, fares fell substantially,[2] for example in Sheffield, where the standard

1. McKay, Tramways and Trolleys, 52-5. 2. Ibid., 58.

company horse fare was 2d. or 3d., but the Corporation electric fare was 1d. until after World War I (2d. on some longer routes).[1] This meant that less affluent groups of people were attracted to ride. In Great Britain 'schoolchildren who formerly walked now ride. The same is true of millions of workingmen, as well as thousands of men and women whose only outing is taken on the top of a car'.[2] The electric tram had, in short, found a new market.

The general picture of expansion is supported by the particular. In January 1899 Liverpool had 45 electric trams, 15 of which were trailers; only three years later the fleet was nearer 450.[3] Earlier,in the horse era, the annual ridership per capita was only 51; in 1913 it was 187, though this was still a long way short of the 271 achieved in Glasgow.[4] Sheffield's first electric car ran in 1899 and its last horse car in 1902. Two years later the fleet numbered 237, by 1910 it was 264 and by 1920 totalled 373.[5] Meanwhile, the ridership per capita in 1913 was 207.[6]

Perhaps less significant in the long run than the expansion of the big systems, but nontheless important, was the spread of tramways to smaller and more scattered communities which had never had them. Appendix G5 lists all British electric tramways, a total of 202. Of these, at least a third had no horse- or steam-powered predecessors, so places such as Ayr, Bournemouth or Norwich acquired the benefit of tramway services for the first time. This was usually a matter for civic junkettings and some popular enthusiasm. The small Kilmarnock system, for example, was inaugurated on

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1. Kenneth Gandy, Sheffield Corporation Tramways: an illustrated history (hereafter, Sheffield Tramways) (Sheffield, 1985), 178.

2. F. C. Howe, 'Municipal Ownership in Great Britain', Bulletin of the Bureau of Labour, No.62 (Jan 1906), 52; quoted in McKay, Tramways and Trolleys, 202.

3. Horne and Maund, Liverpool Transport 1900--1930 2 (hereafter, Liverpool Transport 2) (1982), 113.

4. McKay, Tramways and Trolleys, 193.

5. Buckley, History of Tramways, 68.

6. McKay, Tramways and Trolleys, 193.

10 Dec 1904 with a luncheon, speeches and a procession of six cars which later went into public service and took £53 for the day.[1]

Some of the increase in tramway traffic was therefore due not to improved or cheaper services on existing lines, but to their extension to entirely new areas. This happened not only by the building of new tramway systems, of course, but by the expansion of older-established ones as well. When Glasgow Corporation took over the operation of the city's horse tramways, there were but thirty-one miles of double track. By 1909 this had risen to ninety-five miles, no less than thirty-eight being outside the city. A further ten miles had been added by 1922.[2]

The picture in the period up to World War I was thus one of steady--even dramatic--expansion of tramway mileage, of the number of tramway systems, of tram fleets and of passengers. It was also, generally speaking, one of prosperity, with the dominant municipal sector of the industry able to pay large amounts out of profit towards the relief of rates. In this period Glasgow Tramways Department was passing £30,000 or more annually to the city's Common Good Fund.[3] Nor was Glasgow alone, as Table 5 (overleaf) shows.

The return on gross capital expended had improved--for all lines, both company and municipal--from 3.97 per cent in 1879 to 6.38 per cent in 1898, reaching a pre-war peak of 7.50 per cent in 1911-12 as compared to an average of 6.78 per cent between 1903-4 and 1913-14.[4]

Electric trams were clearly a success. They had spread widely, out from the city centres into growing suburbs[5] and into smaller towns and districts where public road transport had been minimal or non-existent

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1. A[lan] W. Brotchie and R. L. Grieves, Kilmarnock's Trams and Buses (hereafter, Kilmarnock's Trams) (Dundee, 1984), 11.

2. Charles A. Oakley, The Last Tram (Glasgow, 1962), 30, 56, and 71.

3. Ibid., 55.

4. Tramway Returns (UK, including Ireland).

5. For further discussion of the relationship between tramways and urban growth see McKay, Tramways and Trolleys, 205-25.

TABLE 5

ANNUAL PAYMENTS TOWARDS RATE RELIEF OR COMMON GOOD FUNDS BY BRITISH MUNICIPAL TRAMWAYS 1903-4--1913-14

Year	Amount (£)
1903-4	207,807
1904-5	209,881
1905-6	205,981
1906-7	297,456
1907-8	319,676
1908-9	217,263
1909-10	317,206
1910-11	361,018
1911-12	455,676
1912-13	519,715
1913-14	578,019

SOURCE: Tramway Returns.

NOTE: No amounts were applied to rate relief in Ireland until 1909-10, so the earlier figures are for the UK as a whole; thereafter Irish figures are subtracted.

beforehand; they were carrying vastly more passengers than any mode of urban transport had done previously; and they were doing so at a profit and at a reasonable rate of return on capital. Perhaps the archetypal picture illustrating the triumph of the tram is just that--the Edwardian picture postcard. Every town which had a tramway was proud to see it portrayed on local views; and those scenes frequently reveal a street devoid of all except pedestrians and tramcars. If the latter had the road to themselves, they obviously had the passengers to themselves too, a state of affairs which seemed likely to continue, for there appeared to be no serious competitor.

Competition and Financial Problems in the Golden Age

This last, of course, is not entirely true. Tramways had already met and largely matched at least two competitors, but both were capable of a resurgence--the railway and the omnibus.

It is generally agreed that railways played little part in intra-urban

transport in the Victorian period, except in London. Their managements were not usually interested in the market for cheap suburban fares, and so their lines did not greatly influence suburban growth. Granted, clerks and tradesmen moved out from the cities and commuted by rail, but workmen's travel remained small, with most working class people travelling only for holidays and excursions. Tramways--even before electrification--provided the most substantial of all contributions to the internal transport of Victorian cities.[1]

Where new electric tramways competed with suburban railways, the former usually won. According to one authority, trams took millions of railway passengers, who preferred the fast, cheap and convenient cars to walking to inconvenient and drab stations and waiting for an infrequent and dirty train.[2] There are numerous examples of the effect tramways had on local rail services. For example, the Nottingham Suburban Railway was opened in 1889 to Daybrook and Arnold Station with three intermediate stops. Even then, housing development tended to follow the horse car tracks, and when electric trams were extended to the outer terminus, the 'train service grew smaller and beautifully less and ceased altogether in 1916'.[3] Even in larger cities, railway traffic declined. In Birmingham, for instance, suburban stations lost up to half their traffic in the period 1903 to 1914.[4] In Manchester the railway to Altrincham lost £11,000 revenue in the first year the tramways opened, £15,000 in the following year and £16,000 the next. In 1913 takings were still £14,500 less than in 1909, when the tramways opened. The Great Central Railway's Superintendant believed railways were vulnerable over distances of up to five miles;[5] the facts bear him out,

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1. John R. Kellett, The Impact of Railways on Victorian Cities (hereafter, Impact on Cities) (1969), 365, 376, 94, 358 and 288.

2. J. Joyce, Tramway Heyday (2nd Impression, 1974), 78.

3. Klapper, Tramways, 159.

4. Kellett, Impact on Cities, 364.

5. SYRO, Proceedings 1914, 653.

for over longer distances, such as Birmingham to Wolverhampton, railways kept their traffic.[1]

The railway companies attempted to fight back in two ways, one successful, the other less so. On lightly-trafficked branches steam rail motors --combined engines and carriages--were sometimes used, often in conjunction with additional rail-level halts.[2] One such service, between Ossett and Chickenley Heath on the Great Northern Railway, was itself withdrawn by 1909 because of tramcar competition.[3] Rail motors did not work because they were --naturally--used on branches with scarcely sufficient traffic anyway. Where the traffic was worth fighting for, railway companies adopted a bolder and more successful strategy--electrification. Even in the capital the London and South Western Railway had lost much of its traffic to the energetic LUT. Partly to win this back, the railway inaugurated a new electric service in 1916 covering LUT territory and by 1917 was carrying ten million more suburban passengers than it had in 1915.[4]

This was a medium distance operation, but where inner suburban services were concerned 'a mortal blow [was dealt] by electric trams during the Edwardian era'.[5] But it clearly was possible for the railways to recapture some, even a great deal of their traffic on certain lines; trams were not likely to have it their own way for ever.

The victory of trams over horse buses was even more crushing. Horse trams had usually driven horse buses off their routes. Electric trams, when introduced in hithero tramless towns, naturally had an even more decisive impact. Many horse bus operators probably imitated the example of the

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1. Kellett, Impact on Cities, 364.

2. For a relatively long-lived example, see David Joy, The West Riding, Railways in Yorkshire No.1 (Clapham, Yorks., 1976), 57.

3. Ibid., 33.

4. J. Joyce, Town Transport in Camera (hereafter, Town Transport) (1980), 37.

5. D. Fereday Glenn, Roads, Rails and Ferries of the Solent Area (1980), 34.

Wakefield and District Omnibus Company, which withdrew its services prior to the opening of the town's tramways.[1]

There was one place, however, where horse buses continued unchallenged and which became a natural forcing ground for the development of the motor bus--the West End of London, which was never served by trams at all.[2] An experimental motor bus service from Kennington to Oxford Circus was introduced from 9 Oct 1899, but it lasted barely a year.[3] In 1902 an outer suburban service was started between Lewisham and Eltham and there were also further experiments in the central area. The established firm of Thomas Tilling started operations in 1904 and the LGOC followed suit in 1905, as did the rest of their competitors. Development thereafter was rapid. At the beginning of 1905 there were only 20 motor buses in London; by July 1908 there were 1,066, in which month the LGOC absorbed its two main rivals, giving it a fleet of 885 petrol buses.[4]

In the provinces motor bus services were pioneered by the railways. The very first of all was a service between Ilfracombe and Blackmoor station on the narrow gauge Lynton and Barnstaple Railway; this began in June 1903.[5] It was not successful however, and the vehicles were sold to the Great Western, who used them in the classic manner to test the market between Helston and the Lizard, hoping thereby to avoid the expense of building a branch line. The buses began on 17 Aug 1903, just three weeks before the North Eastern's service from Beverley to Beeford. Obviously, given the fact that they were testing marginal propositions, the success of railway bus

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1. W. Pickles, The Tramways of Dewsbury and Wakefield (hereafter, Dewsbury and Wakefield) (Broxbourne, Herts., 1980), 118.

2. Dunbar, Buses,Trolleys and Trams, 64.

3. Klapper, Tramways, 283.

4. Dunbar, Buses, Trolleys and Trams, 64-5.

5. Strictly speaking, the buses were not railway owned, being a personal venture of the railway's Chairman, Sir George Newnes; see John Cummings, Railway Motor Buses and Bus Services in the British Isles, 1902--1933 2 (hereafter, Railway Buses 2) (Oxford, 1980), 10.

services was variable and some routes closed down fairly quickly. But by 1911 the Great Western alone was operating some thirty-one services,[1] including some long runs, like Oxford to Cheltenham.[2]

Municipalities were generally slower off the mark than either the private bus companies or the railways. This was true of the larger provincial cities anyway.[3] Smaller places which had not got round to installing an electric tramway displayed more interest. In 1903 Eastbourne became the first British municipal motor bus operator.[4] Another place which introduced buses in preference to a proposed tramway was Todmorden, starting in 1907.[5]

However, motor buses were seen by established tramway operators either as feeders to the tramways or as a means of testing a new service prior to the building of a tram route. For example, Wolverhampton introduced buses in the period 1903-5 to open up new routes; as early as 1909 they were replaced by trams. In Birmingham the first municipal buses connected the Selly Oak trams to Rednal and Rubery.[6] The Bristol Tramways Company started bus services in 1906 to villages outside the city, but in each case running from a tram terminal.[7]

Although the LGOC standardised on petrol buses, their dominance was by no means assured in the first two decades of the century. Steam buses were used quite extensively in London; the National Steam Car Company operated up to 1919 with a maximum fleet of 184.[8]

A more serious contender was the petrol-electric bus, which had a

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1. Geoffrey Freeman Allen, The Illustrated History of Railways in Britain (1979), 169-70.

2. R. T. Coxon, Roads and Rails of Birmingham 1900--1939 (hereafter, Rails of Birmingham) (1979), 92.

3. Ibid., 94. 4. Bett and Gilham, Networks, 127.

5. Klapper, Tramways, 285. 6. Coxon, Rails of Birmingham, 94.

7. A. W. Hallpike, 'The Development of Transport and Commercial Vehicles in Bristol', paper presented at a meeting of the Institution of Mechanical Engineers, 18 Jun 1952, 4.

8. Dunbar, Buses, Trolleys and Trams, 65.

petrol engine driving a generator and thence an electric motor;[1] most of these were built by a firm called Tilling-Stevens. They were quite widely used, had good acceleration and were reasonably fast on the level, but were slow uphill because the combined weight of the engine, generator and motor was more than that of the conventional clutch and gearbox transmission. The great disadvantage was that the engine could not be used to retard the bus downhill and reliance had to be put on the rear-wheel brakes which, when used with narrow solid tyres, had a minimum braking area with the road.[2]

Not that petrol buses were trouble-free either. The transmission was particularly prone to failure because of the effect of dust and dirt from the roads, brakes were inadequate and the solid tyres showed a distressing tendency to part company with the wheels, a problem peculiar to driven wooden wheels.[3] Keighley's experience of motor buses, which it introduced in 1909,[4] is probably not untypical. After a year or so breakdowns became frequent, the buses found hill-climbing almost beyond their powers, they were noisy--especially because of the petrol engine's propensity to back-fire--and they threw up dust in summer and mud in winter.[5]

A considerable fillip to bus design was, curiously, given by the Metropolitan Police, who in 1909 exercised their powers to issue regulations for motor buses in the capital, including stringent weight limits. It was feared that there could be no more double-deck buses, but instead the designers produced new and effective lightweight versions including, in 1910, the famous LGOC B-type, which was light, silent, long-lived and cheap. 'Scotland Yard had put the bus business on its feet'.[6] Most of these early buses had open tops, as the trams had done before them; the first with fully enclosed top decks were introduced by Wigan Corporation in 1909, this being

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1. Like a modern diesel-electric locomotive.

2. Coxon, Rails of Birmingham, 96. 3. Ibid., 94-5.

4. King, Keighley Transport, 29. 5. Ibid., 35.

6. Klapper, Tramways, 284.

another pioneer undertaking which never operated trams.[1]

The great advantages possessed by motor buses were their low capital costs and high mobility,[2] which meant, of course, that they were ideal for their chosen purposes of proving new routes, acting as tramway feeders or operating services in small towns or in country areas where there was insufficient traffic to support a tramway.

There was before World War I no idea of using motor buses to replace tramways.[3] Some of the reasons for this will be obvious, notably the unreliability of the early buses and the lack of passenger comfort. Another problem was lack of capacity. Four-wheel single-deck trams built for the Yorkshire Woollen District tramways in 1902 seated 30;[4] similar buses operated by Bristol tramways in 1906 seated 18.[5] Double-deck Woollen District cars--typical small trams of the period--seated 48 originally, later 56;[6] London buses seated only 34.[7]

Another reason why motor buses appeared unattractive to municipal authorities was the economics of their operation. For instance, between 1909 and 1912 Hull Corporation ran a bus service through Stoneferry, but a major loss was made.[8] Bus operating costs were high and despite the low capital cost overall, the vehicles themselves costed more than trams; double-deckers costed respectively £850 and £650,[9] with the difference being even

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1. 'Bus Services in Widnes', Modern Transport, 16 Apr 1949 (n.p.,taken from a cutting in the files of C. T. Humpidge, for whom see below).

2. Klapper, Tramways, 287.

3. Ibid. This is not quite so; see the discussion following.

4. Pickles, Dewsbury and Wakefield, 73.

5. Hallpike, 'The Development of Transport and Commercial Vehicles in Bristol', 4.

6. Pickles, Dewsbury and Wakefield, 75.

7. Dunbar, Buses, Trolleys and Trams, 72.

8. G. A. Lee, 'The Tramways of Kingston-upon-Hull: a study in municipal enterprise' (hereafter, 'Tramways of Hull') (Sheffield Ph.D., 1968), 105-6.

9. Joyce, Tramway Heyday, 95.

greater on a per seat basis. The unfortunate financial results of some early undertakings may, however, have been due to the fact that they were operating on too small a scale. Where a couple of buses on a tramway feeder might not show a profit, a larger concern could. This was clearly so in London, where the LGOC had a return of 18 per cent on capital.[1]

The claim that bus operating costs in 1913 were as low as 10d. per vehicle mile was ridiculed by Harry England, Manager of the West Riding tramways. Undertakings like Widnes, Halifax and Keighley had costs from 1s. 2d. to 1s. 4d., he said, 'so that from the point of view of regular scheduled services I should never entertain buses under any consideration'.[2] This was not entirely true, for his Company had decided in 1913 that their proposed tram routes to Alverthorpe and Ardsley could not pay and that, if powers to abandon construction were obtained, they would run buses instead. In 1914 they prepared even more extensive schemes for bus services and ordered some buses, though these were not delivered due to the outbreak of war.[3] England said he was 'only sorry that I have got four on order that will be delivered at the beginning of the month. I am not looking forward to it . . . I do not like being called up at 2 o'clock in the morning to fetch an old omnibus about two miles'.[4]

Far from buses replacing trams, the 'received wisdom' of the day was that, where trams were introduced on a bus route, the buses would be run off the road. This was, of course, Harry England's opinion,[5] but it was not his alone. A. L. C. Fell, the Chief Officer of the LCC Tramways, said in 1909 that in twenty years motor buses would be 'curios in museums'. But the thought was already abroad that buses might achieve more. As early as 1905 Sir George Bartley, a member of the Royal Commission on London Traffic, said it was 'at least an open question' whether buses would ultimately compete

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1. SYRO, Proceedings 1914, 514; exactly what is meant by 'return' is not specified here.

2. Ibid., 386. 3. Pickles, Dewsbury and Wakefield, 150.

4. SYRO, Proceedings 1914, 418. 5. Ibid., 390.

successfully with trams, but in any case trams should not be further extended in narrow streets 'until more experience has been gained as to the future of motor omnibuses'. And in 1912 E. A. Pratt, a transport historian, wrote that 'we have the question whether electric tramways have not attained the height of their possible development, and whether they are not already on their decline . . . local authorities who built them as though for eternity are now faced by the rivalry of the motor omnibus'.[1]

Such thoughts were beginning to be backed up by evidence. The Kidderminster and Stourport tramway in the West Midlands was facing severe motor bus competition in 1913. To compete, more trams were run--mileage rose 20 per cent--and the ordinary 3d. fare reduced to 1d. Partly as a result, revenue plummeted by as much as 49 per cent, from 7.29d. per car mile to only 3.13d. Mr.Chivers, the BET's Inspecting Officer, said that 'if these motor buses continued to be run, the tramway could not live'. Fortunately, by a combination of financial muscle and by putting on its own buses, the Kidderminster Company's parent, the BET, was able to suppress the competition before it did any permanent damage, but the message was clear--even where tram traffic was good, parallel motor bus services could do a lot of damage.[2]

That was a small tramway in a fairly rural area, however, not to be compared with those running in large towns and cities. Here, the opinion expressed in 1907 by Lewis Slattery, Manager of the Oldham tramways, probably still remained typical. While motor buses have come to stay, he said, 'and may be found useful as a feeder to existing tramway lines, their unreliability, offensive smell, vibration and high operating costs prevent them from being a serious competitor to a well-equipped tramway'.[3] Even so, the success of motor buses in central London proved that they could cope

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1. The preceding three opinions quoted in Joyce, Tramway Heyday, 95.

2. This paragraph from J. S. Webb, Black Country Tramways, including Kidderminster and Stourport Tramways 2 (hereafter, Black Country 2) (Walsall, 1976), 192 and SYRO, Proceedings 1914, 634.

3. Quoted in Joyce, Tramway Heyday, 95.

with city traffic. Like railway electrification, here was more evidence that trams would not remain 'king of the road' for ever.

There was one further contender for the tramcar's crown. This was the trolleybus, which had been invented in 1881 by Siemens. Little more was done to develop the trackless tram, as it was first called, until the turn of the century, but in 1901 a public installation started work in Bielthal near Königstein in Germany. All early developments in Britain relied upon continental technology. The main difference between the various designs lay in the method used to collect current from the twin wires needed for trolley vehicles, there being no return circuit through the rails as with trams. The most widespread and successful system was the Schiemann, which used under-running trolley poles of the same type as used on most trams. In 1908 the Railless Electric Traction Company (hereafter, RET) was set up to market the design in Britain. A certain popularity was also enjoyed by the Cedes-Stoll system, which used a four-wheel carriage running on top of the wires.

On 20 Jun 1911 both Leeds and Bradford opened trolleybus routes, the first in Britain and both of the RET type. The Bradford route was very short and operated purely as a tramway feeder, the Leeds route somewhat longer. The attraction was the reduced capital cost as compared to a tramway. The overhead at Bradford cost £1,734 per mile, at Leeds only £1,240 because single poles were used. The twin wires cost more to erect than tramway overhead, but there was no track to lay. In Leeds the cost of construction of the trackless was 20 per cent that of a tramway; the vehicles cost the same.

The initial operating results in Leeds were quite promising too.

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1. Owen, History of the British Trolleybus (hereafter, British Trolleybus) (1974), 18-19.

2. King, Keighley Transport, 40.

3. SYRO, Proceedings 1914, 365.

4. Owen, British Trolleybus, 29.

Receipts were 10.75d. per vehicle mile and costs, including interest and depreciation, only 6.30d. Bradford, however, ran a small deficit, amounting to £380 in 1912-13.[1] Possibly the initial success at Leeds had been due to the novelty value as by 1912 the receipts were less than Bradford's at 6.75d. and, inevitably, there was a deficit; however the General Manager was still speaking of it as a successful experiment and saying that powers would be sought for new extensions.[2]

Cedes-Stoll buses were introduced at Keighley in 1913, but were markedly unsuccessful and subject to frequent breakdowns; to jump ahead a little, in 1917 and 1918 there were times when only one out of the ten buses was fit for service.[3]

By 1914 there were only eight British undertakings using as few as twenty-five trolleybuses.[4] All were municipally owned and operated 40,000 miles per annum carrying 153 million passengers. This compared with 255,810,000 miles run and 2,634 million passengers carried on municipal tramways in 1913.[5] Clearly, trolleybuses were still in an experimental phase and, so far as being a threat to established tramways, a cloud no bigger than a man's hand.

Trolleybuses were believed to have similar functions to motor buses in relation to tramways. First, they were visualised as feeders to tramways. Rotherham's route, for instance, ran from Broom Road tram terminus for a considerable distance out into the country to a mining village at Maltby.[6] In Keighley, one route penetrated the town centre, but the other two were wholly rural and began at either end of the main cross-town tram route.[7] The early use of trolleybuses in rural areas was in complete contrast to

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1. Owen, British Trolleybus, 29. 2. SYRO, Proceedings 1914, 360.

3. King, Keighley Transport, 40 and 53.

4. Owen, British Trolleybus, 34.

5. Herman Finer, Municipal Trading: a study in public administration (hereafter, Municipal Trading) (1941), 54-5.

6. Bett and Gilham, Networks, 60. 7. King, Keighley Transport, map.

their later role, when they were almost exclusively an urban transport mode.

It was often thought that such a tramway feeder route would be only temporary and that once traffic built up it would be replaced by a tramway. So the second use of trolleybuses was as a means of testing traffic on new routes. As Sir Charles Nicholson M.P. said, 'If you are in any doubt as to the amount of your custom it is rather a good thing to try it by a trackless trolley because it saves part of the expense and it is useful for putting up a tramway in the future'.[1] The process might, it seemed, be repeated endlessly, or so a report in Tramway and Railway World for 15 Jan 1914 implied. Referring to Aberdare the article said that 'there is no doubt that in the course of a comparatively short time the trackless trolley lines will have been converted into tramways, and that the former will be re-erected further afield, thus forming one of those systems of light lines of which our continental neighbours have reaped the benefit for so many years past'.[2]

These ideas rather begged the question as to what might happen if the trackless route did not generate enough traffic to justify a tramway. Was it then to remain permanently? In the case of the Mexborough and Swinton Tramways Company (hereafter, M&ST), the experts advising on proposed extensions agreed that tramways 'were absolutely out of the question' because links between one or two small towns only were involved; they therefore recommended a railless system.[3] The extensions would not pay as a tramway, but they would as railless routes because of the latter's lower capital cost.[4] The routes were planned to link with an existing tramway, and as such they come into the category of feeders; but there seems to have been no intention of ever replacing them with a so-called permanent rail system.

Generally tramways remained successful and profitable in the years prior to 1914. There were, of course, one or two failures. Taking the worst recorded year before World War I, 1909-10, there were then four

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1. SYRO, Proceedings 1914, 158.

2. Quoted in Owen, British Trolleybus, 32.

3. SYRO, Proceedings 1914, 574. 4. Ibid., 52.

local authority and eight company loss-making[1] tramways, whilst twenty-nine municipal tramways needed aid from the rates--amounting to £64,215--to pay their capital charges etc.[2]

Company tramways tended to be the obvious casulties, partly because they did not have the resources of the rates to tide them over rough patches, and partly because the structure of the industry was such that private enterprise was left only the lean pickings. In 1911 for example the Scarborough Tramways Company revealed that it had lost money for the seven years since service began and that the previous year's loss was £2,000; they had suspended operations that winter because of the mounting losses.[3] The previous year the Carlisle Company had sold out, for though not making a working loss, its profits were insufficient even to meet debenture interest.[4]

Quite a large number of local authority tramways had to go 'on the rates' however, an example being Gloucester, whose £4,714 working profit in 1911-12 was converted into a loss of £2,317 after meeting all capital charges.[5] The thing which linked all those tramways mentioned was their small size or, in other words, that they were on the margin; any industry, whether or not basically sound, must have such enterprises. The troubles of small-town tramways did not necessarily sound the knell for Glasgow, Liverpool or Manchester.

There was one special case, however, where larger systems were in trouble. This was in the London area, where motorbuses had developed early and, by 1910, were estimated to have running costs and revenue comparable to

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1. Defined as unable to meet working costs.

2. Tramway Returns, UK including Ireland; it does not follow that all these were electric systems, of course, as a few non-electric lines still hung on.

3. H. V. Jinks, 'The Scarborough Tramways', TR 11 (Autumn 1975), 87.

4. George S. Hearse, Tramways of the City of Carlisle (Corbridge, Northumberland, 1962), 26.

5. Stanley E. Webb, 'Gloucester Corporation Light Railways--2', TR 15 (Spring 1983), 14.

the LCC's tramways. Thus by 1914 the latter and most other London municipal tramways were drawing on either reserves or the rates to meet charges.[1]

One financial problem was of even wider concern--the fear that tramway committees were not using the undoubted profits of their undertakings wisely. The worry was that an insufficient proportion of profits was being set aside as depreciation to cover the future necessary reconstruction of the tramways. A survey carried out in 1910 concluded that only about thirty cities were paying enough for depreciation. Other profitable undertakings were paying too much out either as rate relief or to provide cheaper transport, so not leaving enough for the future. Those earning small surpluses or declaring a loss could not set money aside anyway. The future was being mortgaged to the present, so giving a false impression of the municipal tramway industry's true state.[2]

The Eye of the Storm: World War I and its Aftermath 1914--1919

World War I was the tram's time of glory and also the beginning of its decline. The war meant that trams were called upon to carry unprecedented levels of traffic. To give some examples, Glasgow's trams carried about 225 million passengers a year pre-war,[3] or 4.25 million a week. In 1917 the weekly total had risen to over 8 million.[4] In Liverpool passenger journeys increased by 26 per cent between 1913 and 1918, rising from 144.1 to 195.1 million per annum.[5] Such a contribution to the war effort was extremely creditable and was profitable too, at least on paper. Glasgow--a particularly well-run tramway it is true--actually succeeded in extinguishing its tramway debt during the war,[6] whilst many smaller undertakings were able to

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1. J. Sleeman, 'The Rise and Decline of Municipal Transport' (hereafter, 'Municipal Transport'), The Scottish Journal of Political Economy 9 (Feb 1962), 50.

2. McKay, Tramways and Trolleys, 187-90.

3. Oakley, The Last Tram, 56. 4. Ibid., 66.

5. Horne and Maund, Liverpool Transport 2, 32.

6. Oakley, The Last Tram, 56.

make a profit for the first and sometimes also for the last time. Erith, a struggling system on the edge of London, was one of these latter.[1] Profitability was increased partly because the larger number of passengers was usually carried on a reduced number of cars, so that each car was running at nearer full capacity. In Liverpool, for instance, car miles fell 8 per cent during the war.[2] Further assistance was afforded by the fact that motor bus services were generally reduced or eliminated. The Omnibus Act 1916 made the opening of new routes or the provision of purely pleasure trips virtually impossible, and petrol restrictions thinned other routes out.[3]

Increased revenue was one thing, but problems were being piled up in other directions. Military recruitment--often encouraged by tramway managements[4]--left undertakings short of staff. Conductors and later drivers could be replaced by women--as they were in Glasgow[5]--but maintenance and engineering staff were more difficult to find. Together with restrictions on certain materials--rails, for instance, could only be obtained on licence from the Ministry of Munitions[6]--this meant that only the most urgent repairs could be carried out. Track and cars deteriorated; on the Liverpool system the track and overhead in the neighbouring Borough of Bootle was in particularly poor shape by 1917,[7] and when the war ended 148 of the 598 cars were stored as unserviceable.[8]

When it became possible to undertake repairs and renewals again,

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1. Alan A. Jackson, 'The Erith Urban District Council Tramways' (hereafter, 'Erith Tramways'), TR 3 (Nos. 22 & 23, 1957), 135.

2. Horne and Maund, Liverpool Transport 2, 32.

3. D. N. Chester, Public Control of Road Passenger Transport: a study in administration and economics (hereafter, Public Control) (Manchester, 1936), 3.

4. Glasgow's Manager raised a thousand-strong Tramways' Battalion in a day, probably a record; Oakley, The Last Tram, 63.

5. Ibid., 65.

6. For example, see Borough of Doncaster, Minutes of the Electricity and Tramways Committee (hereafter, E&TC), 21 Jul 1916, 530.

7. Horne and Maund, Liverpool Transport 2, 32. 8. Ibid., 191.

inflation had reached alarming proportions. Revenue had increased--on the West Riding Tramways by over 100 per cent between 1913 and 1918--partly because there were more travellers and partly because fares were raised (by 50 per cent on this tramway[1]). But costs were also up by at least 100 per cent at the end of 1919[2] and maybe by as much as 150 per cent.[3]

To meet the crisis special powers had to be given to raise fares above the statutory maximum--generally 1d. a mile[4]--through the Statutory Undertakings (Temporary Increase of Charges) Act 1918 and the Tramways (Temporary . . .) Act 1920.[5]

Despite all the problems, most systems managed to effect repairs eventually. These were often delayed longer than they should have been--Walthamstow was not able to reconstruct its system until 1924-7, for instance[6]--and in the case of smaller undertakings were often no more than make-do-and-mend; in Keighley, for example, one set of new points and new springs on the cars seem to have been the extent of immediate post-war work.[7] One or two systems could not cope at all, Leyton, in East London, being one. Nineteen cars were unserviceable as late as 1921 and an agreement was made for the LCC to work the tramways. Leyton was supposed to reconstruct the track, but it was so bad that the LCC did it themselves.[8]

Even so, no tramway system actually closed specifically because of these wartime and post-war conditions. According to Sleeman, most returned

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1. SYRO, 8/UD28/465, Brief for Applicants at the Light Railway Commissioners Inquiry at Barnsley Town Hall, 21 Jan 1920 (hereafter, Brief 1920), 4-5.

2. SYRO, 8/UD28/467, Minutes of Proceedings, Light Railway Commissioners, Dearne District Light Railways (Amendment) Order, 21-22 Jan 1920 (hereafter, Proceedings 1920), 28.

3. Ibid., 84. 4. SYRO, Brief 1920, 5.

5. See John R. Day, London's Trams and Trolleybuses (1977), 101.

6. Rodinglea, The Tramways of East London (hereafter, East London) (1967), 124.

7. King, Keighley Transport, 61.

8. Rodinglea, East London, 108-10.

to prosperity within a few years,[1] though some only returned from a brief wartime prosperity to their usual insolvency; Erith was a case in point.[2] In a sense, the whole upheaval left matters much as they were, with the large profitable tramways on the one hand and the small struggling ones on the other.

The Storm Breaks: Competition and Decline 1920--1939

There was one change brought about by the war which could not be reversed, however. The conflict had demonstrated the value of motor transport beyond doubt,[3] and when the War Office released a large number of trained drivers and thousands of proven heavy motor vehicle chassis onto the market, road transport began to be a real threat to rail.[4]

The initial fillip provided by the 'hot-house' development induced by wartime needs was rapidly followed by other improvements to the motor bus. Over the whole inter-war period the vehicle changed almost beyond recognition. Early motor buses were based on the same flat-topped chassis as lorries--bodies were even interchangeable--but from the 1920s improved bus chassis were developed to provide a lower loading vehicle. Saloon width--and hence capacity--was improved by replacing curved side panels by straight ones. Slow four cylinder engines were superseded by six cylinder ones with improved transmission, and the overall weight of vehicles was greatly reduced. The lower chassis enabled top covers to be fitted to double-deckers; the driver eventually got a windscreen too. In the 1920s Leyland Tiger and Titan and AEC[5] Regent chassis were exemplars of this modern generation and caused 'a revolution in the P.S.V. world. We now had a vehicle light in weight, easy to operate and manipulate, with plenty of smooth power available, and a comfortable ride on pneumatic tyres. From those days the P.S.V.

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1. Sleeman, 'Municipal Transport', 52.
2. Jackson, 'Erith Tramways', 135. 3. Chester, Public Control, 3.
4. Cummings, Railway Buses 1, 6.
5. Associated Equipment Company, at first an LGOC subsidiary.

has never looked back'.[1]

One of the most important improvements was the pneumatic tyre. At first buses used solid rubber tyres, then cushion tyres, with a soft core inside a solid exterior, and only adopted pneumatic tyres from the mid-1920s onwards. This improved riding and very greatly reduced running costs.[2] A later, and equally important change was the development of the high-speed compression ignition--or diesel--engine for bus use. This was dependent on the invention of a new type of fuel pump, which appeared in the 1920s; in 1930 the first experimental diesel-engined buses were put into service. The engine really became established in 1933, when Scottish Motor Traction took delivery of 250 diesel buses. Fuel consumption was half that of petrol engines, so reducing running costs considerably, whilst the engine was reliable and had the advantage of using non-flammable fuel.[3]

Another necessary improvement was in braking. Early motor buses sometimes had only an upgraded horse bus brake acting directly on the rubber tyre.[4] Mechanical brakes were fitted later, but still acting on only two wheels. Increased weights and speeds made these inadequate, so four-wheel braking with power assistance became essential.[5]

The size and weight of motor buses has always been regulated, during most of the period under review by the Ministry of Transport. Weights for double-deckers were 9 tons in 1927, 9.5 tons for those with pneumatic tyres in 1930, 10 tons in 1931 and 10.5 tons in 1935. At the latter date dimensions were 26 feet by 7.5 feet, remaining the same until 1945. These progressive relaxations permitted improvements such as extending the top deck over the driver's cab and enclosing the rear staircase and, most importantly, expanding the seating capacity to fifty-six. To get more than this some undertakings went in for six-axle buses which could be longer whilst

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1. C. T. Humpidge, 'Development of the Public Service Vehicle as the Complete Vehicle Concept' (hereafter, 'Development of the P.S.V.'), Crompton-Lanchester Lecture, 21 Oct 1966, author's draft, 2-3.

2. Ibid., 5. 3. Ibid., 4-5. 4. Coxon, Rails of Birmingham, 95.

5. Humpidge, 'Development of the P.S.V.', 4.

still meeting axle-weight limitations; sixty-six seats were then possible, but the design was not popular, except for trolleybuses.[1]

Motor bus services during the inter-war period developed under three main groups of operators--large companies, municipalities and small independent proprietors. The first were nearly all grouped under holding companies and were thus known as Associated Companies; one of the largest groups was controlled by the BET and another by Tillings. These were the major sector of the industry, controlling about 40 per cent of the buses and up to 60 per cent of passengers by 1933. After 1928 the railways tended to give up their generally small scale bus operations and to take holdings in these major companies instead. Municipal fleets were often large, but as a whole councils owned only 12.8 per cent of buses and carried 23.4 per cent of passengers in 1933. The small independents accounted for a staggering 90 per cent of operators and 40 per cent of buses, but only for 15 per cent of passengers.[2]

Unfortunately the statistics for motor buses before the 1930s are sparse, largely because buses were not subject to the same strict parliamentary controls as their route-bound competitors. There is only one continuous series, supplemented for a few years only by more detailed figures included in the Tramway Returns. These are reproduced as Tables 6 and 7 overleaf.

When the first reliable statistic for buses and coaches appeared in 1926, the total was already far higher than that for trams--40,000 as against 14,000.[3] Each bus evidently carried a good deal fewer passengers than the equivalent tram, however, an average of 126,625 passengers per annum in 1934-5[4] as against 332,637. The higher capacity trams continued to

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1. Ibid., 3-4.

2. H. J. Dyos and D. H. Aldcroft, British Transport: an economic survey from the seventeenth century to the twentieth (hereafter, British Survey) (Leicester, 1969), 339-40.

3. For tram figures, see Table 10 below. 4. Calculated from Table 7.

TABLE 6

NUMBER OF BUSES AND COACHES IN BRITAIN 1904--1938

Year	Vehicles (thousands)	Year	Vehicles (thousands)
1904	5	1922	78
1906	10	1924	94
1908	15	1926	40 (a)
1910	24	1928	46
1912	35	1930	53
1914	51	1932	47 (b)
1916	51	1934	46
1918	42	1936	49
1920	75	1938	53

SOURCE: Brian R. Mitchell and P. Deane, Abstract of British Historical Statistics (Cambridge, 1962), 230; only alternate years reproduced here.

a. Up to 1925 taxis were included in the totals; in 1926 there were 41,000 taxis, meaning that the earlier figures may be distorted by as much 50 per cent.

b. The fall here was due to the effect of the 1930 Road Traffic Act in weeding out unsatisfactory operators and concentrating the industry in larger units.

TABLE 7

NUMBER OF PUBLIC SERVICE VEHICLES AND PASSENGERS 1934-5--1937-8

Year	PSVs	Passengers (millions)
1934-5	45,536	5,766
1935-6	46,440	6,045
1936-7	47,890	6,287
1937-8	49,655	6,828

SOURCE: Tramway Returns

carry a large number of passengers well into the 1930s, especially as a majority of the buses and coaches would be employed in areas where trams had never run. A more significant comparison is thus between municipal buses and trams, shown overleaf in Table 8. This shows how in the 1920s the huge majority of passengers travelled by tram, but that by the mid-1930s the motorbus was rapidly closing the gap. In fact, if one adds municipal trolleybus traffic, the gap between buses and trams almost ceases to exist;

TABLE 8

PASSENGERS CARRIED ON MUNICIPAL MOTOR BUSES AND TRAMS FOR SELECTED YEARS 1923--1936

Year	Motorbus Passengers (Millions)	Tram Passengers (Millions)
1923-4	122	3,976
1925-6	220	-
1927-8	359	-
1931	1,101	3,660
1932	1,199	3,447
1933	1,266	2,578
1934	1,414	2,479
1935	1,604	2,378
1936	1,797	2,319

SOURCE: Herman Finer, Municipal Trading: a study in public administration (1941), 54-5.

the total for bus traffic rises to 2,165 million[1] as against 2,319 million for the trams.

Municipalities which had invested considerable capital in tramways were naturally rather slow to initiate motor bus services.[2] Another reason for delay was that until 1930 local authorities had no general powers to operate motor buses and had to obtain a special Act to do so, whereas companies did not.[3] Some municipalities favoured the trolleybus as a half-way house between trams and motor buses, one of the great attractions being the ability to retain a major customer for municipal electric power.[4]

Pre-World War I trolleybuses had really only reached a prototype stage and could not under any circumstances have taken over the traffic of any but the smallest tramway. The name given them--trackless trams--was almost

1. Trolleybus traffic from Herman Finer, Municipal Trading: a study in public administration (hereafter, Municipal Trading) (1941), 55.

2. D. H. Aldcroft, British Transport since 1914: an economic history (hereafter, Transport since 1914) (1975), 46.

3. Chester, Public Control, 18 (footnote),

4. Doncaster Corporation Transport: 50 Years Jubilee 1902--1952 (hereafter, DCT Jubilee) (Doncaster, 1952), 40.

literally true, and a lighter vehicle designed for road use was needed. The pioneer in this respect was the Manager of the small Tees-side Trackless concern, who in 1922 adapted a Tilling-Stevens petrol-electric bus to run either as a motor or a trolleybus.[1] Whether following this lead or acting independently, C. Owen Silvers, the Manager of Wolverhampton Tramways,did likewise a year or so later; thereafter the trolleybus developed into an electric bus rather than a trackless, with foot controls,[2] a lightweight body, pneumatic tyres and, usually, a six-wheeled chassis.[3]

Various significant developments in the 1920s persuaded tramway managers to look at the new vehicle seriously. In 1922 Birmingham was faced with the need to renew the awkward single and loop tramway to Nechells. Instead of doing so, the Manager opted for trackless, and when this first conversion from trams proved successful,[4] it naturally attracted attention. In 1924 Keighley converted its complete tramway system to trolleys.[5] But the great trolleybus advocate remained Owen Silvers,[6] who replaced Wolverhampton's trams completely between 1923 and 1928;[7] as a rather larger system, this was of more significance than earlier conversions. When in the early 1930s, the newly-formed London Passenger Transport Board (hereafter, LPTB) decided on a complete changeover from tram to trolleybus, a further great boost was given to the latter.[8]

Tramways experienced competition from the newer road transport modes in two ways. First, existing systems faced competition along all or part of their routes from motor buses operated by either the major companies or by independents (known at the time as 'pirates', because of what larger oper-

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1. Dunbar, Buses, Trolleys and Trams, 82.

2. On Birmingham's new trackless route of 1922 drivers needed one hand on the wheel and the other on a tramcar-type controller; see Coxon, Rails of Birmingham, 128.

3. Klapper, Tramways, 270. 4. Ibid., 269.

5. King, Keighley Transport, 85. 6. Owen, British Trolleybus, 101.

7. Ibid., 100. 8. Klapper, Tramways, 273.

TABLE 9

MILEAGE, PASSENGERS CARRIED AND NUMBER OF VEHICLES AND UNDERTAKINGS FOR BRITISH TROLLEYBUSES 1913-14, 1921-2 AND 1926-7--1937-8

Year	Route Mileage	Passengers Carried	Vehicles	No.of Undertakings
1913-14	20.52	1,960,141	31	8
1921-2	47.9	9,879,730	80	-
1926-7	87.04	50,382,193	253 (b)	-
1927-8	111.34	80,112,970	319 (b)	21
1928-9	132.63	99,065,544	389 (b)	23
1929-30	168.76	127,461,837	492 (b)	22
1930-1	193.70	153,004,554	-	24
1931-2	255.99	184,373,190	-	24
1932-3	279.74	221,070,215	-	28
1933-4 (a)	330.98	254.323,260	-	31
1934-5	367.72	337,751,365	1,095	32
1935-6	442	446,000,000	1,510	33
1936-7	538	632,000,000	1,950	30
1937-8	644	865,000,000	2,585	33

SOURCE: Tramway (and Trolley Vehicle) Returns.

a. From 1933-4 LPTB trolleybuses are not included in the main tables, so figures thereafter are obtained by summing the provincial Returns with summary details provided for London in a separate table.

b. These figures from Owen, British Trolleybus, 37; probably originally from the Returns.

ators of both buses and trams considered unfair competition[1]). An important feature of the 1920s' transport scene was that such competition was very difficult to prevent, since although both tramway and trolleybus routes and operators were very strictly controlled by Parliament and the Ministry,[2] motor buses were subject to a few central regulations coupled with local authority licensing. The latter's powers were based on the Town Police Clauses Acts of 1847 and 1889 which naturally related only to horse-drawn vehicles when passed and did not in any case usually apply in rural areas.[3] There were 1,300 or more licensing authorities and a bus operator needed a

1. Dyos and Aldcroft, British Survey, 341.

2. For instance, Bradford's first trolleybus route had to be authorised by a Bill in 1910, whilst later routes were subject to Board of Trade inspection like tramways; see J. A. L. Stainforth and others, The Bradford Trolleybus System (Huddersfield, 1972?), 3-4 and 8.

3. Sykes, Yorkshire Traction, 21.

licence from each area through which he passed. The usual reading of the Acts was that only vehicles and staff could be licensed, not services, whilst infringements were difficult to prove and carried such light penalties that operators could afford to ignore convictions.[1] The force of the Victorian legislation was in any case much weakened by the Roads Act 1920 which gave wide powers to the Ministry of Transport to overrule decisions of local licensing authorities without right of appeal of their part.[2]

Local authorities owning tramways were naturally anxious to protect them, and many attempted to do so by attaching conditions to the issue of bus licences. But there was no guarantee that these would be upheld if challenged, and smaller authorities particularly found it difficult to stand out against either the large and powerful bus companies or the cheeky independents. For instance, Kircaldy Burgh Council[3] prohibited buses from picking up in the town,[4] but when in 1928 someone broke this condition the Town Clerk had to admit that the Council had no powers to impose such a rule and the floodgates of competition were opened.[5] In other cases, Councils seem to have been able to get away with quite rigid conditions, but in practice found that these were ignored with impunity. In 1923, for example, Doncaster attempted to protect its trams by making bus operators charge higher fares than the trams and forbidding them to pick up or set down passengers on common sections;[6] yet as late as 1930 over 40 per cent of buses running into Doncaster were either unlicensed or evading the law in some way.[7] Some tramway departments even found other council committees frustrated their

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1. R. Stuart Pilcher, Road Passenger Transport (1937), 333-4.

2. DCT Jubilee, 25.

3. The legislation in Scotland was not the same as in England, but the point is the same.

4. Alan W. Brotchie, The Tramways of Kircaldy (Dundee, 1978), 40.

5. Ibid., 43.

6. Doncaster Borough Council, Watch Committee, 21 Feb 1923, 50F/237; 50F/237 refers to a specific minute/page in the printed record.

7. DCT Jubilee, 35.

efforts. South Shields Watch Committee was told by the Tramways' Committee Chairman, 'If you want us to be bankrupt, all you have to do is to go on licensing buses'; by 1929, out of 147 buses licensed, only 11 belonged to the Corporation.[1] This was the regular experience of the few tramway companies, to whom the local authorities felt little loyalty. In the Black Country many authorities licensed all-comers, so making it virtually impossible for the tram companies to pay the rents on the tracks leased from the self-same authorities.[2]

There were on the other hand some authorities which managed to keep competition at bay. Wolverhampton admitted to a transport monopoly in the mid-1920s; over a period of a few years only two licence applications had been made, and both were refused.[3] How this was achieved is not revealed and, in this particular case, it did not benefit trams anyway. Generally it was the major authorities with large tramways who had the power to impose conditions on both large and small competitors. Glasgow Corporation, for example, were concerned at the number of private buses within the city --962 of them in 1929--and were able to obtain parliamentary legislation in 1930 giving them monopoly powers for the city area; thereafter private buses could only pick up passengers at specified points and only if their destination was beyond the boundary. Once more, it was largely 'the Corporation bus that enjoyed the triumph. The Corporation tramcar hardly came into the issue at all'.[4]

The chaotic licensing situation was cleared up by the Road Traffic Act 1930, which transferred licensing to bodies of Traffic Commissioners. They were able to protect existing facilities, including tramways, railways and buses, from fresh motor bus competition by their powers to (1) refuse new service applications and (2) limit existing bus services by not allowing

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1. David Holding, A History of British Bus Services: the North East (hereafter, Bus Services: North East) (Newton Abbot, 1979), 116.

2. Webb, Black Country 2, 64.

3. Chester, Public Control, 23 (footnote).

4. Oakley, The Last Tram, 84.

long-distance operators to pick up or set down within a local area[1] or by making them charge higher fares.[2] These arrangements certainly benefitted the larger bus operators against the 'pirates', but may have done little to improve the fortunes of tramways,[3] particularly since for the first time local authorities already operating any form of road transport were given freedom to introduce their own bus services.[4]

This draws attention to the second way in which tramways experienced competition, that is from bus services introduced by tramway operators themselves. Tramways, particularly in the exposed private sector, had sometimes found it necessary when faced by motor bus competition to put their own buses on in self-defence. By 1924 in the Black Country trams were losing traffic to small buses timed to run just in front of them. Their sister bus undertaking, the Birmingham and Midland (later, Midland Red) was called in to run in front of the competitors.[5] Of course, once that was done the buses had to stay and the only logical conclusion was the withdrawal of the trams themselves.[6]

Local authorities were less likely to adopt such schemes, but were nontheless under great pressure to introduce motor bus services, in particular to new or outlying housing areas; motor buses were also perceived as more comfortable and faster. One authority which did compete directly with its own trams was Manchester, which introduced express buses over the Altrincham route in May 1929; the tramway was abandoned in 1931.[7] But of course the whole question was commercial at bottom. Would motorbuses or trolleys cost less to inaugurate or run than trams? and would they earn more? If they did, then the eventual result would not be in doubt and eventually market forces would compel all or most tramway operators to convert, whether or not

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1. i.e. the Glasgow solution.

2. Dyos and Aldcroft, Transport Survey, 357-8. 3. Ibid., 361.

4. Chester, Public Control, 20. 5. Webb, Black Country 2, 64.

6. Ibid., 85. 7. Pilcher, Road Passenger Transport, 243-4.

they faced direct competition on the road.

Generally speaking, the answer to all the above questions was 'yes'. Some qualifications can be made, but at the time the commercial case against the tram was fairly generally believed to be established.

The capital intensive nature of a tramway is obvious. To take just one example, in 1932 Barrow-in-Furness Council were considering whether to modernise its tramways or not. To rebuild completely the main route and to buy twenty new trams would have cost £127,000, eighteen buses cost £31,700; so the last tram ran in April that year.[1]

The question of running costs is more problematic. The usual measure used to compare operating statistics was pence per vehicle mile. On this basis, trams were considerably cheaper to run than motor buses before World War I. In 1915 in Keighley, for instance, buses cost 15.74d. per vehicle mile and trams only 6.53d.[2] A similar comparison for Wigan in 1929-30 showed the above relationship to be reversed. Tramway working expenses were 13.39d., for motor buses 10.54d. and for trolleybuses 10.37d.[3] It was a matter of argument amongst transport professionals as to whether trolley-buses always had the edge over motor buses or not; Pilcher, who was not a trolleybus fan,[4] produced a table showing that in fourteen undertakings operating both types of bus, the motorbus was cheaper to run in ten.[5] Where the tram was concerned, though, this was an academic argument, as for

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1. Ian L. Cormack, Seventy-Five Years on Wheels: the history of public transport in Barrow-in-Furness 1885--1960 (Glasgow, 1960), 35.

2. Calculated from figures given by King, Keighley Transport, 145; incidentally, trolleybuses showed up much better, with operating costs of only 6.35d., but equally the experimental 'trackless' of the time could not have carried the trams' traffic.

3. E. K. Stretch, The Tramways of Wigan (Rochdale, 1978), 194.

4. See for example the conclusion to his chapter on trolleybuses in his 1937 book, where he says that even if costs do favour trolleys, the advantages of flexibility are with the motor bus and that such a mobile form of transport is essential; see Road Passenger Transport, 153.

5. R. Stuart Pilcher, Road Transport Operation - Passenger (hereafter, Road Transport Operation) (1930), 52.

every mile run, either kind of bus was much cheaper.

However a more sophisticated measure was the seat instead of the vehicle mile. This was important because at least on the larger tramways, trams usually had more seats than buses. Motor buses seated 56 by the early 1930s, but the average Glasgow tram in 1933 seated around 60 and some new ones up to 68.[1] So costs per seat mile might be less favourable to the tramcar's competitors. In Wolverhampton, for instance, trams cost 24.579d. per 100 seat miles in 1928, trolleybuses 24.375d. and motor buses 33.280d. But the gap was closing. There had been over 7d. between motor buses and trams in 1925, but by 1929 there was just 1d. difference.[2] By the 1930s, Sleeman says, 'carrying cost (sic) per passenger on buses were comparable with those on trams, instead of more than twice as high, as they had often been around 1920'.[3]

The third part of the commercial calculation was revenue. Perhaps slightly to the surprise of operators, they found takings rising substantially when trams were replaced. The LUT found their new trolleybuses were earning 26 per cent more than the trams had, though, as the Company's historian mentions, this must partly have been due to the novelty value of the new vehicles and to their comparison with thirty year old trams.[4] Pilcher found the same was true for motor buses in Manchester, which took over 15 per cent more on average than the trams had done over the same routes.[5]

The whole effect of these various competitive and commercial pressures on tramways was that, first a trickle and then a flood were abandoned as the inter-war years went on. The very first tram system to succumb to motor bus competition was Sheerness in 1917,[6] though this was scarcely the begin-

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1. Oakley, The Last Tram, 87.

2. Pilcher, Road Transport Operation, 50-1.

3. Sleeman, 'Municipal Transport', 52.

4. Geoffrey Wilson, London United Tramways: a history 1894--1933 (hereafter, L. U. T.) (1971), 175.

5. Percentage calculated from figures in Road Passenger Transport, 117.

6. Klapper, Tramways, 286.

ning of the end for tramways. The next closure was at Taunton, in 1921, because the Company was unable or unwilling to pay increased electricity charges.[1] Keighley followed in 1924, but the peak of closures--thirteen in one year--was not reached until 1929,[2] and even then it was really only the smaller tramways which were going. But by the 1930s larger undertakings were deciding to dispense with their trams. Manchester's conversion of the busy belt route 53 to motor buses in 1930 was so successful that other conversions quickly followed;[3] in 1939 the city decided to replace all its remaining trams within eighteen months.[4] The giant LPTB system was marked down for conversion to trolleybuses during the 1930s, beginning in 1935 with the remainder of the ex-LUT and the Bexley, Erith and Dartford tramways.[5] By the outbreak of war some quite large towns had replaced trams completely, places like Bournemouth and Nottingham in 1936, Birkenhead in 1937 and Brighton and Halifax in 1939.

It will be seen from Table 10 below that the pruning of small systems made very little difference overall until the early 1930s. Tram passengers numbered about 4,600 million in both 1924-5 and 1929-30, even though about 450 miles of track and the same number of cars had gone. But from then on the mileage and fleet fell rapidly, in the former case to less than half the 1924-5 total by 1937-8. Passengers fell by over 1,000 million, not as much proportionately because it was generally the big city systems which were still running.

Post-World War II, the decline continued. Obviously many of the pre-war reasons still applied, but there were differences too, notably the increased impact of the motor car, both as a traffic stealer and a cause of cong-

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1. Ibid., 185.
2. For dates of closure of all British tramways, see Appendix G5.
3. Klapper, Tramways, 137.
4. Sleeman, 'Municipal Transport', 53.
5. Owen, British Trolleybus, 67.

TABLE 10

MILEAGE, PASSENGERS, NUMBER OF CARS AND SYSTEM CLOSURES FOR BRITISH TRAMWAYS (a) 1924-5--1938-9

Year	Route Mileage	Passengers Carried	Trams	Number of Systems Closed (b)
1917ff	-	-	-	2 (c)
1924-5	2,605	4,620,501,521	14,397	1
1925-6	2,602	4,668,812,206	14,434	2
1926-7	2,554	4,460,298,677	14,481	3
1927-8	2,508	4,705,842,932	14,403	7
1928-9	2,420	4,623,258,679	14,244	6
1929-30	2,323	4,613,526,659	13,922	13
1930-1	2,163	4,394,530,590	13,321	12
1931-2	1,976	4,107,673,072	12,767	12
1932-3	1,861	3,844,907,770	12,275	10
1933-4	1,766 (d)	3,777,901,644	11,708	8
1934-5	1,620	3,664,990,717	11,018	9
1935-6	1,485	3,526,000,000	10,447	10
1936-7	1,341	3,379,000,000	9,803	8
1937-8	1,183	3,059,000,000	8,875	10
1938-9 (e)	-	-	-	2
1939-40	-	-	-	7
1941ff	-	-	-	39

SOURCES: Tramway Returns, except for final column from Appendix G5.

a. Including non-electric lines except for the final column. However these were a very small proportion by the 1920s, there being only 8.55 miles of steam tramway and 14.87 miles of cable in 1926-7, most of the latter anyway being a cable-worked underground railway in Glasgow.

b. Electric lines only; calendar not financial years.

c. i.e. Sheerness in 1917 and Taunton in 1921.

d. As with Table 9, national figures from 1933-4 onwards are obtained by summing the Returns proper with summary data for the LPTB.

e. No further Returns were made until 1948-9.

-estion.[1]

World War II caused the already agreed abandonment plans of many of the remaining operators to be deferred 'for the duration'. In a few cases the timetable was adhered to, for instance in Huddersfield, where the last tram ran in 1940.[2] Two systems closed after air raids, in Bristol and Coventry.[3]

1. For these and other post-war factors in more detail, see J. Joyce, Tramway Twilight (1962), 45-8.

2. Doubtless this was permitted because trolleybuses, which used home-produced fuel, were being used in preference to motor buses.

3. Joyce, Tramway Twilight, 2.

Even so, some 6,000 trams were still in operation after the war.[1] In some cases, such as London, it was only a case of waiting until conditions permitted their replacement.[2] But a few 'tramway strongholds' were still buiding new trams and even new extensions, notable among them being Aberdeen, Blackpool, Edinburgh, Glasgow, Leeds, Sheffield and Sunderland.[3] In Glasgow, for instance, a class of 107 new cars was built,[4] whilst in Leeds a reserved track extension was completed as late as 1949.[5] However, all this was really only a last attempt to delay an inevitable replacement by motor bus--the trolleybus was by now really out of contention[6]--and one-by-one the last big-city systems closed down; Liverpool in 1957, Aberdeen in 1958, Leeds in 1959, Sheffield in 1960 and, finally, Glasgow in 1962.[7] That left, and still leaves, Blackpool operating a classical tramway along its Promenade, the sole survivor from the great age of the tramway industry in Britain.

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1. Ibid., 3. 2. Ibid., 12. 3. Ibid., 33. 4. Ibid., 35.

5. Ibid., 36. 6. Owen, British Trolleybus, 168-70.

7. See Appendix G5.

CHAPTER 2

REASONS FOR THE INDUSTRY'S DECLINE

In describing how the tramway industry declined some indication as to why has necessarily been given. But a great many other contributory factors, apart from the mere tram:bus nexus, must be brought into consideration. The weight which is given to each has, in previous analyses, depended very much on the writer's viewpoint or particular expertise.

Tramway enthusiasts have tended in the past to adopt what might be called a 'conspiracy theory', in which various 'powers and dominions' range themselves against an unjustly accused tram. For example, the historian of the Brighton tramways writes that 'the council appeared to become obsessed with a desire to rid itself of its very faithful servants, the trams, with the greatest possible speed', some of which were to be replaced by 'a more odorous form of transport, viz., the diesel bus',[1] the trams being 'ruthlessly scrapped'.[2] Such emotive language has, happily, been generally replaced in more recent work by a broader appreciation of the commercial and political environment in which closure decisions were taken, a good example being the Black Country history by Webb cited above.

Those writing or speaking from the viewpoint of transport operators naturally give full weight to the commercial considerations which are the bricks and mortar of economic history, but they also pick out factors which the more detached observer might miss. For instance Pilcher, a prominent

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1. R. M. Harmer and other, 'A History of Light Rail Transport in the Brighton Area of Sussex--the Brighton Corporation Tramways', TR 6 (Summer 1966), 133.

2. Ibid., 135.

transport manager, mentions as disadvantageous that reading is difficult on a motor bus,[1] and also spends some time on the relative abilities of trams and buses to cope with fog,[2] apart from more obvious items such as seating capacity.[3] Managers were aware, of course, that such factors affected revenue and costs, and were thus of some importance. It is worth noting, however, that the judgements made and the evidence adduced by professionals could be as emotionally biased as those of enthusiasts. Pilcher himself was anti-tram, and though his writings appeared impartial, they were always weighted against trams.[4]

Economic historians may, on the other hand, miss some things others notice by focussing on purely economic explanations. For instance, it is transport historians who have made most of the--often real--opposition to trams from various quarters.

In attempting to summarise the reasons for tramway closures, the centre of the whole question would appear to be the competition between bus[5] and tram. Various reasons for the success of the former have been dealt with above, as follows: cost advantages, first respecting capital but also increasingly revenue account; ability to earn more; technical improvements; increased size; and lack of licensing restrictions.

Some further points may be made on these subjects before passing on. The question of capital costs might, one would assume, not be an issue for established tramways, or even to work against buses; why spend money on buses when one had a perfectly good tramway? The trouble was, most managements did not. Tramways built in the boom years before World War I were all wearing out at the same time, and unfortunately this was when prices

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1. Pilcher, Road Transport Operation, 129.

2. Pilcher, Road Passenger Transport, 120-3. 3. Ibid., 300.

4. Comment by Ian Yearsley in an unpublished lecture to the Sheffield Area of the Light Rail Transit Association on 23 Feb 1981 and entitled, '"Bus and Coach" and the Anti-tram Campaign' (hereafter, 'Bus and Coach').

5. Understood in the remainder of this section to be motor buses and, where appropriate, trolleybuses also.

of construction and repair had soared. Before 1914 a single line of paved tramway had cost about £4,500 a mile, but by 1919 it was up to £12,500--15,000;[1] even after the general prices had fallen almost to 1914 levels again during the inter-war period,[2] the price of a mile of track was still almost twice what it had been, at £8,092.[3] Many tramways were rebuilt in the 1920s, but others, usually small ones, were only patched up. Eventually the latter were faced with the need for total reconstruction, and if they were to compete at all successfully with buses, with the necessity of introducing additional improvements such as double tracks and modern cars. It simply was not worth it.[4] Increasingly it was not worth it for the larger systems either; for whilst the real capital costs of tramways remained at a very high level, the capital cost of motor vehicles fell sharply.[5]

A further dificulty was that municipal tramways were built on loans, usually repayable in the early days over a period of forty years. Track, however, lasted only twenty years.[6] Whether this happened because of optimistic ideas about the track's durability[7] or whether it was due to a deliberate attempt to get capital costs down to a reasonable annual figure,[8] is not clear. Later loans were usually given for shorter periods, twenty years for track or cars.[9] But the damage had been done, for when older tramways found renewal necessary, they usually still had the millstone of unexpired

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1. Joyce, Tramways Heyday, 97.

2. For price indices, see Appendix G4.

3. Pilcher, Road Passenger Transport, 112-3.

4. Pilcher, Road Transport Operation, 7.

5. S. Glynn and J. Oxborrow, Interwar Britain: a Social and Economic History (hereafter, Interwar Britain) (1976), 104.

6. Yearsley, 'Bus and Coach'.

7. Finer, Municipal Trading, 138 believes the redemption periods were made too long because there was at the time no experience of the life of such new assets.

8. DCT Jubilee, 9 implies this.

9. Finer, Municipal Trading, 134-5.

debt still around their shoulders and, if the tramways were to be reconstructed, with much higher repayments on any new loan. In Wigan, for example, the debt was not due to be paid off until 1937, but it was decided to run the trams only until the track wore out and then to replace them,[1] a process concluded in 1931.[2] A case such as Glasgow's, which paid off its tramway debt in the course of both World Wars,[3] was indeed exceptional.

A new loan would not have been necessary, of course, had adequate allowance been made for depreciation by building up a fund to pay for renewals as they came due. As already noted, this was by no means always done even in the prosperous pre-1914 era. Even where it was, the value of such funds declined in real terms after 1918.[4] This meant that when reconstruction became necessary within the life of the old loans--as it usually did--additional loans had to be raised to cover the new work. For instance, Wigan carried out extensive renewals in the early 1920s by loan finance, the costs being £48,258 for track and £42,402 for cars.[5]

Finer, however, argues that depreciation provision over and above loan redemption was not desirable, because (1) it placed an unfair burden on past generations of ratepayers and (2) whilst in theory it provided a fund for the complete renewal of capital assets at the end of a set period, repairs and renewals were in fact required continuously. There does, however, seem to have been some deliberate attempt to boost reserves in the post-World War I period, for whereas municipal undertakings were only putting a figure equal to 8 per cent of their debt aside as reserve in 1909, in 1925 it was 16 per cent, though this fell back again in the 1930s to reach 10 per cent in 1937.[6]

The general conclusion would seem to be that, when anything much more

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1. Stretch, Tramways of Wigan, 138. 2. Ibid., 151.

3. Sleeman, 'Municipal Transport', 51.

4. Yearsley, 'Bus and Coach'. 5. Stretch, Tramways of Wigan, 196.

6. Finer, Municipal Trading, 136-7 and 139.

than normal repairs needed doing, fresh loans had to be sought. In the case of tramways, these usually had to be added to the unexpired portion of old loans. It was natural, therefore, that if a cheaper alternative to tramways was available, it would be very attractive, particularly if motor buses could earn sufficient profits to provide for their own depreciation over five to six years, as Pilcher claimed they could; at the time this was slightly less than the life of a bus at six and a half years.[1]

Although capital costs included cars, overhead etc as well as track, it seems to have been the condition of the latter which most often impelled the decision to close or convert a tramway. Coxon describes the track in West Bromwich to Dudley and Wednesbury in the mid-1930s. It had not been relaid since 1903 and was 'in fearful and dangerous condition; check rail missing for yards at a time, rail tread split, wheels running on the bottom of the groove most of the way, rails out of alignment and deeply sunk, and a cloud of yellow dust ground from the granite setts following the tram along'. These routes did not close until as late as 1939, but other Black Country tramways succumbed much earlier. The Dudley and Stourbridge Company began closures in 1926, partly because of the need for track renewals and a lack of finance to do this, whilst Wolverhampton's decision in the mid-1920s to convert all its trams was largely also due to the cost of replacing worn-out track.[2] Examples could be multiplied from the rest of the country.

The technical improvements to buses mentioned in the previous chapter meant that by 1930 they were (1) physically able to compete with the tram for city traffic and (2) able to do so at an equal or lesser cost per mile. Mention was also made of the increased revenue earned by buses. Some of the reasons for this are given by Pilcher as follows: the buses ran faster than the trams,[3] service levels could thus be increased, the vehicles were modern and attractive and kerbside loading encouraged travel by the old, women and

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1. Pilcher, Road Passenger Transport, 118.

2. Coxon, Rails of Birmingham, 132-3, 82, 72 and 79.

3. 11.0 m.p.h. versus 8.6 m.p.h. in service conditions in Manchester.

children.[1]

Pilcher was making the case for motor buses and is thus not entirely fair. He himself reports a test run between a bus and a tram when the latter was on reserved track off-street, and here the two ran at 14.84 and 14.19 miles per hour respectively, not a large difference. He also admits modern trams might achieve increases in revenue too, but immediately qualifies this by saying that in Manchester passengers still preferred buses despite some trams being fitted with high-speed motors and upholstered seats.[2] In fact, Manchester's trams were never really modernised in the same sense as some in, say, Glasgow. Tinkering with old cars may have produced genuine improvements, but trams needed to look modern to compete with new buses. This undertakings such as Glasgow, where just over 150 streamlined 'Coronation' cars were produced between 1937 and 1941,[3] or Liverpool, which built 313 streamliners in the years 1935-8,[4] at least partially achieved. Such new cars did stimulate traffic, just as new buses did. For instance, the progressive LUT's comfortable new 'Feltham' trams ran at an average service speed of twelve miles per hour--faster than Manchester's buses--which resulted in an increase of tram passengers over the previous year.[5]

Coupled with new trams, undertakings which were prepared to invest in their tramways modernised their older cars as thoroughly as possible. Glasgow reconstructed or reconditioned over 300 by 1930, making them faster, more comfortable and safer.[6] Lord Ashfield, Chairman of the LUT's parent company, said in 1932 that after their speed and comfort had been improved, trams showed themselves capable of attracting more passengers.[7]

Even if faster trams were used, however, traffic congestion kept their average speed down; this was ten miles an hour on the three London company

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1. Pilcher, Road Passenger Transport, 116-17. 2. Ibid.,117.

3. Scottish Tramway Museum Society, Glasgow Tramway and Railway Rolling Stock (Glasgow, 1958), section 8 (no pp.).

4. Klapper, Tramways, 90. 5. Wilson, L. U. T.,

6. Oakley, The Last Tram, 82. 7. Wilson, L. U. T., 166.

tramways in 1930.[1] So better tracks were also needed, like the grassed reserved tracks pioneered by Liverpool in 1914.[2] The Board of Trade was willing to sanction 20 miles per hour on such lines even then,[3] whereas their normal limits ranged from 8 to 16 miles per hour.[4] By the late 1930s the Ministry of Transport was prepared to allow 30 miles per hour on wide and straight street tracks,[5] but how often these ideal conditions occurred is debatable.

Such tramway modernisation as there was, however, was too limited. In the first case, only a few systems were involved, such as Glasgow, Liverpool and a handful of others. A number of other towns tried a few or even just one modern tram, but the result was predictable. Bradford built a fast single-decker, but then decided modern trolleybuses were a better prospect. Many tramways, for a variety of reasons, scarcely advanced at all. Bradford had to keep open balconies on its double-deck cars to the end because of Ministry of Transport restrictions on narrow gauge trams on steep hills.[6] Other smaller systems ended much as they had begun, presumably because it was never possible or worthwhile to spend money on the trams; no double-deck trams in the South-west ever had a top cover, for example.

Even those tramways that did modernise never completed the task. After World War II Glasgow had about 250 modern trams, but more than 500 of the rest were forty-five years old or more. Nor were reserved tracks as much use as they should have been when trams still had to run through congested central streets. Plans for a tramway tunnel in Liverpool in connection with a scheme to run trams through the Mersey Tunnel might have shown

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1. Ibid. 2. Horne and Maund, Liverpool Transport 2, 93.

3. Ibid., 94. 4. Klapper, Tramways, 222.

5. Pilcher, Road Passenger Transport, 102-3.

6. A. E. Jones, Trams and Buses of West Yorkshire (hereafter, Trams and Buses) (1985), 25-7.

7. P. W. Gentry, The Tramways of the West of England (hereafter, West of England) (2nd edition, 1960), 5.

8. Oakley, The Last Tram, 112.

the way, had this come to fruition.[1] In the event, London's Kingsway Subway[2] remained unique. The only tramway which was really thoroughly modernised with a new fleet on reserved track was Blackpool's Promenade line, for which 116 new trams were delivered between 1933 and 1937;[3] it is surely no coincidence that this is the sole surviving British tramway.

The above has assumed the commonly accepted view--held by most of today's enthusiasts and at least some managers at the time--that if tramways had been allowed to compete by being fully modernised, more than one of them might have survived. In particular, it is argued that the poor showing of old trams against new buses was given the lie by the success of those few modern trams which were built; if other systems had adopted them, or those which did had done so more enthusiastically, the tram might have been retained in favourable conditions.

Ian Yearsley takes a more radical stance, saying that in fact no truly modern trams were ever built in Britain. Improvements made were purely cosmetic, and no radically new inventions were made which either reduced costs or increased revenue. The last real tramway advance, he says, was the Brush low-height double-decker in the 1920s, which made it possible to replace single-deckers in certain situations. In contrast to what he sees as the technical stagnation of tramcar design, buses benefitted from numerous developments, most of which have been mentioned above; an additional one is the introduction of tar macadam road surfaces. By these means buses overtook trams in terms of cost, capacity, speed and comfort.[4]

A point made much of in favour of--usually--motor buses was their flexibility or mobility. This could cover a multitude of virtues, including

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1. Horne and Maund, Liverpool Transport 2, 71-3.

2. C. S. Dunbar and others, London's Tramway Subway (n.d.), passim.

3. County Borough of Blackpool, 75 Years of Electric Street Tramway Operation (Blackpool, 1960), 6.

4. Yearsley, 'Bus and Coach'.

manoeuvrability in traffic,[1] ability to switch quickly from route to route,[2] a limited facility to avoid traffic congestion by diverging over several city streets or termini[3] and the ease of serving new traffic objectives without the need for expensive infrastructure.[4]

The key matters highlighted by the flexibility issue were traffic congestion and the need for route extensions. Trams were seen in some quarters from as early as the turn of the century as 'the principal obstruction to the free passage of other vehicles . . . and the main cause of any insufficiency of road accommodation which at present exists'.[5] Twenty or thirty years later the problem was much worse, and trams attracted a tail of motor vehicles which were unable to overtake and which formed a danger to passengers boarding or alighting.[6] Lee, in one of the few detailed academic studies of a tramway system, quotes the Hull Manager's opinion that hazardous loading was an important reason for disposing of the city's trams.[7] Lee himself regards the traffic problem as decisive. Increased motor traffic was causing congestion, but the trams monopolised the crown of the road, leaving only one lane (if there was no parking) for other vehicles, as well as holding up the traffic as they moved slowly onwards with frequent stops. Passengers had to cross the road to board or alight, causing inconvenience or danger, which could only be alleviated in a few places by refuges or reservations. The cause was the inadequate scale of development of British cities in the nineteenth century.[8] The LPTB also put congestion as a major reason for tramway replacement.[9]

The judgement of the time was not entirely fair--the trams had been

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1. Pilcher, Road Transport Operation, 182.

2. Pilcher, Road Passenger Transport, 300-1. 3. Ibid., 292.

4. Finer, Municipal Trading, 283.

5. Departmental Committee on Highways 1903, quoted in SYRO, Proceedings 1914, 66.

6. Joyce, Tramway Heyday, 108. 7. Lee, 'Tramways of Hull', 217.

8. Ibid., 274. 9. Wilson, L. U. T., 177.

there first after all--or even justified. The LUT's Manager tried to defend trams against the charge of obstruction,[1] and even Pilcher had to admit that they were the most economic users of road space.[2] It was quite possible to argue the contrary point, in fact, that other road traffic held up the trams. Finer mentions Birmingham's attempts to stem losses on its trams by using bigger and faster cars; the policy failed because of traffic hold-ups, the only change for the trams being a large increase in current consumption.[3] True though this might be, however, the sight of a tail of motor vehicles following a tram was sufficient to ensure that the latter got the blame.

Whilst on the subject of congestion, a related point was that tram routes themselves could become congested, usually because the layout was inadequate. For instance, the Kidderminster line needed doubling to deal adequately with the traffic, but there was not the money to do it.[4] And Pilcher's famous route 53 conversion was made necessary by and to a large extent was successful because of low bridges and single track sections along it.[5]

Before moving on to the question of extensions, some other inadequacies which affected tramways, and which therefore invited competition or substitution, may be noticed. One was the isolation of many municipal undertakings This was sometimes due to unfortunate decisions on tramway gauges. For instance, Bradford's 4ft gauge trams met both Halifax's 3ft 6in and Leed's 4ft $8\frac{1}{2}$in tracks;[6] a journey from Bradford to Huddersfield involved two changes, from a Bradford to a Halifax and a Halifax to a Huddersfield car, the latter running on tracks 4ft $7\frac{3}{4}$in apart intended to accommodate railway wagons (which never actually did run).[7] The result was that through ser-

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1. Ibid., 164. 2. Pilcher, Road Pasenger Transport, 289.

3. Finer, Municipal Trading, 282. 4. Webb, Black Country 2, 201.

5. Klapper, Tramways, 137.

6. C. T. Humpidge, unpublished lecture notes (n.d.), 7.

7. An unique dual gauge service was however run between Bradford and

vices were difficult to achieve and private bus operators took advantage of this and established themselves on the interurban routes.[1] It is true, as a later writer says, that it is easy to criticise the gauge differences with hindsight and that local authorities did not at the time envisage further growth of towns or the need for an alternative interurban transport to railways.[2] But this lack of foresight probably was 'a contributory factor in the cessation of tramway development and the commencement of the decline'.[3] In other cases, municipal jealousies were clearly to blame. Bradford and Keighley, for example, could not agree on inter-working arrangements; other authorities, like Halifax and Rochdale, opposed the running of other municipal transport through their areas.

On the other hand, in other places inter-running was the rule, the best example being South-east Lancashire.[5] Even here, though, negotiations at the end of the 1930s failed to achieve the desired objective of a joint transport board. It is perhaps significant that although much is made in the literature about the evils of not co-operating,[6] even in an area where trams did inter-work successfully, the life of tramways was not noticeably prolonged.

A problem which 'let in' bus competition or made buses a more attractive alternative to trams in some cities was an inability to run cross-town services. London's 'tram gap' in the City and West End has already been mentioned above; Birmingham had a similar problem with no through cross-city routes and a series of termini on the fringe of the central area,[7] a fact

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and Leeds from 1909 until towards the end of World War I using special cars with adjustable trucks; Bradford's trams also met those of the Yorkshire (WD), which were standard gauge. See Bett and Gilham, Networks, 47-9 and 51.

1. Humpidge, unpublished lecture, 7.
2. Jones, Trams and Buses, 7. 3. Bett and Gilham, Networks, 47.
4. Humpidge, unpublished lecture, 7.
5. Finer, Municipal Trading, 280.
6. See ibid., 278-82 for a discussion of this point.
7. Bett and Gilham, Networks, 78.

which may have hastened closure.[1]

In some sense all the above tramway deficiencies could be seen as soluble by the much-vaunted mobility of the motor bus. So could the most serious problem of all, the need for extensions. Electric tramways were themselves, of course, often extended versions of old horse or steam tramways. The new trams were regarded by many major municipalities as instruments of social policy which could assist in moving the population out of the city centre slums to better housing on the outskirts; Glasgow is a case in point, Manchester another, whose Housing Committee opined in 1904 that 'the modern electric tramway will come to the rescue'.[2] Experience seemed to bear out this view, though imperfectly, as with all human endeavours. In Manchester as tramway traffic grew in the years before World War I, so the heavily built-up area expanded from a radius of around two miles to four, with less dense housing developments spreading to meet the surrounding towns.[3] When tram routes are superimposed on a population map for Manchester in 1913, the two are shown to match fairly well.[4]

But Britain ended World War I still with severe housing shortages, and to meet these municipal building was encouraged.[5] In one way, the resultant estates were ideally related to tramways as new purpose-built reserved tracks could be laid to serve them; Leeds did this with their Middleton estate in the 1920s, last extending the line as late as 1948-9.[6] But in other ways estates were not good tramway territory. The population was not well off and could not afford frequent trips to town, so the estate was self-contained with its own shops and entertainments. As a result, there were periods of peak demand in the morning and the evening, and not much in

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1. Klapper, Tramways, 242.

2. Kerry Hamilton and Stephen Potter, Losing Track (1985), 72 and 75; quotation on the latter page.

3. McKay, Tramways and Trolleys, 217. 4. Ibid., 218, map.

5. A. Winstone Bond, The British Tram: History's Orphan (hereafter, History's Orphan) (Hartley, Kent, 1980), 46.

6. Hamilton and Potter, Losing Track, 79.

between.[1] Even then, social policy sometimes dictated that subsidised fares should be offered to those who had moved out from the central areas,[2] which only made the public transport provision even more uneconomic.

Other new housing--the leafy crescents and ribbon development of suburbia--was even less attractive to a fixed link form of transport like trams which depended on dense traffic for its profitability. Meanwhile, as people migrated from inner areas, trams lost just that short-distance traffic they had once relied on.[3] In Manchester inner and intermediate wards lost 61,363 people between 1921 and 1934, whereas outer wards gained 99,291.[4] In a parallel process, trams lost traffic as the traditional northern industrial areas declined and people moved south, where tramways were never as important.[5] If the dreams of Edwardian garden city planners had been fully turned into reality, these new towns might have had their own tramways, as Letchworth should have done; the reservation was actually provided, but ended up as a pedestrian walkway.[6]

Moreover the need for new transport facilities came just at a time when tramways were physically run-down after World War I and were having to fight unrestricted motor bus competition. Money for extensions was often unavailable.[7] So Aberdeen Council decided in 1920 that, due to the cost of rehabilitating the tramways, all new routes should be bus operated.[8]

Thus for every city or town which extended its tramways, there were more which did not. As an extreme example, Bristol tramways built no new lines after 1908.[9] In places like Birmingham, buses were often used to serve the new estates, originally as feeders to existing tramways, but later

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1. Bond, History's Orphan, 47. 2. Joyce, Tramway Heyday, 106.
3. Ibid., 101-2. 4. Pilcher, Road Passenger Transport, 298.
5. Joyce, Tramway Heyday, 101.
6. Hamilton and Potter, Losing Track, 77-8.
7. Bond, History's Orphan, 47.
8. Klapper, Tramways, 230; two short lines were built later.
9. Joyce, Tramway Heyday, 102; most smaller systems were the same.

running in along them and taking their traffic, with the inevitable result that those routes themselves would become uneconomic to re-equip when the time came.[1]

Tramway operators were faced with other pressures, apart from purely commercial ones, the chief of these being a number of legal or quasi-legal restrictions. Most of them stemmed from the 1870 Tramways Act and though they bore most severely on private companies, municipalities were not immune. Under the Act, when a tramway was promoted any local authority concerned had the right of veto over the proposals. It was possible to circumvent this by a private act, but this was difficult--Paisley's is the only significant case--and local authorities used their power not usually to forbid, but to exact danegeld in the form of street improvements, bridge reconstruction etc. The LUT, which was asked for huge sums, is the most often quoted example.[2]

The most disliked feature of the 1870 Act was the obligation to repair the road surface between the tracks and for eighteen inches on each side, perfectly logical in the case of horse tramways, but far less so for their successors, particularly when the road surface was worn out by the tram's competitors.[3] The problem was naturally worst on the busiest streets, and it was here that trams were otherwise most economic.[4] Tramway operators compared this high charge to the relatively insignificant road tax paid by bus owners.[5] Incidentally, the complainant in this case was a municipal operator, for although in theory the trams' contribution to road repairs merely relieved another municipal department which would have had to do the job anyway, the transport department were still saddled with an item which

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1. Bond, History's Orphan, 49.

2. G. B. Claydon, '100 Years of the Tramways Act' (hereafter, 'Tramways Act'), MT 33 (Aug 1970), 282; for other legislation, see Appendix G3.

3. Ibid., 281. 4. Finer, Municipal Trading, 282.

5. SYRO, 8/UD28/545, Reports of the Clerk to the Joint Committee (of the DDLR) 16 Nov 1923--21 Jul 1932 (hereafter, Clerk's Reports), 9 Jul 1924, 1; there is no serial numbering in this volume, but each report is numbered internally, and so is cited by date and by individual pagination.

put their own costs up; the natural course was to seek for ways of cutting these.

Equally a matter of municipal book-keeping except where companies were involved was the obligation to pay full rates on a tramway;[1] buses, of course, paid none for their right-of-way. To point the contrast, in 1933 Birmingham's buses had 50 per cent more traffic than the trams; yet the latter paid £50,602 in rates as against £13,595 for the buses.[2]

The reason why there were so few operating companies was the 1870 Act's proviso that local authorities could take over a line after twenty-one years. The surviving companies were still faced with this threat, reinforced by court decisions in the 1890s that only scrap value was to be paid for their assets. Companies were then most unwilling to invest, the most glaring example being Bristol, whose 1895 tramcar fleet was virtually unchanged for forty-six years.[3] Webbs feels that insecurity of tenure was a major factor in holding back further development and in hastening the break-up and closure of the Black Country system.[4]

Private enterprise in the tramway field was thus trammelled from the start; even municipal operators found the Act's financial burdens irksome, particularly since they were often competing with bus companies which had no comparable restrictions. It was true that the Light Railways Act 1896 removed or reduced many of the Tramways Act's worst features. Rates, for example, were cut by 75 per cent and local authorities lost their veto. So though intended for rural light railways, the Act came to be used for purely urban lines, such as those in Walthamstow, which was at least of benefit to new entrants into the industry.[5] Nontheless the mileage involved was not great, only about 350 miles by the end of World War I[6] out of a total of

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1. Claydon, 'Tramways Act', 282. 2. Finer, Municipal Trading, 81.

3. Claydon, 'Tramways Act', 282. 4. Webb, Black Country 2, 85.

5. Claydon, 'Tramways Act', 282-3.

6. W. K. Davies, Light Railways, their rise and decline (hereafter, Light Railways) (1964), 54.

2,569.[1]

Not exactly a legal restriction, but a real competitive disadvantage, was the fact that tramway wage rates were generally higher than those paid to bus men.[2] In Hull, for example, private bus drivers worked up to 104 hours a week for a little over half a tram driver's wage.[3]

From some points of view this might have been regarded as a moral obligation, and so no doubt, in origin at least, was the legal requirement to offer workmen's fares on tramways,[4] usually at half the standard fare.[5] Since this again did not apply to buses, there was a great temptation on the operator to dispense with trams.[6]

This was one reason why tram fares seem generally to have been too low for the operators' own good. Joyce says that there is no evidence of any substantial rise in fares from the inception of tramways to 1938, except for an increase and subsequent reduction around World War I.[7] Other reasons why fares remained low were deliberate municipal subsidy and, though he does not mention it, competitive pressures.[8] This would not have mattered had not running costs risen from 7d. a mile in 1914 to 1s. 1d. by 1930, and if the need for expensive renewals and extensions had not been so urgent. The end result was an undermining of tramways' financial strength.[9]

Operators' troubles may have been partly of their own making in another way too. Lee lays great stress on managerial divisions as a cause of Hull tramways' problems. Early on responsibility was divided between three

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1. Tramway Returns, excluding Ireland; the Light Railways Act itself applied only to Great Britain (see W. J. K. Davies, Light Railways, 282).

2. Pilcher, Road Transport Operation, 182.

3. Lee, 'Tramways of Hull', 205. 4. Finer, Municipal Trading, 352.

5. Joyce, Tramway Heyday, 120. 6. Finer, Municipal Trading, 352.

7. Joyce, Tramway Heyday, 121.

8. Dunbar, Buses, Trolleys and Trams, 74 and 76; in the 1920s both the LCC and Glasgow introduced ultra-cheap fares to counter competition.

9. Joyce, Tramway Heyday, 123-4.

officers,[1] a situation only resolved in 1919 when the Manager and Electrical Engineer were sacked for fraud and a proper General Manager appointed.[2] Unfortunately during the 1920s there were great dissensions between him and the Committee Chairman.[3] Dover was another town where responsibility was split, in this case between the Tramways' Manager and the Borough Engineer, who was responsible for the track.[4]

Tramways did not operate in a vacuum of course, but were affected by economic and political influences external to transport itself. Obviously tramways were always susceptible to changes in the local economy. For instance, the Kidderminster line went through a period of falling receipts and traffic from 1905 onwards due to a depression in the local carpet trade; the Company's receipts did not pick up until there was an upturn about 1911.[5] In this period tramways were not under competitive pressure, and so usually survived. When the same sort of thing happened after World War I, they might not. For example, the Cambourne and Redruth tramway was killed by the depression in Cornish industry,[6] and many tramways were hit hard by the General Strike and its aftermath; the Lanarkshire tramways, for example, had to curtail operations after 1926 and promoted an abandonment bill in 1929,[7] whilst the Kidderminster line, having survived its pre-war troubles, also closed in 1929, following years in which its profits were as low as £19 (1925) and £99 (1926), partly a result of the industrial troubles which had preceded the 1926 strike.[8]

A more domestic issue pointed out by Ian Yearsley is that Britain had no strong tramcar manufacturing industry. Major operators tended to build their own trams, so after the boom years the car industry virtually collapsed, helped on its way by the fact that their products were so long-lived. The few remaining manufacturers just fulfilled what orders they could get,

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1. Lee, 'Tramways of Hull', 96-7. 2. Ibid., 143.
3. Ibid., 186-7, 191 and 212-14. 4. Klapper, Tramways,
5. Webb, Black Country 2, 185,190 and 192. 6. Klapper, Tramways, 185.
7. Ibid., 219. 8. Webb, Black Country 2, 200-1.

usually on traditional lines, and had no incentive to design and sell new models for which there was going to be little demand. Bus manufacturers hardly needed to sell their products; there was no alternative.[1]

A final economic point before moving on to more political matters is to note the obvious parallel between the problems of tramways and those of the railways. The rise in railway costs during World War I marked the beginning of the maladjustment of costs and charges which has plagued the industry ever since, a point already noted about tramways themselves. Rail lines were also, like tramways, concentrated in old and declining industrial areas. The impact of road competition is obvious, but a particularly important point is that as railway traffic fell the operating ratio grew worse. This is because rail systems have a high proportion of fixed assets with concomitant costs inescapable in the short term; thus unit costs vary inversely with the volume of traffic.[2] One would expect tramway costs to behave similarly.

Taking politics in its widest sense to include both bureaucratic and pressure groups as well as elected forums, trams seem to have attracted political opposition from a very early date. Joyce traces this back to Train's trams, which were strongly opposed because of the use of step rail[3] and which, though unintentionally, because identified as a lower class vehicle,[4] an impression reinforced later by the way trams often ran through grim industrial landscapes.[5] Electric tramways were opposed in turn because of the overhead wires.[6] However once established, the new trams often became a source of genuine civic pride.[7]

Later opposition was more serious than aesthetic or class prejudice, and came principally from government, the press, town planners and motoring organisations. Joyce says that the press were generally hostile to

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1. Yearsley, 'Bus and Coach'.

2. D. H. Aldcroft, Transport since 1914, 23 and 31-42.

3. Joyce, Tramway Heyday, 2. 4. Ibid., 4. 5. Ibid., 57.

6. Ibid., 30. 7. See Oakley, The Last Tram, 70 for a tram jubilee.

trams.[1] The most virulent opposition came from Bus and Coach, a magazine founded by a fanatical anti-tram campaigner in 1929 and which provided a platform for men like Pilcher and Owen Silvers. Horace Wyatt, the founding editor, used captions like 'Beauty and the Beast' with illustrations of buses and trams, and though this might seem ludicrous the professional contributors were very influential.[2]

The point has already been made above that physical restrictions in towns often made them unsuitable for trams. Up to the 1920s town planners often suggested the reconstruction of cities to accommodate trams; this was done in a report for Sheffield in 1924.[3] Later, attitudes changed, and the same planner was recommending the removal of trams elsewhere in South Yorkshire to ease the traffic flow.[4] The difficulty of fitting trams into post-World War II plans was even greater, of course.[5] The whole effect was to make trams seem dated and in the way, aspects of the past better cleared off the streets.

Automobile organisations were naturally glad to support such notions and had been early opponents of tramways. The committee which produced the 1903 report on roads cited above[6] was said to include the Chairman of the Automobile Association amongst its members with others interested in the motor industry.[7] Later, when West Ham wanted to put a clause in a bill prohibiting driving past stationary trams, the motor lobby ensured it was dropped.[8]

There is some argument about whether changes in local political control influenced tramway closures. One writer says that trams were scrapped in

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1. Joyce, Tramway Heyday, 111. 2. Yearsley, 'Bus and Coach'.

3. Patrick Abercrombie with R. H. Mattocks, Sheffield: a Civic Survey and suggestions towards a Development Plan (hereafter, Civic Survey) (Liverpool and London, 1924), 55 and 60.

4. Patrick Abercrombie and others, The Sheffield and District Regional Planning Scheme (Liverpool and London, 1931), 35 and 79-80.

5. Joyce, Tramway Twilight, 47-8. 6. See above, 63

7. SYRO, Proceedings 1914, 67. 8. Rodinglea, East London, 145.

Leeds, Sheffield and Edinburgh when the anti-tram party gained office,[1] but this was not so in Edinburgh[2] nor in Sheffield, where what had happened was that the party in almost continuous control since 1926, Labour, had changed its mind.[3] Local political pressure may have operated in other ways, however, as when local interests combined with the Ministry of Transport in the inter-war years to force Bradford and Leeds Watch Committees to give bus companies licences to run into their areas.[4]

What is unquestionable is that central government--which here really means the mandarins--had a negative attitude towards tramways from at least 1931, when the Royal Commission on Transport dismissed trams in one paragraph: 'Tramways . . . are . . . in a state of obsolescence . . . cause much unnecessary congestion and . . . danger', they wrote, recommending that '(a) no additional tramways should be constructed, and (b) that . . . they should gradually disappear and give place to other forms of transport'.[5] This judgement had no practical or immediate effect, but it made it more difficult for go-ahead boroughs to justify expansion or retention of their tramways.[6] By 1949 the Ministry was saying that fixed tracks should be eliminated as soon as possible.[7]

Glasgow provides a clear case of political pressure influencing events, for in 1951 a government committee recommended that the city should give up its out-of-town services and scrap its trams in return for railway electrification; from then on Glasgow was under continuous pressure to adopt the report.[8] It took eleven years, but when the last Glasgow tram ran between Dalmuir West and the delightfully-named Auchenshuggle on 1 Sep 1962,[9] an

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1. Philip Webb, 'The View from Toronto', MT 43 (Nov 1980), 370.
2. John S. Wilson, 'The View from Edinburgh', MT 44 (Mar 1981), 85.
3. Gandy, Sheffield Tramways, 97. 4. Jones, Trams and Buses, 17.
5. Quoted in Joyce, Tramway Heyday, 99. 6. Ibid., 100.
7. Julian Thompson, British Trams in Camera (1978), 12.
8. Dunbar, Buses, Trolleys and Trams, 116.
9. Joyce, Tramway Twilight, 104.

era in British street transport was almost at an end, just over a century after it had begun on Merseyside.

Amongst the reasons suggested for the general decline of British tramways up to 1939 and their almost complete disappearance after 1945, the first essential was the emergence and development of competitors able to do the tram's work more cheaply. Other advantages of buses were that they could serve necessary new extensions more economically than trams and also proved able to earn more revenue; this was partly the attraction of their modernity, and whilst trams could be modernised, the process was at best half-hearted or even, in the view of some commentators, never really undertaken at all, except for basically cosmetic improvements. Tramways found it difficult to withstand motor bus competition because there was no effective statutory protection. At the same time as competition was intensifying, tramways were faced with the need for reconstruction, often within the original loan periods and without adequate renewal funds. Their revenue was also affected by fares which were too low and by general economic trends. Negative factors holding tramways back included legal restrictions on them, municipal isolation, poor tramway layouts, and inadequate managements. Political pressure of one kind or another may have affected local transport policies and so, increasingly, did traffic congestion, which trams were certainly impeded by and were also believed to cause.

These are general points. In seeing how they apply to particular towns in one area of the country, South Yorkshire, it is worth recalling Finer's point referring to transport undertakings, that each area is 'an eccentric economic entity'.[1] The general factors governing the decline of tramways may thus be present in different degrees in different areas; other quite new causes may even be found. The remainder of this thesis is designed to show how typical or otherwise South Yorkshire's tramways were.

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1. Finer, Municipal Trading, 282.

PART II

THE DEARNE DISTRICT LIGHT RAILWAYS

THE SMALL TRAMWAY

CHAPTER 3

THE HISTORY OF THE LINE

There were six tramway systems within present-day South Yorkshire, four in the towns of Barnsley, Doncaster, Rotherham and Sheffield and two connecting smaller places, the Mexborough and Swinton Company line and the municipal Dearne District.[1] The Dearne District Light Railways[2] formed the last complete electric tramway system to open in Britain. It had been proposed and authorised just before World War I, but could not be opened until 1924, by which time motorbuses were already deeply entrenched. The already dated vehicles, layout and operating practices were no match for the more flexible motor bus and the line closed again in 1933, making it one of the shortest-lived tramways in Britain. The goodwill was sold to the competing Yorkshire Traction bus company.

The Preparatory Period

The river Dearne flows through Barnsley to join the Don at Denaby. In this section of the valley are the townships of Bolton-on-Dearne, Darfield, Goldthorpe, Wath and Wombwell.[3] In 1913 the Urban District Councils[4] of Bolton (which included Goldthorpe), Thurnscoe (a little to the east of the places mentioned), Wath and Wombwell combined to promote a tramway to con-

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1. For brief details of these, see Bett and Gilham, Networks, 58-63.

2. Hereafter, DDLR; though promoted under the 1896 Light Railways Act, the line was indistinguishable from a street tramway.

3. Ordnance Survey, 1:50,000, 2nd Series, Sheet 111.

4. A pre-1914 local government area, hereafter UDC; see Appendix G2.

nect the area with Barnsley.[1]

The population of the four authorities was 42,119[2] in the 1911 census. If Barnsley and Worsborough are added, this rises to 105,496.[3] The main industry was--and is--the mining of coal from the Barnsley and Silkstone seams.[4] By 1870 there were 108 mines in the South Yorkshire Coalfield as a whole[5] with some, such as Manvers Main, also associated with coke ovens and by-products plants.[6] By 1913 the other two employers in the area were the railways and the glass industry.[7]

The existing transport network in the Dearne valley included the Dearne and Dove Canal, dating from 1798,[8] various fairly recent road transport facilities and the railways. The Midland had a station at Wath,[9] which also had two other stations. One was the terminus of a Hull and Barnsley line serving Hickleton & Thurnscoe en route,[10] the other on the Great Central route via Wombwell and Stairfoot to Barnsley.[11] The Midland had a separate station at Wombwell and also ran a joint line via Bolton with the North Eastern Railway.[12] The small Dearne Valley Company had opened to passengers only in 1912,[13] and had halts at Great Houghton, Goldthorpe & Thurnscoe and

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1. A. S. Denton, D. D. L. R. The Story of the Dearne District Light Railways (hereafter, D. D. L. R.) (Bromley Common, Kent, 1980), 6.

2. SYRO, 8/UD28/1, Brief for Applicants 26 Feb 1914 (hereafter, Brief 1914), 1.

3. SYRO, Proceedings 1914, 645.

4. G. G. Hopkinson, 'The Development of the South Yorkshire and North Derbyshire Coalfield 1500--1775' (hereafter, 'Yorkshire Coal Industry'), in Studies in the Yorkshire Coal Industry, ed. J. Benson and R. G. Neville (Manchester, 1976), 1.

5. G. D. B. Gray, 'The South Yorkshire Coalfield', in ibid., 31.

6. Ibid., 41. 7. SYRO, Brief 1914, 5.

8. Charles Hadfield, The Canals of Yorkshire and North East England 2 (Newton Abbot, 1973), 283.

9. Denton, D. D. L. R., 4.

10. C. T. Goode, Railways in South Yorkshire (Clapham, Yorks., 1975), 42-3.

11. Ibid., 14. 12. Denton, D. D. L. R., 4.

13. Goode, Railways in South Yorkshire, 94.

Harlington (for Adwick-on-Dearne).[1] Railway services were widely criticised locally for unpunctuality, inadequate services and the unsatisfactory location of stations;[2] this was undoubtedly one of the major reasons why the tramway was promoted in the first place.

Electric tramways had already been built at either end of the valley. The first was owned by the Barnsley and District Electric Traction Company (hereafter, B&DETC), a BET subsidiary,[3] dated from 1904[4] and ran 3.06 miles[5] from Smithies in the north via the railway stations to the twin Worsborough Bridge and Dale termini.[6]

At the other end of the valley, in 1907, the Mexborough and Swinton Tramways Company (hereafter M&STC) opened a line from Rotherham--where it connected with the Corporation tramways--to Denaby via Swinton and Mexborough, originally on the Dolter surface contact system and later using normal overhead.[7] The M&STC was one of the five tramway subsidiaries of the National Electric Construction Company (hereafter NECC).[8] In 1912 the Company proposed to build trolleybus routes out from its tramway, but determined opposition from the Dearne local authorities ensured that only two were approved, from Denaby to Conisbrough and Mexborough to Manvers Main;[9] service began in 1915, but did not become regular until 1922.[10]

There were horse buses[11] and wagonettes[12] in use in the area, and the

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1. Denton, D. D. L. R., 4. 2. SYRO, Brief 1914, 6.

3. Sykes, Yorkshire Traction, 7.

4. C[has]. C. Hall, 'A History of the Barnsley, Dearne, Mexborough & Rotherham Tramway Conurbation' (hereafter, 'Conurbation History'), TR 7 (Winter 1967), 75.

5. SYRO, Proceedings 1914, 645.

6. Hall, 'Conurbation History', TR 7 (Autumn 1967), 59.

7. Ibid., (Spring, 1968), 111-13. 8. Bett and Gilham, Networks, 193.

9. Hall, 'Conurbation History', TR 7 (Autumn 1968), 147-8.

10. C. T. Goode, The History of the Mexborough & Swinton Traction Company (hereafter, M&STC History) ([Hull?], 1982), 20-1; 'Traction' from 1929.

11. From Mexborough to Goldthorpe, for example; see ibid., 21.

12. SYRO, 8/UD2/3, Wombwell UDC Minutes, Highways and Buildings Comm-

first motor bus service may have been started in Darfield by the brothers Camplejohn as early as 1905.[1] By 1913 numerous proprietors were running buses and charabancs on the West Melton to Barnsley road,[2] which was also chosen by the B&DETC for one of its pioneer motor bus routes opened on 3 May 1913; another Dearne valley route served Goldthorpe.[3]

Despite these fairly extensive transport facilities, they linked the local communities in the valley either badly or not at all. A need for improved transport was still clearly felt,[4] and the local authorities too may have wanted to put forward a scheme as a counter to the M&STC plans.[5]

Various abortive proposals for tramways had been made between 1901 and 1906,[6] but it was not until much later that the local authorities--at first including Darfield--combined to produce a plan for a circular tramway and branches to serve their area.[7] Darfield withdrew at an early stage,[8] and other voices were raised in support of municipal buses. Bolton and Wath had actually planned a joint motor bus service, but the idea was dropped on expert advice,[9] and by 1913 Bolton seems to have wanted trolleybuses.[10]

However in 1913 an extended tramway scheme was applied for under the Light Railways Acts 1896 and 1912. The main line was to go right through the valley, starting by a junction with the Barnsley tramway (railway 1)[11]

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ittee, 3 Jun 1913, 98. The particular Wombwell Minutes consulted consist of two volumes containing only committee minutes (8/UD2/3-4) and eight including full council minutes as well (8/UD1/11-18), these of course being part of a longer series. References are to volume, meeting and page.

1. Denton, D. D. L. R., 4. 2. SYRO, Proceedings 1914, 465-6.

3. Sykes, Yorkshire Traction, 12. 4. See SYRO, Brief 1914, 6-7.

5. SYRO, Proceedings 1914, 542.

6. See Hall, 'Conurbation History', TR 7 (Autumn 1967), 56; (Winter 1967), 58 and 77-8; (Spring 1968), 116.

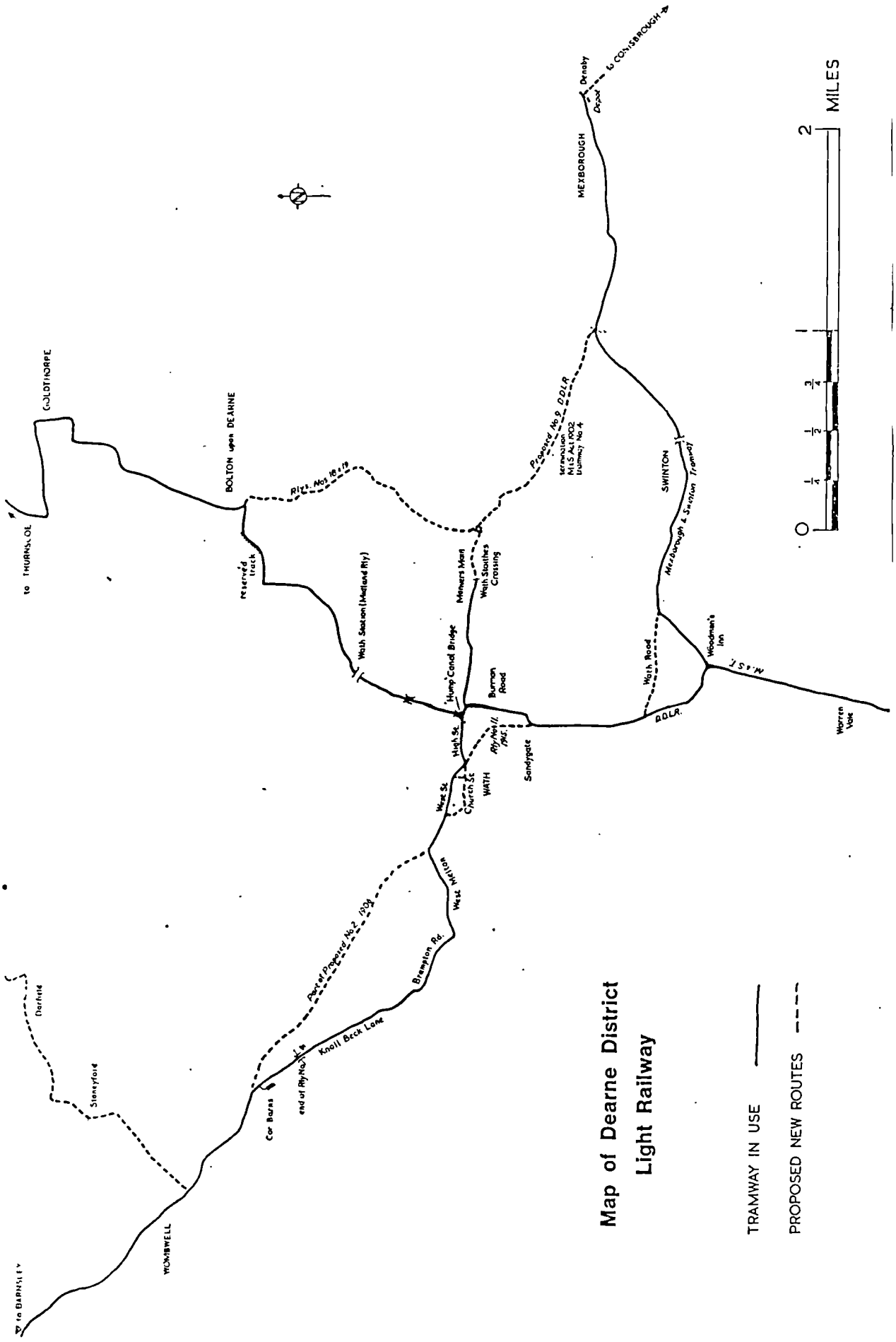
7. Ibid., (Autumn 1968), 148. 8. SYRO, Proceedings 1914, 544.

9. SYRO, 8/UD28/9, Proofs of Evidence given before the Inquiry 21 Jul 1914, 8-9 (hereafter, Proofs 21 Jul 1914, document preceding page, as 9,8-9).

10. Denton, D. D. L. R., 6.

11. For legal reasons tramway or light railway proposals were not made for complete systems or lines, but for separate sections known as 'railways' or 'tramways', sometimes as short as a few furlongs.

FIGURE 1
(reproduced from Hall, 'Conurbation History', TR 7 (Winter 1968), 181)



and passing through Ardsley (2), Worsborough and Wombwell (3 and 4), Brampton (5), West Melton and Wath (6 and 7) with a deviation in Wath (6a) to Adwick (8) and Manvers Main to join the M&STC line in Mexborough (9). Branches were proposed from Wath to Stonyford Bridge (10), the Darfield boundary; from Wath to Swinton, again joining the M&STC line (11--12a); from Wath to Thurnscoe (13--17); and from Bolton to rejoin the main line at Adwick (18--19a).[1] About fifteen miles of line were proposed,[2] of standard gauge and mostly single track.[3]

The DDLR[4] was promoted as a light railway,[5] and so the application was heard by the three Light Railway Commissioners in a quasi-judicial form with applicants and opponents being represented by barristers (twenty one of them).[6] The inquiry was held at Barnsley in the period 26--28 Feb and resumed in London over 2--10 Mar 1914; the minutes run to 778 pages.[7]

Each side produced expert witnesses. The main ones for the proposers were Stephen Sellon and Harry England. Sellon's firm had drawn up the scheme and he himself was a senior figure in the tramway world--consulting engineer to many tramways and the builder of some 800 miles of line, former member of and witness to various government committees, Vice-President of the Tramways and Light Railways Association.[8] Sellon made particular use of his experience as Engineer and Managing Director of the Weymss and District tramway,[9] a line which had many similarities to the proposed scheme. So did the Wakefield tramways, of which Harry England was General Manager.[10]

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1. SYRO, Brief 1914, 1-3. 2. Ibid., 4. 3. Ibid., 16.

4. The planned name was Dearne Valley Light Railway, but this was altered to suit the local railway company; see Goldthorpe Library, DDLR Joint Committee Minutes 1 Sep 1913--13 Jul 1923 (hereafter, JC Minutes), 37.

5. See Appendix G3/1 for the advantages of this procedure.

6. SYRO, Proceedings 1914, 1-2. 7. Ibid., 249 and 778.

8. SYRO, Proofs 21 Jul 1914, 11/1.

9. Alan W. Brotchie, The Wemyss and District Tramways Co. Ltd., Tramways of Fife and the Forth Valley--Part 3 (hereafter, Wemyss) (Dundee, 1976), 11 and 27.

10. SYRO, Proceedings 1914, 379 and 778.

The main opponents of the scheme, who were the existing transport operators and a vociferous group of ratepayers, also had their expert witnesses, chiefly an official of the BET and Mr. Cownie, Managing Director of the NECC and a Director of the M&STC.[1]

There were two main points at issue in the inquiry. First, were existing transport facilities adequate or not? As well as criticising the railways--who admitted they would lose traffic to a tramway--the promoters had put forward a traffic census showing heavy potential demand.[2]

Second, was a tramway the best means of satisfying this demand? Other actual or potential transport undertakers put the case for their vehicles, largely based on their lower capital costs.[3] Most of the argument was about whether or not a tramway would pay. There was a difference of about £10,000 between Sellon's estimated profit of £4,750 per annum[4] and the loss forecast by Mr. Chivers of the BET.[5]

After all the evidence had been heard, the inquiry was closed to await the decision of the Commissioners. If an Order was granted it needed only to be confirmed by the Board of Trade,[6] whereas under the Tramways Act parliamentary approval was needed.[7]

The Commissioners decided to grant the application, except for Wath to Bolton (railways 13 and 14) and Manvers Main to Mexborough (9), where the M&STC already had trolleybus powers; railway 8 could not be built without a bridge over Wath Staithes level crossing, and a bridge was necessary for the same reason at Elsecar.[8] Whilst accepting the latter,[9] the DDLR Joint Committee decided to appeal to the Board of Trade over the Bolton line.[10]

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1. Ibid., 1-2, 628 and 573. 2. Ibid., 666-7 and 382-3.
3. See, for example, the M&STC's case for trolleybuses; ibid., 52.
4. SYRO, Brief 1914, 11.
5. SYRO, Proceedings 1914, 644; for full details, see Appendix D1.
6. Davies, Light Railways, 53. 7. Claydon, 'Tramways Act', 280.
8. Hall, 'Conurbation History', TR 7 (Autumn 1968), 150.
9. Goldthorpe Library, JC Minutes, 40. 10. Ibid., 39.

However, although an inquiry was held at Bolton on 21 Jul 1914,[1] some complex legal action by the Great Central and Midland Railways led to the appeal being ruled ultra vires.[2] Thus when the Order finally appeared in 1915[3] it was as outlined above, with the addition of a deviation railway for the bridge at Elsecar.[4] Powers would lapse if construction was not commenced within three years or an extension of time were not granted by the Board.[5]

The Committee, advised by Sellon, were still unwilling to accept defeat and made a new application to substitute railways 13 and 14 for 18 and 19[6] by means of an amending order.[7] A draft order on these lines was actually published,[8] but the Commissioners deferred the local inquiry[9] and the Committee itself decided to suspend all expenditure until the war's end.[10]

In 1918 the Board of Trade granted an extension of time and the Committee decided to proceed with the draft order,[11] which would now need altering to increase the capital, fares etc in line with post-war prices.[12] Without the amendment, and without a bridge at Wath, the railways would be in two halves;[13] given this, it was still believed they would be viable.[14] The opposition, taking into account the two to two-and-a-half times rise in capital and running costs since 1914,[15] disagreed; one experienced witness

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1. SYRO, 8/UD28/4, Light Railway Commission, Proceedings 21 Jul 1914.

2. Goldthorpe Library, JC Minutes, 70.

3. SYRO, 8/UD28/14, Dearne District Light Railways Order 1915 (hereafter, Order 1915).

4. Ibid., 6-11. 5. Ibid., 21.

6. Goldthorpe Library, JC Minutes, 72. 7. Ibid., 80.

8. SYRO, 8/UD28/345, DDLR (Extension and Abandonment) Order 1916,2.

9. Goldthorpe Library, JC Minutes, 95. 10. Ibid., 96.

11. Ibid., 116. 12. SYRO, Brief 1920, 6.

13. SYRO, Evidence of Arthur Richard Hoare (hereafter, Evidence A. R. Hoare), 1; bound with above, but with separate pagination.

14. Ibid., 8-9.

15. SYRO, Proceedings 1920, 43.

was the first to forecast an actual working loss.[1]

A draft order was then drawn up amending the route and doubling the authorised capital and fares.[2] Further opposition was brought to bear to try to prevent its confirmation by the new Ministry of Transport.[3] More significantly, an official told the Committee that tramways would inevitably be loss-making[4] and that motor buses alone might break even. However the law only allowed existing tram operators to obtain municipal bus powers,[5] so he recommended coming to terms with the B&DTC[6] to provide extra services.[7]

Mr. Hoare, senior partner in Sellon's firm[8] since the latter's death in 1919,[9] not unnaturally insisted that only a tramway could meet the traffic demands;[10] and, though somewhat imprecise on financial details at first,[11] by 1921 was forecasting a surplus of over £5,000 after capital charges.[12] Even though the Committee took Hoare's advice and obtained the confirmation of the Order in 1921,[13] two years later some members were still uneasy and Hoare had to assure the meeting that 'the statement as to Revenue, Working Expenses etc was a very safe one'.[14]

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1. Ibid., 75.

2. SYRO, 8/UD28/474, DDLR (Amendment) Order 1920 (hereafter, Order 1920).

3. For example, SYRO, 8/UD28/476, Objections of the Motor Legislation Committee to the Confirmation of the Order.

4. SYRO, 8/UD28/482, Notes on the Speech of Mr. Stanley of the Ministry of Transport . . . 15 Dec 1920 (hereafter, Stanley 1920), 5.

5. Ibid., 7. 6. Ibid., 8.

7. The B&DETC dropped the 'Electric' from its title in 1919 and so is hereafter abbreviated as B&DTC; see Sykes, Yorkshire Traction, 18.

8. SYRO, Evidence A. R. Hoare, 1.

9. Goldthorpe Library, JC Minutes, 119.

10. SYRO, 8/UD28/484, Statement by Mr. Hoare . . . 3 Jan 1921, 3.

11. Ibid., 4-6.

12. SYRO, 8/UD28/488, Brief for Applicants at the Inquiry . . . into the Confirmation of the . . . Order . . . 1921 (hereafter, Brief 1921), 7.

13. SYRO, 8/UD28/495, DDLR (Amendment) Order 1921.

14. SYRO, 8/UD28/544, Minutes of the Joint Committee 30 Aug 1922--15

The tender of the Consolidated Construction Company was accepted[1] and work began at Thurnscoe in May 1923. It was later decided to build the Swinton (Woodman Inn) branch along a different route in Wath,[2] this being approved by another Order.[3] The completed sections were inspected by Major Hall from the Ministry of Transport on 9 Jul 1924[4] and opened five days later from Barnsley to Thurnscoe and Manvers.[5] The Woodman branch followed on 29 Sep 1924,[6] but the Darfield branch and the outer end of the Manvers Main line were not proceeded with at the time.[7] The total capital expended to date was £279,215, of which £274,142 was loaned.[8]

The Operating Period

The DDLR was controlled by a Joint Committee comprised of representatives of the four participating authorities.[9] The first Chairman was C. H. Oxley, 1913--20, followed by A. E. Allott, 1920--1, M. Nokes, 1921--32 and G. Probert, 1932ff.[10] Policy could also be debated by any of the UDCs and major decisions were sometimes thrashed out at joint conferences of the Councils.[11] The Clerk to the Committee was Joseph Ledger Hawksworth, who was also Clerk to both the Bolton and Thurnscoe UDCs and Accountant for the Wath and Bolton Gas Board;[12] he kept all the Committee's minutes and accounts and

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Dec 1932 (hereafter, JC Minutes), 26 Jan 1923. These minutes are bound in date order but only numbered in series up to 9 Apr 1925 (p. 127). Minutes of individual meetings are numbered internally, but erratically, so in these circumstances citations are made by date of meeting only.

1. Ibid., 2 Feb 1923. 2. Denton, D. D. L. R., 7.
3. SYRO, 8/UD28/496, DDLR (Amendment) Order 1924.
4. SYRO, Clerk's Reports, 9 Jul 1924, 1.
5. SYRO, JC Minutes, 4 Jul 1924. 6. Ibid., 26 Sep 1924.
7. SYRO, Clerk's Reports, 1 Feb 1924, 2.
8. Denton, D. D. L. R., 7.
9. Goldthorpe Library, JC Minutes, 3.
10. From Goldthorpe Library and SYRO, JC Minutes, passim.
11. For example, see SYRO, JC Minutes, 27 Nov 1930.
12. SYRO, Proofs 21 Jul 1914, 9/1.

normally attended all delegations etc.

Day-to-day control was in the hands of a General Manager, first Major Fred Coutts,[1] who had held a similar position at Paisley,[2] and then when he resigned in 1925,[3] his son Ronald.[4] Many staff accompanied Coutts down from Scotland, where Glasgow Corporation had recently taken over the Paisley system.[5] Probably because of this influx and because the depot was rather isolated, it was decided to take the unusual step of building a small estate to house the staff[6] in Broomhead Road, now one of the few remaining relics of the tramway.

Standard tramway track was laid upon a thick bed of concrete and paved with stone setts, but most of the DDLR's track was laid on wooden sleepers and paved in tarmacadam; there was also a short length of unpaved 'railway' track near Bolton,[7] which was equipped with signals.[8] This construction was adopted for economy and also for ease of repair in case of subsidence.[9] Most of the line was single track with passing loops, but there was double track in the centres of Wath and Wombwell.[10] Sections 8, 10, 12a and 18a were never built, nor was the authorised connection made with the Barnsley system.[11] The only alteration which may have happened was the lifting of the final loop in Thurnscoe.[12] Current supply was from the mains via a DDLR

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1. SYRO, JC Minutes, 30 Aug 1923.

2. Ian M. Coonie and Robert R. Clark, The Tramways of Paisley and District 1885--1954 (Glasgow, 1954), 12.

3. SYRO, JC Minutes, 11 Dec 1924. 4. Ibid., 27 Jan 1925.

5. Denton, D. D. L. R., 10. 6. SYRO, JC Minutes, 18 Jan 1924.

7. SYRO, 8/UD28/501, Short Statement of Facts and Evidence . . . 1933 (hereafter, Statement 1933), 16-19.

8. Denton, D. D. L. R., 8. 9. SYRO, Proceedings 1920, 29.

10. Denton, D. D. L. R., 8.

11. SYRO, 8/UD28/510, Agreement as to the Abandonment of Light Railways and Substitution of Omnibus Services 1932 (hereafter, Agreement 1932), 1.

12. SYRO, 8/UD28/546, DDLR Works Committee Minutes (hereafter, DDLR Works Committee), 2 Jun 1926; cited by date of meeting only forsimilar reasons to 'JC Minutes'.

TABLE 11

DEARNE DISTRICT: REVENUE ACCOUNT SUMMARY 1924-5--1933-4

Year	Working Surplus (Pounds)	Working Deficit (Pounds)
1924-5	3,530	-
1925-6	1,647	-
1926-7	-	2,458
1927-8	4,196	-
1928-9	1,102	-
1929-30	1,225	-
1930-1	-	812
1931-2	-	2,054
1932-3	-	3,632
1933-4	-	1,435

SOURCE: SYRO, 8/UD28/558-67, DDLR Financial Statements, passim, rounded to the nearest pound. These figures agree with those in the Tramway Returns except for the years 1926-7 and 1933-4; allowing for rounding errors, the discrepancies are due to the omission of £65 bank interest received in 1926-7 and of a proportion of the payment for rates, taxes etc in 1933-4

substation and the standard overhead wires.[1]

The depot, always known American-style as the Car Barns, was on Brampton Road, just outside Wombwell.[2] There were thirty single-deck trams, in a red and white livery and built by the English-Electric Company.[3]

The main line from Barnsley to Thurnscoe took about ninety minutes to traverse; the Manvers and Woodman lines were usually operated as branches, though the cars normally ran to and from West Melton.[4] In 1932 every alternate car was running through to the Woodman; there were four cars an hour in the mornings and six in the afternoons[5] plus, of course, any special workers' or scholars' cars.[6] Fares were set at 1½d. a mile and 1d. for workmen,[7] but generally the latter only was charged with further discounts offered to

1. SYRO, 8/UD28/608, List Apparatus and Materials for Disposal 18 Aug 1933 (hereafter, Disposal 1933); no pagination.

2. Denton, D. D. L. R., 7. 3. Ibid., 12. 4. Ibid., 14.

5. SYRO, Statement 1933, 15.

6. SYRO, Clerk's Reports, 15 Oct 1925, 6. 7. SYRO, Order 1920, 4-5

workers.[1]

It will be obvious from Table 11 that the financial situation of the tramway was never good, and that it worsened considerably in later years. However even notional 'profits' shown above were turned into losses when interest and repayments on the massive capital debt were taken into account. These losses, shown in Table 12 below, were borne by the constituent authorities.

TABLE 12

DEARNE DISTRICT: STATEMENT OF REVENUE CHARGES ALLOCATED TO THE VARIOUS AUTHORITIES FROM 31 MAR 1925 TO 31 MAR 1933

Year	Profit (Pounds)	Loss (Pounds)	Loan Charges (Pounds)	Net Charges (Pounds)
1925	3,609	-	3,776	167
1926	1,462	-	12,137	10,676
1927	-	2,404	13,394	15,798
1928	4,196	-	19,155	14,958
1929	1,102	-	18,386	17,284
1930	1,225	-	18,159	16,935
1931	-	475	18,063	18,538
1932	-	2,054	17,952	20,005
1933	-	3,628	19,464	23,092

SOURCE: Table (same title) SYRO, 8/UD28/604; rounded to the nearest pound. At present no explanation suggests itself for the sometimes wide discrepancies between some of the profit and loss figures and those in Table 11; in any case, the positive or negative result remains the same. The breakdown of charges between the four authorities given in the original is omitted.

From first to last, therefore, the DDLR minutes record varying degrees of concern about the financial plight of the undertaking, and the efforts of the Joint Committee were principally directed towards solving or mitigating the problem. Their almost inevitable failure in the face of such odds was sealed by the closure of the line on 30 Sep 1933, the trams being replaced by buses of the Yorkshire Traction Company.[2]

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1. SYRO, 8/UD28/609, Report on Workers' Fares etc, 12 Apr 1932 (hereafter, Fares Report), 1; part of a file of miscellaneous papers.

2. Denton, D. D. L. R., 23; the B&DTC became the Yorkshire Traction Company (hereafter, YTC) in 1928 (see Sykes, Yorkshire Traction, 18).

Appendix D1 presents the finances of the DDLR in historical context by calculating the estimated and actual profit and loss account in constant 1913 prices. From these figures it will be seen that though the DDLR's revenue never reached the levels forecast by the engineers, neither did it fall as low as all its critics had feared. The problem in respect of the operating ratio was that working costs were higher in real terms than anyone had expected, which produced results varying from small surpluses to larger deficits. This was much what the opponents of the construction had prophesied, though the result was not always achieved in the manner they had imagined. What nobody grasped sufficiently was the size of the capital debt, which made surpluses inadequate and converted bearable losses into unbearable ones.

Why did the DDLR fail? On the basis of these figures one could argue that it was insufficient revenue, excessive running costs or the high level of capital repayments. At the cost of some unreality, each is examined separately below. The assumption, of course, is the old economists' adage 'ceteris paribus'. If one assumes costs to be so-and-so, why did revenue not meet them? and so on. Naturally, the failure of the DDLR was due to a combination of all three variables in the financial equation, but one must first separate in order to synthesise.

CHAPTER 4

REVENUE

Although looked at from the standpoint of 1913 or even of 1920, the revenue achieved by the DDLR was not unreasonable and might have been expected to result in at least a break-even situation, receipts were in fact wholly inadequate. Taking the figures as they stand, one could say that this was due not to low revenue but to rises in costs. But this begs the question, why did revenue fail to keep pace with cost increases? At least three reasons can be isolated--the nature of the DDLR and of the area it served, competition, and the economic conditions of the period.

The Area and its Tramway

The DDLR was of a type of tramway relatively uncommon in the British Isles though much more prevalent on the European continent. That is, it was a line which connected a string of settlements rather than a line or lines confined within the limits of a single town or city. Some evidence was adduced at the inquiries into the proposals to show that such lines, at least in certain circumstances, were less viable than more strictly urban tramways.

The first point made was that the DDLR would not attract the level of ridership and revenue expected by Sellon because of the nature of the area. An interesting comparison was drawn with the Rhondda tramways, like the M&STC a subsidiary of the NECC.[1] The original route there was built about 1902 and then served a population of 132,000. About 9 million passengers were carried, so the population was carried 67.8 times per annum. In 1910

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1. Bett and Gilham, Networks, 193.

the line was extended to the top of the valley and by 1913 the population of the whole area was 157,951 and passengers were 11,200,000, so the carrying ratio had risen to 71 per annum. The point was that the Rhondda area was exceptional, in that it was almost 'one continuous street of eighteen miles' and densely populated.[1] The legally permitted maximum fare of 1d. was not enforced and the ½d. fare encouraged traffic.[2] It was not believed that these results would be repeated in the Dearne valley,[3] where Sellon was prophesying a carrying ratio of 80.[4]

The basic reason why the Rhondda results would not be repeated was the lack of pick-up traffic on the planned route. The crucial importance of this was admitted by Harry England; tramway competition to the railways as regarding through traffic from Thurnscoe to Barnsley would not be severe, he said, 'it would be pick-up traffic which would be the important thing on this line'. To put it the other way, according to a Wombwell resident who opposed the scheme, it would take one-and-a-half hours by tram from Thurnscoe to Barnsley; these passengers would travel by rail and the tramway would not receive the higher long-distance fares, a point with which the Chairman of the inquiry concurred.[5]

The bulk of the revenue on the Rhondda tramways was received from short-distance passengers, as shown by the analysis of tickets sold shown in Table 13 overleaf. The very small number of long-distance fares in the Rhondda was partly accounted for by railway competition along both branches of the tramway. This was compensated for, however, by the high demand from short-distance travellers. In the DDLR's case, it was submitted, this would not occur, as the proposed line had no population at all on 50 per cent of its route. The only pick-up traffic would be between Barnsley and Wombwell, possibly also in Wath.[6]

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1. SYRO, Proceedings 1914, 504-5; the opening dates given here conflict with those in Bett and Gilham, Networks, 96.

2. Ibid., 578. 3. Ibid., 579. 4. Ibid., 267.

5. Ibid., 578, 406 (quotation) and 567.

6. Ibid., 579, 577 and 580.

TABLE 13

ANALYSIS OF TICKETS SOLD ON THE RHONDDA TRAMWAYS
WEEK ENDING 19 FEB 1914

Ticket Value (Pence)	Number Sold	%	Receipts (Pounds)	%
7	66	0.04	2	0.21
6	299	0.19	7	0.74
5	961	0.61	20	2.12
4	3,052	1.95	51	5.40
3	9,084	5.81	114	12.06
2	37,518	23.98	312	33.01
1	105,461	67.42	439	46.46
-	156,441	100.00	945	100.00

SOURCE AND NOTES: ticket sales from SYRO, Proceedings 1914, 579; receipts and percentages calculated for this table, the largest percentages being rounded up to make 100 per cent; the 1d. fares include workmen's fares.

A comparison between the ticket sales of the two concerns whilst the DDLR was operating is not possible because the ticket analysis books, at least of the DDLR, have not survived. However it is possible to compare the operating results.

TABLE 14

DEARNE DISTRICT: OPERATING RESULTS COMPARED WITH THE RHONDDA TRAMWAYS 1927-8--1932-3

	1927-8	1928-9	1929-30	1930-1	1931-2	1932-3
DDLR						
Income per route mile (£)	2,466	2,321	2,386	2,085	2,029	1,731
Passengers (ditto)	298,718	258,186	267,843	243,869	231,159	209,748
Operating Ratio (%)	88.45	96.65	96.38	102.60	107.13	114.21
RHONDDA						
Income per route mile (£)	4,215	4,172	3,956	3,860	3,422	3,007
Passengers (ditto)	515,765	501,131	510,485	538,597	437,024	377,660
Operating Ratio (%)	90.18	86.41	91.33	92.06	95.52	98.43

SOURCE: Tramway Returns; passengers per route mile calculated for this table from the figures in the Returns for passengers and car miles.

Even though the Rhondda tramways were clearly in decline by the 1930s,

they still out-performed the DDLR in terms of revenue and passengers per route mile by, in the case of passengers in 1930-1, more than 100 per cent. If neither line had many long-distance passengers, then clearly there were many more short-stage passengers in the Rhondda than in the Dearne valley, exactly as the witnesses had indicated in 1914. The operating ratio of the Rhondda Company was positive throughout and better than the DDLR's, except in 1927-8 when the DDLR experimented with low fares.[1] The difference between the two undertakings is somewhat reduced by the early 1930s, however, which argues that, whilst the DDLR was a likely loser even in 1914 terms, small tramways in general were facing harsher conditions twenty years later.

Whilst the lack of pick-up traffic could be shown to affect the particular prospects of the DDLR, the general point was also made that tramways where the length of line was high in relation to population served would show reduced receipts per car mile as opposed to those where the ratio of line to population served was lower. Whilst this might theoretically apply to an over-extended urban system, the most obvious cases were interurban[2] tramways.[3] The example of Stalybridge was often quoted at the DDLR inquiry. There a population of 92,000 was served by 21 miles of tramways with revenue of 7.75d. per car mile; this was contrasted with Warrington, where 7 miles served 86,000 people and earned 12.23d. The obvious reason was that ridership per head of population would be about the same in both, but where this was drawn out over a longer distance, the higher car mileage would result in lower receipts per car mile.[4]

Appendix D2 lists those electric tramways in Britain which could be

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1. See below, 116.

2. 'Interurban' is not used in the American sense of a high-speed electric railway, but of a street tramway outside city limits, more on the European pattern once found in, for example, Belgium.

3. Though the BET, referring to the its Potteries' tramway, thought that 'no lines paid better than those connecting towns' (Fulford, B. E. T., 23). This however does not really contradict the points being made here, for two reasons: (1) the Potteries was a fairly continuously built-up area, more like the Rhondda than the Dearne valley and (2) the Dearne settlements were more large villages than towns.

4. SYRO, Proceedings 1914, 686.

classed as more than purely urban. If we compare the closure dates of these with those for all tramways, the results are as follows.

TABLE 15

CLOSURE DATES OF INTERURBAN TRAMWAYS COMPARED TO THOSE OF ALL ELECTRIC TRAMWAYS IN GREAT BRITAIN

	All Tramways	%	Interurbans	%
Closed by 1930	46	30.26	16	44.74
Closed by 1940	117	76.97	33	86.84
Closed by 1950	136	89.47	35	92.11
Closed by 1962	151	99.34	37	97.37
Still open	1	0.66	1	2.63
Totals	152	100.00	38	100.00

SOURCE: All Tramways from Appendix G5 and Interurbans from Appendix D2.

In the earlier decades there is quite a marked tendency for the interurban lines to close at a faster rate. The percentage gap is gradually reduced as the closure of all tramways accelerates and is in the end reversed by the sole survivor, Blackpool. It is notable, though probably not significant statistically, that a number of the late survivors in the second group were, like Blackpool, tramways with a heavy holiday traffic, such as Isle of Thanet (closed 1937), Llandudno (1956) and Swansea and Mumbles (1960). The DDLR was clearly not of this number.

One line in Appendix D2, the Sunderland District, provides an interesting case study of a tramway which was very similar to the DDLR. Opened in 1906, 'the nature of the . . . system was essentially interurban, whereas all successful networks were within towns, and its poor traffic, together with local industrial troubles, was to be its undoing'. Bankrupted by a Wearside shipbuilders' strike in 1909, the Company was in the receiver's hands by 1913. In 1922 a national scheme aimed to cut tramwaymen's wages by 3s. a week, but the Sunderland District asked for 13s.; a proposal to break

1. Closure dates from Appendix D2.

the resultant strike by blackleg labour was defeated by a threatened boycott from the principal customers, local miners. The trams were by then vulnerable to buses, particularly as the main route was indirect and Sunderland Corporation had hindered the Company by refusing through running until 1921. In 1924 the Company decided to substitute buses--the very year the DDLR opened--which was done by summer 1925.[1]

Both the general and the particular thus seem to support the contention that interurban tramways were not particularly good investments in the British context.[2] Some, like the Stalybridge and Sunderland systems, were financial failures even before World War I; others, though successful at that time, were also closing down by the inter-war years. Even against the background of a general decline in the tramway industry, which became a collapse in the 1930s, interurban lines disappeared at a markedly faster rate.

Many of the doubts expressed at the original hearings into the DDLR proposals could be rephrased as a belief that the undertaking was or would be on the margin. This was so even in the relatively good environment for trams in 1914. Looked at with hindsight, this was only to be expected. Although no-one knew it at the time, the DDLR was destined to be the last complete electric tramway opened in Britain; an undertaking constructed at the end of a boom is more than likely to be marginal, all the better prospects having been exploited first.

The marginal nature of tramways opened at a late date has been illustrated for West Germany in Figure 2 overleaf. None of the lines built after 1905 survived until 1980; and most of the survivors dated from 1876--1885.[3]

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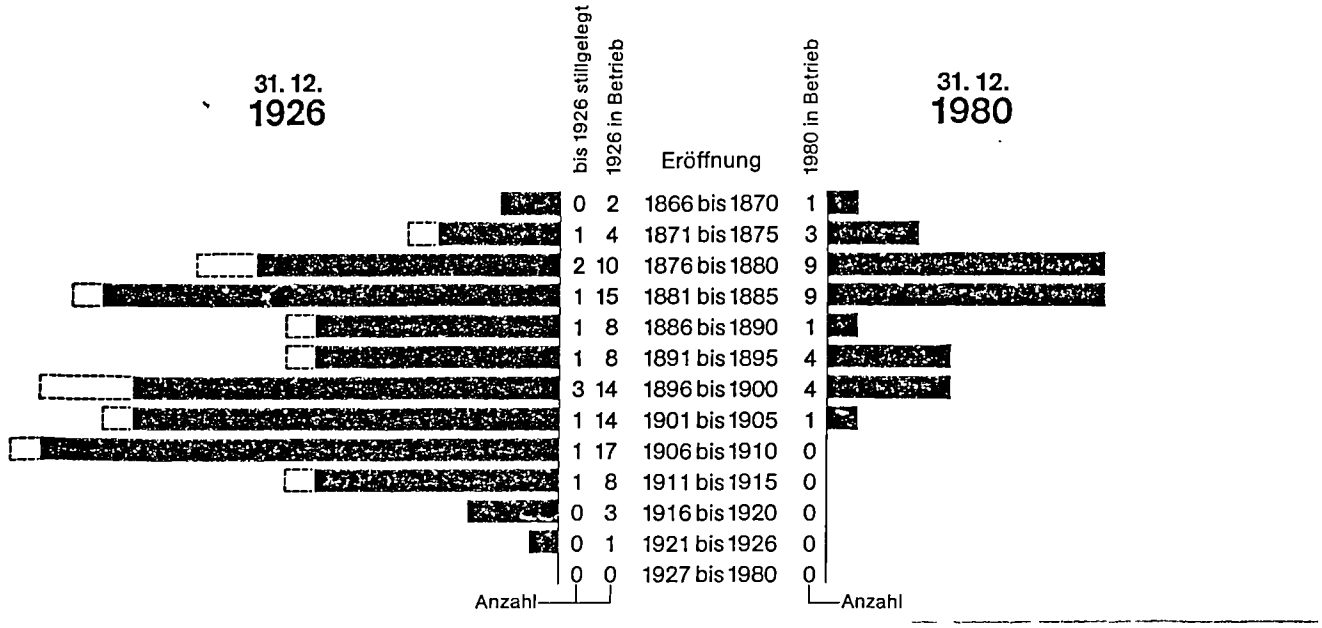
1. Holding, Bus Services: North East, 52-3.

2. There are many examples of such lines being successful abroad, certainly in the period under review.

3. A rather similar point is made in connection with Irish railways in R. S. Joby, The Railway Builders (Newton Abbot, 1983), 97: 'over 800 miles of line had been completed by Dargan [by the late 1850s] , a quarter of all the railways ever built in Ireland. The proportion of these remaining in use today is nearer half, as the early lines were the key lines and have so remained'.

FIGURE 2

NUMBER OF WEST GERMAN TRAMWAYS OPEN IN 1926 AND 1980
ACCORDING TO DATE OF OPENING



SOURCE: Wolfgang Hendlmeier, Handbuch der deutschen Strassenbahngeschichte 1, 45; this is evidently based on the opening and closing dates of all tramways, not merely electric ones. The German words are as follows: Anzahl = total; bis = up to; Eröffnung = opening; in Betrieb = in operation; stillgelegt = closed.

Making a rough comparison with British experience, of the sixteen tramways which survived after 1950, fourteen were built in or before 1885, with only the Llandudno & Colwyn Bay and the Grimsby & Immingham lines having been built in the present century.[1]

The early criticisms made of the proposals for the DDLR thus seem to be borne out in practice. The area did lack sufficient traffic to support a tramway; interurban lines were risky ventures; and the whole scheme came too late in the tramway era to stand much chance of viability.

External Economic or Legal Restrictions on Earning Capacity

The economist's cover-all 'ceteris paribus' is a necessary assumption when considering any one factor in the DDLR's troubles. The above section has largely gone on the assumption, 'had 1914 conditions prevailed, would the DDLR have proved a success?'. In this section the artificiality is to

1. See Appendix G5 for dates of closure, D8 for opening.

ignore the existence of competition and to ask, 'what other external factors affected the fate of the DDLR and how much?'.

The two basic restrictions on a tramway's earning power, assuming that happy position of monopoly (which many effectively enjoyed prior to 1918), were regulations to limit fares and the general economic climate in a particular locality.

Maximum tramway fares were always fixed by the Act or Order which set up the line. For many years these could not be altered without parliament's authority, a fact which in itself clearly hampered tramways when dealing with competition.

Under the 1920 (Amendment) Order maximum fares on the DDLR were set at 1½d. a mile, but with a minimum of 2d. for any distance over half a mile. Workers were to be charged 1d. and 1½d. on the same basis.[1] Over most of the line's history, however, the latter were the basic fares and workers were offered a discount on these of about 40 per cent through the purchase of twelve journey tickets at prices ranging from 1s. 6d. to 3s.[2]

Clearly, the maximum fares in the 1920 Order did not restrict the DDLR in themselves, because these fares were never charged. There are three possible reasons why this happened: (1) because of competition along the route; (2) because of the sharp fall in prices which started immediately after the Order had been confirmed and which by 1933 had brought the wholesale price index down almost to its 1913 level;[3] and (3) because the area was economically depressed and the Joint Committee felt an obligation not to overcharge.

As evidence for social conscience, the Committee did say in 1927 that they had decided to increase fares to obtain a co-ordination agreement, but only with reluctance, given the economic situation of the miners.[4]

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1. SYRO, Order 1920, 4-5; this draft Order was later confirmed, same title and dated 1921, but only the draft exists in the archive.

2. SYRO, Fares Report, 1. 3. See Appendix G4.

4. SYRO, Clerk's Reports, 15 Mar 1927; where no page number is given, there are none in the original.

As well as working under legal maxima, tramways were also required to sell workers' tickets at reduced rates. The DDLR actually fulfilled this obligation by its basic fare tables, but still sold discounted tickets at well below this rate. The manager would have liked to abolish such concessions, or at least to reduce the discount to 25 per cent, but he certainly felt unable to abolish the privileges entirely because of the need to retain the goodwill of the public and because the YTC issued similar tickets on their buses.[1] So it was not really social conscience which caused the DDLR to offer such low fares, but competition.

The general tenor of the manager's statement was that fares were too low. Much earlier a union representative had also referred to the 'uneconomic fares being charged'.[2] Though this was generally recognised therefore, it was impossible to do anything about it, not because of legal restrictions but because of competitive pressures on the tramway.

There was one legal obligation on the DDLR, however, which might have made some difference. As well as workers' fares, they were also expected to run workers' cars before 8.00 a.m. and after 5.00 p.m.[3] The early morning cars were expensive to run, but the bus company had no such obligation.[4]

However, though this may have marginally increased costs, it cannot have been more than a very minor factor in the DDLR's difficulties. Legal restrictions on fares charged were clearly not significant at all, because commercial pressures and the generally falling level of prices made the legal maxima unobtainable anyway.

The prospects of the DDLR were closely linked to those of the coal industry. A table published in 1919 showed the works which would be served by the proposed lines and the number of their employees. Only seven of the twenty-one works were not collieries, and the latter employed over 91 per

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1. SYRO, Fares Report, 1-2.
2. SYRO, Clerk's Reports, 1 Apr 1925, 2.
3. SYRO, Order 1915, 62; provisions repeated in the 1921 Order.
4. SYRO, Fares Report, 2-3.

cent of the stated workforce.[1]

Back in 1913 reference was made to the rapid population growth in the area in the first decade of the century (as much as 72 per cent in Thurnscoe) which, it was believed, would continue because of the increased output of existing collieries and the development of new ones and of associated industries all of which, it was said, 'were highly prosperous and constantly increasing their demands for labour'.[2]

The optimism with regard to the coal industry continued after the war Hawksworth was to say at the 1921 inquiry that 'as the men are now being quickly demobilised and in view of the developments at the collieries . . . and the abolition of Coal Control, it is an acknowledged fact that the coal output will be materially increased in the very near future'.[3]

In fact there were already signs of an easing in demand for coal before 1913, but this was concealed during the war by the urgent need to maximise production from a reduced labour force. By 1921 the post-war boom had collapsed, signs of a long-term fall in demand had re-appeared and prices fell catastrophically. There was a major strike by the miners against wage cuts in 1921 and another, even longer, starting on 1 May 1926 with the General Strike. Both were unsuccessful, and towards the end of 1926 miners gradually drifted back to work, having to concede a longer working day. Throughout the inter-war years the industry remained weak, with high unemployment and low wages, only 56s. a week on average in the last year of peace.[4]

The DDLR was thus built not in the prosperous environment foreseen by the optimists of 1913 or 1920, but in a depressed area. The line had been operating for only eighteen months before the 1926 strike began. Receipts for the week ending 2 May 1926 were £593 5s. 11d.; for the following week

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1. SYRO, 8/UD28/471, Table shewing Collieries etc . . . Aug 1919.

2. SYRO, Brief 1914, 11. 3. SYRO, Brief 1921, 6.

4. For the coal industry see R. S. Sayers, A History of Economic Change in England 1880--1939 (hereafter, Economic Change) (Oxford, 1967), 89-92.

they were £84 8s. 8d.[1] Over the eleven weeks prior to the dispute, the average revenue was £651 11s. 1d.; in the eleven weeks following it was £390 19s. 2d., down by £262 11s. 11d. Expenditure of £112 5s. 2d. was saved, but there was still a net loss of £148 6s. 9d.[2] The receipts as compared to the wage bill in the week ending 19 Sep 1926 were £431 18s. 9d. versus £306 7s. 11d.,[3] leaving precious little to meet other expenses. No wonder that 1926-7 brought the first operating deficit.[4]

The comparison with the Sunderland District is again interesting. That line had been brought to bankruptcy in 1909 by a strike in the staple industry, shipbuilding. However even after the Company abandoned its trams for buses, its troubles were not over, for the 1926 strike made it bankrupt again.[5]

Minute after minute in the DDLR records continues to hark back to these events in later years. Two years after the strike began it was said that 'the far reaching effect of the Industrial trouble in 1926 and the unfortunate position of the mining industry at the present time were to a large extent responsible for the financial situation of the Committee'.[6] There was, it is true, quite a strong recovery in 1927-8, but after that it was virtually downhill all the way, with a working deficit appearing again in 1930-1 and reaching crisis proportions in the following two years.[7]

The fact that the coal trade in the area was severely depressed in the early 1930s can be illustrated from the Quarterly Reports of the Manager of the YTC.[8] In the first quarter of 1931 many mines were closing for periods

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1. SYRO, 8/UD28/547, DDLR Finance Committee Minutes (hereafter, DDLR Finance Committee), 13 May 1926 (date references as other minutes); of course, the staff may themselves have been on strike in the first week.

2. SYRO, DDLR Works Committee, 21 Jul 1926.

3. SYRO, DDLR Finance Committee, 14 Oct 1926. 4. See Table 11 above.

5. Holding, Bus Services: North East, 52-3.

6. SYRO, JC Minutes, 3 May 1926. 7. See Table 11 above.

8. YTC, Mr. Robinson's Reports to the Board, Dec 1929 to Nov 1937 (hereafter, Mr. Robinson's Reports); cited by date plus internal pagination of the particular report.

of up to eight days; people were managing with half pay and the dole.[1] By March the following year 'the depression in the Coal Trade . . . was . . . worse than at any period in our Company's existence'.[2] In the quarter July to September 4,750 miners had been discharged in the Thurnscoe, Wombwell, and Doncaster areas,[3] and in the six months leading up to the end of 1932 out of 144 possible working days, collieries were idle for up to 66 days each.[4] The problem was the quota system, introduced by the coal owners following legislation in 1930; this was a reasonably successful cartel arrangement to cut production and raise prices.[5] The trouble was it allowed companies owning more than one colliery to concentrate on that with lowest production costs, so the transport operator got reasonable business in one sector and much less in another, but not to the extent that services could be cut. So operating expenses remained high, whilst revenue fell.[6] In the quarter ending 31 Mar 1933 this resulted in even the YTC recording an operating deficit of £1,012,[7] the only time this happened during the period 1929--37.[8]

It is fairly obvious therefore that the worsening position of the DDLR in the early 1930s was partly due to the continuing troubles in the coal industry. Table 16 overleaf summarises the DDLR's receipts and payments account during its lifetime.

The major factor which caused the negative operating ratio in the period 1930-1 to 1933-4 was not any increase in operating costs; they in fact fell. It was a sharp decrease in revenue, which collapsed from an historically not unreasonable £33,000 in 1929-30 to only £25,000 in 1932-3, a fall of 25 per cent. There were certainly other reasons for this change, but the state of the coal industry was perceived then as the major cause. The reality of

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1. Ibid., 31 Mar 1931, 1-2. 2. Ibid., 31 Mar 1932, 2.
3. Ibid., 30 Sep 1932, 2. 4. Ibid., 31 Dec 1932, 3.
5. See Sayers, Economic Change, 91-2.
6. YTC, Mr. Robinson's Reports, 31 Dec 1932, 3.
7. Ibid., 31 Mar 1933, 1. 8. Ibid., passim.

TABLE 16

DEARNE DISTRICT: OPERATING RESULTS 1924-5—1933-4

Year	Receipts £	s	d	Payments £	s	d	Balance £	s	d
1924-5	23,254	16	11	19,725	4	0	3,529	12	11
1925-6	33,866	2	5	32,218	13	0	1,647	9	5
1926-7	27,743	14	2	30,202	1	7	2,458	7	5
1927-8	36,204	13	9	32,008	1	10	4,196	1	11
1928-9	32,899	8	0	31,797	3	6	1,102	4	6
1929-30	33,838	8	0	32,613	12	5	1,224	15	7
1930-1	30,604	12	2	31,416	15	2	812	3	0
1931-2	28,788	5	11	30,841	19	0	2,053	13	1
1932-3	25,556	19	11	29,188	19	5	3,631	19	6
1933-4	12,067	12	0	13,502	18	1	1,435	6	1

SOURCE: SYRO, DDLR Financial Statements, passim; negative balances underlined.

these difficulties is evidenced by the similar troubles affecting the YTC, though being much larger and spread into areas like Huddersfield[1] not so dependent on coal, it was able to survive relatively unscathed.

Having said all this, however, it remains true that even in its best years, the DDLR was quite unable to earn enough revenue to cover its massive capital debt. It is most unlikely that a booming local economy could have reversed the situation, for there was a further and even more important reason why the DDLR was unable to pay its way--competition.

Motor Bus Competition

All the railway services mentioned earlier remained open throughout the inter-war years, except for the former Hull and Barnsley branch to Wath on which passenger services ceased on 4 Apr 1929, largely because of bus competition.[2] It is impossible to say how the remaining rail services affected the DDLR, but usually tramways took traffic from railways, rather than

1. See map in Sykes, Yorkshire Traction, 17.

2. Goode, Railways in South Yorkshire, 46.

vice-versa. Both trains and trams were immensely vulnerable to the burgeoning motor bus however.

Motor bus services in the Dearne valley followed the common pattern of a multitude of small proprietors, often one-man, one-bus affairs, which were later overtaken by a large 'Area' operator. The smaller businesses were often very transitory and have left few records, except for those of local authorities, who before the Road Traffic Act 1930 came into force in 1931 had to license vehicles and staff.[1] Most pre-1914 buses seem to have run to or via Wombwell, so taking this as an example, as early as 1913 the UDC had licensed 24 buses or charabancs.[2] A census taken in early 1914 logged 401 vehicles and 5,510 passengers at Wombwell Town Hall.[3] A surprisingly large number of buses continued to run during the war; 15 operators were licensed by the UDC in May 1918[4] and 5 more before the end of the year.[5] By 1920 this total had risen to 31, running between them 63 vehicles.[6] Though these were small compared to modern buses, seating anything between 16 and 30 passengers,[7] there were clearly a great many buses on the road well before the DDLR opened; the other local authorities in the area would have licensed still more on routes not touching Wombwell, of course.

Very early on the B&DTC/YTC became by far the largest concern and operated over a far wider area than the Dearne valley alone. In May 1913 the Company put five buses on the road[8] on five routes;[9] by June 1931 they owned 202 buses used on local services ranging between Huddersfield, Pontefract,

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1. Sykes, Yorkshire Traction, 18.

2. SYRO, Brief 1914, 8. 3. SYRO, Proceedings 1914, 383.

4. SYRO, 1/11, Wombwell UDC Minutes, Finance and General Purposes Committee, 7 May 1918, 24.

5. Ibid., 4 Jun 1918, 56; Council, 9 Jul 1918, 103; Highways and Buildings Committee, 26 Sep 1918, 170. Note the random manner in which the Council and various committees issued licences.

6. SYRO, 1/12-13, Wombwell UDC Minutes, passim.

7. Sykes, Yorkshire Traction, 36. 8. Ibid., 36.

9. Ibid., 12.

Doncaster and Sheffield, as well as long distance runs to Manchester, Birmingham and London.[1] By 1923 every DDLR destination and its entire route (to be) was covered by the Company's buses.[2] A 1928 agreement to reduce or eliminate bus services on the Thurnscoe and Woodman branches[3] actually only removed them from the short stretch from Wath to Bolton, the remainder being covered by other services. The Wath to Bolton section was anyway used by independent or 'pirate' buses, as was virtually every road of importance in the area, except that from Wath to the Woodman.[4]

On the direct road via Darfield Camplejohn Brothers had operated to Great Houghton[5] and Thurnscoe since before 1920. The former service was co-ordinated with others run by the B&DTC, S. McAdoo, L. Pepper and G. White.[6] Nothing further is known of Pepper; White first appears in the Wombwell records in 1926[7] and McAdoo, whose buses extended from Great Houghton into Thurnscoe, was an old-established operator and had bought this route from F. Oades in 1924.[8] The other known operator in this direction was F. Stewardson, who ran via Darfield and Goldthorpe and also from Great Houghton via Thurnscoe and Goldthorpe to Doncaster.[9] G. S. T. Deverew also operated between Thurnscoe and Doncaster.[10]

White also ran from Great Houghton down to Wombwell.[11] The Darfield road was shared with a Camplejohn service to Wombwell which ran through to Barnsley[12] and the four members of the Darfield Bus Owners' Association, Pickerill, Greenhow, Linley & Spencer and D. Smith running from Darfield to

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1. YTC, The Yorkshire Traction Company Ltd., Return of Revenue and Expenditure for the three months ended June 30th 1931 (hereafter, Quarterly Returns, dated for end of period, no pagination); these returns exist from this date to the quarter ending 31 Mar 1933.

2. See Appendix D3. 3. SYRO, Clerk's Reports, 27 Sep 1928, 2.

4. Denton, D. D. L. R., 18. 5. Sykes, Yorkshire Traction, 65.

6. Denton, D. D. L. R., 16.

7. SYRO, 1/18, Wombwell UDC Minutes, Licensing Committee, 23 Feb 1926, 545.

8. Sykes, Yorkshire Traction, 66. 9. Ibid., 56. 10. Ibid., 18.

11. Ibid., 65. 12. SYRO, Clerk's Reports, 22 Nov 1927, 1.

Wombwell only.[1]

From Thurnscoe or Goldthorpe down to Mexborough there were at least four operators. In 1922 the M&STC introduced a motor bus to Bolton via Manvers Main.[2] James Guest, trading as 'Blue Bus', had a network of routes in the Mexborough area, one of which ran to Thurnscoe.[3] Two small operators also ran to Mexborough, Hollinshead & Stannard from Thurnscoe and, from Goldthorpe, Mrs. J. Evans.[4]

W. Cooper ran a bus from Brampton to Thurnscoe via Wath, at least from 1930-1[5] and possibly much earlier.[6]

On the Manvers branch R. Bates and later J. W. Frost ran one bus each between West Melton and Mexborough. On the main line from Wath into Barnsley many of the small proprietors licensed earlier by Wombwell must still have been running in 1923-4. Camplejohn ran through from Wombwell and T. Burrows and Sons from Wath; their route was later extended from Barnsley to Leeds and from West Melton to Rawmarsh. Various local buses also ran between Stairfoot or Kendray and Barnsley only;[7] one, Helliwell's, had originally run as far as Wombwell, but was later confined to the shorter distance.[8]

Thus, by the time the DDLR opened the situation had changed radically from 1914. Then motor buses had run little further than Wombwell and Darfield; now they covered the entire district, and the old idea of 'running the buses off the road' was a far cry from reality.

This was evidently realised by the authorities and Wombwell UDC set about a bold attempt to clear the road for the trams. From early 1924 they

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1. Denton, D. D. L. R., 16. 2. Ibid., 18.

3. Sykes, Yorkshire Traction, 55. 4. Ibid., 57-8.

5. SYRO, Clerk's Reports, 21 Sep 1931, 1.

6. A bus licence, without specifying the route, was issued to a W. Cooper in 1920; see SYRO, 1/12, Wombwell UDC Minutes, Finance and General Purposes Committee, 8 Apr 1920, 505.

7. Denton, D. D. L. R., 18; nothing more is known of Frost.

8. Sykes, Yorkshire Traction, 60.

decided to try to restrict the number of bus licences issued. The B&DTC's request to license eighteen new vehicles was turned down on the grounds that there were already enough buses on the road and that congestion was caused on Saturdays.[1] After some argument, the Company climbed down and agreed to substitute six old licences for six new.[2] By April both Wombwell and Wath Councils[3] had decided to issue only short term licences to the B&DTC, to expire in June when the trams would be running.[4]

These temporary licences were later extended to September[5] as the opening of the tramway was delayed; the same restrictions were applied to private buses.[6] In September the B&DTC and seventeen private operators appealed to Wombwell against the expiry of their licences and the Council decided to impose a new policy. They would issue no licences for the tramway route, but only for four specified corridors leading to it; when buses reached the tramway, passengers would have to change.[7] Most smaller operators climbed down and agreed to run a 'branch' service only--for instance, Aston to Jump, Pickering to Low Valley[8]--which accounts for the relatively small number of firms running between Wombwell and Barnsley after 1924.

Had this arrangement stuck, it would have been a most sensible one. German tramways have long been protected in this way. In Würzburg, for instance, most tram termini include cross-platform interchange with suburban and out-of-town buses, thus confining each mode to the job it does best

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1. SYRO, 1/16, Wombwell UDC Minutes, Finance and General Purposes Committee, 3 Jan 1924, 406.

2. Ibid., Highways and Building Committee, 26 Feb 1924, 503.

3. Bolton Council had also refused certain licences, so there was probably a concerted policy by all the four authorities; the Ministry of Transport held an inquiry into Bolton's refusal of licences in mid-1924. See ibid., 1/17, Highways and Buildings Committee, 27 May 1924, 92.

4. Ibid., 1/16, Finance and General Purposes Committee, 1 Apr 1924, 557.

5. Ibid., 1/17, Highways and Buildings Committee, 24 Jun 1924, 149.

6. Ibid., 8 May 1924, 48. 7. Ibid., 16 Sep 1924, 305-6.

8. Ibid., 30 Sep 1924, 323.

--buses to the lightly-trafficked outer routes, trams to the intensive town services.[1] Whereas in the very early days of motor bus operation this was also done in Britain, it was later generally felt that the public would not stand for a change of vehicle. In Sheffield, for example, the first motor bus route of 1913 ran from a tram terminal; this system of feeder buses was generally maintained up to 1925, but from then on buses were gradually extended through to the city.[2]

However in the Wombwell case the B&DTC and some of the larger independent operators appealed to the Ministry of Transport against the refusal of licences; the Minister felt unable to support the Council in its outright refusal to license competing buses,[3] though he was prepared to enforce an arrangement between all four UDCs, the B&DTC and other operators requiring the latter to run to timetables, to co-ordinate their services with the tramway and to fix their fares above those of the trams.[4] Thus by 1926 though Wombwell and the other UDCs had succeeded in thinning out the number of bus operators on the main tramway and in obtaining some protection for the trams, the B&DTC, Burrows and Camplejohn were still licensed to run through to Barnsley.[5]

A further problem was that small operators often ignored local authority regulations altogether. In June 1925, for instance, two firms were reported to Wombwell for plying for hire without a licence;[6] later in the month four were fined, just £2 each.[7] Penalties were so inadequate that it was often worthwhile for the 'pirates' to pay up and carry on. The problem was

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1. Personal observation in 1983.

2. Sheffield Transport Department, A Brief History of the Progress of Municipal Transport in Sheffield since 1896 (hereafter S.T.D., Brief History) (Sheffield, 1946), 15.

3. SYRO, 1/17, Wombwell UDC Minutes, Finance and General Purposes Committee, 6 Jan 1925, 499.

4. Ibid., 1/18, Highways and Building Committee, 30 Nov 1925, 389.

5. Ibid., Licensing Committee, 23 Feb 1926, 545.

6. Ibid., Finance and General Purposes Committee, 3 Jun 1925, 83.

7. Ibid., Highways and Buildings Committee, 30 Jun 1925, 132.

not really ended until the Road Traffic Act came into force in 1931 and licences had to be obtained from the Traffic Commissioners instead. The last unlicensed operator in the area was Mrs. Evans, who gave up when the Commissioners refused her application.[1]

The whole affair illustrates the general powerlessness of small local authorities in the face of large and determined bus companies, or indeed of many small and opportunistic ones. Local authority licensing powers dated from the days of the horse and trap and were quite inadequate to deal with motor vehicles.[2] Whenever authorities tried to impose conditions beyond the minimum conditions of vehicle safety etc, these were usually challenged and found to be ultra vires. The difficulty experienced by Kircaldy Burgh Council in keeping out competing buses has already been mentioned, and this 'undoubtedly hastened the end of both the Corporation and the Company [Wemyss] tramways'.[3] The DDLR was faced with through bus competition from the start, so this judgement must apply to it in even greater measure.

In a sense tramways, especially small ones, were drowned by the sheer numbers of competing buses. This was not often due to the pirates alone, because they were unco-ordinated and most local authorities made some effort to control them. Where they did not, however, the results could be disastrous. The most famous case is that of the Potteries Company, where the local authority, having no loyalty to a company tramway, licensed any and every bus operator; at one time there were seventy, mostly running along the eleven mile main tramway route. The Company which, faced with the uncertainty of municipal policy, had not modernised their cars or layout, were totally beaten and went over to buses themselves.[4]

Pirate bus drivers were well known in the 1920s for their aggressive tactics. When bus competition to the Wemyss tramway started two buses would commonly run with each tram, one picking up passengers at the stop, the

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1. Sykes, Yorkshire Traction, 58. 2. Ibid., 21.

3. Brotchie, Wemyss, 51.

4. Dunbar, Buses, Trolleys and Trams, 76.

other then passing to beat the tram to the next stop, and so on.[1] Competition between bus companies was equally intense, with opponents cutting fares, physically forcing other buses off the road, racing each other and even resorting to ruses like painting vehicles to resemble those of competitors.[2]

The DDLR seems to have been free of the worst excesses, but frequent references are made to obstruction of the trams by buses,[3] a tactic which could easily disrupt such a single-line tramway. Obstruction was still a problem as late as 1931.[4] Tactics like those at Wemyss were also used. In 1926 the B&DTC was complaining that some buses 'run when it pays them to run and . . . chip in immediately in front of the Company's buses and the trams'.[5]

Area operators were in origin small firms themselves and only gained their later semi-monopoly positions by means as ruthless as those of any pirate, and B&DTC buses were amongst those obstructing the DDLR.[6] Most area operators were, however, subsidiaries of larger groups. Most of the advantages were financial, for instance economies derived from central purchasing.[7] Being part of a large concern, and also by operating over a wide area with a big fleet, gave the financial resources to buy out competitors, which most small operators could not hope to do. The YTC bought out most of the other concerns in the Dearne valley, especially after the Road Traffic Act gave the assurance that no new competitor could take the old one's place.[8]

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1. Brotchie, Wemyss, 48.

2. For examples of these practices, see R. C. Anderson, A History of Crosville Motor Services (hereafter, Crosville) (Newton Abbot, 1981), 10 and 15.

3. For instance, SYRO, JC Minutes, 18 Jul and 23 Aug 1924.

4. SYRO, DDLR Works Committee, 2 Apr 1931.

5. SYRO, Clerk's Reports, 23 Nov 1926, 1.

6. SYRO, JC Minutes, 29 Aug 1924.

7. The BET formed the British Electrical Federation Limited in 1907 to purchase stores in bulk; see Bett and Gilham, Networks, 193.

8. See Sykes, Yorkshire Traction, 22 for one example involving a purchase in the Penistone area.

For instance in 1935 Bate's service from West Melton to Mexborough was purchased for £4,250.[1] Being an area operator also meant that losses could be sustained on one route by the profits earned elsewhere, so the large company could usually outlast its rivals. This is just what happened with the DDLR. In the first quarter of 1933 the YTC made a loss of £392 in the DDLR area; a year later, after the takeover, this had been turned into a £1,660 profit, even after paying £750 to the DDLR Joint Committee.[2]

Reference has been made above to the effect of through bus services on a tramway. Those wishing to travel beyond the tramway would naturally use a bus for the entire journey; the wide variety of destinations offered by YTC buses in the Dearne valley must have taken many travellers from the tramway. The Company was even able to deny the DDLR the centre of Barnsley, for the intended and authorised connection to the Barnsley tramway was never made and passengers--also including all independent bus passengers except those of Burrows--had to get out at the inconvenient Doncaster Road terminus and walk into the centre.[3] It had certainly been the intention of the Joint Committee to build the junction,[4] and at first it probably was, as Denton believes,[5] the Company who turned this down. Certainly the matter went to the Minister of Transport,[6] who presumably confirmed the DDLR's rights under the 1915 Order. But later, to be fair to the Company, it appears to have been financial stringency which caused the DDLR to defer the scheme,[7] and in 1929 the Chairman of the YTC was even reported as being prepared to agree to it.[8]

Many small tramways found themselves in a similar situation in the 1920s and 1930s, one of being surrounded by a larger bus operator whose

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1. YTC, Mr. Robinson's Reports, 31 Mar 1935, 3.
2. Ibid., 31 Mar 1934, 2. 3. Denton, D. D. L. R., 18.
4. SYRO, JC Minutes, 21 Sep 1923. 5. Denton, D. D. L. R., 8.
6. SYRO, JC Minutes, 12 Apr 1924.
7. SYRO, DDLR Works Committee, 6 Apr 1927.
8. SYRO, Clerk's Reports, 18 Jan 1929.

through services reduced the tramway's revenue. Where the small concern went over to buses on longer routes itself, it often managed to survive; where it did not, it went out of business.[1] The Potteries Company, already mentioned, is an example of a survivor; York Corporation Tramways of a casualty. Amongst the reasons for the latter's closure were the existence of new housing estates beyond the tram termini and the fact that passengers rode on private buses serving areas beyond the city. So in 1935 a Joint Committee was set up with the West Yorkshire Road Car Company to operate buses in York and the tramways were closed.[2]

Apart from its somewhat half-hearted attempts to make the Barnsley connection, the DDLR did make one serious effort to provide a service to Rotherham, which was not served by a direct bus service. A connection had been laid in at the Woodman with the M&STC tramway[3] and grandiose plans for through running with Rotherham and Sheffield Corporations were aired.[4] Typically, however, the matter was deferred.[5] Further moves were made in 1926,[6] but by the end of that year the M&STC had already decided to replace its trams by trolleybuses and would have liked to extend the latter to Bolton.[7] Possibly to keep its foot in the door for this, they did agree to an experimental tram service, using their own cars.[8] A trial trip over the DDLR as far as West Melton was made at 6.30 a.m. on 22 Jul 1927,[9] but public

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1. Pilcher, Road Passenger Transport, 111.

2. M. J. O'Connor and G. J. Mellor, 'The Tramways of York', TR 3 (No. 19), 56-7.

3. Hall, 'Conurbation History', TR 7 (Spring 1969), 175.

4. SYRO, JC Minutes, 1 Aug 1924.

5. SYRO, DDLR Works Committee, 8 Dec 1924 (filed with, JC Minutes).

6. SYRO, JC Minutes, 18 Mar 1926.

7. SYRO, Clerk's Reports, 11 Nov 1926.

8. Ibid., 6 Jul 1927. A DDLR car had been tried earlier over the M&STC line, but had proved too long; see Hall, 'Conurbation History', TR 7 (Spring 1969), 175.

9. SYRO, JC Minutes, 18 Jul 1927.

service did not begin until Tuesday 10 Apr 1928.[1] Company cars were used to provide the entire Woodman service, but operated by DDLR crews as far as the boundary; one car an hour ran through.[2] The initial trial was to have been for one month,[3] but for some reason the DDLR Manager discontinued it after only one week.[4] In any case, the trams from the Woodman to Rotherham were replaced by trolleybuses on 12 Mar 1929,[5] thus finally ending DDLR hopes of any through services.

The kind of boundary disputes which stopped the link with Barnsley and held up that to Rotherham until too late were all too typical of tramways in general, and must have been a factor militating against them once buses started running through. There were excellent examples of through running in the tramway era; for instance Manchester had an arrangement with six authorities for joint operation.[6] But in many cases the municipal boundary was guarded jealously, particularly against encroachment by companies. But municipal suspicions were often as strong. In the north-east, Wallsend would not allow Newcastle's trams in until reassured that this was not the precursor of absorption by the larger authority.[7] The old tramwayman's idea that people would 'walk across the gap as they always do'[8] was all very well when the tram had the road to itself; once buses filled the gap, passengers had no need to use the trams at all when they wanted to make longer journeys.

The B&DTC route map in Figure 3 overleaf shows perfectly how motorbuses filled the gaps between tramway services. Rather cunningly, the draughtsman has not shown the Huddersfield tram service beside the bus route from Water-

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1. SYRO, DDLR Works Committee, 5 Apr 1928.

2. SYRO, 484/Z1/1, Notice to Motormen, 1-2.

3. SYRO, JC Minutes, 20 Oct 1927.

4. Ibid., 19 Apr 1928; Hall believes the service ran on Saturdays only for three weeks, but this seems wrong. See 'Conurbation History', TR 8 (Summer 1969), 195.

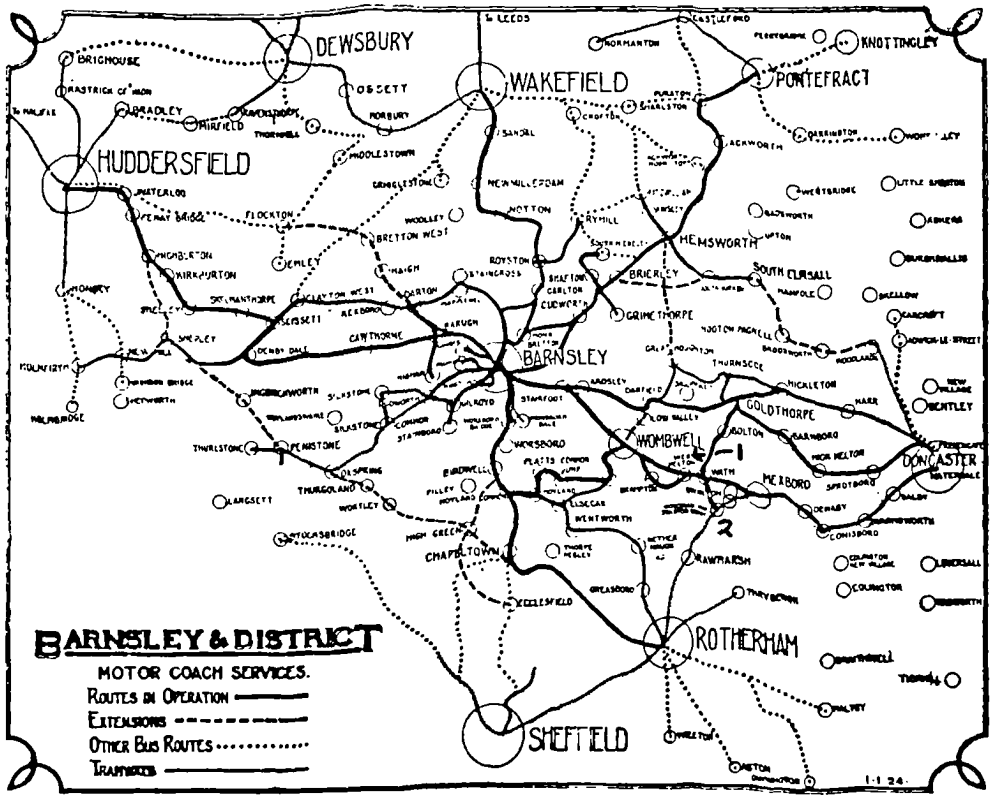
5. Goode, M&STC History, 24.

6. Finer, Municipal Trading, 281. 7. Ibid., 282.

8. SYRO, Proceedings 1920, 29; A. R. Hoare's evidence.

FIGURE 3

BARNSLEY AND DISTRICT TRACTION COMPANY ROUTE MAP 1924



SOURCE: Sykes, Yorkshire Traction, 17; the DDLR is not shown because it was not yet completed.

loo into town. But if, say, someone wanted to travel from Barnsley to Rotherham they would take the bus via Chapeltown rather than use the DDLR, when it opened, with changes at West Melton and the Woodman (marked '1' and '2' on the map) on the way.

Some reasons for the ability of buses to attract passengers from small tramways like the DDLR have been mentioned above. These include the large numbers of competing buses resulting from weak legal controls, the thrusting tactics of both small and large operators and above all the advantage of being able to offer a lot of through services to places not served by trams. Two other factors affecting the earning capacity of motor buses should be mentioned--speed and comfort.

Before World War I the speed of a motor bus was restricted to twelve

miles per hour.[1] On 10 Oct 1928 this went up to twenty for all buses with pneumatic tyres.[2] The B&DTC's first delivery of new buses with pneumatic tyres took place at the turn of 1923-4, and since all older vehicles were withdrawn by 1928, one may assume that the whole fleet was then fitted with modern tyres.[3] Tramway speeds were fixed by the Ministry of Transport too, but for each individual line or part thereof. The maximum speed on the DDLR was sixteen miles per hour, but more often than not cars were supposed to run at twelve, eight or even four miles per hour over particular stretches.[4]

It was recognised at a meeting in 1928 between the YTC and the DDLR that the raising of the bus speed limit had 'somewhat altered the position and no doubt affected the relative position of the trams and buses'.[5] The comment of Frank Collindridge, Chairman of the DDLR Finance Committee, is worth reproducing in full:

> The Joint Committee are faced with the fact that people show a preference for the faster method of transport by the omnibuses than by the trams. I have heard it said many times by people who are not hostile to the trams, "It is a matter of getting a living with me, I have to get to and from my work as quickly as possible and I must take a 'bus which gets me to my journey's end more speedily.". (6)

It is not actually maximum speed which counts, but service speed. In fact, the DDLR was not slow as tramways went, especially considering the awkward single track layout. In 1930 its average speed was 8.35 miles per hour, fifteenth fastest in the country and by far the fastest single line system. The inevitable waiting at loops probably gave an impression of delay,however,[7] and anyway buses were faster. In Manchester later in the decade the average speed of trams was 8.6 and of buses 11.0 miles per hour, a difference of nearly 28 per cent.[8] When the YTC scrapped their own trams

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1. J. Graeme Bruce, A Source Book of Buses (1981), 18. 2. Ibid., 26.

3. See Sykes, Yorkshire Traction, 36 and Denton, D. D. L. R., 19.

4. SYRO, Clerk's Report, 9 Jul 1924. 5. Ibid., 9 Nov 1928, 3.

6. SYRO, 8/UD28/501, Short Statement of Facts and Evidence . . . (drawn up at the time of closure), 31.

7. Klapper, Tramways, 128.

8. Pilcher, Road Passenger Transport, 116.

in 1930 the Manager said that the public much appreciated the change as the time from Worsborough to Barnsley was reduced by as much as 50 per cent.[1]

Another point was that many destinations on the outer end of the DDLR were served by direct buses on the top road via Darfield; it was obviously much quicker for passengers from Goldthorpe or Thurnscoe to use the YTC services in this direction than to go round via Wath on the tram. At a meeting with DDLR representatives in 1930 Mr. Robinson put the latter's dilemma in harsh terms—'if passengers are going to ride on the trams, they will have to be forced to do so, especially in view of the fast moving vehicles of the Traction Company and other omnibus proprietors'.[2]

Apart from advertising campaigns,[3] public meetings,[4] and a short-lived 'Support Your Own Trams Movement'[5] backed by councillors and union members, the Joint Committee made one bold and desperate throw to attract passengers. Early in 1927 they decided to cut the fares drastically to a 3d. maximum,[6] which came into force on 1 Mar 1927.[7] Even though the B&DTC reduced its fares to the same level,[8] DDLR passengers shot up to a record four million in 1927-8, a year which also saw the best-ever working surplus.[9] Such uneconomic fares were still insufficient to meet capital as well as working costs however, and in July agreement was reached with the B&DTC to raise fares again to their 1926 levels.[10]

The Committee also made an attempt to compete in terms of comfort. Pneumatic tyres must have made a great difference to bus travel and in addition, certainly by the time the DDLR opened, all buses had cushioned and

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1. YTC, Mr. Robinson's Reports, 30 Sep 1930, 2.
2. SYRO, JC Minutes, 5 Feb 1930. 3. Ibid., 22 Sep 1926.
4. Ibid., 8 Mar 1927.
5. SYRO, Clerk's Reports (n.d.; bound between 21 Jul and 22 Nov 1927).
6. SYRO, JC Minutes, 21 Feb 1927. 7. Ibid., 24 Feb 1927.
8. Sykes, Yorkshire Traction, 18.
9. See Table 11, above.
10. SYRO, JC Minutes, 14 Jul 1927.

sprung seats. Older buses in the Traction fleet were being replaced by modern ones too, such as the Leyland Lion with thirty comfortable seats, all except one facing forward, modern lighting and a sleek appearance. By contrast the trams looked old-fashioned, and were indeed little different from those built before the war. There were two wooden longitudinal seats down either side of the saloon, whilst the internal decor and lighting gave an impression which was less than inspiring.[1]

In 1926 it was decided to put cross-seating in one car as an experiment,[2] and when this proved a success to convert cars 26--30 inclusive.[3] Some short lengths of old seating were left in at each end for workmen in dirty clothes, but the rest were replaced with transverse seats with polished wooden backs and cushioned seats; brighter lighting and a white ceiling gave a much more cheerful impression. The modernisation was a great success, but in the event only four cars were dealt with,[4] and when the Works Committee proposed further 'additional seating' in the cars in 1931 the idea was turned down as 'not opportune',[5] presumably on financial grounds.

Had the trams been palaces on wheels, they would scarcely have dented the bus's hold on long-distance traffic. The replacement buses took only fifty-five minutes from Thurnscoe to Barnsley; by tram, it had taken eighty minutes.[6]

The climate of thought in which the DDLR was proposed was one in which trams had the road to themselves. Assuming for a moment that this had happened, what would their revenue have been? Roughly, this should be the total revenue of all road transport operators running over the line of route --that is, the DDLR itself, the YTC and the independents.

The revenue of the DDLR is of course known. That for the YTC is given

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1. Denton, D. D. L. R., 19, 12 and 14.
2. SYRO, DDLR Works Committee, 7 Jul 1926.
3. SYRO, JC Minutes, 18 Nov 1926.
4. Denton, D. D. L. R., 23; only 26--30 were suitable anyway.
5. SYRO, JC Minutes, 20 Aug 1931. 6. Klapper, Tramways, 129.

in various documents, but does not distinguish the Dearne routes precisely enough. In 1928, however, when a revenue pooling arrangement was being discussed between the two, the YTC did give an estimate of their revenue.

TABLE 17

DEARNE DISTRICT: COMPARATIVE REVENUE OF THE YORKSHIRE TRACTION COMPANY AND OF THE DDLR OVER THE TRAMWAY

Year ended 31 Dec	YTC[a] (Pounds)	DDLR (Pounds)
1926	22,516	26,887
1927	23,296	34,789
1928[b]	21,326	32,477

SOURCE: SYRO, Clerk's Reports, 17 Dec 1928, 1.

a. YTC revenue included takings on most buses between Barnsley and Stairfoot on routes diverting from the tramway at the latter point and also on buses on the Darfield route as far Wombwell Town Hall; see Clerk's Reports, 17 Dec 1928, 2.

b. Revenue for the forty-eight weeks ending 30 Nov 1928 was actually given; an average figure for the remaining four weeks of the year has been added.

It is difficult if not impossible to calculate the revenue taken by independent bus proprietors from the DDLR. This is partly because their records have not survived, and also because their routes rarely followed the tramway for their entire length. It is known that Bates's West Melton to Mexborough service was taking £2,860 per annum in 1934;[1] perhaps half of his route was over the DDLR Manvers branch, so one might estimate a loss of £1,460 to them. But this is the only definite figure for the independents' receipts known. As a very rough guide, one might allow the same figure for each of the following--Burrows, Camplejohn, Cooper and Frost--and also for the groups of operators running between Barnsley and Stairfoot and between Thurnscoe and Mexborough, which comes to £10,010 including Bates. This still allows nothing for direct services to Bolton, Goldthorpe or Thurnscoe via the top road, passengers on which, in the absence of buses, would have

1. YTC, Mr. Robinson's Reports, 31 Mar 1935, 3.

had to go round by either tram or train, more likely the latter of course; these services may therefore be ignored. Since prices fell considerably between 1926 and 1934, the £10,000 must be expressed in the higher prices current in the earlier period. This 'guesstimate' can then be added to the figures for the other operators.

TABLE 18

DEARNE DISTRICT: ESTIMATED REVENUE ACCOUNT FOR THE DDLR IN A MONOPOLY SITUATION

Year	YTC[a] (Pounds)	Independent[b] (Pounds)	DDLR[a] (Pounds)	Total (Pounds)	DDLR[c] Working Costs (Pounds)	Balance (Pounds)
1926	22,516	14,227	26,887	63,630	52,853	10,777
1927	23,296	13,602	34,789	71,687	55,645	16,042
1928	21,326	13,477	32,477	67,280	57,072	10,208

SOURCES AND NOTES:

a. From Table 17.

b. Calculated as in the previous paragraph, corrected according to the Wholesale Price Index in Appendix G4.

c. It is known that the DDLR's traffic was so low that it only needed half its fleet in regular service (see Denton, D. D. L. R., 14). The total revenue figures above are at least 100 per cent more than those actually achieved and the DDLR clearly had some spare capacity to meet extra demand without increasing its working costs much. However, costs would inevitably have risen considerably in the long run through increased current consumption, the employment of additional staff etc.; a seventy-five per cent rise in working costs has been allowed over those actually recorded in the years 1926-7, 1927-8 and 1928-9 (from Table 16).

If the figures for all road transport operators are summed as in Table 18, this gives an idea at least of what the DDLR might have earned in the total absence of the motor bus. It is obvious that the DDLR would have been in a much better situation. However, in the years ending 31 Mar 1927, 1928 and 1929 the loan charges on the line were £13,394, £19,155 and £18,386,[1] which in each case would have cancelled out the notional 'profit' achieved above.

1. From Table 12.

As a rough check on the figures, after the DDLR closed the YTC had an arrangement with the Joint Committee to run the buses in the former DDLR area on a separate accounting basis so the profits could be divided between the Company and the Committee.[1] In the last complete year of tramway operation the DDLR earned £25,557 versus working expenses of £29,189[2] over 744,200 cars miles.[3] In the first complete year of YTC operation, £52,080 was earned versus £40,614 expenses over 1,241,780 miles.[4] Taking £52,080 as what the tramway might have earned without YTC competition and setting against that working expenses at the same rate as that reported for the DDLR in 1932-3 (9.41d[5]) for the higher mileage, a total of £48,688, one is left with a working surplus of £3,392. This does not include an allowance for the earnings of independent buses of course, but many of them had been taken over by the YTC anyway by 1934, including the following of those 'allowed for' in Table 18 (dates of takeover in parentheses)-- Guest (1928), Deverew (1929),[6] Stewardson (1929),[7] Hollinshead and Stannard (1930),[8] Helliwell (1933)[9] and Mrs. Evans.[10] Even if something is allowed for the earnings of such independents who remained on the road, like Burrows, it is evident that the earnings of a virtual monopoly operator, as the YTC then was in the Dearne area, were insufficient to pay the capital expenses of the DDLR.

It is evident therefore that even though motor bus competition was immensely significant in holding down the DDLR's actual earnings and in causing its collapse, it was not the only factor. For as far as one can judge, the DDLR would in no circumstances have been a financial success, given its

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1. YTC, Dearne District Light Railway (typescript, 1950?), 1.
2. See Table 16 above.
3. See Appendix D4, Ministry of Transport Returns.
4. YTC, Dearne District Operation 1950? , 1.
5. See Appendix D4, Ministry of Transport Returns.
6. Sykes, Yorkshire Traction, 56. 7. Ibid., 57. 8. Ibid., 58.
9. Ibid., 38 and 47.
10. Ibid., 58; ceased trading rather than being taken over.

burden of debt.

In the real world of the inter-war years the DDLR had no hope of earning enough revenue to pay for its running and capital costs. Its actual revenue was low because of strong omnibus competition, aided by certain inherent advantages of the motor vehicle, such as speed, comfort and mobility, and also by the inability of local authorities to control bus operation at all successfully. The tramway was unable to compete adequately in terms of speed or comfort, or to provide through services with the same ease as buses could. However, even the DDLR's potential revenue in the absence of bus competition would probably not have fully covered its capital outgoings, and certainly left no reserve for later replacement of capital assets. This was partly because of certain inherent disadvantages of the line and its area, such as low traffic potential, a long and circuitous route and the poor performance of the local economy. But it was also of course due to the high level of the costs themselves. These costs will now be examined to see how they affected the DDLR's position.

CHAPTER 5

WORKING COSTS

The level of working costs incurred by the DDLR cannot be judged in isolation. It must be measured against the hopes of the line's promoters, against the general trends in prices in the inter-war years and against costs incurred by other tramways and by motor bus operators.

The Pre-opening Comparison

Appendix D5 gives a detailed breakdown of the DDLR's operating costs during its working life. As has already been shown in Appendix D1, for the two years there compared these costs were in real terms considerably more than those prophesied by the line's promoters in 1913, though not as high as later opponents of the scheme had feared. This means that either Sellon's original estimates of running costs were inaccurate or that costs of operation rose significantly in real terms during the period between the planning and opening of the tramway.

Unfortunately Sellon was most imprecise about working costs and only gives details for repairs and maintenance, for both the DDLR and the existing Wemyss tramway. Sellon was pressed hard on his estimate--given overleaf in Table 19--and particularly in relation to the permanent way; comparison with the actual costs for 1931-2 does indicate that this was one of two areas where Sellon's figures were far too low.

His overall estimate of 5.97d. per car mile was supported by one of 5.5d. from Harry England, but an opposing witness could find only two

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1. SYRO, Procedings 1914, 278-81. 2. Ibid., 387-90.

TABLE 19

DEARNE DISTRICT: ESTIMATED REPAIR AND MAINTENANCE COSTS COMPARED WITH ACTUAL COSTS FOR WEMYSS IN 1910 AND FOR THE DDLR IN 1931-2 IN PENCE PER CAR MILE

Item	Sellon 1913[a]	Wemyss 1910[b]	DDLR 1931-2[c]
Permanent Way & Paving	0.30	0.243	0.53
Cars	0.45	0.63	0.42[e]
Electrical Equipment Buildings & Tools	0.125	0.189[d]	0.60[f]

SOURCES AND NOTES:

a. SYRO, Proceedings 1914, 279.

b. Ibid., 281.

c. Figures from Appendix D5, converted to 1914 prices.

d. Includes 0.139d. for electrical equipment of cars, 0.030d. for buildings and 0.020d. for workshops, tools and sundries.

e. This is assumed to be equivalent to 'Cars, mechanical' in accounts.

f. Includes all other relevant items in the accounts.

out of sixty or seventy tramways with costs as low as this, whilst the local M&STC returned 7.4d per car mile.[1] Later evidence did mention the more nearly comparable 6.4d. at Doncaster,[2] but this 1913 figure had risen to 7.72d. by the following year.[3] In 1913 or 1914, then, these two near-by tramways were turning in operating costs some 30 per cent above Sellon's estimate for the DDLR.

Without as much evidence as one would like therefore, it seems reasonable to suppose that Sellon was quoting figures which were <u>just</u> possible, but which were unlikely to be obtained in practice, at least for any period of time.

During World War I and afterwards the costs of tramway operation rose alarmingly. When the inquiry was held in 1920 a doubling of money values was evidently taken as a rule of thumb, for the promoters now expected rev-

1. Ibid., 510. 2. Ibid., 684.

3. Calculated from the Tramway Returns for Doncaster, 1913-14; further details for Doncaster will of course be found in Part III below.

enue to be 20d. and working costs 12d. per car mile.[1] The latter did not appear unreasonable when compared to other tramways in 1918-19; there were twenty-one lines with working expenditure under 13d., including two similar to the proposed DDLR, the Rhondda at 11.98d. and the Yorkshire Woollen at 11.00d.[2] The promoters even hoped expenditure would be less in the early years when maintenance was low.[3]

The problem in 1919-20 was that last year's prices were little guide to the current year's, and a distinguished witness for the opponents, Edward Waller, believed costs should now be two-and-a-half times those of 1914 or 15d. per car mile. He also queried the wisdom of basing the estimate on the early years of operation.[4]

Figure 4 below shows that, when corrected for changes in money values, the DDLR's costs in its first year of operation were actually below Sellon/Hoare's 6d./12d. However the warnings given about basing the estimate on the early years--even Harry England admitted 12d. was 'on the tight side, and would definitely increase once the first two years of light repairs were passed'[5]--were amply borne out by the sharp rise in costs thereafter. It is probable, therefore, that some of the discrepancy between the DDLR's projected and actual running costs can be attributed to a deliberate understatement on the part of the consulting engineers, whose opportunities for profit lay in the construction rather than the operation of the line.

The Comparison with General Prices

There are two main indicators of price trends in the inter-war years, the Wholesale Price and the Retail Cost of Living Indices.[6] The former is regarded as the more reliable,[7] but although the DDLR was, for example, able

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1. SYRO, Evidence of A. R. Hoare, 8-9. 2. Ibid., 21.

3. Ibid., 9 and Evidence of H. England (bound with Brief 1920), 7.

4. SYRO, Proceedings 1920, 84. 5. Ibid., 47.

6. See Appendix G4.

7. Brian R. Mitchell and P. Deane, Abstract of British Historical Statistics (hereafter Statistics) (Cambridge, 1962), 466.

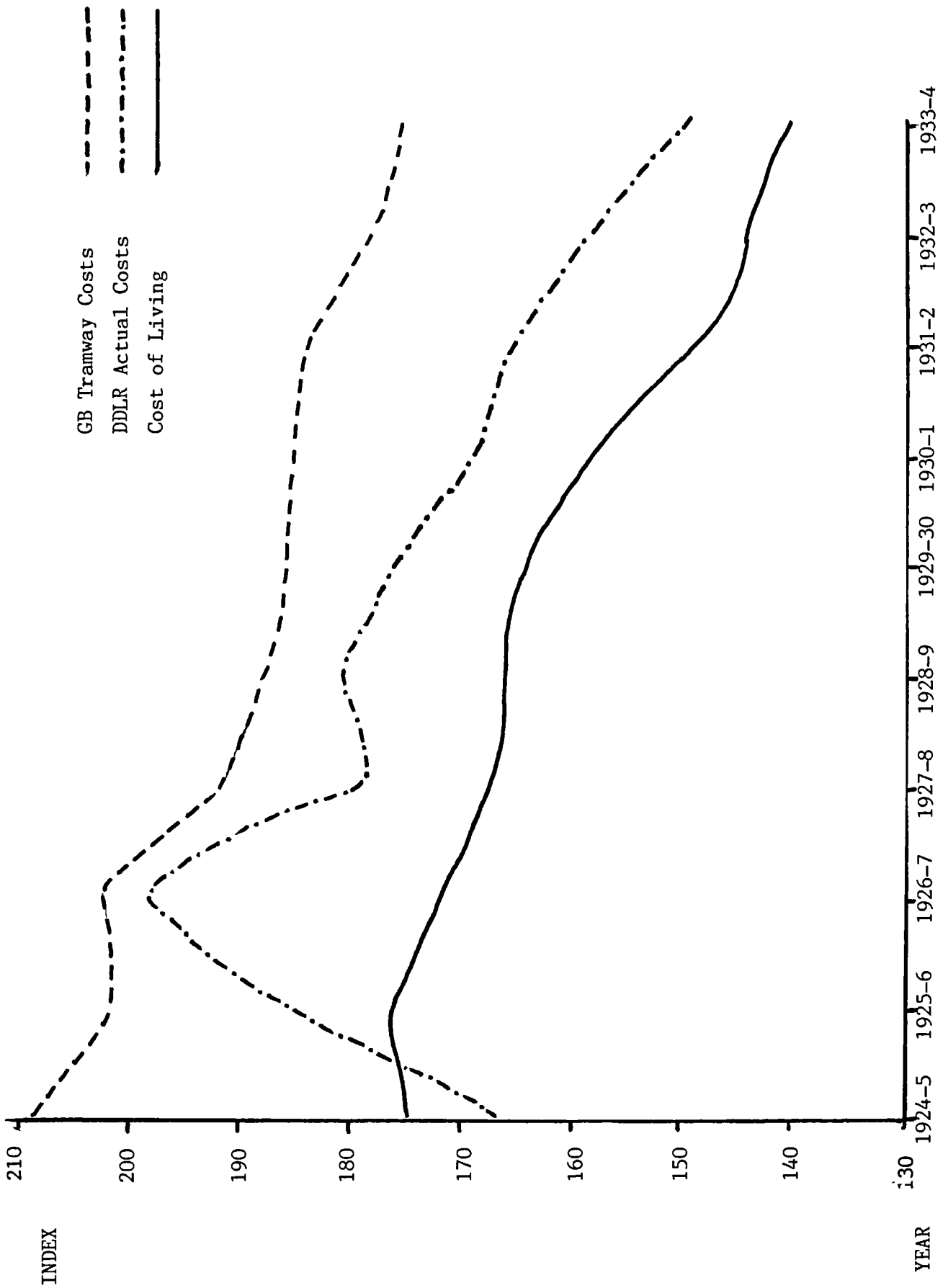

FIGURE 4

INDICES FOR COST OF LIVING AND WORKING COSTS OF BRITISH TRAMWAYS AND THE DEARNE DISTRICT 1924-5--1933-4

to buy electricity at wholesale prices, most of its costs were closer to the retail end of the market. It was, for example, the final purchaser of items like tickets, uniforms and spare parts. So it is the Cost of Living Index which is used as a yardstick in Table 20 and in Figure 4 which compare price trends with the level of operating costs for tramways as a whole and for the DDLR in particular.

TABLE 20

INDICES FOR THE COST OF LIVING, FOR BRITISH TRAMWAYS' OPERATING COSTS AND FOR THE DDLR'S OPERATING COSTS 1924-5--1933-4

Year[a]	Cost of Living[b]	Operating Costs	
		All Tramways[c]	DDLR[d]
1924-5	175.0	208.2	166.7
1925-6	176.0	201.6	186.1
1926-7	172.0	202.5	198.5
1927-8	167.5	191.5	178.4
1928-9	166.0	187.7	180.7
1929-30	164.0	185.9	175.7
1930-1	158.0	185.0	168.8
1931-2	147.5	183.5	165.0
1932-3	144.0	177.6	157.6
1933-4	140.0	175.3[e]	149.7

SOURCES AND NOTES:

a. Calendar years 1924ff for Cost of Living and for Company tramways' costs; for Local Authorities, including the DDLR, to 31 March the following year.

b. Ministry of Labour Retail Prices (Cost of Living), reproduced in Appendix G4; 1914 = 100.

c. Calculated from Gross Expenditure per car mile figures in Tramway Returns; 1914 = 100.

d. Calculated from Gross Expenditure per car mile figures in Appendix D5; Sellon's 1913 estimate = 100.

e. 1933-4 figure is for Great Britain excluding London.

The high level of tramway operating costs post-war relative to the cost of living is made plain in Figure 4, which is based on the data in Table 20. The costs for tramways as a whole are far in excess of the Cost of Living Index, and whilst those for the DDLR are less so, the variation from the general price level is still wide and also much more erratic.

It is clear that the DDLR was not a high cost tramway. In fact, its

costs were extremely low, being only 9.97d. per car mile[1] in 1930-1, which compared with 12d. in London and 18.57d. in Colne.[2] The DDLR's cost advantages included single track--obviously cheaper to maintain than the usual double--and the fact that it was eleven years newer than any other tramway.[3]

It is unlikely that all DDLR costs moved at the same rate. Table 21 shows how the five main areas of expenditure moved in relation to gross costs.

TABLE 21

INDICES FOR DDLR WORKING EXPENDITURE UNDER INDIVIDUAL HEADS

Year	Traffic	General Repairs & M'tenance	Electrical Power & Energy	Salaries	General Expenses	Gross Costs
1924-5	100.0	100.0	100.0	100.0	100.0	100.0
1925-6	102.9	150.3	100.8	93.2	132.9	111.7
1926-7	102.1	164.5	122.4	106.8	129.1	119.1
1927-8	98.1	161.3	83.8	93.8	141.7	107.0
1928-9	100.2	158.7	90.5	95.4	121.5	108.4
1929-30	93.7	158.7	90.0	90.9	126.6	105.4
1930-1	92.9	149.0	86.3	95.4	107.6	100.2
1931-2	90.3	147.1	85.5	90.9	102.5	99.0
1932-3	89.5	120.6	83.0	93.2	111.4	94.6
1933-4	89.5	107.1	78.0	88.6	93.7	89.8

SOURCE: based on the figures in Appendix D5.

The final column obviously mimics the costs displayed graphically in Figure 4; that is, a sharp rise to 1926-7 followed by a gradual fall except for a further slight rise in 1928-9. The particular items of expenditure which are most above average and most regularly so are Repairs and Maintenance and General Expenses; the Power index also behaves somewhat erratically.

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1. Figure quoted by Klapper, Tramways, 128. He does not specify the year concerned, but he starts with 10.08d., which is the 1930-1 sum listed in Appendix D5. From this he subtracts 0.11d. for the cost of housing, which was clearly not a normal expense for a tramway.

2. Ibid.

3. Aberdare and the Notts & Derby systems both opened in 1913 and were otherwise the final new tramways; see E. Jackson-Stevens, 100 Years of British Electric Tramways (Newton Abbot, 1985), 94-5.

For these to have any significant effect, they need to be fairly large components of expenditure; even a big index rise on an item contributing, say, 5 per cent to costs would have little effect on the total. Table 22 shows that Repairs and General Expenses combined made up 23.53, 31.70 and 29.14 per cent of costs in the three selected years; a large, and except for a fall in the Repairs percentage in 1932-3,[1] a rising proportion.

TABLE 22

DEARNE DISTRICT: MAIN CATEGORIES OF EXPENDITURE AS PERCENTAGES OF GROSS EXPENDITURE FOR THREE SELECTED YEARS

Year	Traffic	Repairs	Power	Salaries	General	Total
1924-5	47.81	15.59	24.20	4.46	7.94	100.00
1928-9	44.21	22.80	20.20	3.89	8.90	100.00
1932-3	45.31	19.82	21.24	4.31	9.32	100.00

SOURCE: based on figures in Appendix D5.

The actual effect of changes in the costs of Repairs/General Expenses can be calculated by subtracting the actual expenditure under these heads from gross costs, adding to this a figure representing constant 1924-4 costs[2] and indexing the result.[3] This is done in Table 23 overleaf.

When drawn onto Figure 5 as revision (A) it will be seen that adjusting for a nil increase in Repairs/General Expenses actually brings the DDLR's costs below the cost of living for most years, thus demonstrating that the initial increases and continued high levels of these expenses was the major factor in keeping the tramway's operating expenditure above average prices.

It is noticeable, however, that the two peaks in 1926-7 and 1928-9 in

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1. Probably due to a cut-back in maintenance because of the likelihood of closure or sale at that time.

2. Constant 1924-5 costs are not, of course, 2.34d., but this figure corrected for inflation or deflation by the Cost of Living Index for the year concerned over the base year's (i.e. 1924-5); for 1927-8 for example, 2.34 x 167.5 ÷ 175 = 2.24.

3. The final index is produced using Sellon's 5.97d. as a base; for 1927-8 again, 9.27 x 100 ÷ 5.97 = 155.3.

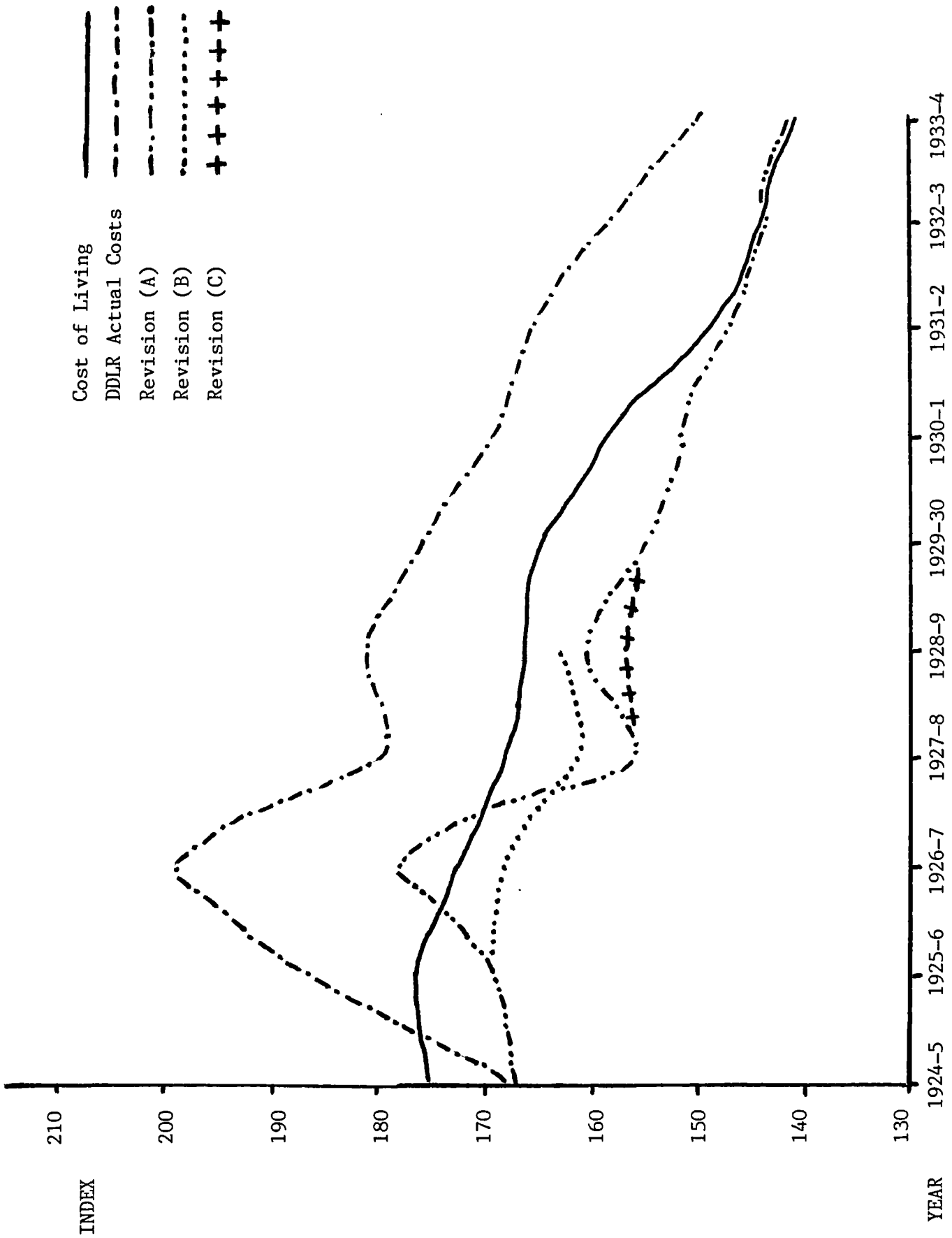

FIGURE 5

INDICES FOR COST OF LIVING AND DEARNE DISTRICT WORKING COSTS
CALCULATED AS PER TABLE 23 1924-5--1933-4

TABLE 23

DEARNE DISTRICT: ACTUAL WORKING COSTS IN PENCE PER CAR MILE ADJUSTED FOR (A) CONSTANT REAL REPAIR AND GENERAL EXPENSES 1924-5--1933-4 (B) CONSTANT REAL POWER EXPENSES 1924-5--1928-9 AND (C) CONSTANT REAL TRAFFIC EXPENSES 1928-9

Year	Actual Gross Costs	Less Actual Costs (A), (B) or (C)	Plus Indexed 1924-5 Costs	Notional Gross Costs	Costs Index 1913 =
(A) Repairs and General Expenses					
1924-5	9.95	2.34	2.34	9.95	166.7
1925-6	11.11	3.38	2.35	10.08	168.8
1926-7	11.85	3.57	2.30	10.58	177.2
1927-8	10.65	3.62	2.24	9.27	155.3
1928-9	10.79	3.42	2.22	9.59	160.6
1929-30	10.49	3.46	2.19	9.22	154.4
1930-1	10.08	3.16	2.11	9.03	151.3
1931-2	9.85	3.09	1.97	8.73	146.2
1932-3	9.41	2.75	1.93	8.59	143.9
1933-4	8.94	2.40	1.87	8.41	140.8
(B) Power Expenses					
1924-5	9.95[a]	2.41	2.41	9.95	166.7
1925-6	10.08	2.43	2.42	10.07	168.7
1926-7	10.58	2.95	2.37	10.00	167.5
1927-8	9.27	2.02	2.31	9.56	160.1
1928-9	9.59	2.18	2.29	9.70	162.5
(C) Traffic Expenses					
1928-9	9.59	4.77	4.52	9.34	156.4

NOTE:

a. The figures in the remainder of this column are not Actual Gross Costs but Notional Gross Costs from section (A).

the original curve are not entirely eradicated. Evidently certain other costs were behaving erratically here. Reference to Table 21 shows that the Power Expenses index rose in both of those years, so this may be the cause. When the same calculation as for repairs etc is carried out and transferred to Figure 5, revision (B), we see that Power Expenses do indeed explain most of the remaining rise in operating cost for 1926-7, but not for 1928-9.

Again from Table 21, we see that the other costs which rose in 1928-9 were Traffic and Salaries. Discounting the latter as only a small proportion of total costs and performing the standard calculation for Traffic in 1928-9 only, we get the result indicated in revision (C) on Figure 5; that is, it was Traffic Expenses, added to Repairs etc., which caused the rise in

costs that year. The reasons why these cost variables behaved as they did are examined below.

The level of detail available in each category of expenditure differs and gaps have sometimes to be filled by conjecture. Taking first the two consistently above average groups, Repairs and Maintenance with General Expenses, almost all the numerous items under the latter head are very small. Only two made anything like a significant contribution to costs per car mile--Fire Insurance and Rates, Taxes and Licences. Insurance was charged at a fairly steady £550--600 mark over the life of the DDLR, though it was lower in the first incomplete year and very low indeed in the last. This fairly unvarying premium would tend to keep General Expenses up in cash terms, and thus over the period to make them rise in real terms.

The same is true of Rates, Taxes and Licences which, again discounting those untypical first and last years, rose from 1925-6 to 1927-8 and then fell gradually from then until 1932-3, only in the latter year going below the amount charged in 1925-6. Once more, given the general fall in the cost of living, this would tend to cause a rise in real costs. The largest item was rates. In April 1932 it was stated that £1,025 was payable to the various local authorities. Presumably this relates to 1931-2, when the total of Rates, Taxes etc. was £1,130, all but £100 therefore being rates. This clearly worried the Committee. In 1924 they succeeded in getting a reduction from £1,287 to £743, but later the sums must have gone back up. In 1928 it was hoped to reduce the assessment again. A meeting was held with the Inspector of Taxes in Doncaster in June and, since the amount payable for Rates, Taxes etc. does begin to fall from 1928-9, presumably the Joint Committee was successful in reducing both the tax and the rating assessment,

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1. Details of expenses in this section, where otherwise unacknowledged, are from Appendix D5.

2. SYRO, JC Minutes, 16 Oct 1924.

3. Ibid., Special Committee, 27 Jan 1928.

4. SYRO, Clerk's Reports, 11 Jun 1928.

or at least in curbing their rise.

However the DDLR actually paid far less in rates than it would have done had it been constructed under tramway legislation. Light railways were allowed a 75 per cent reduction like main line railways,[1] much to the chagrin of the latter.[2] Moreover, rates were in one way not a real burden on the municipally-owned DDLR. Taking the figure for 1932, only £111 of this went to outside authorities, namely Barnsley, Rotherham and Swinton.[3] All the rest was paid to the four owning councils, and since the DDLR was regularly 'on the rates' this might validly be regarded as a contribution towards its own deficit. Even so, to the management rates were an outgoing and with fire insurance combined to keep General Expenses at a high level.

Again taking full years of operation only, Repair and Maintenance was below £7,000 only in the first two and the last of these. The initial rise in repair costs has already been partially explained as a natural result of the 'running in' of a new system. The marked fall in 1932-3, which would have been continued in a full year at 1933-4 rates, was no doubt partly due to falling prices, but more to the general acceptance that closure was inevitable. It was specifically said early in 1933 that there was to be no further unnecessary expenditure on the track,[4] whilst serious negotiations with the YTC had been under way since 1932.[5] It is thus probable that the markedly lower maintenance expenditure from 1932-3 would not have happened had continued operation been seriously envisaged. Table 21 shows that these costs were almost the same in real terms in 1925-6 and 1931-2 and that between those dates they had risen and then fallen. Here again is a factor calculated to keep DDLR costs above the generally declining price level.

Appendix D5 shows that following the first year of low repair costs

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1. SYRO, Proceedings 1914, 617.
2. See ibid., 612-27, for long legal arguments on this matter.
3. SYRO, Clerk's Reports, 21 Apr 1932.
4. SYRO, DDLR Works Committee, 2 Feb 1933.
5. SYRO, JC Minutes, Sub- (or Special) Committee, 14 Jan 1932.

the more important components of this item all showed either a fairly constant level of both gross and mileage costs (track, roadway and electrical equipment of line) or actually rose (cars, especially mechanical). Against the background of generally falling prices there can be two explanations--(1) that these particular unit costs were acting untypically or (2) that the amount of work done, and hence of wages paid and materials used, was increasing over time.

As to (1), there is some evidence that wages in the tramway industry had a tendency to creep gradually up in the period up to 1932, in which year some were reduced. In 1925 permanent way workers were granted an extra ½d. an hour or 3.8 per cent; the following year overhead linesmen's pay went up to 60s. per week; in 1927 the permanent way foreman received an extra 5s. a week; and in 1930 the electrician's pay rose by ½d. an hour.[1] So there was a tendency for wages in the maintenance departments to rise, inevitably affecting costs.

In 1932 the National Joint Industrial Council for the Tramway Industry, to which most tramways had belonged since 1917,[2] recommended wage cuts for some tradesmen.[3] This would have been a further contributory factor in the fall of maintenance costs from 1932-3.

So far as the costs of materials used for repairs are concerned, very little specific information is available. The ledgers and minutes do not give this level of detail. Comparing the costs of constructing the DDLR's track with costs quoted later gives some idea of how prices of repairing, rather than constructing track must have behaved. The capital cost of the DDLR's permanent way was £139,453.[4] Taking the single track mileage as 17.98,[5] this works out at £7,756 per mile. This may be compared with

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1. SYRO, DDLR Works Committee, 8 Aug 1925, 6 Jan 1926, 4 May 1927 and 3 Jul 1930.

2. DCT Jubilee,11. 3. SYRO, JC Minutes, 17 Mar 1932.

4. SYRO, 8/UD28/609, Miscellaneous Papers re. Abandonment (hereafter, Misc. Papers), Evidence of J. L. Hawksworth, 7.

5. Tramway Returns, Appendix D4.

£15,776 per mile for double track about 1929; if we assume single track was half this, the 'going rate' was £7,888. This undoubtedly conceals a fall in costs, for the latter refers to a standard of construction far superior to that of the DDLR; there was a seven inch concrete foundation, for instance, and sett paving,[1] both absent over much of the DDLR's length.

About the only case where one can compare prices of materials from one year to another bears out the idea that such prices were falling during the DDLR's lifetime. In June 1927 the purchase of car tyres in the rough from John Baker and Company was minuted at £3 1s 3d. each,[2] by November 1930 the same firm was quoting only £2 17s 9d.,[3] a difference of 6 per cent. One cannot build a case on one item, but it is at least an indication that prices of materials were falling, and by almost exactly the same as the cost of living, where the index fell by 9.5 points or 5.7 per cent over the same period.[4]

Taking wages and materials together, it would seem that wages rose somewhat over the period up to 1932 whilst material costs fell. Without having much more detail, it is impossible to say whether these 'cancelled out' to produce 'no change', or whether unit costs of repairs rose or fell. It seems certain, however, that they could not have fallen as fast as the cost of living and would therefore have contributed towards keeping overall repair costs up.

Going back to point (2) above, it is obvious that more maintenance would be required as time passed. On the one hand, various items of equipment had to be purchased out of revenue in the early days—for instance, a tar boiler at £28 in 1925,[5] a welding plant for £91 in 1927,[6] more welding plant at £43 in 1928,[7] oxy-acetylene cutting equipment at £16 in 1930[8] and

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1. Pilcher, Road Transport Operation, 56.
2. SYRO, DDLR Works Committee, 2 Jun 1927. 3. Ibid., 6 Nov 1930.
4. See Appendix G4. 5. SYRO, DDLR Works Committe, 4 Jun 1925.
6. Ibid., 1 Sep 1927. 7. Ibid., 7 Jun 1928.
8. Ibid., 6 Mar 1930 (filed with, DDLR Finance Committee).

a rail grinder and other apparatus from the YTC at an undisclosed price in the same year.[1]

Regarding repairs themselves, there does seem to be an increasing amount of attention given to track and overhead as the years pass. Most of the items are unfortunately not costed. In June 1925 the track and margins[2] were to be sprayed with tar;[3] this was probably an annual requirement. In 1931 a purchase of seventy tons of Shell spray and 400 tons of slag[4] implies that some resurfacing was now needed as well as spraying. In fact the Manager said about this time that though the rails might have a life of twenty years, resurfacing would be necessary once or twice in that time.[5] The first major item of overhead maintenance is reported in 1927, when the poles and standards were to be repainted at a cost of £150.[6] Apart from regular maintenance, repairs and renewals were required from time to time, sometimes due to subsidence. 'The occurrence most remembered took place on Kendray Hill, near Barnsley, when, one morning, the rails were forced to a height of seven feet or so in the air, taking both the sleepers and the tarmac with them'.[7] In other cases, alterations were made, often for reasons unconnected with the tramway itself. For instance, in 1930-1 the improvement and widening of Houghton Road, Thurnscoe necessitated resiting some poles[8] and changing the level of the rails[9] at a cost of £245;[10] and in 1931 the track near Swinton Common was to be resited at the request of the West Riding County Council (hereafter, WRCC).[11] Work done in effect for the good

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1. Ibid., 2 Oct 1930.

2. That is, the eighteen inch wide margin for which a tramway was responsible under the 1870 Act and also presumably applied to light railways.

3. SYRO, DDLR Works Committee, 4 Jun 1925. 4. Ibid., 2 Apr 1931.

5. SYRO, JC Minutes, 11 May 1931, Local Authorities' Conference.

6. SYRO, DDLR Works Committee, 2 Mar 1927.

7. Denton, D. D. L. R., 15.

8. SYRO, DDLR Works Committee, 3 Jul 1930. 9. Ibid., 2 Oct 1930.

10. SYRO, DDLR Finance Committee, 5 Feb 1931.

11. SYRO, DDLR Works Committee, 7 May 1931.

of other road users was thus chargeable to the tramways' account. By this time however 'wear and tear' was obviously becoming more of a problem; for example in 1931 the Manager recommended the renewal of the rails on Stairfoot Hill.[1]

There is rather less detail available on cars repairs and improvements, though it is known that a few cars were fitted with a new seating arrangement; this was costed at £25 exclusive of labour.[2] However the rising amount which would have needed spending to keep the fleet up to date is indicated by the £5,550 which was estimated as required to meet motor bus standards in 1933.[3] The purchase of items such as car tyres has already been referred to above.

There is therefore enough evidence to show why Repair and Maintenance costs rose over most of the DDLR's lifetime. It was partly because at least some of the costs involved, and particularly wages, did not fall in line with the cost of living, but more because the need for repairs naturally grew as the equipment aged.

Turning to Electric Power, it had originally been intended that the DDLR would build its own generating stations at Wath and Wombwell,[4] but in the event the Committee decided to buy from Barnsley within that Borough and elsewhere from the Yorkshire Electric Power Company Limited.[5] Electricity was first supplied by the former on 6 Jun 1924 and by the latter on 18 Jun 1924,[6] presumably for test running and driver training before the opening.

The agreements with the two bodies differed in that the one with the Company was much more flexible in regard to price. The Barnsley agreement was to run for seven years before a revision could be sought,[7] whereas the other specified three years[8] and was also subject to variation up or down

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1. Ibid., 7 May 1931. 2. Ibid., 7 Jul 1926.
3. SYRO, Statement 1933, 15. 4. SYRO, Order 1915, 15-16.
5. SYRO, JC Minutes, 9 Mar 1923. 6. SYRO, Statement 1933, 2.
7. SYRO, Clerk's Reports, 31 May 1929.
8. SYRO, 8/UD28/541, Copy Agreement: Conditions of Supply, 31 Dec 1923

with the cost of coal and with peak load.[1] The Barnsley current came at the line voltage of 550v. d.c.,[2] whereas the Company's supply was three-phase a.c., which had to be converted to d.c. at the DDLR's Wath sub-station.[3]

Appendix D6 gives the actual amounts charged by each supplier. The Barnsley agreement was much the simpler, being based only on a charge per unit used. A sliding scale starting at 1.7d. for the first 200,000 units and then falling by 0.1d. for every additional 75,000 units caused the first part year's charge to be high because consumption was low; thereafter the charge settled down to around 1.65d. per unit until it fell sharply in 1932. As early as 1929 the Joint Committee had entered into negotiations for a reduction in charges, even though the seven year period was not up. In support of their case they said that Barnsley already charged the B&DTC less and the Power Company charge to the DDLR was also less.[4] Agreement was not reached until 1932, when Barnsley did cut their charges by, on average, over 0.30d. per unit.

The Yorkshire Company's charging system was much more complex, being made up of a charge of 10s. per kilovolt ampere (KVA) of maximum demand in any one month, a charge of ½d. per unit consumed and an adjustment up or down for the cost of coal.[5] Even though a revision was possible after three years, no change was ever made, presumably because the average charge per unit fell by 15--20 per cent in any case. The reasons for this are a little complex.

Since the KVA and unit charges remained unchanged,[6] one might have

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1. Ibid., (later draft) 1 Oct 1924.

2. SYRO, Clerk's Reports, 6 Oct 1931.

3. SYRO Misc. Papers, 18 Feb 1933. The electricity supply industry at this period was in the hands of a mixture of private and public concerns, like the public transport industry itself. Further details can be found in Leslie Hannah, Electricity before Nationalisation: a study of the electricity supply industry in Britain to 1948 (1979).

4. SYRO, Clerk's Reports, 31 May 1929.

5. SYRO, Copy Agreement: Conditions of Supply, 1 Oct 1924.

6. Calculated from Appendix D6; see Table 24 overleaf.

expected the unit price to remain the same also. However, two factors combined to reduce it. First, the Coal Compensation Clause operated in the Company's favour from 1924 to 1927, whilst thereafter it operated in favour of the DDLR or was not applied. This was only a very small addition to or subtraction from the price however. The really significant factor was a fall in the gross amount paid in KVA charges, to 88 per cent of the 1925 charge in 1926, to 83 per cent in 1927 and to around the 76--77 per cent mark thereafter. This did not actually result in a fall in the average price per unit in 1926 because far less units were used, obviously because of the effects of the industrial unrest; thus less units had to carry a

TABLE 24

DEARNE DISTRICT: VARIATIONS IN THE PRICE PER UNIT OF ELECTRICITY PURCHASED FROM THE YORKSHIRE ELECTRIC POWER COMPANY

Year	Price per Unit d.	Price per KVA s./d.	Fall in Gross KVA Charge 1925 = 100% %	KVA Element in average price per unit d.	Coal Control Clause d.	Average Price per Unit (a) d.
1924	0.5	9/6	-	0.55	0.07	1.12
1925	0.5	10/0	100.00	0.49	0.02	1.01
1926	0.5	10/0	87.76	0.50	0.05	1.05
1927	0.5	10/0	82.72	0.40	0.08	0.98
1928	0.5	10/0	77.06	0.38	0.01	0.89
1929	0.5	10/0	77.16	0.36	0.00	0.86
1930	0.5	10/0	74.84	0.37	0.00	0.87
1931	0.5	10/0	75.81	0.35	0.00	0.85
1932	0.5	10/0	76.10	0.35	0.00	0.85

SOURCE: calculated from data in Appendix D6.

a. The 1928 and 1930 figures are slightly higher than those in Appendix D6, presumably due to rounding errors.

still large KVA charge. But thereafter the trend of consumption is broadly up, and with more units used in the period 1927--32 than in 1925, except for 1928, the already lower gross KVA charge could be spread more thinly, so giving a lower average price per unit; the amount per unit attributable to the KVA charge is calculated above in Table 24.

One must assume that the KVA charge fell because of more economical operation of the tramway. Because the KVA charge was levied on maximum de-

mand in any one month, any reduction in that peak requirement would have the effect of lowering the price, even on a larger overall consumption. This may have been achieved by cutting the number of cars used at times of peak traffic demand,[1] which may well have happened as traffic fell from its peak of 42.5 million to only 29.7 million in 1932-3. It is also noticeable that in 1927-8 the amount of traction units consumed per car mile falls to a lower level and then falls again between 1931-2 and the closure, this time quite markedly.[2] This is the equivalent of miles per gallon on a motor vehicle and could have been a deliberate effort on the part of management to encourage economical driving.[3] On the other hand, falling consumption could have been more directly related to falling traffic, for if less passengers were carried in each car, the weight, and therefore the power consumption, would also be reduced, again with the effect of 'trimming' the peak demand and hence the Power Company's KVA charge.

There are several problems in assembling this data to give a correct picture of the DDLR's electricity costs. First of all, the amounts paid to Barnsley Corporation and to the Company have to be summed, together with the costs of converting the latter's supply to d.c.. According to one source, conversion costed 0.30d. per unit.[4] When the calculation is made, however, the resultant annual costs are far too high in relation to those in the Tramway Returns. If, however, the cost of conversion is taken to be the account entry for wages,[5] the sums work out more-or-less exactly, if allowance is made for a second problem: the fact that the electricity charges discussed above relate to calendar years, the DDLR accounts to years ending

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1. In support of this, one car was taken off the road during the first financial year; see SYRO, Clerk's Reports, 1 Apr 1925.

2. Tramway Returns, reproduced in Appendix D4.

3. For an example, see the Wrexham tramway company, which had a very strict set of rules designed to encourage economical driving; H. G. Dibdin, 'The Tramways of Wrexham and District--1', TR 15 (Spring 1984), 144.

4. SYRO, Misc. Papers, 18 Feb 1933.

5. That is, sub-station attendants' wages; see Appendix D5.

TABLE 25

DEARNE DISTRICT: POWER COSTS 1924-5--1932-3

Year (a) (1)	Cost of Power bought from Suppliers (b) £ (2)	Ditto, from DDLR Accounts (c) £ (3)	Cost per Unit from col. (2) based on units supplied (d) d. (4)	Ditto based on MOT units (e) d. (5)	Ditto, from col. (3) and based on MOT units d. (6)
1924-5	3,439	4,773	1.41	1.05[f]	1.46
1925-6	7,090	7,034	1.27	1.41	1.40
1926-7	6,464	7,514	1.32	1.49	1.74
1927-8	7,171	6,074	1.26	1.42	1.20
1928-9	6,389	6,418	1.17	1.31	1.32
1929-30	6,640	6,741	1.15	1.25	1.27
1930-1	6,502	6,475	1.13	1.27	1.17
1931-2	6,556	6,451	1.13	1.29	1.27
1932-3	6,110	6,201	1.06	1.27	1.29

SOURCES AND NOTES:

a. Calendar years for data derived from Appendix D6; financial years ending 31st March for DDLR Accounts or Tramway (i.e. MOT) Returns.

b. Cost of current supplied from Appendix D6 plus cost of conversion (wages) for nearest equivalent financial year from DDLR Accounts (Appendix D5); e.g. power costs for 1924 plus wages for 1924-5.

c. This does not exactly match the previous column because the figures are for different periods; in particular, the 1924-5 figure is for approx. six months in col. (2) and for nine in col. (3). As a check on the accuracy of the calculations, if half the electricity cost (£1,421) for the six month period in which the DDLR continued running in 1933-4 (not in the Table) is added to col. (2) to make the periods covered similar, the totals of the two columns are then £57,781 (2) and £57,681 (3).

d. That is, costs from col. (2) divided by units supplied from Appendix D6.

e. The same, but divided by the number of units from the Tramway Returns (Appendix D4).

f. Untypically low because it is based on six months supply divided by nine months consumption; in this case col. (4) is more accurate.

31st March. Finally, if one sums the Barnsley, Power Company and wages costs and divides this by the number of units supplied to get the cost per unit, one gets a quite different result to that obtained by doing the same using the units supplied quoted in the Tramway Returns. It can only be assumed that there is some significance in the fact that the latter are always carefully described as Ministry of Transport units, and that these

1. Calendar years for power, wages nearest financial year.

are larger than the units normally used in the electricity industry. Table 25 above illustrates the conclusions.

The differences between columns (5) and (6) will largely be due to the discrepancy of three months in the periods covered. Thus, for example, the difference in the years 1926-7 and 1927-8 is shown to be minimal when the two years are averaged, the result being 1.46 in column (5) and 1.47 in column (6); evidently the price per unit must have continued to rise sharply in the first three months of 1927, a fact picked up in 1926-7 in the second column but not until 1927-8 in the first.

Figure 5 and Table 21 above show that the amount paid per car mile for electricity tended generally to decrease over time, except for a sharp increase in 1926-7 and a smaller one in 1928-9. That in the former year was evidently due to the rising price per unit shown in the final columns of Table 25. Taking calendar years, though consumption and hence the gross charge--column (2)--actually fell in 1926, this caused the KVA charge and the costs of conversion to be spread over less units, so causing the price per unit to rise. The high rates obviously continued into 1927, though paradoxically this time because of increased consumption which would have affected the peak load requirement and hence put up the KVA charge. The rise in consumption in early 1927 would partly be due to recovery from the strikes and partly to the DDLR's low fare experiments, starting in March, which must have resulted in fuller and perhaps more cars.

The second 'price peak' in 1928-9 is not really significant, because it is purely a function of where one puts the boundary, at December 31st or March 31st. Whereas the latter shows a rise in both gross and unit costs, the former shows the steady decline from 1926-7 is continuing.

The main effect of electricity charges on gross costs was thus to accentuate the problems caused by the 1926 strikes and their aftermath, rather than being a consistently inflationary factor like repairs.

Salaries and Traffic Expenses, the last two important categories in Table 21, may usefully be coupled together since the major component of

the latter was wages.[1] Salaries were only a small proportion of expenditure[2] and did not vary greatly in cash terms. Indeed the Committee seized the opportunity afforded by the appointment of a new manager in 1925 to cut his salary from £600 to £450.[3] Many other salaries were extremely low, though small rises were given from time to time; for instance, a new scale for female clerks in 1927 ranged from £35 to £70, and at the same time some other salaries were increased by between 2s. and 5s. a week.[4]

Wages on existing tramways had risen sharply during and after the war, but by the early 1920s a scheme of wage cuts in line with deflation was being carried out. By 1924, however, the National Joint Industrial Council was seeking to standardise and increase wages again. Undertakings were to be grouped on the basis of size and of the cost of living in their areas; there were four groups, group 1 including the highest wage-payers in the most expensive areas of the country. Wages were to be the group average plus 10 per cent.[5]

The DDLR therefore opened at a time of wage stability. In fact, the gross amount payable in wages varied very little from 1925-6 onwards, except for 1926-7 when the strikes would have caused less hours to be worked; the tendency of the payment per car mile to fall was due to the generally rising car mileage.[6] It seems to have taken some time to establish which group the DDLR should be in. Right at the start the Committee decided to

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1. For example, in 1927-8 traffic accounted for 43.86 per cent of expenditure, and wages alone were 33.42 per cent of total costs and equal to the sum of the first three items on the expenditure side in Appendix D5.

2. 3.82 per cent in 1927-8.

3. For Major Coutts's salary, see SYRO, JC Minutes, 30 Aug 1923; for his son's, ibid., 27 Jan 1925. Actually £450 was quite generous. In 1922 Great Yarmouth paid its new manager only £400; see T. Barker, Transport in Great Yarmouth 2: Electric Tramways and Petrol Omnibuses 1919--1933 (hereafter, Transport in Yarmouth) (Bristol, 1983), 19.

4. SYRO, DDLR Works Committee, 4 May 1927.

5. See T. Barker, Transport in Yarmouth 2, 1, 24, 30 and 42; by early 1919 the town was paying 20s. as a war bonus on wages.

6. See Appendix D5.

pay full wages despite the fall in the cost of living,[1] but the maximum for drivers was only 59s. a week. A deputation from the Transport and General Workers Union wanted the group 1 rate of 63s 6d.,[2] whilst the Committee offered group 3, pointing out that the M&STC only paid group 2;[3] this was the compromise level eventually agreed on.[4]

In 1924-5 the wages of motormen and conductors had cost £6,969 over about nine months of operation; in a full year this would have been approximately £9,292. The first complete year at the new rates cost £10,291, a rise in the wage bill of £999. This is reflected by the highest ever cost per car mile in 1925-6.[5]

Despite this, the DDLR wage bill was obviously fairly moderate, or its general level of costs could not have been so far below that of other tramways. Two actions of the Joint Committee probably helped to achieve this. First, even before the wage rise, they were cutting back on staff numbers as the disappointing traffic results became evident. The unions were complaining that since the opening one car and two crews had been taken off the road.[6] Second, the decision was taken very early on to employ conductresses rather than conductors.[7] It is not quite clear if any men were employed, but it seems probable they were as two conductors were in a union delegation and their pay scale is also specifically mentioned, 53s. 6d. a week.[8] Denton's recollection is however of girls only.[9] In a heavy industrial area with little female employment, this made sense. But it also had the advantage of very low pay scales, rising with age from 25s. to 35s. a week for a twenty-four hour week.[10] A month later, when the Committee agreed to advance

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1. SYRO, JC Minutes, 18 Jul 1924.
2. SYRO, DDLR Works Committee, 5 Mar 1925 (bound with Clerk's Reports)
3. Ibid., 1 Apr 1925. 4. SYRO, JC Minutes, 9 Apr 1925.
5. See Appendix D5. 6. SYRO, Clerk's Reports, 1 Apr 1925.
7. SYRO, JC Minutes, 6 Mar 1924.
8. SYRO, Clerk's Reports, 5 Mar 1925. 9. Denton, D. D. L. R., 10.
10. SYRO, Clerk's Reports, 5 Mar 1925.

the motormen from group 3 to group 2, they refused any advance for the conductresses,[1] probably reflecting the difference between a plentiful supply of cheap female labour and the more scarce commodity of skilled drivers.

Various wage and salary awards were made over the next few years, but these were generally small and involved only ancillary or office staff, not the main body of employees on the traffic side. In March 1932 most wages covered by the National Council were reduced, the majority by ½d. an hour.[2] So wages paid to motormen and conductresses fell from £10,389 in 1931-2 to £10,189 in 1932-3, a drop of £200 a year.[3]

With these exceptions, however, once wage rates were established in 1925, they remained the same throughout the tramway's life. The rate per car mile did tend to fall, but only because mileage was higher. Wages, which were so large a proportion of expenditure, thus tended to keep costs at a constant level in cash terms and thus, in a period of declining prices, higher in real terms. The 1932 cuts were a recognition of this, but it was obviously easier to raise wages regularly, as Yarmouth had done in 1919-20,[4] than it was to reduce them.

To sum up this section, if one takes the cost of living index as the average, then it is evident that tramways were a high cost industry.[5] It is not surprising therefore that the DDLR's costs were above this average too, even though they were lower than for tramways in general.

The sharp rise in costs per car mile up to 1926-7 against a background of generally falling prices was due to two factors--(1) the rise in general expenditure and in repair and maintenance costs, in particular the latter, and (2) the peculiar causes making electricity prices go up in 1926-7.

Thereafter gross costs fell at about the same rate as the cost of living index, but having peaked so far above this were never again brought down to the same level. The major factor keeping costs relatively high was the

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1. SYRO, JC Minutes, 9 Apr 1925. 2. Ibid., 17 Mar 1932.

3. See Appendix D5. 4. Barker, Transport in Yarmouth 2, 2 and 8.

5. See Figure 4.

increasing burden of repairs, which cancelled out much of the benefit of falling costs elsewhere.

None of this would have mattered if the operating costs of competing modes, especially motor buses, were the same. But they were not.

The Comparison with the Motor Bus

The great commercial advantages possessed by even early motor buses as compared to railed transport were their low capital costs and high mobility. However these were not matched by either reliability or economy in operation.[1] Many bus ventures lost money and were quickly withdrawn. For example, the Lancashire and Yorkshire Railway started a service in Chorley, Lancs., about 1907 but withdrew it in January 1911 after making losses.[2] On the other hand, the LGOC was profitable,[3] largely due to its development of the reliable 'B' type bus which, its reputation enhanced by wartime service, really established economical and reliable motor bus operation in London and the provinces.[4]

The YTC's offices were burnt out on 7 Dec 1929, destroying all traffic records,[5] which means that detailed costs are available only for later dates,[6] except for a summary record going back to 1928.[7]

Table 26 overleaf summarises this latter source and contrasts it with both the DDLR and the YTC's own tramway. The expenses of the latter are at all times higher than those for the buses. The DDLR's costs were, as mentioned already, untypically low and the Barnsley tramway was being run with minimum maintenance prior to closure.[8] So in normal conditions tramway costs

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1. See above, 29 and 30-1.
2. Cummings, Railway Buses 1, 59-60. 3. See above, 31.
4. Humpidge, 'Development of the P.S.V.', 1-2.
5. YTC, Mr. Robinson's Reports, 18 Jan 1930, 3.
6. In YTC, Quarterly Returns; figures go back to April 1930.
7. YTC, Mr. Robinson's Reports, passim.
8. Ibid., 18 Jan 1930,1; 31 Mar 1930, 1; and 30 Jun 1930, 1.

would have been even higher. In Barnsley, with mostly double-deck trams[1] running on a short urban system, this could be compensated for by much higher earnings per car mile than the buses; for the DDLR this became increasingly impossible to do.

TABLE 26

REVENUE ACCOUNT FOR YORKSHIRE TRACTION BUSES AND TRAMS AND FOR THE DDLR 1928--1937 IN PENCE PER CAR MILE

Year (a)	Buses (YTC)			Trams (YTC)			Trams (DDLR)		
	Rec.	Exp.	Bal.	Rec.	Exp.	Bal.	Rec.	Exp.	Bal.
1928	10.71	9.87	0.84	14.07	12.94	1.13	11.16	10.79	0.37
1929	10.11	9.10	1.01	13.83	12.38	1.45	10.88	10.49	0.39
1930 (b)	9.75	8.59	1.16	14.47	12.94	2.92	9.82	10.08	0.26
1931	9.30	7.77	1.53	-	-	-	9.19	9.85	0.66
1932	9.29	8.16	1.13	-	-	-	8.24	9.42	1.17
1933 (c)	9.53	8.49	1.04	-	-	-	7.99	8.94	0.95
1934	9.53	7.85	1.68	-	-	-	-	-	-
1935	9.33	7.61	1.72	-	-	-	-	-	-
1936	9.61	7.50	2.11	-	-	-	-	-	-
1937 (d)	9.82	7.67	2.15	-	-	-	-	-	-

SOURCES: YTC figures from Mr. Robinson's Reports, passim; DDLR figures from Appendix D5.

a. Calendar years for YTC, March 31st the following year for DDLR.

b. YTC trams to closure on 31 Aug 1930 only.

c. DDLR to closure on 30 Sep 1933 only.

d. Eleven months only.

Appendix D7 makes a detailed comparison between YTC and DDLR costs for the years ending 31 Mar 1931 to 1933. Precise comparisons between the two modes are not always possible,[2] but with so wide a gap between them, this is not too important. YTC running costs--those which varied directly with mileage--are always at least 25 per cent lower than the DDLR's; the gap is increased to more than 50 per cent in 1932 when other--or overhead--costs are added. In one particular the DDLR does not come too badly out of the comp-

1. W[ingate] H. Bett and J[ohn] C. Gilham, The Tramways of South Yorkshire and Humberside (hereafter, SY&H Tramways), ed. J. H. Price (n.d.), 40.

2. Where does one put bus tyres, for instance? The YTC puts them under running costs, whereas DDLR tramcar tyres are classed as car repairs.

arison. Its costs were falling between 1931 and 1933 whereas those of the YTC were rising. But this would have promised no salvation for (1) DDLR revenue was also falling, (2) this is a comparison between a declining 'minimum maintenance' situation and an on-going operation and (3) the YTC's costs also resume a generally downward trend in 1934.

To some extent the differences in costs will represent economies of scale rather than absolute differences in the costs of running trams or buses. There is, for instance, a wide discrepancy in office/administration charges. There is no reason to suppose bus companies could obtain these services more cheaply.[1] But whilst the DDLR employed a General Manager and an office staff to operate thirty cars with an annual mileage of 748,125,[2] the YTC's staff supervised 185 vehicles over 7,808,585 miles.[3] Part of the difference in car/bus maintenance costs may also be due to the relative size of the fleets; whereas the YTC's Barnsley workshops dealt with all overhauls and major repairs for its large fleet, the DDLR had to provide similar facilities for its thirty trams, of which only half were in regular use anyway.[4] The size of the difference in costs per mile, however, makes it obvious that buses enjoyed an inherent advantage over trams in respect of repair costs.

Electricity was one area where the DDLR could buy in bulk, but the difficulty in renegotiating the Barnsley agreement has already been noted. The YTC, on the other hand, was able to reduce its fuel costs at the end of 1930, partly because of a general fall in petrol prices, but also because of the 'very favourable contract' entered into with the supplier.[5] Even if the

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1. Quite possibly the opposite in fact; one would expect the General Manager and staff of a large concern to be paid more than those of a small one. An indication that they were is that the DDLR's Manager happily accepted a lower position with the YTC; see Denton, D. D. L. R., 23.

2. 1930-1 figures; see Appendix D4.

3. Also 1930-1; number of vehicles from YTC, Quarterly Returns, 31 Mar 1932 and mileage calculated as per data in Appendix D7.

4. Denton, D. D. L. R., 15.

5. YTC, Mr. Robinson's Reports, 31 Dec 1930, 1.

DDLR had been a bus operator, its size would have made such concessions unlikely.

Certain items in Appendix D7 are not easily comparable; bus tyres and licences and tramway track and overhead have no direct equivalents.[1] Conveniently, though, these can be regarded as the charge each mode paid for the use of the road. Tramways were faced with the heavy burden of maintaining their fixed equipment, plus the road surface up to eighteen inches on either side of the tracks, a particular bone of contention when their competitors were using and wearing out this road.[2] There had been early attempts to make bus operators pay a direct road charge--for instance, Wombwell UDC wanted 2d per vehicle mile from the B&DTC for an extension to Brampton in 1919[3]--but such charges rarely stuck. The highways were thus free of charge except for an annual vehicle tax[4]; that is the sum for bus licences in Appendix D7. Bus tyres can also be regarded as a road charge roughly equivalent to tram track. It is notable that this item falls rapidly between 1931 and 1933, from 0.44d. to only 0.24d. per car mile. It is probable that the 1930-1 figure was exceptionally high due to the new Traffic Commissioners, who insisted that tyres be removed when worn down to the breaker band instead of 'the common practice of letting them wear down to the canvas'.[5] By 1932 the problem had been overcome by regrooving the tyres to give at least 3,000 miles more use[6] and thus a reduction in tyre charges. This enabled the YTC to keep its costs well below the DDLR's, even despite the low 'minimum maintenance' figures for the latter in 1932-3. Summing these items over the three years, track etc cost 1.16d., 1.15d. and 0.86d.

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1. Tramcar tyres, an inconsiderable item in comparison to the heavy expenditure on rubber tyres, cannot be separated from car repairs.

2. Klapper, Tramways, 33.

3. SYRO, 1/12, Wombwell UDC Minutes, Finance and General Purposes Committee, 2 Dec 1919, 327.

4. SYRO, Clerk's Reports, 15 Oct 1925, 4.

5. YTC, Mr. Robinson's Reports, 30 Sep 1931, 5.

6. Ibid., 31 Mar 1932, 6.

and bus tyres and licences 0.78d., 0.64d. and 0.60d. per car mile;[1] the first two years are a fairer comparison than the last.

The marked difference in costs between electricity and petrol in 1930-1 and 1931-2 is somewhat surprising; the YTC was at a clear advantage. However special factors were behind this. First, as noted above, the DDLR's costs were excessively high because of the difficulty in renegotiating the Barnsley agreement; in 1932-3 this comes through as a small reduction in overall costs for power. Second, the YTC enjoyed exceptionally favourable petrol prices in 1931-2 because of a price war between suppliers.[2] Later in 1932, however, fuel prices began to rise markedly,[3] making it necessary to cut services[4] and contributing to a working deficit in the first quarter of 1933.[5] The advantage still lay with the buses though, and after the DDLR closure petrol prices began to fall again.[6] Had the tramway still been running, however, fuel costs would have swung decisively against it from 1935 when the Company's first oil-engined bus was delivered.[7] In the early 1930s diesel oil was much cheaper than petrol, and even more significantly the engines did nearly twice as many miles to the gallon as equivalent petrol engines. Thus in the first quarter of 1933, with an all petrol-engined fleet, the YTC's buses were doing 6.88 miles per gallon,[8] whereas a new Gardner diesel engine tested in 1935 returned 12.7 miles to the gallon.[9] It is difficult to see how electricity consumption and charges could have been reduced to meet this technological advance, even on the larger tramways.

The other major running cost is wages. Here the YTC enjoyed a marked

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1. See Appendix D7.

2. YTC, Mr. Robinson's Reports, 31 Dec 1931, 7.

3. Ibid., 30 Jun 1932, 2. 4. Ibid., 31 Dec 1932, 4.

5. Ibid., 31 Mar 1933, 1-2. 6. Ibid., 31 Dec 1933, 2.

7. Ibid., 31 Mar 1935, 3. 8. Anderson, Crosville, 118.

9. YTC, Quarterly Returns, 31 Mar 1933.

10. YTC, Mr. Robinson's Returns, 31 Dec 1935, 8; the main comparison was not with petrol engines but with the rival Leyland diesel engine, which performed less satisfactorily.

and invariable advantage. There are probably two or three reasons for this. One is higher productivity in the bus undertaking. Buses ran as much as 50 per cent faster than trams;[1] given equal capacity, which was roughly the case between the YTC[2] and the DDLR,[3] the buses could be run at a corresponding saving in working costs.

It is also the case that pay and conditions for company employees tended to lag behind those of municipal concerns. The larger tramway companies did join the National Joint Industrial Council in 1918, but they seceded again in 1937 when it was proposed to include their bus employees too,[4] evidently because to do so would have meant improving standards. The DDLR obviously employed its staff full-time,[5] whereas the YTC discharged some men after the summer peak, usually temporary men who could rely on employment the following summer, but in particularly difficult times regular employees too.[6] The very large discrepancy between total wages for drivers and conductors[7] also argues that the Company operated some one-man vehicles, which the DDLR did not.

Since wages were so important a part of running costs, the advantage enjoyed by the buses over the trams, largely due to the former's higher speed, was a crucial one.

When all running and overhead costs have been summed, the YTC comes out with a clear advantage over the DDLR. Of long-term significance is the fact that the DDLR was quite unable to set aside any money for eventual renewal of assets. The YTC did make allowance for depreciation, which meant that its fleet could be continuously renewed and modernised,[8] giving a growing

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1. This relates to YTC buses replacing their own trams; see above

2. Not all were as large, but most single-deckers delivered new from 1928 had over thirty seats; see Sykes, Yorkshire Traction, 37ff.

3. The original cars seated thirty-six, the four modernised ones five less; see SYRO, Disposal 1933, 18 Aug 1933.

4. DCT Jubilee, 11. 5. An argument from silence.

6. YTC, Mr. Robinson's Reports, 31 Mar 1933, 20. 7. See Appendix D7

8. See fleet list in Sykes, Yorkshire Traction, 35-51.

advantage over the increasingly archaic trams. And this financial husbandry was possible whilst still earning a working profit, a happy state of affairs denied to the DDLR management throughout. The motor bus was master both of the present and of the future.

In almost all particulars, the YTC's operating costs were lower than the DDLR's, most significantly in the cases of fuel, road staff wages, road charges, vehicle repairs and administration. This may partly have been due to economies of scale, but more importantly stemmed from certain inherent or developed advantages of motor buses over trams--that is, the lack of road, track or overhead charges; a lower price for fuel, especially after the development of oil engines for bus use; and higher productivity, giving lower unit wage costs. The competition between the Company and the Joint Committee was really very unequal.

This chapter has shown that whilst the DDLR did not have high costs relative to other tramways, its operating expenditure was higher than expected, due partly to a--probably deliberate--understatement by the line's engineers of the long-term burden of repairs and more significantly to an obstinate refusal of these expenses to conform to the fall in the cost of living. The main factor was the rise in repair bills, which were a significant sum and invariably higher in real terms than they had been in the year of opening. There was, it is true, some decline in these payments over the last two years of operation, but in an interesting document--probably written to reassure the councillors that they <u>had</u> made the right decision to sell out--J. L. Hawksworth admitted that because of the Committee's desire to 'make end's meet' and perhaps because of the likelihood of ceasing to run, the repair bill had been cut from £7,000 plus to only £5,785 in 1932-3; had trams continued this would have been a 'veritable "Rakes Progress"' and against all considered opinion, which said that repair costs, particularly on track, should peak after eight to ten years of operation. Really, he said, expenditure in 1932-3 should have been the same as in the previous year, which would have increased the loss on working from £3,627 to

£4,979.[1]

Other important variables in the costs equation were electricity prices, whose erratic behaviour tended to accentuate the problems of the General Strike and its aftermath in 1926, and wages, which were the largest item and which, though not rising, did not fall either except marginally at the end of the period.

It is significant that the YTC's motor buses were able to compete successfully against what was in fact a very low cost tramway. Amongst their advantages were economies of scale, lower fuel prices, slightly lower wages and, more importantly, the lack of fixed equipment such as track and overhead to maintain. The YTC was thus able to keep its costs well below those of the DDLR and, though its earning power was little if at all greater than that of the DDLR on a per mile basis, was able to earn a surplus to meet both depreciation and a shareholders' dividend.

What is particularly interesting is that the YTC's working costs are much lower than those being quoted elsewhere at the time. Pilcher gives the costs per bus mile returned by ten municipalities. Their working costs vary from 7.89d. to 12.258d. or, with capital charges added, from 9.057d. to 14.742d.[2] Assuming any allowance was made for depreciation, it would presumably come under capital charges, so if one compares the higher bus mileage rates to those on the bottom line of Appendix D7, one sees that the YTC's expenses were at least 1d. less than the lowest municipal one, itself about 1.5d. below the next. The point is that that out-of-town bus services could evidently be operated even more economically than those in towns, thus increasing their competitive edge over the tram and probably being the main reason for the fact which Pilcher commented on at the beginning of his book: that in rural districts 'it became clear that . . . it was cheaper and quicker to travel by bus than by tram [and] many of these undertakings have

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1. SYRO, 8/UD28/604, Misc. Papers, Post-abandonment, incl., Review of Statement as presented by the Clerk on December 18th on the comparisons of years 1931 to 1934 respectively and 1935 . . . [1935] , 1.

2. Pilcher, Road Transport Operation, 127.

been abandoned'.[1] The DDLR, like a sickly child born out of time, was soon to follow them.

1. Ibid., 7.

CHAPTER 6

CAPITAL COSTS

Sellon's original estimate of the cost of construction for the planned eighteen mile network was £151,891 5s. 0d.[1] This was deliberately cut to the bone; as the Chairman remarked at the 1914 Inquiry, 'Mr. Sellon admits fairly enough that his estimates depend on the low rate at which he can construct this line'.[2]

The opposition naturally claimed that Sellon could not build the line at the price stated. Amongst the detailed criticisms were that there was insufficient allowance for building/altering bridges and that the estimates for track did not allow for satisfactory construction. The overall cost per mile was to be about £8,334, a great deal lower than most if not all other tramways then built. For instance, Rotherham's had cost £11,413 and Doncaster's £10,304 per mile.[3]

A recurring criticism was that the period allowed for redemption of the loan--forty years--was too long, as most of the assets would be life-expired long before then. Track was given a 'book life' of thirty years in 1914, cars fifteen, the average life of all assets being twenty-four years.[4] The point was that replacements would be needed well <u>within</u> the loan period, so putting an additional burden of depreciation on the revenue.[5] Hoare did manage to find a few examples where a forty year period was allowed--York in

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1. SYRO, Brief 1914, 4. 2. SYRO, Proceedings 1914, 270.
3. Ibid., 258, 523, 522 and 684. 4. Ibid., 686.
5. SYRO, Proceedings 1920, 72.

1908, for example, even Brighton in 1920--but the main reason for the long time scale seems not to have been any rational assumptions about the life of assets but, as Hoare said, because any shorter period would put a heavy burden on the authorities.[1]

After the war, of course, inflation pushed up costs vastly. In 1919 the engineers estimated it would cost £299,898 to build what was now only a fifteen mile system;[2] that is, £19,993 per mile. Even as the debate went on, costs were still rising, which the opposition was not slow to point out;[3] by the end of 1920 the total envisaged was up to £360,000.[4] Hoare however believed that the peak of prices had been passed,[5] which was in fact correct.

It was not, however, only the gross costs that had risen, but the cost of capital itself. Before the war the rate of interest had been $3\frac{3}{4}$ per cent but in 1920 it was not less than $6\frac{1}{4}$ per cent. Hawksworth claimed that he could get $5\frac{3}{4}$ per cent, having only borrowed £500 at $5\frac{1}{4}$ per cent that day, making an easy target for the opposition, who pointed out that the government had to pay $5\frac{3}{4}$ per cent and so did Birkenhead Corporation, whilst the four Councils' was 'a name unknown on the money market [and they] could not borrow at anything approaching these terms'.[6]

The crux of the matter was that the increased costs of construction and the higher interest rates meant that the DDLR would be paying larger capital charges out of its revenue surplus (if any) than other tramways constructed at pre-war costs/rates were doing, and even then these lines, which were usually more remunerative than the DDLR was likely to be, were finding it a struggle.

William Cash summed it up: 'The working results of these three[7] show

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1. SYRO, Brief 1921, 10.

2. SYRO, Evidence of A. R. Hoare, 12.

3. SYRO, Proceedings 1920, 80. 4. SYRO, Stanley 1920, 3.

5. SYRO, Brief 1921, 4. 6. SYRO, Proceedings 1920, 71, 64 and 70.

7. Rotherham, Birkenhead and Southampton Corporations, whose loans had cost 3.3, 4.4 and 3.07 per cent respectively.

that they just pay their way with an enormous traffic and a thickly populated area, and a population being carried a larger number of times than the Promoters suggest will be the case here'.[1] Even the perennially optimistic Hawksworth had to admit the scheme might go on the rates.[2]

In the event, the DDLR had to pay 6½ per cent interest on its capital, more even than had been feared in 1920, though interest rates did fall slightly from 1929 onwards.[3] In 1924-5 the total capital expended was £279,215; about £10,000 was added in the following year as the final bills were paid off, and thereafter the amount rises slightly to £295,068 in 1930-1[4] as further minor purchases/alterations are made.[5] Not all this amount was outstanding at any one time, of course, as small amounts were being repaid annually; according to the Returns, £261,396 was outstanding at closure.[6]

Since only 14.18 miles of route were actually built as opposed to the 15.11 authorised,[7] the total cost of construction per route mile was now £20,809, almost exactly two-and-a-half times Sellon's estimate of £8,334 in 1914. The total is remarkably close to Hoare's estimate of £299,898 in 1919-20, though one might have expected it to be slightly less since a mile less line was constructed and prices were falling by the early 1920s. Generating stations were not built, but this is partially balanced by the cost of the sub-station (which should properly include some of the cost of buildings) and of houses, whose construction was a late decision.[8] The cost of cars did fall dramatically, especially when the five extra cars are taken

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1. SYRO, Proceedings 1920, 71. 2. Ibid., 63.

3. SYRO, 8/UD28/609, Statement setting out . . . the History of the Undertaking . . . (n.d.); part of miscellaneous papers file (n.p.).

4. See Appendix D4.

5. For example, £351 was spent on track in Wombwell Lane in 1927-8, £655 on a new tower wagon in 1929-30; see SYRO, 8/UD28/548, Ledger, 96 and 92.

6. See Appendix D4. 7. Ibid.

8. SYRO, JC Minutes, 8 Jan 1924.

TABLE 27

DEARNE DISTRICT: COST OF CONSTRUCTION IN POUNDS

Actual Costs[a]		Estimated Costs[b]	
Permanent Way[c]	139,453	Permanent Way	127,582
Land	7,725	Road Widenings including Land	7,676
Electrical Equipment of Line	26,493	Overhead Electrical Equipment & Cables	25,690
Rolling Stock[d]	42,003	Rolling Stock	47,500
Buildings	15,739	Depot	7,750
Sub-station Plant	4,918	Generating Stations	28,800
Dwelling Houses	13,861	-	-
Preliminary Exp.	13,861	Preliminary Exp.	14,000
Interest during Construction	8,019	Interest during Construction	15,000
Engineer's Fees,[e] Parliamentary & Legal Expenses, Miscellaneous	24,150	Contingencies	25,900
Total	295,067	Total	299,898

SOURCES AND NOTES:

a. SYRO, Misc. Papers, Evidence of J L. Hawksworth, 7.

b. SYRO, Evidence of A. R. Hoare,12.

c. 14.18 miles actually built as against 15.11 planned in 1920.

d. 30 cars purchased as against 25 planned in 1920.

e. Sellon included his fee under Contingencies; see SYRO, Proceedings 1914, 258.

into account; this would also explain some of the increased cost of buildings, since a larger depot would be needed. The cost of constructing the permanent way did rise, but overall costs were not excessive when compared with the estimate.

The price paid by the local authorities was very high however. Table 12 shows the capital payments made from 1925 to 1933,[1] a total of £140,487. After taking working profits and losses into account, this left an accumulated deficit of £137,453. This was borne by the local authorities in the

1. See above,89 ; this excludes the final financial year of operation.

following percentages--Wombwell 39, Wath 26.3, Bolton 24.5 and Thurnscoe 10.2.[1] Table 28 shows how this worked out in 1931-2.

TABLE 28

PARTICULARS OF THE LOAN CHARGES BORNE BY THE CONSTITUENT AUTHORITIES FOR THE YEAR ENDED 31 MARCH 1932

Authority	Interest £ s d	Repayment £ s d	Sinking Fund £ s d	Total £ s d
Wombwell	5,445 9 7	234 3 5	1,450 3 4	7,129 16 4
Wath	3,505 10 9	931 15 5	*	4,437 6 2
Bolton	3,296 4 2	40 14 5	1,119 15 5	4,456 14 0
Thurnscoe	1,451 0 6	-	476 18 11	1,927 19 7
Totals	13,698 5 0	1,206 13 3	3,046 17 8	17,951 16 1

*Loans repaid on an Annuity Basis [Note in original]

SOURCE: SYRO, Misc. Papers, Evidence of J. L. Hawksworth.

a. The clerk has evidently made 17d. equal to 1s. 7d. instead of the correct 1s. 5d., an error transposed into the total.

As early as October 1925 it was feared that a 9d. rate might be needed to meet the deficit,[2] but later on the amount of rateable income being spent on the tramway was becoming insupportable, as Table 29 shows.

TABLE 29

DEARNE DISTRICT: CHARGES ON RATES FOR YEARS ENDING 31 MARCH

Authority	1932 d.	1933 d.
Wombwell	33.3	35.7
Wath	25.7	29.0
Bolton	24.9	25.5
Thurnscoe	14.3	14.6

SOURCE: SYRO, Short Statement of Facts and Evidence, 31.

1. SYRO, Misc. Papers: Evidence of J. L. Hawksworth, 7.

2. SYRO, Clerk's Reports, 15 Oct 1925.

Charles Klapper writes that 'despite the change in circumstances after the war . . . the sponsors went blindly on with the scheme'.[1] It is true that the Joint Committee had received plenty of warnings about the catastrophic effects the huge capital burden would have. They might conceivably have dismissed the opinions of their opponents as special pleading; for instance, in 1919 the railway companies were saying that the 'whole of the works proposed could not be constructed except at an enormously increased capital cost upon which no remunerative return can be anticipated'.[2] But other more independent witnesses were also ignored, such as Mr. Stanley from the Ministry, who told the Committee that interest and sinking funds would be 'the killing thing'[3] and that the scheme looked like 'a very serious burden on the rates, and I think it is my duty to say so'.[4]

It is not entirely fair to say that the Committee went 'blindly on', however. They clearly were rattled and frequently turned to Hoare for advice. In 1920 he strongly advised them to proceed despite the rises in costs,[5] and even after Stanley's devastating criticism was still claiming that there would be sufficient surplus to cover capital charges and leave a reserve.[6] It is difficult to avoid the conclusion that the Committee was badly advised by a man who had an obvious pecuniary interest in the work going ahead; it would have been wiser to employ a fresh outside consultant. But it is not true to say that the sponsoring authorities went ahead without thinking. An attempt was made on Wombwell Council in 1921 to suspend all expenditure for a year because of the 'abnormal and unsettled conditions prevailing at the present time'; this was amended to allow preliminary work to continue, but construction was deferred.[7] The following month one of

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1. Klapper, Tramways, 127.
2. SYRO, 8/UD28/463, Objections to the 1919 Order, 2.
3. SYRO, Stanley 1920, 4. 4. Ibid., 5. 5. SYRO, Brief 1920, 10.
6. SYRO, Brief 1921, 7.
7. SYRO, 1/15, Wombwell UDC Minutes, Council, 30 Jan 1923, 423.

Wath's representatives on the Joint Committee was expressing concern,[1] and this time Hoare's bland assurances were not received so kindly. At the subsequent meeting the proposal to proceed with tendering was lost on a motion to adjourn and it was decided to ask the engineers for a new estimate.[2] At the adjourned meeting Wath did actually ask for a report from an independent expert, but this was rejected and the tender of the Consolidated Construction Company accepted.[3] Wath were clearly unhappy, however, and so was Wombwell, whose Council only passed the motion to accept the tender by 7:5.[4]

Finally there was a dawning realisation on the part of the promoters that a loss would be made after capital payments. Under cross examination by Sir Lynden Macassey[5] at the 1920 hearing Hawksworth said that the Councils now agreed the scheme would be self-supporting 'taking into account the development that will be brought about in the district'; that is, the rather dangerous assumption was now being made that the tramway would pay because of the development it would stimulate, rather than on the basis of things as they were, or that a loss would be worthwhile because of the development brought about. Hawksworth went on, 'If it does not pay, then from their point of view [the Councils'] they would be prepared to shoulder the burden'.[6] The so-long held feeling that the line would benefit the community was being allowed to take precedence over commercial sense.

The capital burden clearly made the Joint Committee's position untenable. To quote Oliver Hardy's immortal phrase, 'Now look at this mess you got me into.'; who was 'you'? The engineers' estimate of the cost of construction was accurate enough, but Hoare's firm, whose fees were calculated as a percentage of expenditure, were clearly at fault in advising that a

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1. SYRO, JC Minutes, 5 Jan 1923. 2. Ibid., 26 Jan 1923.

3. Ibid., 2 Feb 1923.

4. SYRO, 1/15, Wombwell UDC Minutes, Council, 30 Jan 1923, 423.

5. Clearly a lawyer specialising in tramway matters. For instance, he was appointed to arbitrate on the sale price of the Grimsby tramways in 1924. See J. H. Price, 'Great Grimsby Street Tramways—4', TR 16 (Summer 1985), 37.

6. SYRO, Proceedings 1920, 63.

break-even situation was possible. The Committee itself, represented by local officials like Hawksworth who were quite out of their depth, was unable properly to assess the assurances they received. When told by independent experts not to proceed, despite the doubts of many local councillors, they foolishly went ahead. The failure at bottom was not economic but human.

The harsh facts revealed by the figures were that, in the real world of the 1920s, the capital costs laid upon the DDLR could not be met except by a massive recourse to the rates. Even, as discussed earlier, had the competition of the motor bus been miraculously removed, it is unlikely that the DDLR could have made enough to pay its way on the stony ground of the recession-hit Dearne valley.

CHAPTER 7

THE CONCLUSION

The main problem facing the DDLR's management throughout was how to relate to the Traction Company. There are four distinct phases in that relationship.

Meetings between the two parties began as early as September 1924,[1] initially with the aim of co-ordination and protection.[2] The YTC[3] quickly agreed on an alternate fifteen minute service of trams and buses, but would not agree to protection.[4]

Bus operators could be made to protect tramways in one of two ways, either by a prohibition on carrying local passengers over a tram route or by the imposition of an excess fare on such passengers.[5] It was the latter which the DDLR wanted,[6] and there was excellent precedent in the agreement between another BET-owned company--the Birmingham and Midland--and Birmingham Corporation, where it was agreed to charge a double fare on buses within the city limits.[7] Official support for protection was forthcoming on the grounds that it was unfair to penalise transport operators for having failed to foresee the development of newer forms of transport and that large amounts

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1. SYRO, Clerk's Reports, 19 Sep 1924. 2. Ibid., 23 Feb 925.

3. For ease of reference the later 'YTC' title is used throughout this chapter, even though not always strictly correctly.

4. SYRO, JC Minutes, Co-ordination Sub-Committee, 19 Mar 1925.

5. Humpidge, unpublished lecture notes, 2.

6. SYRO, Clerk's Reports, 23 Feb 1925.

7. Humpidge, unpublished lecture notes, 2.

of still-useful capital tied up in tramways should not be discarded all at once.[1]

The YTC said, however, that their investment must be protected too, and also made the point that whilst it might be usual to protect existing tramways, this did not apply in the Dearne valley, for they were there first.[2] The Dearne authorities, though, felt they had a moral right to protection since, in their view, the motor bus interests had used unfair tactics, in particular by putting large numbers of buses on the road during the period of construction.[3]

There was another reason, apart from being built after buses had become established, why the DDLR was in particularly acute difficulties. Usually tramways only needed protecting on the short outer ends of routes,[4] but in this case 'the whole of the route was . . . seriously threatened'.[5]

The Minister of Transport was clearly swayed by the Committee's arguments since he was willing to support Wombwell's refusal to license the YTC buses until protection was granted[6] and also to up his own suggestion of a 1d. protective fare[7] to 2d., meaning that over each 1d. stage the YTC was to charge 3d. However the agreement, to last for one year till 1 Jan 1927, did not cover the route outside the four Councils' areas nor workmen's tickets.[8]

It was felt that this slightly increased the tramway's revenue,[9] but

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1. Finer, Municipal Trading, 362-3.

2. SYRO, Clerk's Reports, 19 Sep 1924. 3. Ibid., 26 Mar 1925.

4. This would apply to urban tramways, the outer ends of which may have been vulnerable either because they were beyond the municipality's licensing area or because the further one went, the more the bus's speed told.

5. SYRO, Clerk's Reports, 27 Jul 1925.

6. SYRO, 1/18, Wombwell UDC Minutes, Highways and Buildings Committee, 30 Jun 1925, 132.

7. SYRO, Clerk's reports, 27 Jul 1925.

8. SYRO, JC Minutes, 17 Dec 1925.

9. SYRO, JC Minutes, Emergency Sub-Committee, 22 Sep 1926; from this time such ad hoc committees met fairly regularly with such titles as 'Emergency' or 'Negotiating' Sub-Committee, depending on how serious the situation was. Future citations are simply to 'Sub-Committee'.

the agreement was not continued after expiry because the Committee was dissatisfied with its execution, even accusing the Company of using it as a front for 'acts of deliberate piracy'.[1] In March 1927 the fare-cutting war broke out,[2] which was eventually settled by a new co-ordination and protection agreement drawn up under Ministry of Transport auspices; this was less favourable to the DDLR in that only a 1d. excess fare was to be charged, and once more workers' tickets and the Barnsley to Stairfoot section were excluded.[3]

This arrangement appears to have lasted until the end, though it failed to arrest the decline in either revenue or passengers, the latter evidently preferring the faster buses at a premium fare. The agreement as it stood had various deficiencies. One was that independent buses, which strictly speaking were also meant to give protection, did not;[4] this hurt both the YTC and Committee. Another was that workers' discount tickets were not included at all; if they were Mr. Coutts believed the trams would recapture many passengers,[5] but the Company had always refused such a concession.[6]

The main problem was that 1d. was simply not enough of a deterrent to using the buses. This or even ½d. was frequently imposed as a protective fare, but as an academic commentator at the time noted, this usually needed to be higher to be effective.[7]

Towards the end of 1928 the issue of protection began to give place to that of pooling. The idea of this was that within a defined area the YTC and the DDLR would run approximately the same mileage and pool the receipts, each party to receive half after certain expenses had been met.[8] Efforts

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1. SYRO, Clerk's Reports, 15 Mar 1927. 2. See above, 116.

3. SYRO, JC Minutes, 14 Jul 1927.

4. SYRO, Clerk's Reports, 14 Jun 1928.

5. SYRO, Misc. Papers, Reports on Workers' Fares etc., 12 Apr 1932.

6. SYRO, JC Minutes, 14 Jul 1927. 7. Chester, Public Control, 122.

8. Usually bus excess mileage expenses, the logic being that the YTC had to run extra and unnecessary buses to compete with independents.

would be made by both parties to reduce or eliminate private competition either by licensing controls (local authorities) or by buying them out (the Company).[1]

The details of this arrangement were the result of a long and hard negotiation between the two parties. The idea first surfaced from the DDLR side on 31 Oct 1928.[2] The Company was favourable, but initially offered to include only its receipts over the tramway and from direct buses from Thurnscoe and Goldthorpe to Barnsley, amounting to some £19,686 per annum.[3] This was considerably less than the DDLR's income and Coutts said that 'not under any circumstances can I see any advantage to the Joint Committee under the proposed pooling arrangements'.[4] Eventually it was agreed that bus receipts from a much wider area, including the four Urban Districts and some areas outside them, should be brought in.[5]

At a meeting at the Ministry doubts were raised about the legality of such an agreement between a local authority and a private company, but the Committee was told it was alright to go ahead as long as no payments were made to the YTC until an Act had been secured. Pooling was due to begin on 8 Apr 1929, but the day before--a Sunday--the Company suddenly pulled out on instructions from head office in London because of fears that the Committee would be unable to pay any balances due. Legal opinion was sought, but in the event the Company proved willing to start on 22 April without waiting for a response.[6]

Legal opinion when received was that the agreement was ultra vires.[7] To meet this the Joint Committee promoted the Dearne District Traction Bill in

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1. SYRO, Clerk's Reports, 28 Nov 1929 (bound with, JC Minutes).
2. SYRO, JC Minutes, 31 Oct 1928.
3. SYRO, Clerk's Reports, 17 Dec 1928.
4. SYRO, JC Minutes, 17 Dec 1928.
5. SYRO, Clerk's Reports, 7 and 9 Jan 1929.
6. SYRO, JC Minutes, 17 Jan, 21 Feb, 7 Apr and 18 Apr 1929.
7. SYRO, Clerk's Reports, 3 Jun 1929.

conjunction with the YTC; it would, incidentally, have given the DDLR bus operating powers.[1] The Bill had to be deposited by 17 December, but--again at the eleventh hour--Wombwell Council refused its support;[2] they had done so because they wanted a vigorous effort to make a go of the tramway by speeding up the trams and encouraging public support.[3]

It was hoped that at least some of the powers needed would be covered by the new Road Traffic Bill,[4] but the Act did not do so, and an appeal to the Ministry of Transport to amend it produced the frosty response that 'they were not in a position to do anything more for the Committee'.[5] Despite a recommendation to terminate the pool,[6] it was continued until the end of operation,[7] the bus mileage being so arranged that money would be due from the YTC but not vice-versa.[8]

The benefits to the DDLR were not great. The initial idea was that the elimination of direct competition would reduce the mileage run[9] and hence costs; but mileage rose rather than fell from its 1928-9 level.[10] Hopes that revenue might improve were dashed as the finances deteriorated still further over 1929.[11] The best that could be said was that losses were mounting less rapidly. Up to 21 Apr 1929 revenue had fallen by £74 3s. 8d. a week against the same period the previous year; thereafter the decrease was less at £27 8s. 7d., a 'saving' of £46 15s. 1d.;[12] a year later this had become

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1. SYRO, Clerk's Reports, 28 Nov 1929 (bound with, JC Minutes).
2. Ibid., 19 Dec 1929.
3. SYRO, JC Minutes, 19 Dec 1929, Local Authorities' Conference.
4. SYRO, Clerk's Reports, 19 Dec 1929. 5. Ibid., 10 Dec 1931.
6. SYRO, JC Minutes, Sub-Committee, 2 May 1932.
7. Ibid., undated, but taking Pool Account to 4 Jun 1933.
8. SYRO, 8/UD28/534, Brief for the YTC, 3 May 1933, 6.
9. SYRO, Clerk's Reports, 31 Oct 1928. 10. See Appendix D4.
11. SYRO, JC Minutes, 19 Dec 1929, Local Authorities' Conference.
12. Ibid., Sub-Committee, 24 Jan 1930.

£69 19s. 3d..[1]

There were two major disadvantages too. Firstly the YTC was building up a balance owing to the DDLR--£4,369 16s. 9d. by June 1933[2]--and used this fact to help force a later agreement on closure.[3] Secondly, the decline in the trams' revenue was accelerated as the public accepted the idea that it did not matter which form of transport they used.[4]

By early 1931 the Committee, as one member remarked, had got to the end of its tether.[5] The brusque reaction of the Ministry of Transport in December of that year provided a psychological moment for the Company to re-introduce the idea of a takeover, which the Sub-Committee started to consider in January 1932.[6] Sykes has an excellent summary of the options open to the DDLR at that time:

(1) to carry on as they were;

(2) to double the track at a cost of at least £150,000;

(3) to replace trams by buses;

(4) to replace trams by trolleybuses;

(5) to abandon the light railways by,

(a) simply closing down;

(b) arranging for the M&STC to run trolleybuses over the route;[7]

(c) selling out to the YTC; or

(d) ditto, but keeping the Joint Committee alive as a notional partner in bus operations in the pool area, any profits after deduction of expenses being shared.[8]

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1. SYRO, Clerk's Reports, 15 Jan 1931. 2. SYRO, JC Minutes, undated.

3. SYRO, Misc. Papers, Meeting of Members . . . with YTC, 20 May 1931.

4. SYRO, Clerk's reports, 10 Dec 1931.

5. SYRO, Misc. Papers, Meeting of Members . . . with YTC, 20 May 1931.

6. SYRO, JC Minutes, 14 Jan 1932.

7. Actually they only showed interest in the outer branches from Wath onwards; see SYRO, JC Minutes, Sub-Committee, 20 Jan 1932.

8. Sykes, Yorkshire Traction, 26.

The Manager produced a detailed report on options (3) and (4),[1] but the Committee seems to have done no more than to receive it.[2] One can certainly see why the option of motor buses was rejected, for Coutts's figures showed a maximum possible working profit of £9,375 per annum as against capital charges of £9,434; there would have been nothing left to pay towards the tramways' outstanding debt. Trolleybuses were a more attractive proposition though, with the best possible option--cheap installation at maximum profit--showing a surplus of £6,842; however £2,000 per annum was a much more likely result, and even this was uncertain.[3]

So far as the other options were concerned, modernising the tramway does not seem to have been taken seriously--adding 50 per cent to the already insupportable capital burden would not have been wise--and nor does closing down without replacement. 'Going it alone', abandoning the pool and actively competing with the YTC, was considered,[4] but when it came to a vote was rejected.[5] The M&STC offer was not really practicable, being for only part of the route, but was found useful as a bargaining counter.[6] This left only a sell-out to the YTC as a viable possibility.

The Committee would not sell for a lump sum, because the amount offered was too low,[7] so a long-term agreement was the only option left. There were precedents for such a scheme. Ayr Corporation had sold out for £20,000 down

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1. SYRO, Misc. Papers, Manager's Report on Substitution of Trackless Trolley or Petrol Buses for Trams (hereafter, Manager's Report); there are two drafts dated 4 and 12 Jan 1932, details being taken from both.

2. SYRO, JC Minutes, Sub-Committee, 28 Jan 1932.

3. SYRO, Misc. Papers, Manager's Report, 1-2 and conclusion.

4. SYRO, Misc. Papers, Additional Report to Sub-Committee, 28 Jan 1932

5. SYRO, JC Minutes, 18 May 1932.

6. SYRO, Misc. Papers, Final Recommendation of General Manager to Special Sub-Committee, 15 Feb 1932.

7. SYRO, Clerk's Reports, 2 Jun 1932; both Denton (D. D. L. R., 23) and Sykes (Yorkshire Traction, 26) state that a lump sum of £75,000 was paid for the undertaking, but this is almost certainly a mistake, as the lump sum was the alternative to the scheme eventually decided on.

and £2,500 per annum for ten years and then £500 for the next eleven years, for example.[1]

The basis for negotiation was Coutts's estimate that a bus operator could earn £4,000 per annum over the DDLR.[2] The arguments were about how much of this the YTC might reasonably be expected to pay. It was eventually agreed that the Company would guarantee a fixed payment of £3,000 per annum for the first five years and £2,000 after that; if higher profits were earned, these would be divided 50:50. The profit was to be the balance after operating costs of 10.125d. had been subtracted, these to vary only with changes in the prices of fuel and tyres.[3] The agreement was to last for thirty-two years until the DDLR had paid off its debt; the YTC would pay for the necessary Bill, buy any assets it required and pay over the pool balance once buses took over.[4]

This agreement was quickly accepted by the four Councils.[5] Because annual payments were still to be made, the Joint Committee had to remain in existence until these were completed[6] on 4 May 1966.[7] In effect the old pool area was continued, and all fares taken within that were summed and expenses at 10.125d. subtracted to arrive at the 'profit' to be divided between the Company and the Committee.[8] The Councils were precluded from operating buses,[9] but for many years retained a shadowy existence in the public eye through the special tickets issued on buses in the prescribed

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1. SYRO, Misc. Papers, Manager's Report, 5; it is not known whether this involved Ayr Corporation a a nominal joint operator of the buses or not

2. Ibid.

3. The Company's wish to include wages was rejected; see SYRO, Misc. Papers, Negotiations with the YTC . . . , 8 Jul 1932.

4. Ibid., Letter from the Secretary to the YTC, 9 Jul 1932.

5. Ibid., Letter from J. L. Hawksworth, 10 Aug 1932.

6. SYRO, JC Minutes, Sub-Committee, 10 Oct 1932.

7. SYRO, 8/UD28/510, Agreement as to the Abandonment of Light Railways . . . , 17 Nov 1932, 2.

8. Ibid., 5-7. 9. Ibid., 11.

area;[1] these appear to have been overprinted 'DDP Div.',[2] presumably standing for 'Dearne District Pool Division'. However even this disappeared later when the complex dual ticket system was replaced by agreed percentages of receipts on routes passing through the area.[3]

On 30 Sep 1933 the trams ceased running, without formality or notice.[4] As is usually the case in the real world, Goliath had triumphed over the boy David.

Even after the various negotiations over protection, pooling and sale had been brought to their inevitable conclusion, however, the YTC and the DDLR were not done with each other, but entered upon a fourth, post-closure phase in their relationship; for the first time, the details were specified by law.[5]

At one stage it had been hoped that the disposal of assets etc. would leave at least a break-even situation.[6] But although the sale of equipment,[7] car barns, houses etc. realised £16,080, the costs of breaking up the system were much higher than expected with road reinstatement alone costing £18,184 19s. 0d. The shortfall amounted to £8,785 18s. 9d., but much of this was covered by additional revenue accrued during the six months between closure and the end of the financial year, most of which must have been from the first payments under the Act and the settlement of the pool balance; a revenue 'profit' of £5,439 5s. 0d. was shown, leaving the author-

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1. SYRO, 8/UD28/593, Miscellaneous JC Minutes, 26 Jan 1949.

2. Letter from W[ingate] H. Bett in TR 8 (Summer 1969), 42.

3. SYRO, Misc. JC Minutes, 26 Jan 1949.

4. Denton, D.D.L.R., 23.

5. SYRO, 8/UD28/539, The Dearne District Traction Act 1933.

6. SYRO, Clerk's Reports, 21 Jul 1932.

7. Five trams were sold to Falkirk and four to Lytham St. Annes and the trucks and equipment of the remainder to Hull; see Bett and Gilham, SY&H Tramways, 40. By a roundabout route some of the trucks later found their way to Calcutta, where they are still in service, more than half a century after the DDLR closed; see G. B. Claydon, 'Calcutta Revisited--2', MT 45 (Feb 1982), 74.

ities only just over £3,300 to stump up to balance the books.[1]

Thereafter, except for small amounts of bank interest and other odd items, the Joint Committee's sole source of income was the payments from the YTC, virtually all of which was available for distribution to the authorities, except for a small amount for administration--usually about £100 per annum--and a slightly greater amount payable to the YTC as interest on capital they had expended on buying other bus services, a move which would benefit the receipts in the agreed area. From 1943 onwards income tax started to be deducted from payments at approximately 50 per cent, which seriously reduced the DDLR's income.[2] However it appears that the authorities themselves could reclaim the tax.[3]

Annual capital charges on the authorities were approximately £7,155 for Wombwell, £4,440 for Wath, £4,465 for Bolton and £1,940 for Thurnscoe.[4] It will be obvious therefore that the initial payments of £3,000 per annum did not go far towards meeting these amounts. Nontheless this was better than the previous situation. Wombwell, for example, had borne £1,174 of the working loss in 1933, equal to a 5.59d. rate; in 1935 they expected to receive £830 from the YTC, equal to a 4d. rate, the difference between the two being a 9.5d. rate or £1,995.[5]

The last payment of £3,000 was made in 1938 and the following financial year the DDLR's share fell to only £2,669,[6] as the original agreement had clearly envisaged when setting a minimum of £2,000 per annum. With the outbreak of war, however, earnings per bus mile rose sharply, partly because

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1. SYRO, 8/UD28/567, Financial Statement . . . Year Ending 31 Mar 1934

2. See SYRO, 8/UD28/568-82, Financial Statements . . . Years Ending 31 Mar 1935--49, passim.

3. SYRO, 8/UD28/605, Treasurer's Report to the Dearne UDC Finance Committee; about 1937 or 1938 the Bolton and Thurnscoe UDCs were combined into a new Dearne UDC.

4. SYRO, Misc. Papers, Evidence of J. L. Hawksworth, 8.

5. SYRO, Misc. Papers/Post Abandonment, Review of Statement.

6. Ibid., DDLR Joint Committee in Account with the YTC, 1934--49 (hereafter, JC Account).

services were cut;[1] but even after the war, though earnings per mile fell back a bit, gross receipts continued to rise, from only £64,602 in 1939 to £116,117 in 1949.[2] The catch--or opportunity, depending on one's point of view--was that costs were still calculated as 10.125d. per bus mile plus any variation in the costs of fuel and tyres. This took no account of the tremendous increase in labour charges nor of increased prices for almost all other items, including buses.[3] Thus the actual costs were far in excess of those used to calculate the DDLR's 'profit'; in 1949 the 'agreement' costs were 10.77d.,[4] but the real costs were 14.35d. per bus mile. The result was that since 1943 the YTC had been paying over a grossly disproportionate percentage of its working profits, and by 1948 was actually paying more than this--that is, it was showing a loss in the Dearne area, amounting to £2,188 in 1947 and to a staggering £6,412 in the first ten months of 1950.[5]

The result was that at least one of the local authorities was now making an actual profit on the DDLR account. The Dearne UDC had been subsidising loan payments from the General Rate Fund throughout, but in 1949 and 1950 was able to pay in £650 and £4,437 respectively from DDLR receipts.[6] Failing a revision of the agreement, the YTC's only recourse was to raise fares, but even this was a double-edged weapon, for higher receipts also meant higher payments to the DDLR. In 1951, it was estimated, the actual profit on bus operation in the Dearne area under the old fares would be £748, but the payment to the DDLR would be £17,851. Higher fares would

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1. YTC, The Dearne District Light Railways (hereafter, The DDLR), 3; a statement made towards the end of 1950 to support the Company's case for a review of the agreement.

2. YTC, The DDLR, Table attached to Report. 3. Ibid., 3.

4. SYRO, Misc. Papers/Post Abandonment, JC Account.

5. YTC, The DDLR, Table; the figures for Committee and Company are not for precisely the same periods, because the DDLR worked on financial and the YTC on calendar years.

6. SYRO, Misc. Papers/Post Abandonment, Dearne UDC Finance Department, 1 Dec 1950. Whether the other two authorities were in 'profit' at this time or not depends on whether they had followed similar policies to the DUDC, which had accelerated repayments from 1942 to save interest and by 1950 was reaping the benefit of this.

raise the profit to £11,748, but then the DDLR would get £23,081. The Company's subsidy to the DDLR would thus be cut from £16,833 to £11,333, but by no means be eliminated. The position was serious for the YTC because in January 1951 it made a loss on overall working of £4,554, increased by payments to the DDLR to £5,866.[1] Unfortunately available sources run out at this moment, so it is not known whether or not the agreement was modified. Certainly it was in the local authorities' interest not to do this, and the Dearne UDC seems to have contemplated fare rises with equanimity, as the increased revenue would have helped to reduce their debts.[2]

Obviously, therefore, the tables were turned and, as in all good tales, David had gained his victory over the giant.

One must conclude that the Dearne District Light Railways were a mistake, and very largely an avoidable mistake. This is so because even when they were proposed and still more so when they were built, it was pretty clear that they could never be an economic success.

As the arguments at the original hearing make clear, the main reason why the lines were promoted was the perceived inadequacy of local railway services. Even then, and much more so by the early 1920s, motor buses provided a viable alternative, making the expensive construction of a tramway both unnecessary and increasingly risky. In short, the line was built under out-dated assumptions about the role these various transport modes should or could play. Perhaps someone should have taken note of the Chairman of LUT, who is reported as remarking of his Company's 1908 results, 'with the advent of motor buses the situation was quite altered. Any man who attempted to build a tramway today under the conditions imposed by the Acts would be insane'.[3]

It was also true, however, that even without bus competition, the DDLR

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1. YTC, Dearne District; a paper outlining the various estimates for 1951 and giving the actual results for January 1951.

2. SYRO, Misc. Papers/Post Abandonment, DUDC Finance.

3. Wilson, L. U. T., 125.

would have been at or below the margin of profitability. Interurbans, with limited ridership spread out over long routes, were less likely than town systems to earn enough to cover a tramway's necessarily high operating and capital costs particularly, as in the case of the DDLR, when there was little chance of concentrated short-stage traffic. The experience of the Belgian Vicinal light railways was often similar. Though a lot of these were commercially successful and a few are still running today, many of those in less densely populated areas could not have continued without support from the parent organisation. For instance, a large group of steam tram lines around Turnhout, in Antwerpen Province, was completed before World War I, but even then 'several required an annual subsidy'.[1]

That is on the revenue side. Where costs were concerned, most of the witnesses at the original hearings doubted that operating costs would be as low in the long term as the engineers had claimed, and also that revenue would be sufficient to meet the capital burden. Both prognostications were proved correct, with operating costs--and in particular repair costs--first rising faster than and then falling more slowly than the general cost of living.

Because of the vastly increased costs of construction after the war, and the higher interest rates then ruling, the cost of repaying and servicing the debt proved prohibitive. Even before the DDLR was opened other tramway authorities were drawing the obvious lesson from increased capital costs and the availability of less capital-intensive alternatives to trams. In 1923 it was estimated that renewal of only two-and-a-half miles of single line in Keighley would cost £35,500; to meet loan charges, maintenance etc. on track alone would cost £6,150 per annum, clearly a sum which the undertaking's previous annual surplus of £1,429 was inadequate to meet, so it was sensibly decided to scrap the trams in favour of trolleybuses.[2]

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1. W. J. K. Davies, 100 Years of the Belgian Vicinal, SNCV/NMVB 1885--1985, a century of secondary rail transport in Belgium (Broxbourne, Herts. [1985?]), 51.

2. King, Keighley Transport, 75-7.

Much of the foregoing was or could have been known at the time of promotion or construction. Advice not to proceed, even from impartial sources such as the Ministry of Transport, was ignored. Undue reliance was placed upon Richard Hoare, the Engineer, and his assurances that despite changed conditions, the line would be a paying one; he was proved particularly at fault in his estimate of future working costs.

Not everything could have been foreseen, however. The tramway had been planned to serve a booming and expanding mining area. The downturn in the coal industry and the consequent long-term depression of trade could hardly have been expected by those involved in planning the area's services. Undoubtedly this decline in the industrial base added to the DDLR's troubles, even though it was probably not as significant as the management appeared to assume at the time.

As has been shown, the DDLR would probably have been a loss maker even if it had had the field to itself. In such a case, however, a relatively small subsidy might have been justified to maintain an essential public service. As it was, though, motor bus competition destroyed all possibility of the loss being other than horrendous, and it was this factor which made the DDLR completely unviable. The DDLR's revenue must have been at least halved by the traffic lost to--or rather never gained from--the YTC and independent buses. The DDLR could not charge fares high enough to cover its own costs because of this intense competition, and though the YTC itself might have preferred higher fares, it was able to survive even the price war on low ones because of cross-subsidisation from other areas and because of its own markedly lower costs; those of the 'pirates' must have been even less.

All attempts to control or mitigate bus competition by licensing of routes, by protective fares or by pooling of revenue failed in their objective of bolstering the DDLR's position. This was partly because local authorities had insufficient powers to deal with private competition; protection etc. could have been effective given the political will from central government. But with the limited measures available, failure was inevitable for

two reasons. First, bus travel was attractive to passengers as against the slow and circuitous service offered by the DDLR. Buses were faster, more comfortable and offered more direct services, so people did not mind paying a slightly higher fare, particularly when pooling appeared to make loyalty to the trams--if it ever existed--irrelevant. Second, no amount of legal control could deny the economic facts. Motor buses were vastly cheaper to inaugurate than trams and thus bore a correspondingly reduced capital charge. Their running costs were also much lower, a fact which is particularly significant in the Dearne where the buses were competing with a tramway which was new and built for economical working. Few tramways could match the DDLR's low operating costs, but even so the YTC was able to undercut these consistently, and by a considerable margin. The YTC's running costs seem to have been markedly lower, too, than those returned by bus undertakings in other, probably more urbanised areas. If this was usual in semi-rural districts like this, it makes a point of general importance about the viability of tramways in such environments.

Quite possibly, as Denton says, the Dearne Committee might have had a longer career as a transport operator had it gone in for motor buses at the start.[1] Various other small municipal ventures were started in similar circumstances at about the same time. For instance, the Tees-side Railless Traction Board started a trolleybus service in 1919, supplemented by motor buses from 1924; Ramsbottam UDC did the same in 1923, and there were also a couple of examples in South Wales. 'A common feature of these "pioneer" efforts, some jointly between neighbouring Urban District Councils, akin to the Dearne joint authorities, was that, unlike the latter, all steered well clear of trams. Most only lost their independence with the 1974 local government reorganisation',[2] a full forty years after the Dearne District Light Railways Joint Committee lost its to the all-conquering Yorkshire Traction buses, even if the DDLR did finally prove a rather indigestible morsel.

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1. As the Ministry had recommended; see SYRO, Stanley 1920, 7.

2. Denton, D. D. L. R., 24.

PART III

DONCASTER CORPORATION TRAMWAYS

THE TOWN TRAMWAY

CHAPTER 8

EXPANSION AND CONSOLIDATION 1899--1914

Introduction

Doncaster dates back to Roman times and thereafter developed into a market town serving a wide area; few considerable relics of this past remain, apart from the eighteenth century Mansion House. Horse racing has been a feature since at least the seventeenth century; the St.Leger classic started in 1776. Doncaster's modern importance derives from its position as a centre for road, rail and to a lesser extent water communication; from about 1910 it became an important coal mining area too.

The town became a Borough in 1194. Its boundaries were extended in 1914 and again in 1936, whilst in 1927 County Borough status was achieved.[1] Even after 1936 certain places within the town's immediate economic orbit remained municipally independent, the most important of these in the present context being the UDCs of Adwick-le-Street and Bentley-with-Arksey;[2] these were absorbed into the Metropolitan Borough with local government reorganisation in 1974.

No full scale history of the tramways has yet been written, though various articles and booklets cover the subject in greater or lesser detail and accuracy. There is a considerable body of primary material, mainly Council minutes, letter files etc., as well as some documents held by the South Yorkshire Passenger Transport Executive, successor to the Corporation Trans-

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1. For details of local government in the period, see Appendix G2.

2. Doncaster Official Guide (Doncaster, n.d.), 17-37, passim.

port Department.[1] The most appropriate way of presenting this case study, and especially in view of the lack of a detailed published history, is broadly chronological.

Legal Preliminaries 1898--1903

Modern Doncaster was really created by the Great Northern Railway, whose line reached the town in 1849,[2] and which opened its engine repair shops there in 1852-3, so stimulating residential development in the suburbs of Balby, Hexthorpe and Hyde Park[3] and in turn creating a demand for local public transport.[4] Horse buses were introduced in the 1880s[5] operated by three proprietors, Hodgson and Hepworth, J. Steadman and J. Stoppani.[6] Services eventually ran to Wheatley, the Racecourse, Hyde Park, Balby, Bentley and Hexthorpe.[7]

A proposal for a tramway--almost certainly horse-powered--was made in 1878 and another in 1896;[8] it is not clear if the latter was that next described, but probably was not. In 1898 the BET approached the Corporation with a scheme[9] for five miles of line to Bentley, Avenue Road, Balby and

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1. See the footnotes and bibliography.

2. DCT Jubilee, 5.

3. P. Tuffrey, Doncaster's Electric Transport 1902--1963 (hereafter, Electric Transport) (Doncaster, n.d.), Introduction; this photographic album lacks page numbers, so references are to 'Introduction' or 'Captions'.

4. DCT Jubilee, 5.

5. Leslie Flint and Michael Fowler, 'Doncaster Corporation Transport, British Bus and Tram Systems 29' (hereafter, 'Corporation Transport'), Buses Illustrated 10 (March--May 1960), 78.

6. Tuffrey, Electric Transport, Introduction.

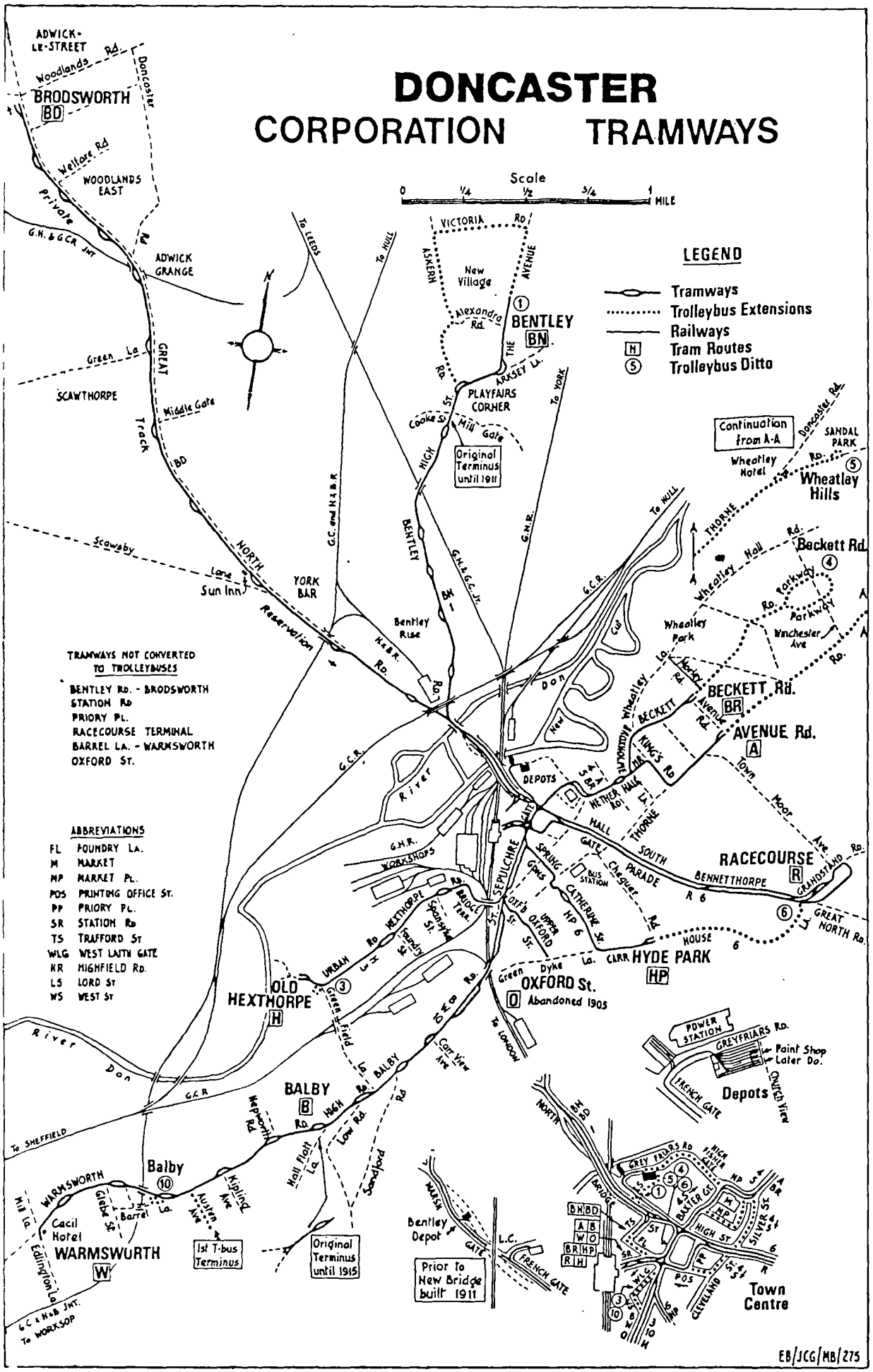
7. Doncaster Archives (hereafter, DA), AB9/TC3/A45, Light Railway Commission, Minutes of Proceedings of the Inquiry into the Doncaster and District Light Railways, 15 Feb 1899 (hereafter, Proceedings 1899), 9. Individual documents at DA may have a distinctive number, but most are bound in boxes or bundles with a common number, as in this case. The same code may thus recur for several differently titled papers.

8. DA, AB9/TC3/A45, Mr. Crabtree's Evidence 1899 Inquiry , First Draft, 4.

9. DCT Jubilee, 13.

FIGURE 6

(from Bett and Gilham, SY&H Tramways, 50)



Hexthorpe.[1] The Company withdrew when the Corporation promoted their own Order, but secured an informal agreement that if they should obtain powers for an interurban connection towards Mexborough and Rotherham, the Corporation would grant running powers over their lines.[2] The BET never moved in this direction, however, but a new company which promoted a line later to Mexborough and then to Barnsley[3] did receive the support of Doncaster Corporation;[4] the scheme was withdrawn before going to an inquiry however.[5]

Within the Borough, though, municipal enterprise was felt to be preferable, some of the justification for this attitude being that the Corporation had a greater stake in the area than a company and would be more responsive to local needs.[6] The same approach applied across the board. The Council had already dismissed at least three applications from electricity supply companies,[7] and a street lighting supply became available from the municipal generating station late in 1899 and a public supply on 2 Apr 1900.[8] To call this tendency municipal socialism--a contemporary phrase--gives a slightly false impression, for by 1900 the only Council to have had a Labour majority was at West Ham. Pre-1914 councils were rarely strongly party politicised; sitting councillors were often returned unopposed and though party labels were used, once elected both Conservatives and Liberals tended to act as individuals paying little attention to party allegiance when making their

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1. DA, AB9/TC3/A52, Doncaster and District Light Railways Order 1899 (Draft), 3-4.

2. DA, Proceedings 1899, 247-8.

3. DA, AB9/TC3/A46, The Barnsley and Doncaster Light Railways Order 1902, passim.

4. DA, AB9/TC3/A47, Evidence . . . in support of the . . . above Scheme (Draft), passim.

5. Ibid., manuscript note on title page.

6. DA, Proceedings 1899, 47.

7. DA, AB2/2/1/11, Town Council Minutes 1 Jan 1895--4 Apr 1912, 11 Aug 1897, 314-5 and 324. These manuscript minutes are in separate volumes for Council, Committees etc., each having a specific reference code.

8. Tuffrey, Electric Transport, Caption.

decisions.[1] Doncaster's Council was obviously of the type described. Of six retiring councillors standing in November 1897, five were returned unopposed.[2] Though most bore party labels, in many cases this was prefixed by 'Independent'.[3] A leader writer in a local paper said that elections were chiefly fought on personal lines, with little bearing on public questions.[4]

Where tramway municipalisation happened--as it usually did in Britain--it was certainly not always or even generally a result of Fabian Socialist principles as set out by Sidney Webb.[5] In a number of important cities municipalisation seems almost to have been an accident, happening in spite of rather than because of firmly held principle. Leeds took over its tramways because of the shocking condition of the permanent way and initially formed a temporary sub-committee to run them, only making the arrangement permanent when no suitable lessee could be found.[6] In Liverpool the boot was rather on the other foot. There the city owned the tracks whose condition was so bad as to ruin the tram company's cars; rather than face the likelihood of heavy compensation, the corporation bought out the company.[7] If the motive for municipalisation was positive, it did not have to be collectivist; the Lord Provost of Glasgow said that municipal enterprise had spread so rapidly in the north because it made good business sense to obtain cheap public utilities.[8]

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1. Bryan Keith-Lucas and Peter G. Richards, A History of Local Government in the Twentieth Century, The New Local Government Series No. 17 (1978), 111.

2. Doncaster Gazette, 5 Nov 1897, 6.

3. Of six councillors elected in 1898, three of the four with known affiliations were independents of one sort or another; ibid., 4 Nov 1898, 6.

4. Ibid., 9 Nov 1900, 5.

5. Sidney Webb, The Course of Municipal Socialism in the United Kingdom, Labour Annual, 1894.

6. Brian Barber, 'Municipal Government in Leeds 1835--1914', in Municipal Reform and the Industrial City ed. Derek Fraser (Leicester, 1982), 90-1.

7. Horne and Maund, Liverpool Transport 1, 109.

8. To the Select Committee on Municipal Trading in 1903; see Finer, Municipal Trading, 60.

Some councils were getting more politicised, however, the most obvious example being the LCC where municipal socialism was carried forward by the Progressive party, a group not totally identified with either the Labour or Liberal parties, but with close affinities to both.[1] Elsewhere Liberal councils were most likely actively to favour municipal tramways. Of eighteen Doncaster councillors (excluding Aldermen) in 1897,[2] the party affiliations of thirteen are given in the press in that and the following year, eight being some kind of Liberal, only five being Conservatives,[3] which may help to explain what seems to have been a relatively uncontentious decision to run the tramways themselves. Another factor was certainly the value of tramways as a customer for the planned power station;[4] when the trams opened in 1902 the 1901 price per unit for electricity was reduced from 5d. to 3d., whilst for some years afterwards the trams bought half the output.[5]

At the end of 1898 an application was made to the Light Railway Commissioners[6] for powers to build lines within the Borough, to Balby and Hexthorpe within the then-UDC of that name, to Bentley and to Wheatley.[7]

The hearing was held and concluded on 15 Feb 1899. The Corporation's arguments included a recent population increase, the likely expansion of the coalfield to the town, the development of Corporation-owned land outside the Borough, expansion of their markets and benefit to the electricity undertaking. The horse buses had proved the traffic, and a probable initial loss on the light railways would soon be reversed by the growth of the district.

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1. G. M. Trevelyan, English Social History: a survey of six centuries, Chaucer to Queen Victoria ([2nd?] ed., 1948), 583.

2. Doncaster Gazette Directory 1897 (Doncaster, 1897), 21.

3. Doncaster Gazette, 5 Nov 1897, 6 and 4 Nov 1898, 6.

4. DCT Jubilee, 14 and Tuffrey, Electric Transport, Introduction.

5. Tuffrey, Electric Transport, Caption.

6. Thus the lines were strictly light railways built under the 1896 legislation (see Appendix G3); however in Doncaster, as opposed to the DDLR, this title was employed only legally, 'tramway' being the common usage.

7. DA, Town Council Minutes, 13 Dec 1898, 463.

The main objection came, not unreasonably, from the Great Northern and other railways over the plan to run trams over the Frenchgate level crossing on the East Coast main line. After discussion, a compromise was agreed by which the tram lines would stop either side of the crossing, leaving passengers to walk through the existing subway.[1] The only major point at issue was thus settled, but at the expense of leaving the Bentley line detached

TABLE 30

DONCASTER: ORIGINAL ROUTES, LENGTHS AND COSTS

No.	Route	Length mi.	f.	ch.	Cost of Construction £	s.	d.
1	Station Road--Balby	1	4	8	6,533	19	7
1a	St. Sepulchre Gate, connecting 1 & 3			2½	152	5	5
2	St. James' Church (1)--Hexthorpe	1	0	5	4,447	0	6
3	Station Road--Bentley	1	7	8	7,990	1	1
4	Joining (3) near baths to tram sheds			8	455	12	1
5	St. Sepulchre Gate/High Street (3) --Avenue Road		7	8½	4,131	10	0
6	Ditto--Racecourse	1	1	2	4,786	15	1
7	St. Sepulchre Gate (1)--Hyde Park		4	8½	2,675	5	1
	Other Items	7	4	0½	31,172	8	10
	Land and Buildings				3,327	11	2
	Electrical Equipment:						
	Feeders etc				5,500		
	Overhead				7,000		
	Posts,Pillars etc				7,500		
	Single-deck Cars (15)				10,500		
	Contingencies				1,000		
	Engineering and Legal Costs				2,000		
	Cost of obtaining Bill				2,000		
					70,000		

SOURCE: DA, AB9/TC3/A44, Estimate of Proposed Light Railways (slightly adapted for brevity).

a. Miles, furlongs, chains; same abbreviations used in later tables.

1. DA, Proceedings 1899, 1, 7-9, 13-14, 106, 17-18, 215-16.

from the rest of the system.

Modern accounts of the tramways fail to make it clear that the system as suggested in 1899 was quite significantly different from that actually built. The Hyde Park line was projected only to Jarratt Street[1] and, as Table 30 shows, two of the early routes--to Oxford Street and Beckett Road--do not appear in the plans at all. The layout was simple to the point of parsimony. All routes were single track, except where Railways 1 and 3 ran alongside in Station Road, and passing places were provided only on the Balby, Bentley and Hexthorpe lines.[2] This layout allowed a twenty minute service generally and a ten minute one on the three shorter lines.[3]

For various reasons, this scheme proved inadequate and the Corporation had to return to the Commissioners for further Orders, granted in 1902 and 1903.[4] The first provided for a diversion of Railway 5--via 5a--to avoid building a new road through the cattle market[5] and for a short extension --6a--to take the Racecourse terminus a little nearer the stands. It had also been agreed to double most of the latter line because of the need to cope with abnormal traffic on race days, but this did not need to form part of the application to the Commissioners, since the Board of Trade had power to agree such alterations and had done so; the estimated cost was £5,000.[6] The other works were priced at £2,500, so an increase in borrowing powers to £77,500 was requested.[7]

This was the substance of the 1902 Order. The next was the result partly of problems revealed by initial operations and partly of pressure by various interest groups for further extensions. The 1902 scheme had left the Racecourse route still with an awkward stretch of single track in High

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1. DA, AB9/TC3/A45, Doncaster Corporation Light Railways Order 1899 (hereafter, Order 1899), 5.

2. One apiece, presumably mid-way along the route.

3. DA, Proceedings 1899, 87-8. 4. DCT Jubilee, 50.

5. DA, AB9/TC3/A45, Light Railways Commission, November 1901, Memorial of the Mayor, Aldermen and Burgesses . . . , 2-3.

6. Ibid., 4. 7. Ibid., 6.

Street, and after the first St. Leger's Day service in 1902 this was found quite unworkable,[1] so an interesting scheme was drawn up to remove the bottleneck by constructing a second track along Priory Place and Printing Office Street as well as making the outer terminus a turning circle. In this way, cars would be able 'to run in one continuous circle, the one after the other, without changing the trolley pole'.[2] At the same time an extension of the Hyde Park route to Childers Street was agreed.[3] Meanwhile, pressure was being put on from Wheatley--then still an independent UDC--for an additional branch from the planned Avenue Road route to Beckett Road,[4] and this was agreed by the Doncaster Committee in September together with a second line within the Borough to Oxford Street.[5] The latter stemmed from a residents' petition.[6] Details are given below in Table 31. Except for Oxford Street, these extensions were designed to serve developing districts such as Hyde Park, where ten new streets had been built, mostly since the passing of the 1899 Order.[7] An inquiry into the proposals was held on 27 Jan 1903[8] and an Order was granted later in the year.[9]

As actual construction came closer, the usual problems had to be sorted out with interested parties, particularly the road authorities, such as Hexthorpe UDC.[10] It also became clear that in some cases the planned layout was inadequate, so various loops were lengthened[11] and other new ones inserted.[12]

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1. DCT Jubilee, 16.

2. DA, AB9/TC3/A52, Doncaster Corporation Light Railways, November 1902, Mr. Crabtree's Evidence (hereafter, Crabtree's Evidence), 1.

3. DA, AB2/2/16/2, Tramways Committee Minutes 7 May 1901--13 Nov 1905 (hereafter, TC), 29 Sep 1902, 103P, 88; most minutes have a paragraph number (viz. 103P), which is quoted before the page to give a precise reference.

4. Ibid., 7 Jan 1902, 136P, 45. 5. Ibid., 29 Sep 1902, 103P, 88.

6. Tuffrey, Electric Transport, Caption.

7. DA, Crabtree's Evidence, 1. 8. DA, TC, 12 Jan 1903, 145P, 110.

9. DCT Jubilee, 50. 10. DA, TC, 13 Jun 1901, 47P, 13.

11. Ibid., 26 Nov 1902, 135P, 104; this was after using the line.

12. Ibid., 12 Aug 1901, 104P, 30; on the Balby line.

TABLE 31

DONCASTER: EXTENSIONS ORDER 1903

No.	Route[a]	Length[b] mi. f. ch.	Cost of Construction[b] £
6b	From 6a along Racecourse Road to Town Moor Avenue		
	Double:	5½	
	Single line back:	1 3½	1,300
7a	From 7 along Carr House Road to near Childers Street	1 5	1,000
8	From High Street via Priory Place and Printing Office Street to to St. Sepulchre Gate	1 3½	850
9	From Nether Hall Road to Beckett Road	3 4	1,800
10	From St. Sepulchre Gate via Camden Street, St. James' Street and Oxford Street to Upper Oxford Street/Green Dyke Lane	2 6	1,400
	Other Items	1 2 7½	6,350
	Land and Buildings		350
	Electrical Equipment:[c]		
	Feeders etc		950
	Overhead		1,200
	Posts etc		1,250
	Double-deck Cars (5) for passengers and a water van		4,000
	Contingencies		200
			14,300

SOURCES:

a. DA, AB9/TC3/A45, Light Railway Commission, November 1902, Doncaster Corporation Light Railways (Extension).

b. Lengths and Costs of routes and land/buildings from DA, AB9/TC3/A52, Doncaster Corporation Light Railways, November 1902, Mr. Crabtree's Evidence, 1-2.

c. Electrical Equipment from ibid., Mr. Wyld's Evidence.

Again, such changes did not require a further Order, but merely the approval of the Board of Trade.[1] This is however running ahead of construction into the operating period.

1. DA, Order 1899, 5-6.

Constructing the System

After getting the Order in 1899 the Town Council moved swiftly to approve tenders, though initially leaving tramway matters in the hands of the Electricity Committee.[1] A Tramways Committee was not formed until May 1901 when Councillor Smith became the first Chairman.[2] It was decided to leave construction in the hands of the Borough Surveyor and Electrical Engineer instead of appointing an outside engineer[3] which, in view of later events, might have been a mistake. No specific appointment of a Tramways Manager was made, but the Electrical Engineer, Mr. Wyld, seems to have slipped into the role by early 1902.[4]

Because electric tramways were still quite novel, local councillors tended to indulge in 'site visits' to choose equipment etc. An important trip was made to Hull in May 1901,[5] significant because Doncaster decided to model its tramways on those of its larger neighbour, in particular by using a rail with the groove in the centre instead of at one side.[6] These were the only two British electric tramways to adopt such rail and centre-flange wheels, the idea being to afford smoother passage through points etc.; the obliquely-cut rail joints used were supposed to assist the effect.[7] This non-standard rail might have been expected to push up costs, but the price of £6 2s. 6d. a ton[8] compared well with the £7 a ton which Liverpool was paying at about the same time.[9] Fortunately for Doncaster, there was at least one other system with the same type of track, and in later years supplies were sometimes derived from Hull, 200 tie bars in 1920 being one

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1. DCT Jubilee, 14.

2. DA, TC, 7 May 1901, 1; procedural matters like this lack paragraph numbers.

3. Ibid., 1P and 2P, 1. 4. Ibid., 24 Mar 1902, 15P, 52.

5. Ibid., 21 May 1901, 12P, 4. 6. DCT Jubilee, 14.

7. Bett and Gilham, SY&H Tramways, 9.

8. DA, TC, 3 Jun 1901, 18P, 6-7.

9. Horne and Maund, Liverpool Transport 2, 80; granted, Liverpool's rail was probably of a heavier section.

example.[1]

Doncaster was not, however, able to afford to build its track to the same standards as Hull. In the larger city wood paving had been used, but Doncaster had to be content with laying its rails in concrete.[2] Writers on the system seem to agree that this construction was 'unusual'[3] and that such poor methods contributed towards premature closure.[4] Actually, the above comment from the official history is meaningless as it stands, for the concrete refers to the foundations and the paving to the actual road surface. Hull had, presumably, used the then quite popular wooden blocks for paving, but Doncaster was going to have macadam which, the Sheffield City Surveyor said, was quite good enough for a town innocent of any paving at all[5] except at the level crossing.[6] The best form of paving at this time and for some decades afterwards was stone setts grouted in pitch.[7] Such a watertight surface may well have been important for the durability of foundations, and to this extent the cheaper methods may have been less effective in the long run.

Electric tramway rails themselves were not normally laid on sleepers, as they had been for horse tramways, but were kept to gauge by steel cross ties positioned, in Doncaster, every 10 feet. Originally it had been

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1. Borough of Doncaster, Minutes of the Proceedings of the Committees of the Council as a Municipal Authority and as an Urban District Council, Electricity and Tramways Committee, 12 Jun 1920, 146P, 623. Minutes from November 1904 are held in the Local Studies section of the Central Library. They differ from the earlier ones in the Archvives in being printed, bound in annual (municipal not calendar years, usually starting in November) volumes and by including all Council and Committee meetings under one cover. After the first citation of a Committee or other meeting an abbreviated reference is given and used thereafter; thus the Electricity & Tramways Committee becomes E&TC. The two Committees were combined from November 1905; see Council-in-Committee (hereafter, C-in-C), 10 Nov 1905, 14M, 42.

2. DCT Jubilee, 14.

3. Flint and Fowler, 'Corporation Transport', 79.

4. Tuffrey, Electric Transport, Introduction. 5. Stone presumably.

6. DA, Proceedings 1899, 143.

7. See a list of materials in Pilcher, Road Transport Operation, 56.

8. DA, Crabtree's Evidence 1899 Inquiry First Draft, 2.

planned to use rail weighing 108lb. per yard,[1] but that actually laid was 90lb.[2] This was similar to that used on other small tramways at the time[3] and though later British Standard rail was usually a little bit heavier--from 96lb[4]--the rail section used at Doncaster should not have been a particular problem.

A great weakness of early tramway track was always the joints, which were fishplated on contemporary railway practice. Even when fully tightended, set in concrete and supported by a sole plate, there was nearly always a tendency for the hammering action of the car wheels to loosen the joint and disturb the paving.[5] As will be seen below, joints behaved predictably[6] in Doncaster.

References to track problems in the later literature, however, clearly refer to the foundations. The Borough Surveyor described the planned construction as follows. The rails were to be bedded on and surrounded by Portland cement to a depth of six inches.[7] After the site had been excavated the holding down bolts and plates would be put in position, the rails packed up, and the concrete filled in 'pudding fashion'; once it had set, the bolts would be screwed up.[8] All this was routine. The key phrase was this: the track would be paved with tarred macadam six inches deep on a bed of concrete for the total width of the rails and verges, about eight feet.[9] This reads as though there would be a continuous concrete foundation beneath

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1. DA, Proceedings 1899, 89.

2. DA, AB9/TC3/A45, Form of Tender for Rail (blank).

3. See for example, Brotchie and Grieves, Kilmarnock's Trams, 11.

4. Horne and Maund, Liverpool Transport 2, 86.

5. Frank E. Wilson, The British Tram (Hemel Hempstead, 1961), 25.

6. This is, of course, unfair; at the time nobody had any way of knowing how electric tramway track would behave over a twenty-year life span.

7. DA, Crabtree's Evidence 1899 Inquiry First Draft, 2.

8. DA, AB9/TC3/A50, Track Specifications, 3.

9. DA, Crabtree's Evidence 1899 Inquiry First Draft, 2.

both track and paving, which was the best and most robust method of construction.[1] However a diagram accompanying the tender for setts--reproduced here as Figure 7--shows the concrete extending only below the rails themselves, the area between and outside these being covered in tar macadam on a base of rough core.[2]

If this diagram is correct--and it bears the stamp of the Doncaster Borough Surveyor's office--then the clue to the later problems may have been found. That the early construction was of this type is borne out by later plans for the experimental relaying of a section of track in 1915 to include a ferro-concrete foundation;[3] the obvious implication is that there wasn't one before.

An excellent parallel is provided by the Wemyss tramway, where street track was laid on a longitudinal concrete 'sleeper' eighteen inches wide by six inches deep; there was a line of setts down each side of the rail, the rest of the road surface being simple waterbound macadam. Such methods made the line one of the cheapest ever built at about £5,500 a mile as against an average of around £7,500 elsewhere. However, evidence of deterioration within a few months showed that cheap construction was not always the most economical.[4] The line opened in August 1906,[5] but within only three years considerable reconstruction became necessary. It was precisely the sections described above which had given trouble, particularly where the base had been affected by subsidence. Work to correct the faults began in February 1909. The concrete base was scrapped and replaced by wooden cross sleepers[6]

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1. E. Jackson-Stevens, 100 Years of British Electric Tramways (Newton Abbot, 1985), 109 has a description of such track on the LUT.

2. DA, AB9/TC3/A50, Doncaster Corporation Tramways, Basalt Lava Setts, London Basalt Stone Co.; the setts were laid either side of the rails to stop other traffic, which tended to follow the newly-paved lines, from wearing ruts in the road surface.

3. Doncaster Minutes, Highways and E&TC Joint Sub-committee (hereafter H/E&TC Joint), 24 Nov 1915, 13P, 87.

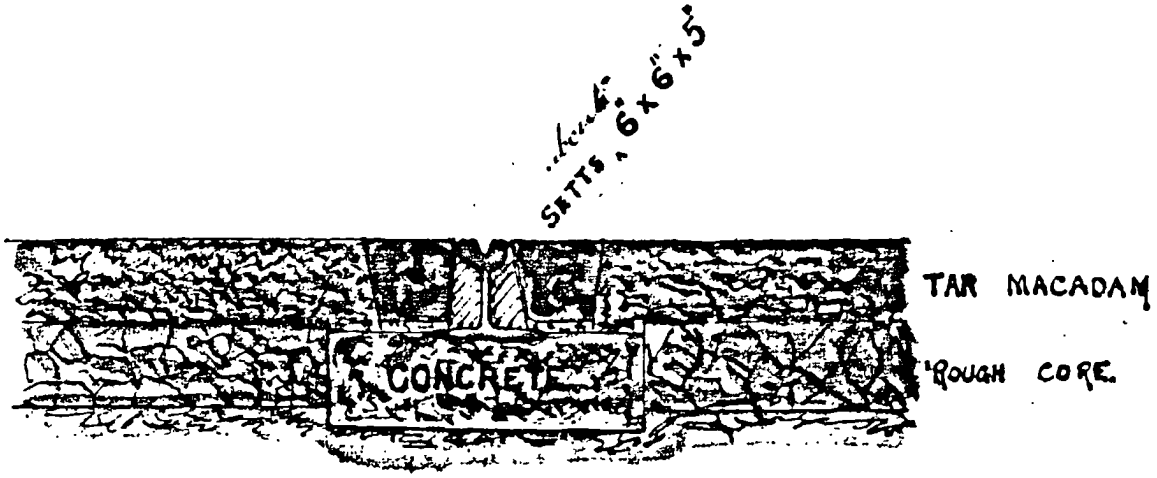
4. Brotchie, Wemyss, 12-13. 5. Ibid., 21.

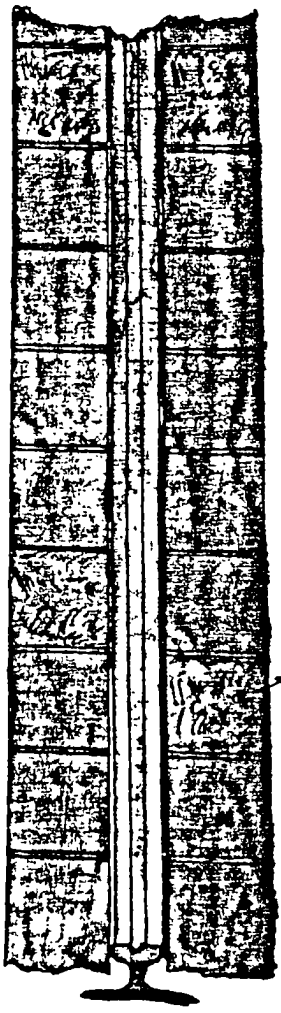
6. A common expedient in mining areas, as used later on the DDLR.

FIGURE 7.

DONCASTER CORPORATION TRAMWAYS.

BASALT LAVA SETTS.





London Basalt Stone Co. Limd.

Managers.

in most instances, though in one case a solid concrete base was laid.[1] This is clearly a highly significant example, if indeed Doncaster's track was as described. Granted, severe problems did not occur there quite so soon, but this may have had something to do with the fact that the mines were sunk after the first tramways were built.[2]

Another clue to Doncaster's problems is given by a comparison with the Birkenhead tramways.

> Firstly, it must be explained that the track in Birkenhead was laid directly onto a concrete foundation which gave a rigid formation. As a result, the vibrations caused by the running of the cars rebounded back into the trucks causing deterioration . . . and caused . . . damage to the rigid track. (3)

A decision to retruck the cars was made as early as 1906, then some time later an attempt to reduce the noise caused by the rigid track was made by laying an experimental section with longitudinal wooden sleepers between rail and concrete.[4] Doncaster clearly came across the same problem at an early date, for the later lines in Priory Place and Lower Oxford Street were laid from new with longitudinal sleepers under the rails to reduce vibration and to ensure smooth running.[5] This was, incidentally, the form of construction used for the original track in Hull.[6] The advantage claimed for it there was that it prolonged the life of the rails by reducing the gradual loss of alignment at joints and the consequent 'hammering' by the car wheels.[7] That there was some truth in this is shown by the fact that major recon-

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1. Brotchie, Wemyss, 35-6.

2. The expansion of the coalfield up to and beyond Doncaster was still in the future at the time of the 1899 Inquiry; see DA, Proceedings 1899, 8-9.

3. Letter from T. A. Packwood in TR 16 (Spring 1986), 158. 'Trucks' in trams means the frame holding the wheels, axles, motors etc.

4. Ibid., 158-9.

5. DA, Light Railways Committee: Letters 80/1, 19 Mar 1903 (two letters, one from solicitors). These letters are stored in boxes with identification numbers covering two periods, but without the contents being separated. So citations can only refer (hereafter) to 'Committee Letters', to the box, date and originator (Town Clerk unless otherwise stated).

6. This clarifies the use of 'wood' and 'concrete' in the two towns.

7. Lee, 'Hull Tramways', 98.

struction in Hull did not start until 1919-20, twenty or more years since the first lines had been laid down,[1] whereas Doncaster's track was to show serious signs of decay during or even before World War I even though it was a few years newer than the track in Hull.[2]

The overhead was strung on a mixture of span wires and bracket arms and erected for £7,383 by the well-known wiring contractor, R. W. Blackwell and Company. They also supplied a tower wagon for overhead repairs.[3]

Original plans seem to have included two town centre depots in part of the old Wool Market and on Bathhouse Fields (Greyfriars Road); however wiser counsels prevailed and it was decided to enlarge the latter instead, work being complete by May 1902. The detached Bentley line required a temporary shed at Marshgate, evidently a pretty flimsy affair because it blew down in a gale at the turn of 1904-5 and had to be replaced. There was room for three cars.[4]

Fifteen cars were needed for the initial system. First thoughts were of single-deckers,[5] but the specification was soon changed to double-deck cars.[6] After some indecision, it was decided to accept a tender from Dick, Kerr and Company Limited.[7] The trams were typical small cars of the period with open tops and reversed stairs rising in a clockwise spiral from the open platforms. Cars 1--15 were delivered by rail early in 1902 and fitted to their trucks at Greyfriars Road.[8] The livery was described as crimson and yellow.[9]

The newly planned extensions meant that five more cars were needed, to

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1. Ibid., 162. 2. See below, 258-9.

3. DA, TC, 29 Jul 1901, 81P, 20; 30 Sep 1901, 105P, 30; 14 Jul 1902, 69P, 73. Price for the planned 1899 system only.

4. DA, TC, 6 Jun 1901, 38P, 10; 12 Jul 1901, 63P, 16; 29 Jul 1901, 76P, 19; 22 May 1902, 46P, 64; 9 Jan 1905, 18P, 209; 13 Mar 1905, 27P, 216.

5. See Table 30 above. 6. DA, TC, 3 Jun 1901, 26P, 7.

7. Ibid., 22 Aug 1901, 101P, 28-9.

8. Flint and Fowler, 'Corporation Transport', 78.

9. DA, TC, 15 Jan 1903, 154P, 113.

cost £3,000[1] or £600 apiece; these would become 16-20. At about the same time a water car--a works vehicle--was ordered,[2] and this was later joined by a salt and sand trailer rebuilt from an ex-York horse tram.[3] Five more passenger cars joined the fleet in 1903,[4] becoming 21-5.

The Board of Trade inspection of the Balby and Hexthorpe routes took place on Tuesday 27 May 1902[5] and a formal opening on Monday 2 June when the Mayor walked from the Mansion House to Greyfriars Road, where he was presented with a gold key; after the usual speeches, the routes were then inaugurated with a procession of three cars.[6] The remainder of the original system opened as follows: Race Course 30 Jun 1902, Hyde Park 1 Aug 1902, Bentley 27 Oct 1902 and Avenue Road 15 Jan 1903.[7]

Because the Bentley cars could only run as far as the level crossing, it was decided to operate a shuttle car from Station Road terminus[8] round to Frenchgate at a fare of ½d.[9] Passengers preferred to save their money and to walk across Station Yard, however,[10] and in just over a fortnight the car took only £4 12s. 0½d. from 2,209 passengers; this compared to 17,823 passengers on the Bentley service proper.[11] The car was thus cancelled forthwith on 12 Nov 1902[12] and for over a year people were left to walk. Late in 1903, however, a new trial was made on a rather different basis. This time the connecting car was to run from the Guildhall[13] and only on Friday nights and on Saturdays after noon; a 1d. fare gave through travel to Bentley,[14] so it

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1. Ibid., 29 Sep 1902, 104P, 89. 2. Ibid., 14 Oct 1902, 116P, 93.

3. Leslie Flint, Doncaster Corporation Transport, Official Fleet History 1902--1974 (hereafter, DCT Fleet) (Doncaster, 1974), 1.

4. DA, TC, 8 Jun 1903, 189P, 137. 5. Ibid., 22 May 1902, 47P, 64.

6. See, DCT Jubilee, 14 and 16. 7. Ibid., 50.

8. Only from Clock Corner according to DCT Jubilee, 16; this is probably a confusion with the later service, as the Minutes are definite.

9. DA, TC, 14 Oct 1902, 114P, 93. 10. DCT Jubilee, 16.

11. DA, TC, 12 Nov 1902, 125P, 100; 26 Nov 1902, 133P, 104.

12. Ibid., 12 Nov 1902, 127P, 100. 13. In Frenchgate.

14. DA, TC, 14 Dec 1903, 31P, 164; earlier accounts have missed this.

was in effect a free service. A further month's extension was agreed at the next Committee,[1] so the service must have been more encouraging than the previous scheme. No more is heard about it though, so the probability is that it lapsed after 1903-4.

When the '1899' system was completed, the contractors probably moved on immediately to the extensions authorised under the later Orders. The Beckett Road line opened in August 1903,[2] but the Oxford Street line proved more difficult for two reasons. First, the narrow streets caused constructional problems[3] and, second, doubts were evidently surfacing about the route's profitability. As a result the whole scheme was reconsidered on Committee in June, but it was decided to finish the line because of the expenditure already incurred and the cost of abandonment.[4] The route finally opened for traffic on 25 Nov 1903.[5]

A couple of other details involved in setting up the system remain to be noticed. The original eight motormen and conductors[6] were expanded to thirty-five crews by the end of 1902. Pay, which started at a lower level, was a maximum of £1 7s. 0d. for motormen (6d. an hour) and £1 2s. 6d. (5d. an hour) for conductors.[7] Other staff appointed were a traffic inspector (a salaried appointment at £90 a year), a car shed mechanic, car cleaner, chief clerk and office boy (at 8s. a week).[8] Uniforms were supplied by the Doncaster Co-op and had yellow piping.[9] For some reason this was changed at an early date to red, when the full list of items was as follows--cap, tunic,

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1. Ibid., 11 Jan 1904, 37P, 167-8.

2. Precisely when is not clear. DCT Jubilee, 50 has 17 Aug, but DA, TC, 10 Aug 1903, 2P, 148 records 2,210 passengers and receipts of £9 4s. 2d. for the period up to 8 Aug. Judging by the next set of traffic figures (ibid., 18 Sep 1903, 11P, 153) this is about three days' traffic, so the opening must have been on 4 or 5 Aug, depending on if there was a Sunday.

3. Track problems have been noted above; see DA, TC, 18 May 1903, 183P, 134 and 8 Jun 1903, 193P, 138 for difficulties over the poles.

4. Ibid., 22 Jun 1903, 197P, 140. 5. DCT Jubilee, 50.

6. DA, TC, 24 Mar 1902, 15P, 51-2. 7. DCT Jubilee, 11.

8. DA, TC, 8 Apr 1902, 18P, 53. 9. Ibid., 1 May 1902, 39P, 60.

trousers, overcoat, mackintosh and oilskins.[1]

Tickets were the then almost universal type which was punched to show the stage boarded and hence the distance which the passenger was entitled to travel. Originally in Doncaster the stages were named, but from 10 Apr 1928 numbered stages were substituted.[2] The usual system involved hiring punches at an annnual rental and, usually no doubt, buying tickets from the same source. Doncaster took both from A. Williamson, Ashton-under-Lyne,[3] a well-known ticket printer. Initially a flat fare of 1d. was charged,[4] but ½d. tickets would also have been needed for the short-lived Frenchgate car and also for the various concessionary fares which were quickly introduced.[5]

Thus in a period of just under eighteen months the complete system authorised under the 1899, 1902 and 1903 Orders was put into use. This included about eight and a half miles of route, two depots and twenty trams, as well as hiring and training staff and the thousand-and-one administrative details necessary to putting a new undertaking on its feet. No doubt the Tramways Committee looked forward to the future with great hopes, but it was to be a long time before even a modest prosperity was attained.

General Developments 1904--1914

1904 may be regarded as a significant date in the history of the undertaking because it was the first year in which all the originally planned routes were in service. A further important change took place in January, however, when Mr. Wyld moved to become Manager at Birkenhead.[6] The Electricity and Tramways Committees appointed a sub-committee to consider a further joint appointment of an Electrical Engineer and Tramways Manager,[7]

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1. Ibid., 12 Sep 1904, 82P, 198; the two items of rainwear would be worn respectively by the conductors and drivers who, it must be remembered, had little protection from the weather on early tramcars.

2. DCT Jubilee, 36.

3. DA, TC, 1 May 1902, 34P, 59; 14 May 1902, 42P, 61.

4. DCT Jubilee, 16. 5. See below, 204-5.

6. DA, TC, 26 Jan 1904, 42P, 170. 7. Ibid., 11 Feb 1904, 48-9P, 175

their eventual choice being Mr. E. S. Rayner.[1]

An important improvement to the system came in 1910 with the opening of the new North Bridge and its associated tramway.[2] A Bill had been deposited in 1907[3] and work probably began towards the end of 1908.[4] As far as the tramways were concerned, an economy could be effected by the closing of Marshgate shed[5] and, more importantly, a surprisingly large stimulus was given to traffic on the Bentley route. Between 1909-10 and 1911-12 revenue rose overall by 16 per cent, but to Bentley it increased by a massive 66 per cent.[6]

At the same time planning was going on for an extension at the outer end of the Bentley line. First mentioned in 1908,[7] the aim was to reach the new colliery being sunk at Bentley.[8] This actually opened in 1908[9] and evidently caused a build-up of traffic on the existing tramway,[10] so two additional passing places were put in hand immediately to allow a strengthened service.[11] These, incidentally, were to be sett-paved for the whole width,[12] an improvement which was doubtless maintained for all new work thereafter.[13]

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1. DCT Jubilee, 51.

2. Doncaster Minutes, C-in-C, 7 May 1910, 121M, 321. The precise date when the tramway opened is not clear, but probably lay between 8 and 12 May. DCT Jubilee, 19 and Bett and Gilham, SY&H Tramways, 50 both wrongly say 1911.

3. Ibid., 18 Dec 1907, 42M, 53. 4. E&TC, 9 Nov 1908, 3P, 53.

5. DCT Jubilee, 20.

6. Calculated from Doncaster, Abstract of Accounts for the years ending 31st March (hereafter, Doncaster Accounts) 1910 and 1912, Tramways Revenue Account. 1911 is untypical because two routes were combined for a time.

7. Doncaster Minutes, E&TC, 14 Sep 1908, 60P, 421.

8. Ibid., 17 May 1909, 44P, 285.

9. Christine Heap, Mines and Miners of Doncaster (hereafter, Mines of Doncaster) (Doncaster, n.d.), 4

10. As shown by the revenue figures in Doncaster Accounts, Tramways Revenue Account, 1909--1911.

11. Doncaster Minutes, E&TC, 9 Aug 1909, 6P, 27.

12. Ibid., 20 Sep 1909, 12P, 29. 13.. Such as North Bridge.

The extension itself was not authorised until 1911 and work began in 1912.[1] The line opened on 20 Mar 1913, with a through fare of 1½d.--the first time the standard 1d. fare had really been exceeded--with two overlapping stages, Guildhall to old terminus and Bentley Post Office to New Bentley.[2]

Various other loops were extended or built new in this period,[3] mostly on the Balby route, but further town centre improvements proved very controversial[4] and had to go up to the Council for a decision; the result was a policy of masterly inactivity, since it was agreed that no central area line should be built or improved at that time.[5] The tramcars themselves were improved, however, most importantly by the fitting of top covers to sixteen of the cars between 1907 and 1913; at the same time the stairs were altered from the reversed to the direct type.[6] All published sources have the dating wrong on this; one, for instance, lists all the covers in 1913.[7] In fact, the Committee visited Sheffield in May 1907 to see the top covers used there[8] and ordered the first four a month later.[9] Four more were bought in 1909-10, another four--exceptionally from the Brush Company rather than the Dick,Kerr associated United Electric Car Company--in 1911 and the final batch in 1913. The cars receiving covers were 5--16 and 22--6.[10]

According to Joyce, before World War I it was possible to operate a tram economically on the basis of the bottom deck alone, with the top deck being regarded very much as a reserve for periods of peak demand. This was all very well except when it rained, so bad weather could reduce earning capacity by a half.[11] Granted, like most cars of the period, those used in

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1. Ibid., 12 Aug 1912, 68P, . 2. Ibid., 19 Mar 1913, 58P, 287.
3. Ibid., 9 Jan 1905, 20P, 95; 12 Aug 1907, 59P, 407.
4. See for instance, ibid., 21 Apr 1913, 67-9P, 341.
5. C-in-C, 10 Jun 1914, 96M, 466. 6. For cars, see Appendix DN2.
7. DCT Jubilee, 20. 8. Doncaster Minutes, E&TC, 23 May 1907, 42P, 307.
9. Ibid., 10 Jun 1907, 46P, 309. 10. See Appendix DN2.
11. Joyce, Tramway Heyday, 86-7.

Doncaster had provision for keeping the seats dry,[1] which would have consisted of some sort of spring-loaded flap covering the seat after the passenger rose,[2] but even this was not much comfort when it was actually raining. The problem was made worse by restrictive Board of Trade regulations on standing passengers. Only eight were allowed,[3] and then only on Saturdays after twelve noon, on Race days or holidays and in the case of inclement weather.[4] Thus it was clearly to the tramway department's advantage to fit covers. Incidentally, it was necessary to draw up a bye-law to stop passengers standing on the steps, 'buffers'[5] etc. on the Racecourse route when football matches were in progress.[6] Some cars were later fitted with sloping fronts to stop this practice.[7]

A final pre-war improvement to the trams was the purchase of destination indicators in 1911.[8] The names of termini were certainly displayed from the first,[9] so this must refer to a plan to mount large route letters at the ends and sides of the cars, although these were only used for a short time.[10] An interesting addition to the works fleet was a new tower wagon purchased in 1912 and based on an Albion motor chassis.[11] This replaced the horse-drawn original and was one of the first motor vehicles in the country specially built for the purpose.[12]

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1. DA, AB9/TC3/A50, Form of Tender and Specification, 4.

2. Similar to some ex-Bournemouth seats re-used on the tourist tramway at Seaton in Devon; personal observation.

3. DA, TC, 9 Mar 1903, 168P, 123.

4. Ibid., 12 Jan 1903, 151P, 111-2.

5. Actually, on a tram, the fender.

6. Doncaster Minutes, E&TC, 13 Feb 1911, 29P, 217.

7. Tuffrey, Electric Transport, Caption.

8. Doncaster Minutes, E&TC, 12 Jun 1911, 56P, 419.

9. Photographic evidence in, for example, Tuffrey, Electric Transport.

10. Flint and Fowler, 'Corporation Transport', 79.

11. Doncaster Minutes, E&TC, 23 Oct 1912, 11P, 11. 12. DCT Jubilee, 20.

Traffic Results

Traffic and revenue in the initial nine months or so of operation were quite encouraging, but in the next two years there was a large and growing deficit after capital payments and, in 1904-5, an actual working loss.[1] After that there was a gradual and sustained recovery which brought the undertaking into reasonable financial health by 1913.[2] These changing fortunes are expressed in Table 32 below in terms of pence per car mile.

TABLE 32

DONCASTER CORPORATION TRAMWAYS: WORKING RESULTS IN PENCE PER CAR MILE 1903--1914

Year ending 31st March	Revenue	Expenditure	Balance
1903	6.08	3.60	2.48
1904	6.09	5.50	0.59
1905	6.09	6.37	0.28
1906	6.06	5.18	0.88
1907	6.01	4.78	1.23
1908	6.24	5.15	1.09
1909	6.46	5.23	1.23
1910	7.46	5.50	1.96
1911	7.88	5.82	2.06
1912	8.41	6.31	2.10
1913	9.41	6.40	3.01
1914	10.53	7.72	2.81

SOURCE: working results from Appendix DN1 divided by car mileage figures in DCT Jubilee, 49. The Statistical Information appended to the Tramway Accounts has slightly different revenue and expenditure figures, but there is no obvious reason why this should be so.

Initial relief was gained by a sharp reduction in working costs per car mile from the high point of 1905. In one respect, costs were already exceptionally low in that by 1904 conductors were paid only 3d. to 4d. an hour or 15s. to 20s. for a sixty hour week. Drivers on top rate earned a fairly average 6d., but the only undertaking which paid its conductors less was Lincoln, which had a flat rate of 15s. per week. Plymouth paid 4d. as well,

1. This is disguised in the 1904-5 published accounts by the accounting conventions then used, but if later methods are followed, a deficit of £510 is revealed; see note (b) to Appendix DN1.

2. See Appendix DN1.

explaining that its conductors were only lads; it is a reasonable assumption that this was the explanation in Doncaster too.[1] Economies would not come from depressing wage rates then.

As costs mounted towards the end of 1904 obvious efforts were made to reduce them however. When complete, the system was operated at frequencies of between ten and twenty minutes.[2] In 1904 the Racecourse and Avenue Road services were cut from fifteen to twenty minutes, meaning only one car was needed for each, and a further car was saved by running a through service from Balby to Beckett Road.[3] Hexthorpe and Avenue Road were linked about the middle of the 1904-5 financial year[4] and, for just a short while, Bentley and Bennetthorpe in 1911.[5]

However real improvement depended not upon reducing costs, but on raising revenue. It is not without significance that the very years--1913 and 1914--when worthwhile profits were first earned were also those when costs again exceeded the earlier peak in 1905.[6] This reflects the fact that rail-based transport systems have a high level of fixed costs, making it difficult to reduce operating costs below a certain minimum. The only real solution is to maximise the use of those fixed assets, taking advantage of the fact that costs do not rise proportionately with mileage.

Between 1905 and 1913 the route mileage remained at about eight and a half, give or take a few furlongs, except for the one and a half miles to New Bentley added at the very end of the financial year 1912-13. In this period revenue did not rise because the system was expanding therefore. Fares did not go up either. In fact, due to various concessions, the aver-

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1. DA, AB9/TC3/A54, County Borough of Croydon, Information obtained from other Towns, December 1905 (hereafter, Croydon Survey), passim.

2. DA, TC, 18 Sep 1903, 13P, 153-4. 3. Ibid., 10 Oct 1904, 4-5P, 201.

4. Doncaster Accounts, 1904-5; DCT Jubilee, 17 dates all cross-town services to 1911, but this is far too late.

5. Doncaster Minutes, E&TC, 11 Jul 1910, 71P, 414; 'Bennetthorpe' is a district on the way to the Racecourse and was sometimes used of the route.

6. See Appendix DN1 and Table 32.

age fare paid per passenger fell over most of this period, from 1.08d. in 1906 to a low of 0.922d. in 1912, then rising slightly to 0.962d. in 1913.[1]

Against this static background, gross revenue went up by 75 per cent between 1906 and 1913.[2] Passengers, paying less each, naturally increased even more; in fact, numbers actually doubled. Part of this rise was probably due to an increase in the population served by the trams, up from 41,835 in 1906 to 50,000 in 1912,[3] or by 19 per cent. Part again would be due to the boost in the Bentley traffic resulting from the connection over the North Bridge. This still leaves a large proportion of the rise in traffic as 'pure' growth. The improvement can be seen in the change in the average number of passengers carried per car mile; this rose from only 5.4 in 1906 to 9.81 in 1913, or by about 80 per cent.[4]

Though an initial loss had been expected, the actual deficits were more than had been budgeted for. £1,000--1,500 had been quoted as a possible loss when the tramways were first discussed,[5] but, as shown in Appendix DN1, the actual losses after capital payments in some early years were much larger than this, more than £2,000 in 1904 and 1906 and as much as £4,550 in 1905. Nevertheless the acceptance that there would be some loss betokens the Corporation's realisation that the riding habit would have to be stimulated before the system could be expected to break even. Before the electric tramway era working class people in particular had never made any significant use of public transport. People would tend to live near their place of work, use local shops and seek entertainment near-by; it would take time to break these patterns of life. Well into the present century, too, people would regularly walk much longer distances than are normal today. For example, in the 1920s two young women walked daily to and from their teaching

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1. Statistical Information, published with Doncaster Accounts, 1905-6 --1922-3 (hereafter, Doncaster Statistics); not published outside these years.

2. Percentage derived from data in Appendix DN1.

3. Figures after 1912 will include New Bentley and not be comparable.

4. Data based on, Doncaster Statistics. 5. DA, Proceedings 1899, 1.

posts from Highfields to Toll Bar, a round trip of several miles.[1]

Increasing use of the trams by working people was actively encouraged by the provision of cheap fares and of special services. Workmen's cars were a condition of the 1899 Order, but though fares of ½d. a mile were specified, no less than 1d. per journey needed to be accepted.[2] The ordinary 1d. flat fare presumably qualified, therefore, but there was early pressure for even cheaper fares.[3] In 1903 it was decided to run special cars at a fare of ½d. before 7.00 a.m. on all routes where there was already a service at that time.[4] The following year experimental returns at ½d. each way were issued on a workmen's car between Hyde Park and Hexthorpe, valid before 6.00 a.m., at lunchtime and after 5.30 p.m.[5] Shortly afterwards, returns at single fares were made available to all passengers before 8.00 a.m. and after 5.00 p.m. on the day of issue;[6] it was never really possible to distinguish the 'labouring classes'[7] defined in tramway legislation from other passengers, so the usual result was that all travellers at certain times received the concession. Workmen's dinner returns therefore seem to have become available on all cars by 1908 and were then extended to Saturdays as well.[8] There was intermittent pressure to get returns issued at all times,[9] but the Committee wisely resisted this. Half fares for children going to school were conceded in 1903[10] and extended to those under twelve at all times in 1906.[11] For a time discount tickets were sold at fourteen for a shilling,[12] but these were subject to abuses such as passengers exchanging

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1. Reminiscence of Mrs. Alice Harris, Woodlands, Doncaster.
2. DA, Order 1899, 31. 3. DA, TC, 12 Nov 1902, 129P, 101.
4. Ibid., 8 Jun 1903, 187P, 137. 5. Ibid., 10 Oct 1904, 6P, 201.
6. Ibid., 9 Jan 1905, 19P, 209. 7. DA, Order 1899, 31.
8. Doncaster Minutes, E&TC, 11 May 1908, 38-9P, 311.
9. See ibid., 9 Nov 1908, 5P, 6 for an example.
10. DA, TC, 12 Oct 1903, 20P, 158.
11. Doncaster Minutes, E&TC, 12 Feb 1906, 29P, 154.
12. DCT Jubilee, 20.

the tokens with the conductor for cash, so the scheme was ultimately judged a failure.[1]

The general attempts to stimulate traffic by concessionary fares and improved or special services were clearly successful however. Rides per head of population rose from 60.28 per annum in 1906 to 97.54 in 1913.[2] This was way below giants like Glasgow with 271 per annum,[3] but quite respectable, even being higher than six of twenty-one German tramways listed by McKay.[4] From 1903 a small additional contribution was made by letting the advertising rights, initially for £21 per annum per car.[5]

All-in-all therefore, Doncaster's tramways appeared to be becoming established as a valuable and financially secure undertaking by 1913. It was even possible to start a Renewals Fund in 1911, re-named the Reserve Fund the following year and receiving its first worthwhile balance in 1913.[6] Certain difficulties were already becoming apparent though and others lay below the surface as a likely source of future problems.

Workmen's Traffic: profitable or not?

The Croydon Survey of 59 municipal tramways made in 1905 revealed that 32 offered ½d. fares, in four cases only for children. The remaining 28 gave rides of between 0.42 and 2.0 miles for ½d. Of these, 14 said that a loss was definitely or probably made on such concessionary fares, a further 7 did not know either way and only the remaining 7 claimed a profit. Even

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1. South Yorkshire Transport, Leicester Avenue Garage, Doncaster: Letter Books (hereafter, SYT Letters), 3 Mar 1924, 147-8. This source consists of a series of bound volumes of duplicate outgoing correspondence. Volumes are available for most of the 1920s and 1930s, but do not appear to exist for earlier dates. Volumes are not numbered, so individual letters are cited by date and by the page they begin on. Each volume has 1,000 leaves, but some letters naturally take up more than one page, so there are rather less than 1,000 letters per volume. All letters, with one or two exceptions not quoted here, are originated by the Manager, Mr. Potts.

2. Calculated from data in, Doncaster Statistics.

3. McKay, Tramways and Trolleys, 193. 4. In 1910; ibid., 194.

5. DA, TC, 15 Jan 1903, 154P, 113.

6. Doncaster Accounts, Tramways Net Revenue a/c, 1911-12 and 1912-13.

that was doubtful in cases like Ipswich, which claimed that no loss resulted because ½d. fares were only in use for a short time. West Ham put it precisely--average working costs were 0.52d. per passenger, so 0.50d. fares naturally led to a loss.[1] Doncaster was one of the towns surveyed and offered one of the longest distances for ½d., one and a quarter miles; not surprisingly the undertaking was definite about the result, a 'decided loss'.[2]

It is very difficult to say whether the increased numbers thus encouraged to ride succeeded in turning the loss on half-fare passengers into a profit by 1913. On average such passengers were not profitable even then, for total working costs were 9.06d. and the number of passengers 9.81 per car mile, the average fare being 0.962d;[3] this would produce 9.44d. per car mile, just enough for a small surplus. Early morning cars carrying only half-fare passengers up to one and a quarter miles each might, theoretically, have earned only 0.4d. per passenger per car mile; 23.6 passengers per car mile would be needed to take 9.44d.[4] Full cars would easily achieve this, but whether all cars between 5.30 a.m. and 8.00 a.m. were full--especially in both directions--is open to question.

The experience of the LCC is instructive. They offered avowedly unprofitable services as part of their progressive social policy. But even though workmen's traffic grew rapidly, it remained unprofitable and, as profits elsewhere fell towards the end of the pre-war period, the tramways were forced onto the rates; that is, even full workmen's cars lost money. The fall in profitability of the LCC tramways was caused by a rapid rise in motor bus competition.[5]

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1. And if account were taken of capital repayments etc., the economics of reduced fares become even more dubious.

2. DA, Croydon Survey, passim. 3. Doncaster Statistics, 1912-13.

4. This was one very good reason why lower decks only would not do; both decks were needed to make a profit on workmen's services in winter.

5. Barker and Robbins, London Transport 2, 186-9. The LCC tramways had a surplus of over £220,000 in 1911-12, the following year this was reduced to less than £500 and by 1913-14 had become a deficit of almost £90,000.

It is true that an industrial and working class town like Doncaster could do no other than attempt to build up workmen's traffic. On its own, this is most unlikely ever to have been profitable, but there may have been some 'loss-leader' effect.[1] For instance, by using the trams for work, workers and their families would become used to travelling for other reasons such as leisure and shopping; that is, the 'riding habit' would be encouraged. Also, cheap fares might tempt workers to live further away from their places of employment and thus involve their families in longer trips for shopping etc. There is no doubt that Doncaster's tramways did gain from stimulating a growth in traffic, but an underlying weakness remained in the form of a large group of passengers who were almost certainly being carried at below cost price. If anything affected the profitable traffic, as it had already done in London, there could be trouble.

Oxford Street

The doubts about completing the Oxford Street line were amply justified by events. Service began an 25 Nov 1903[2] with the intention of running a car every twenty minutes and every ten on Fridays and Saturdays.[3] Results were extremely poor, however--over most of January 1904 less than 3,000 passengers brought in under £12[4]--and in March the normal service was cut to start at 1.00 p.m. only, except on Saturdays.[5] This measure naturally did nothing to improve revenue--which nearly halved by April[6]--and in May it was decided to run only on Friday and Saturday evenings.[7] By early 1905 less than £1 was being taken over a four week period,[8] and the inevitable decision

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1. Specifically claimed at the time by Dover, who said that loss-making services induced traffic during the day from outlying districts at higher fares; see DA, Croydon Survey.

2. DCT Jubilee, 16. 3. DA, TC, 18 Sep 1903, 13P, 153.

4. Ibid., 11 Feb 1904, 44P, 173. 5. Ibid., 14 Mar 1904, 53P, 179.

6. Ibid., 9 May 1904, 59P, 184.

7. Ibid., 62P, 185; this is an interesting comment on a period when public transport loads reached a peak on Friday and Saturday evenings.

8. Ibid., 13 Feb 1905, 22P, 213.

could not be long delayed. According to one source, the route closed from April,[1] but the last traffic return is for the three weeks ending 27 July,[2] so the last run must have taken place on a Saturday earlier that month.

In April 1907 the Committee decided to try again and authorised a month's trial of a twenty minute service, this time at a reduced fare of ½d.[3] There may have been a few more passengers as a result, but receipts stayed at a disappointing £11 9s. 11d. after six weeks, so it was decided to stop the car once more after May 18th.[4] After that the line remained disused until in 1917 the Borough Surveyor was told to lift the rails for repairs on the Balby route.[5]

The line must have cost about £2,270 to build, made up of £1,400 for track and £870 for overhead etc.;[6] no allowance is made for a tram, because it could be used elsewhere. Total capital expended by 1905 was £83,596[7] and £2,270 is 2.72 per cent of that. Capital charges that year were £4,286,[8] the amount directly attributable to Oxford Street thus being £117. Only in 1912 would this have tipped the balance between overall profit and loss, but even so this was a burden--some £4,600 over the forty year loan period--which the undertaking need not have borne had wiser decisions been taken at the planning stage.

Such mistakes were not uncommon. A short-lived tramway branch in East London, South Africa, has been described as an 'economist's nightmare',[9] whilst nearer home Erith had persistent problems with its Northend route and

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1. DCT Jubilee, 16. 2. DA, TC, 14 Aug 1905, 46P, 230.

3. Doncaster Minutes, E&TC, 8 Apr 1907, 32P, 245; as noted, such a low fare was unlikely to pay.

4. Ibid., 13 May 1907, 38-9P, 307.

5. H/E&TC Joint, 30 Mar 1917, 49P, 251.

6. Track from Table 31; overhead a proportion of 1903 schemes.

7. Doncaster Accounts, Tramways Capital a/c, 1904-5.

8. See Appendix DN1.

9. Brian Patten, 'Tramways in East London (South Africa)--1', TR 14 (Summer 1982), 174.

finally closed it in 1910.[1]

Probably none of this was crucial to the fates of any of the tramways mentioned, but it did show some significant facts:

1. that mistakes made when constructing a tramway were costly in the long-term;

2. that it was difficult to use trams to 'prove' new routes; and

3. that certain areas could not be economically served by tram, all of which might make more flexible modes attractive as and when they became available.

Conclusions

Given the need to build up the 'riding habit', Doncaster tramways' long climb to prosperity is not all that surprising. If one looks at the balance sheet presented in Appendix DN1, however, one can see that this prosperity was not to last; in fact, the tramways' account was in deficit more than it was in credit after World War I, just as it had been before. Post-war losses were obviously not due to the need to attract riders to public transport however, as the habit was well entrenched by then. But although most of the difficulties of the post-1918 period were new ones, the weaknesses of the pre-war era must clearly have exacerbated those of the next.

Three issues have been highlighted. First, the Oxford Street fiasco had direct financial penalties as well as more general lessons for the future. Second, the poor state of the track, both physically and in terms of layout, would influence later events in two ways--(1) where improvements later became necessary, they would have to be paid for at much higher prices; and (2) if the layout remained awkward and the track bad, the case for a more flexible means of transport would thereby be strengthened. And third, the large workmen's traffic was almost certainly unremunerative, which meant that any possible loss of profitable traffic would hit the tramways hard.

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1. Jackson, 'Erith Tramways', 131.

CHAPTER 9

FURTHER EXPANSION AND STAGNATION 1914--1925

Wartime Challenges

From here on it makes sense to depart from a strictly chronological arrangement in favour of a thematic one. One of the most significant events in this next period was of course the outbreak of war in August 1914. The war had immediate and also more long-term effects upon public transport, as it did on almost every other aspect of life. Before going any further, one point concerning the tramway system must be briefly noted, which is that the tram lines were extended twice during the war, to Warmsworth (from Balby) in 1915 and to Brodsworth along a completely new line in 1916.[1]

So far as the direct impact of the war was concerned, an early casualty was the traditional Sabbath. Committee and Council had always resisted running Sunday cars,[2] but the Council issued instructions to institute a service from 30 Aug 1914. This was doubtless in any case a commercially sound decision, even given the fact that time and a quarter was paid to crews.[3] Sunday cars were not, of course, withdrawn after the war. Any immediate gains made here were probably given away by another concession the Committee felt bound to make--half fares for military personel,[4] many of whom were quartered in the town.[5] This reduction was evidently found to be costly,

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1. DCT Jubilee, 50; see the section on new services below for details.
2. As late as 1911; see Doncaster Minutes, E&TC, 18 Sep 1911, 76P, 548.
3. C-in-C, 25 Aug 1914, 131-4M and attached ink note, 585.
4. E&TC, 1 Dec 1914, 3P, 100. 5. DCT Jubilee, 22.

for fares were raised again at peak weekend periods in 1915[1] and an attempt made to rescind the concession entirely.[2] It is interesting to note that Lee believes the free rides offered to servicemen in Hull until 1917 (after most other cities had given up the idea) were a severe burden to the undertaking there.[3] And of course as already noted, ½d. fares were in all cases probably offered at a loss; the fact that there was a strong minority in favour of withdrawing them for servicemen is further evidence of this. Certain other related concessions were made from time to time. Towards the end of the war wounded soldiers were allowed to travel free off-peak.[4] Afterwards this was continued for those who had lost a leg[5] and special 1d. tickets were issued to reservists travelling to drills.[6] Police on duty had travelled free since 1910,[7] but when finances got tight after the war the Watch Committee agreed to pay 20s. per man per annum for the privilege.[8] The most contentious 'free travel' issue related to a 1915 proposal to give free passes to all councillors;[9] two months of argument resulted in a compromise to limit these to council business only.[10]

It is usually said that tramways experienced a vast increase in traffic during World War I.[11] It is true that passengers per annum in Doncaster did rise from 5,747,273 in 1913-14, the last complete year of peace, to 8,885,922 in 1917-18, the last complete year of war. This was an increase of 54.61 per cent over five years or 10.92 per cent per annum. However between 1905-6 and 1912-13 an increase of 101.13 per cent had been recorded, or

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1. Doncaster Minutes, E&TC, 16 Mar 1915, 32P, 304.

2. C-in-C, 29 Sep 1915, 179-80M, 690. 3. Lee, 'Hull Tramways', 136.

4. Doncaster Minutes, C-in-C, 18 Jan 1917, 39M, 128.

5. E&TC, 9 Aug 1920, 155P, 686; this recalls the reserved seats for war wounded found for many years on German trams.

6. Ibid., 12 Jun 1922, 142K, 434. 7. Ibid., 10 Jan 1910, 37P, 197.

8. Watch Committee, 16 Nov 1920, 26F, 87.

9. C-in-C, 1 Mar 1915, 75M, 289-90. 10. Council, 5 May 1915, 429.

11. See above, 37.

12.64 per cent per annum.[1] So the war actually slowed down the rate of growth in traffic in Doncaster overall, although there were larger rises in some of the war years. Nor was the rise entirely or even largely due to the war. That in the financial year ending 31 Mar 1915 probably was; that is, a 9.66 per cent increase in revenue.[2] The following year showed a 15 per cent increase, but the whole of that disappears if the extra revenue earned on the Balby route--extended to Warmsworth on 4 Feb 1915[3]--and on the new Brodsworth line[4] is subtracted. The same pattern is repeated between 1915-16 and 1916-17; a 29.35 per cent rise in revenue is converted to only 0.15 per cent if the first full year's results for Brodsworth are excluded. So what appears to have happened is that the war gave an initial boost to traffic and receipts, but that thereafter they would have tended to level out had it not been for the expansion of the tramway system itself. The increase in passengers between 1916-17 and 1917-18, when no new routes were opened, was only 5.63 per cent.[5] This rather contrasts with the great growth in traffic on some other tramways, which commentators usually put down to the direct effect of the war.[6] On the other hand some systems, such as those in seaside resorts, suffered catastrophic falls in receipts.[7] Doncaster seems to have been a middle case, not greatly affected in traffic terms by the hostilities.[8]

The initial effect of all this was quite healthy. Revenue, working balance and 'profit' all grew during the early years of the

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1. Traffic figures from or based on, Doncaster Statistics, passim.

2. Revenue figures and percentages from or based on, Doncaster Accounts, Tramways Revenue a/c; revenue, unlike traffic, is available for each route.

3. DCT Jubilee, 50. 4. Opened on 2 Feb 1916; ibid., 50.

5. 8,411,263 as against 8,885,922; see Doncaster Statistics, 1916-17 and 1917-18; revenue rose much faster (see Appendix DN1) after fare rises.

6. See Barker and Robbins, London Transport 2, 194-5 for London.

7. T. Barker, Transport in Great Yarmouth, 1, Electric Tramways 1902 --1918 (Bristol, 1980), 74.

8. Though of course the urgent need to expand services to the mining areas was a war priority.

war, and the £2,856 earned in 1914-15 was the best ever; so was the operating ratio of 66.3 per cent. The following year things took a sharp turn for the worse, however. The operating ratio climbed again to 72.4 per cent and the surplus fell to £757.[1] The cause was not a fall-back in receipts, which were rising faster than ever, but two problems which were hitting the undertaking together. These were an even faster rise in working expenditure and higher capital payments because of the extensions and improvements made to the system.[2] Table 33 shows that up to 1915-16 the rise in working costs was still slightly behind that of revenue if a 1913-14 base is used. But if the exceptionally low costs of 1914-15 are used as a base, it becomes obvious that that expenditure was in fact increasing faster than revenue as early as 1915-16; by the following year both indices pick this up, though the second indicates better the severity of the problem. 'Chasing from behind', as it were, expenditure never catches up with revenue, but it would have done if no remedial action had been taken.

The major elements of costs were repairs, power and traffic (mainly wages). The first was actually less in cash terms in 1914-15 and 1915-16 than in 1913-14 and was a declining percentage of costs afterwards throughout the war.[3] The reason was obviously the reduction in maintenance caused by shortages of labour and materials.[4]

The cost of electricity was affected in two ways. First, the unit charge crept up from 1.25d. in 1914-15 to 1.59d. in 1918-19.[5] This was only a 27 per cent rise however, and does not go far towards explaining a 100 per cent plus increase in overall power costs over the same period. A more

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1. Figures from, Doncaster Statistics and Appendix DN1.

2. The extensions are dealt with more fully below.

3. Doncaster Accounts, Tramways Revenue a/c.

4. A reasonable assumption, based on the particular maintenance problems discussed below and on the experience in other towns during this period. For instance, Liverpool's tramways ended the war 'almost derelict'; see Horne and Maund, Liverpool Transport, 2, 57.

5. Calculated from power costs and mileages in, Doncaster Accounts.

TABLE 33

DONCASTER TRAMWAYS: THE RELATIONSHIP OF REVENUE AND OF WORKING COSTS 1913-14--1927-8

Year Ending 31st March	Gross Revenue	Index 1914=100	Index 1915=100	Working Costs	Index 1914=100	Index 1915=100
1914	23,209	100	-	17,027	100	-
1915	25,348	109	100	16,657	98	100
1916	29,349	126	116	21,274	125	128
1917	37,874	163	149	28,229	166	169
1918	44,519	192	176	33,069	194	199
1919	53,528	231	211	37,566	221	226
1920	60,193	259	-	56,607	333	-
1921	75,008	323	-	69,041	405	-
1922	72,295	312	-	62,537	367	-
1923	73,055	315	-	58,516	344	-
1924	66,484	286	-	52,337	307	-
1925	70,947	306	-	54,993	323	-
1926	71,434	308	-	54,592	321	-
1927	62,479	269	-	55,201	324	-
1928	72,586	313	-	53,605	315	-

SOURCES: Revenue and Working Costs from Appendix DN1; Indices calculated for this Table.

important factor seems to have been a rise in the amount of power consumed by each tramcar, which went up sharply in 1913-14[1] (from 1.32 units per car mile to 1.51) and again in 1916-17 (to 1.88).[2] This rise is loosely related to the growth in traffic and hence in passengers per car mile, which would have caused greater power consumption through heavier loads and probably also more frequent stops and starts. It is noticeable, however, that the really significant jumps in current consumption coincide with the delivery of new cars with 40 h.p. motors as opposed to the old 25 h.p. ones; seven such cars were delivered in 1913[3] and four more in 1916. Thus only a part of the increased power costs, and that probably the lesser, was due to war-time inflation or to traffic increases;[4] the greater part resulted from mod-

1. Still peace-time, of course. 2. Doncaster Statistics.

3. For fleet details, see Appendix DN2; h.p. = horse power.

4. Except that, of course, the argument is a circular one: new cars were needed to cope with increased traffic, which could not have been carried without them . . .

ernisation and improvement of the fleet, which would presumably have happened anyway.

Traffic costs rose by 150 per cent from 1913-14 to 1918-19, more if war service allowances are included, and increased their share of total costs also;[1] traffic costs are thus clearly the key determinent of rising expenditure levels. The war forced up the wage bill in three ways. First, the Council agreed to pay a proportion of the wages of any employee on active military service;[2] in the peak year, 1918, this cost the tramways £2,198.[3] Second, in an attempt to cover inflation, some existing employees were paid a war bonus of 2s. a week for those not earning over 40s.,[4] later raised to 3s.[5] Evidently few tramway employees came within this scheme, for the maximum payment made was only £450 per annum (in 1918-19).[6] Most traffic employees seem to have been protected by the third element, increases in basic rates. The last pre-war maximum rates were $6\frac{3}{4}$d. for motormen and $5\frac{1}{2}$d. for conductors; the former was raised to 7d. in 1916 and conductors were started at a higher minimum rate.[7] Wage scales were also compressed in time, so that the maximum was reached sooner. By this time only women conductors were mentioned and some women were also driving.[8] In the general mood of patriotism, recruitment of staff was actively encouraged. In May 1915 the Council appointed a sub-committee to interview all eligible men who had not yet enlisted.[9] T. Barker describes how the process worked in Great Yarmouth.

> There was no conscription . . . at this time (not until 1916) . . . the Government . . . therefore . . . resorted to little less than blackmail,

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1. Calculated from Doncaster Accounts, Tramways Revenue a/c,1913-14--1918--19, passim.

2. Doncaster Minutes, C-in-C, 18 Aug 1914, 124M, 585; 29 Mar 1915, 89M, 293.

3. Doncaster Accounts, Tramways Revenue a/c, 1917-18.

4. Doncaster Minutes, C-in-C, 29 Mar 1915, 89M, 293.

5. E&TC, 11 Jun 1917, 85P, 327.

6. Doncaster Accounts, Tramways Revenue a/c, 1918-19.

7. Doncaster Minutes, E&TC, 13 Mar 1916, 54P, 315.

8. Ibid., 11 Dec 1916, 23P, 102. 8. C-in-C, 26 May 1915, 116M, 431.

> exerted upon local authorities to provide workmen, the local authorities in turn making it clear that they expected young, able-bodied men to enlist . . . To refuse was to be a coward and in practice few did. The Tramwaymen were affected in the same way as everyone else. (1)

The inevitable result in Doncaster as elsewhere was the decision to employ women,[2] who staffed most of the cars during the rest of the war.[3]

Inflation was so severe in 1917, however--the retail price index rose 38.5 points in the year 1916-17[4]--that the existing wage/bonus rates became inadequate. Two unions called their members out on strike early in 1918,[5] though it seems probable that only one, the National Amalgamated Union of Labour, actually did come out.[6] It appears from traffic returns[7] that tram services were suspended for a full week, from 22nd to 28th March, and after arbitration[8] up to 5s. extra was paid on the war bonus to the car shed men;[9] platform staff received a similar award in August.[10]

These events illustrate a permanent change brought about by the war in the climate of industrial relations. The Town Council had previously behaved as a paternalistic employer, with its good points--such as reserving the jobs of men in the forces[11]--and its bad. Discipline was almost military. A conductor, for example, was brought 'before the General Manager for being intoxicated and failing to turn up for his Reliefs. He was booked on late

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1. Barker, Transport in Yarmouth, 1, 66-7.

2. Doncaster Minutes, E&TC, 14 Jun 1915, 56P, 499. Amongst the larger cities, Glasgow had been the first to employ women conductors in April 1915, only grudgingly followed by London operators in November of that year; see Barker and Robbins, London Transport, 2, 197.

3. Tuffrey, Electric Transport, Introduction.

4. See Appendix G4 for price indices.

5. Doncaster Minutes, C-in-C, 4 Mar 1918, 60M, 195; 6 Mar 1918, 72M, 197.

6. Special Committee, 18 Mar 1918, 105S, 225.

7. E&TC, Mar 1918, 62P, 256; May 1918, 69P, 287.

8. Special Committee, 23 Mar 1918, 112S, 226.

9. C-in-C, 14 May 1918, 101M, 284. 10. E&TC, 12 Aug 1918, 88P, 410.

11. SYT, Tramways Department Employees Register and Record (hereafter, Register), 1.

turn for one week and warned';[1] in 1912 a driver was 'dismissed the service'.[2] Trades unions could be ignored so, for example, a union secretary wanting to discuss a man's dismissal with the Manager was, in 1907, refused an appointment.[3] The shortage of labour caused by the war changed the balance of power markedly, and though discipline remained firm, things could never be quite the same again.

Rising working costs alone might not have forced a rise in fares during the war, though they certainly would after it, but a 63 per cent increase in capital contributions by 1918-19 as opposed to 1913-14[4] (due to the new extensions) caused revenue to be squeezed beyond the ability of pre-war fare scales to cope. In 1917 most concessionary fares were withdrawn[5] and certain other fares increased;[6] further increases followed in 1918.[7] Revenue was thus increased more-or-less in line with working costs, so the operating ratio remained fairly stable, being 74.3 per cent in 1917-18 as opposed to 73.1 in 1913-14.[8] So even after meeting capital charges there was still a good surplus in both 1916-17 and 1917-18.[9]

Interestingly therefore the war seems to have had very <u>little</u> effect in itself on Doncaster's tram system. It did not increase traffic in any marked or direct way, and though wartime inflation and labour problems did affect costs, other cost increases would have happened anyway, such as the higher power consumption caused by larger cars and the rise in capital charges consequent on the system's extension. The Council coped well with

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1. Ibid., 5. 2. Ibid., 29.

3. Doncaster Minutes, E&TC, 4 Nov 1907, 8P, 14.

4. Percentage calculated from Appendix DN1.

5. Doncaster Minutes, E&TC, 17 Sep 1917, 127P, 447.

6. Ibid., 2 Apr 1917, 54P, 252; C-in-C, 25 Jun 1917, 106M, 323.

7. E&TC, 8 Apr 1918, 66P, 257.

8. Doncaster Statistics, 1913-14. This source gives the later ratio as 91.9 per cent, but figures in Appendix DN1 show this to be an error.

9. See Appendix DN1; though granted inflation had reduced the real value of the surplus as opposed to pre-war.

the financial problems of the period, although the war probably did have a lasting effect on industrial relations in the town. The war left a legacy in other ways too. In national terms the most significant 'hangover' from the war was inflation and this compounded the more domestic concern of the tramways' management--that is, the accumulated burden of essential repairs.

Services to the Coalfields: Tram or Motorbus?

At the end of the nineteenth century coal mining had not yet reached Doncaster. Between 1900 and 1920 many new and deeper mines were sunk in the concealed coalfield to the east of the older mining areas such as the Dearne valley and by 1935 Doncaster had become the most important mining centre in South Yorkshire.[1] The new pits were, for obvious reasons, not sunk in Doncaster itself but around it, and by the early 1920s, according to the Transport Manager, ten new mining villages had sprung up in the environs of the town.[2] He does not specify which places he means, but the most important in relation to public transport were New Bentley, Armthorpe, Rossington, Hatfield, Edlington, Woodlands, Carcroft and Askern; there were other pits at more distant places, such as Haworth and Maltby.[3]

These 'greenfield sites' developed into quite large communities--it was planned to house over 10,000 people at Woodlands, for instance[4]--but were still small enough to require close connections with a larger centre. Doncaster Corporation was thus faced with a fairly sudden and very extensive requirement for increased transport services for which, before World War I anyway, it was the only obvious provider.

The extension of the tramways to New Bentley, already described,[5] was

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1. Gray, 'The South Yorkshire Coalfield', 38.

2. T. Potts, Doncaster Cavalcade: the history of a successful and progressive municipal undertaking (hereafter, Doncaster Cavalcade) (reprinted from Transport World, 8 Jan 1948), 5.

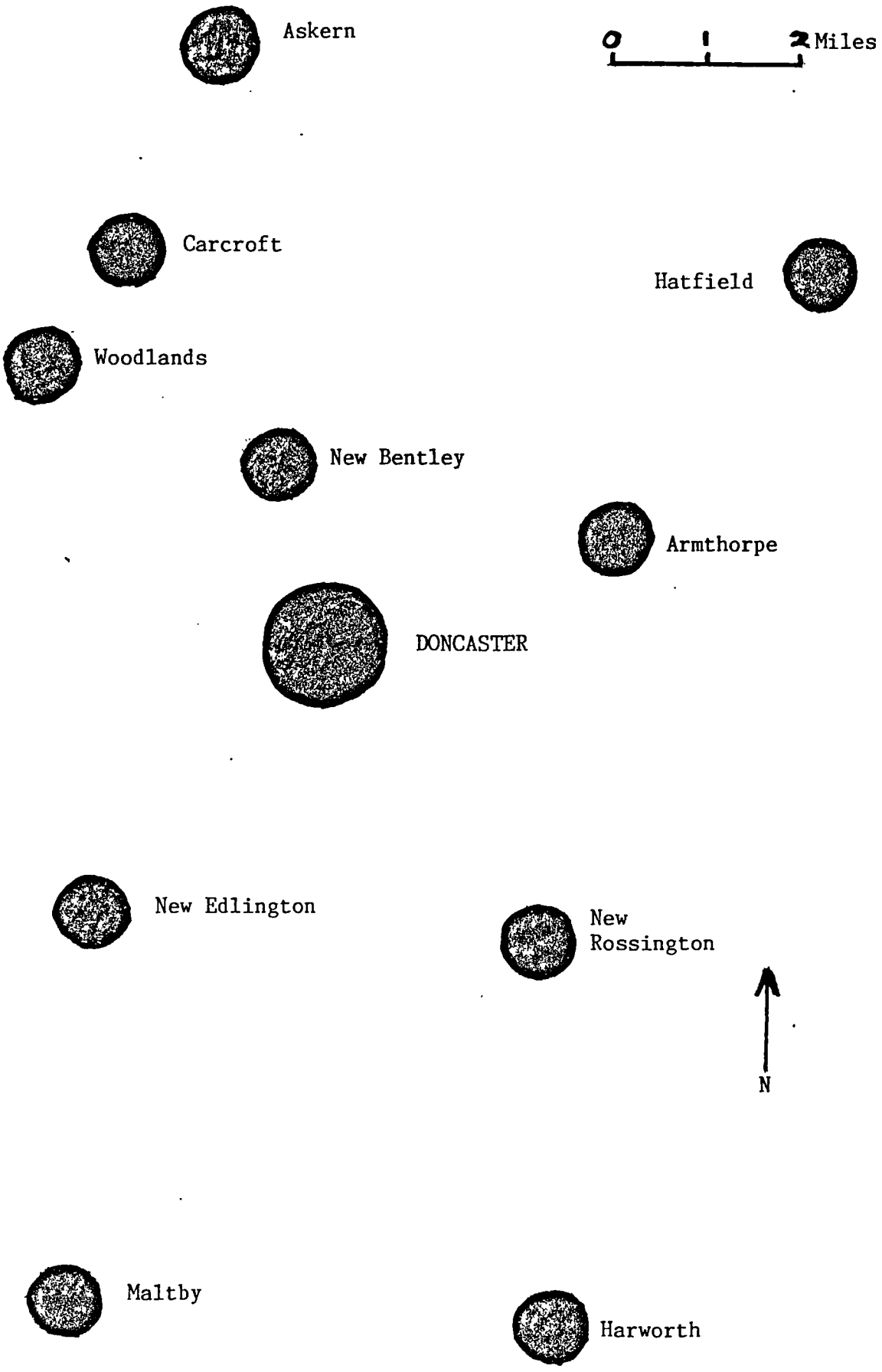
3. Heap, Mines of Doncaster, 4.

4. Brodsworth Main Colliery: Jubilee 1905--1955 (hereafter, Brodsworth Jubilee) (Doncaster, [1955]), 44.

5. See above, 198-9.

FIGURE 8

COALFIELD COMMUNITIES IN THE ENVIRONS OF DONCASTER c1920



the transport department's first response to the new demands made upon it. It had been intended to apply at the same time for a line from Balby to Warmsworth[1] to serve the new colliery village at Edlington.[2] In fact the proposed terminus was three quarters of a mile from the pit and a mile from the village; why the gap was left is not recorded. In the event the application was not made until 1912, by now in conjunction with a second line to Brodsworth[3] (the name of the pit; the village was called Woodlands). The delay was due to a prolonged dispute with neighbouring local authorities, principally the WRCC, over road widths etc.[4] A tender for the Warmsworth line was finally accepted in April 1914[5] and the route was opened on 4 Feb 1915. It was 1 mile, 2 furlongs and 7½ chains long in single track with loops and had cost £11,500 to build. The through fare was to be 2d., half for workmen, with every alternate car running to Warmsworth. The cars would, it was thought, be a great convenience for colliers, for country jaunts and as a stimulus for residential development.[6] The line ended in the middle of the main road to Sheffield and concern was immediately expressed about the dangers of this;[7] approval for a short extension down Edlington Lane was rapidly received,[8] though the war caused construction to be delayed until 1919.[9]

Meanwhile public pressure was building up for a tramway link to Woodlands,[10] which is about four miles from Doncaster itself. Interestingly, one reason for the hold-up was that councillors had become interested in the new

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1. Doncaster Minutes, C-in-C, 12 Nov 1909, 43M, 117.

2. Ibid., 17 Nov 1909, 45M, 118. 3. E&TC, 8 Jul 1912, 60-4P, 491-2.

4. See for example, ibid., 9 Oct 1911, 6P, 13.

5. Ibid., 23 Apr 1914, 50P, 356.

6. Doncaster Gazette, 5 Feb 1915, 5; the area was obviously still fairly rural, a further report in the same edition of the paper mentioning the 'pleasant rural charm' remaining over much of the route.

7. Doncaster Minutes, E&TC, 13 Sep 1915, 89P, 697.

8. Ibid., 13 Mar 1916, 52P, 314. 9. Ibid., 5 Aug 1919, 97P, 578.

10. See for example, Brodsworth Jubilee, 46.

trolleybus systems at Leeds and Bradford and had visited the former soon after its opening in 1911.[1] A substantial minority of members on both the Committee[2] and in Council[3] favoured 'trackless trams' for the Brodsworth route, but were finally over-ruled.[4] This was ten years before trolleybuses are generally believed to have been considered in Doncaster,[5] though the Council were almost certainly right to go for tried technology in the form of the tram at this very early date.

The Committee made its decision to build a tramway in 1912, most of it on sleeper track on the roadside verge;[6] this must have been helpful as road traffic grew after the war because the route followed the Great North Road (A1) throughout. Yet further delay, however, led to the local authority for the area--Adwick-le-Street UDC--proposing to license motor buses along the route.[7] This led to a counter proposal from two Doncaster councillors that they should buy some buses to run to both Brodsworth and Edlington,[8] but once again the idea was rejected by the Council.[9] Early in 1914, however, the Manager submitted a report on the development of tram and bus services for the growing colliery districts[10] and it was later decided by the Committee to recommend the Council to seek powers for motor bus routes from Doncaster to Rossington, from Beckett Road to Armthorpe and between Bentley, Bullcroft (the colliery at Carcroft) and Brodsworth;[11] however the Committee later reversed its own decision,[12] reading between the lines, on Rayner's

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1. Doncaster Minutes, E&TC, 6 Dec 1911, 10P, 133.

2. Ibid., 4 Jan 1912, 18P, 181. 3. C-in-C, 17 Jan 1912, 48M, 170.

4. Council, 1 Feb 1912, 219. 5. Owen, British Trolleybus, 139.

6. Doncaster Minutes, E&TC, 4 Jan 1912, 17P, 181; 8 Jul 1912, 64P, 492.

7. Sanitary Committee, 22 Jul 1913, 311N, 551.

8. Council, 6 Aug 1913, 557. Interest had been shown on the Committee even earlier, in 1907; see E&TC, 12 Aug 1907, 58P, 406; 4 Sep 1907, 63P, 408; 14 Oct 1907, 6P, 13.

9. C-in-C, 27 Aug 1913, 119M, 558. 10. E&TC, 7 Jan 1914, 20P, 184.

11. Ibid., 13 Jul 1914, 1P, 11; most were to run from tram termini.

12. Ibid., 6 Nov 1914, 2P, 11.

advice.

The Brodsworth tramway did get built in the end however and was finally opened on 21 Feb 1916,[1] bringing the route mileage to just over fourteen.[2] Fares from Frenchgate were fixed as follows--1d. to the railway bridge, 1½d. to Pipering Lane, 2d. to Green Lane, 2½d. to Highfields and 3d. to Woodlands.[3]

In order to work the new extensions it had been necessary to buy additional cars. Six--cars 26-30--were broadly of the existing type but were delivered ready fitted with top covers and had a more modern type of truck known as the Peckham Pendulum. One--car 32--was similar but much larger, with seats for seventy-four, and also had an experimental long-wheelbase radial truck. These were all delivered in 1913. Four more--cars 33-6--were supplied in 1916 and were mid-way in size between the earlier deliveries.[4] To accommodate the cars, the depot had to be enlarged as well.[5]

After the war it was clearly intended to continue the policy of tramway extension. The Council put such extensions fourth on their list of public works priorities.[6] Schemes were laid for lines to Armthorpe, Hatfield and Rossington[7] and the plans for the last, starting from the Racecourse, were well advanced by 1918.[8] Ten new trams, which became numbers 38-47 and were the most modern on the system with, for the first time, enclosed driver's vestibules,[9] were ordered that year.[10] To house them an additional tram shed had to be built on the opposite side of Greyfriars Road, next to the

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1. DCT Jubilee, 50. 2. See note (b) to Appendix DN3.
3. Doncaster Minutes, E&TC, 2 Feb 1916, 35P, 264.
4. See Appendix DN2 for fleet details.
5. Doncaster Minutes, C-in-C, 21 Apr 1913, 82M, 333.
6. Ibid., 23 Dec 1918, 53M, 113.
7. Flint and Fowler, 'Corporation Transport', 100.
8. Doncaster Minutes, E&TC, 9 Dec 1918, 19P, 118.
9. Flint and Fowler, 'Corporation Transport', 101.
10. Doncaster Minutes, E&TC, 20 Nov 1918, 14P, 70.

Electricity Works.[1] The necessary application to the Light Railway Commissioners for the actual extensions was left too late for 1919, however, and it was decided to let the matter stand over,[2] with the obvious intention of picking it up again later. But from that time onwards no more is heard of further extensions into the colliery villages.

According to the Manager, Mr. T. Potts (who was appointed in 1919[3]), one reason for the change in policy was that the density of population in the area was too low for revenue to cover the capital expenditure for new tramways.[4] The only empirical test for this claim is the Brodsworth route, which was the only one of the semi-rural coalfield lines to be constructed.[5] More than half of this tramway, from the junction with the Bentley line as far as Highfields, ran through countryside in the same way as, say, a route to Rossington would have done. As noted in connection with the DDLR above, pick-up traffic was usually the mainstay of a tramway, and that would have been absent over such sections. It is surprising to discover from Appendix Table DN3 therefore that the Brodsworth trams performed as well as or even better than those elsewhere in the town, so in this particular case it seems that short-stage traffic was not so important after all.[6] In order to measure whether the Brodsworth line actually earned enough to cover its capital costs, one needs to know the latter. Capital charges on the Doncaster tramways as a whole rose by £1,651 in 1915-16, the year the Brodsworth route was completed. The following year a further £240 was added,[7] the total of £1,891 probably being roughly the annual cost of the new line and of the four cars purchased at the same time. Table 34 overleaf shows the likely surplus earned between 1916-17 and 1922-3 by the Brodsworth trams. It demonstrates that capital repayments were probably payable from revenue until

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1. Ibid., 10 Mar 1919, 40P, 260. 2. Ibid., 14 Apr 1919, 52P, 319.

3. C-in-C, 9 Oct 1919, 2M, 6. 4. Potts, Doncaster Cavalcade, 5.

5. Both the New Bentley and Warmsworth lines were also new extensions serving coal mines, but being prolongations of existing urban lines, they do not really provide a suitable comparison.

6. See Appendix DN3. 7. See Appendix DN1.

1919-20; thereafter they were not. This argues that the scattered population

TABLE 34

APPROXIMATE OPERATING SURPLUS OF THE BRODSWORTH TRAMWAY
1916-17--1922-3

Year Ending 31st March	Traffic Revenue £	Working Costs £	Operating Surplus £
1917	8,451	6,374	2,077
1918	10,094	7,396	2,698
1919	12,410	8,484	3,926
1920	14,961	12,782	2,179
1921	16,301	15,589	712
1922	13,806	14,123	317
1923	13,462	13,213	249

SOURCES

a. Doncaster Accounts, Tramways Revenue a/c.

b. Estimated by multiplying costs per route mile from Appendix DN3 by Brodsworth route mileage (3.5).

and consequent lesser revenue mentioned by Mr. Potts were not, in the conditions prevailing up to 1920-1, reasons for calling off the construction of the extensions; up to that time, the capital could be serviced. Since the Rossington application was allowed to stand over in April 1919, before the decline in the viability of the Brodsworth route could have become apparent, it was not fears about the ability of revenue to meet capital payments which caused this. There is in fact no reason to doubt the official explanation that the application for powers had not been submitted in time.

But what Table 34 does show is that by the time the matter was again raised, the failure of the Brodsworth route to cover its loan charges would be becoming obvious. Moreover, this was in relation to construction costs and interest rates prevailing in 1916. By 1920 the Wholesale Price Index had risen by 182.3 points.[1] Such rapid inflation must seriously have affected the cost of constructing new tramways and hence the capital liability.

1. See Appendix G4.

The Brodsworth and Warmsworth extensions had together cost £37,218 to construct;[1] the former was 3.0[2] and the latter 2.3 miles long,[3] so the cost per mile for mostly single track was £7,022. By 1919 the DDLR, also single line but probably built to cheaper standards, was estimated at £10,645[4] per mile, a rise in construction costs of 52 per cent. This would have pushed loan repayments up by a similar proportion, whilst on top of that--as already noted in connection with the DDLR[5]--the cost of borrowing had about doubled. Very roughly, interest accounted for 65 per cent of the capital burden for Doncaster in 1919, the rest being sinking fund contributions.[6] If one takes the actual annual capital cost of the Brodsworth extension (£1,891), 65 per cent of this is £1,229; doubling that achieves £2,458. The loan repayments themselves would be about 50 per cent more or £993, a total of £3,551. Only in 1918-19 could such an amount have been met. So Mr. Potts's fears about the insufficiency of revenue to cover capital payments would have been amply justified by the time the question of extensions came up again in 1920.

If the brief prosperity of 1919 had continued, however, expansion of the tramways might still have been a viable proposition. But post-war conditions worked against this not only by pushing up the costs of construction, but also by squeezing the 'profit margins' available to pay for such investment. Table 33 above shows that working costs continued to increase more rapidly than revenue until 1921 and thereafter fell more slowly; an approximate equality between revenue and costs indices was not obtained until

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1. Doncaster Accounts, Tramways Capital a/c, 19171-18; that is, basically track and overhead costs but not including cars.

2. See note to Appendix DN3; this is not the same as route length, part of which was common with the Bentley service.

3. See above, 220.

4. Also track and overhead only; calculated from mileage and costs in SYRO, 8/UD28/359-63, Estimate of Expenses, 24.

5. See above,155; of course, this was over a 1913 base, the increase for Doncaster over a 1916 base might well have been less.

6. That is, £5,283 versus £2,818; see Doncaster Accounts, Tramways Net Revenue a/c, 1918-19.

1928. This meant that the surplus available for meeting capital charges was reduced, so that even capital raised at the old levels and rates could not be serviced, let alone inflated post-war loans. Thus whilst Doncaster tramways' revenue in 1920 was three times that of 1913, working costs had gone up by over four times, just about halving the balance available for meeting capital charges; the result was a massive deficit of £4,572.[1] To undertake new capital obligations under such circumstances would clearly have been a folly.

Some of the discrepancy between revenue and costs was due to the difficulty of raising fares to meet the latter. Tramways could only raise their fares by going through official channels, in this case by applying to the Ministry of Transport under the Tramways (Temporary Increase of Charges) Act, 1920.[2] There were two adverse results from this procedure. First, there was a long delay between application and approval and, second, the increase requested was not necessarily granted. Thus the Committee decided to apply in March 1920 for an 100 per cent increase in fares;[3] an interim Order for only a 50 per cent rise was granted in November,[4] after which an inquiry had still to be held[5] before the final Order was made.[6] All this in a time of rapid inflation meant that the cure was applied too late and so the 1921 deficit was even worse than that for 1920.[7]

Doncaster faced special problems because the collapse of the post-war boom hit the coal industry particularly hard. This had direct effects on the tramways in 1921 when there was a bitter and lengthy coal strike. This started on 31 Mar 1921 when the miners were locked out following notice of severe wage cuts by the coal owners. Backing for the miners was not forthcoming from other workers and they had to sue for peace; even so the agree-

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1. See Appendix DN1.
2. Doncaster Minutes, C-in-C, 28 Jun 1920, 161M, 544.
3. E&TC, 8 Mar 1920, 77P, 350. 4. Ibid., 11 Oct 1920, 6P, 14.
5. Ibid., 8 Nov 1920, 13P, 137. 6. Ibid., 14 Feb 1921, 39P, 287.
7. See Appendix DN1.

ment to return to work was not signed until 1 July 1921.[1] Such a long dispute caused obvious difficulties to industries such as electricity generation, and as part of this tramway services in Doncaster were curtailed and there was also a sympathy strike by tramway workers.[2] A much more serious result of the coal industry's problems was a decline in passengers, which must have been at least partly related to lay-offs, short-time working or strikes at the pits. Passengers peaked at 10,210,984 in 1920-1, but then fell back sharply to 8,251,449 in 1921-2,[3] meaning that even with increased fares, revenue also fell.[4]

These industrial problems and the low population density mentioned already will have contributed to Doncaster's low place in the 'league table' of tramway receipts. Revenue per track mile of line for Britain as a whole in 1921-2 was £12,171,[5] almost two-and-a-half times larger than Doncaster's average of £5,056 in the same year.[6] So far as working results were concerned, to some extent this did not matter. A lesser patronage would need fewer cars, less staff, less power etc.; that is, running costs would be smaller than on a busier tramway and a working surplus might still be earned, as it was almost every year in Doncaster. But within very broad limits, a mile of tramway cost the same to build everywhere. So even if a similar percentage surplus was earned on a small system as on a large one, it would be very much less in cash terms and thus less able to cover capital outlay.

A final factor which would have made further expenditure on a fixed track transport system most unwise was the arrival of motor buses on some of the routes which were being considered for tramways. A bus had been licensed

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1. R. Page Arnot, The Miners: Years of Struggle, a history of the Miners' Federation of Great Britain (from 1910 onwards) (1953), 296, 300, 329 and 331; other sections of this work deal with difficulties in the mining industry at other times which also affected tramways in Yorkshire.

2. Doncaster Minutes, E&TC, 18 Apr 1921, 62-3P, 418.

3. Doncaster Statistics, 1920-1 and 1921-2. 4. See Appendix DN1.

5. Tramway Returns (excluding Ireland).

6. Revenue of £72,295 (Appendix DN1) divided by track mileage of 14.25 (Doncaster Statistics, 1921-2).

for the Rossington route during the war[1] and another shortly afterwards;[2] two months later a third came on the scene.[3] At this stage the number of buses involved was not great, though some were also licensed for other areas; Carcroft was a popular destination, for instance.[4] From 1920, however, the tramways' Manager said that he experienced a 'swarm' of small buses descending on the Corporation's tram routes, putting their future in doubt,[5] let alone any commercially shaky extensions which might be planned. Under these circumstances it was natural that the Tramways Committee should look for a means of serving the surrounding communities which involved a lesser capital outlay than a tramway and which was also free of the straight-jacket on tramway charges. Ideas for running motor buses to the outlying districts had resurfaced by March 1920[6] and in April 1921 the Manager reported on the practicability of trolleybuses as well and it was decided to apply for powers for both.[7] In the event the necessary enabling Bill included motor buses only, to run to New Edlington, Carcroft, Rossington, Hatfield and Conisborough.[8]

It would be interesting to know how much this change of plan was influenced by the change of manager. Mr. Rayner had accepted tramway extensions as policy,[9] but he left in 1919 to manage the Hull tramways.[10] After an abortive attempt to appoint another joint Electrical Engineer and Tramway

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1. Doncaster Minutes, C-in-C, 29 May 1916, 82M, 432.

2. Ibid., 26 Mar 1919, 119M, 253. 3. Ibid., 19 May 1919, 144M, 371.

4. See for example C-in-C, 23 Jul 1919, 190M, 500; Watch Committee, 17 Mar 1920, 69F, 348. These applications related to three small independent operators; the two licensed in 1920 were going to run a 16 seat bus and a 27 seat charabanc respectively.

5. Potts, Doncaster Cavalcade, 6.

6. Doncaster Minutes, E&TC, 8 Mar 1920, 76P, 350.

7. Ibid., 6 Apr 1921, 53P, 416. 8. Ibid., 4 Oct 1921, 1K, 13.

9. Potts, Doncaster Cavalcade, 5.

10. KHCT 1899--1979: an illustrated history of Kingston-upon-Hull City Transport (Hull, 1979), inside front cover; DCT Jubilee, 51 is incorrect in giving 1920 as the year of Rayner's departure.

Manager,[1] it was decided to split the two posts so an independent tramway department could face up to the challenges posed by new transport modes and to the need for a policy on extensions.[2] Mr. T. Potts, who had already acted as Manager during Rayner's absence on war service,[3] was appointed.[4] As a transport man rather than an electrical engineer he may well have had a more open mind on the relative merits of trams and buses and he certainly saw himself as a new broom sweeping aside his predecessor's policies; the tramways' 'prosperous fantasy', he wrote, 'had throughout been only a bankrupt reality'.[5] Without going into the matter at length, it is probably true to say that a strong manager could hold up or influence the pace or direction of change, but that he could not stand out against broad economic or commercial trends beyond a certain time limit. Thus, in the case of Doncaster, the new management may well have hastened the change in policy, but such a change would in time have become inevitable in any case.

The first Corporation motor bus service, to Skellow,[6] began on 26 Oct 1922; six single-deck petrol buses seating thirty-two passengers each were acquired from the Bristol Company.[7] Four more Bristols, including two of smaller capacity, were ordered a month later[8] and further services were inaugurated to Rossington and Hatfield--in 1922--and to Edlington in 1923.[9] The buses were evidently garaged at the tram sheds.[10]

The new vehicles were quite successful. In a five week period they earned £1,217 against the trams' £6,129, which was around £203 per bus as

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1. Doncaster Minutes, C-in-C, 20 Aug 1919, 217M, 570; 27 Aug 1919, 226M, 571.

2. DCT Jubilee, 26-7; the joint committee arrangement remained though.

3. Doncaster Minutes, E&TC, 28 Jun 1917, 93P, 329.

4. C-in-C, 9 Oct 1919, 2M, 6. 5. Potts, Doncaster Cavalcade, 5.

6. Next to Carcroft. 7. DCT Jubilee, 30.

8. Doncaster Minutes, E&TC, 14 Nov 1922, 25K, 78.

9. DCT Jubilee, 50.

10. Doncaster Minutes, C-in-C, 16 Jan 1923, 16M, 206.

against only £130 per tram.[1] Moreover the capital expended on motor buses by the end of 1925 was only £21,160, which covered 24.5 miles of route.[2] This compared to the 15 mile DDLR, built about the same time, but at a cost of nearly £300,000.[3] In 1924-5 the bus side earned £29,072, which easily covered both working and capital costs, and left a surplus of £5,959.[4] On these facts, it is unsurprising that there was no more mention of extending the tramways into the surrounding districts.

Possible Use of Motor Buses on Urban Services

It might be thought that the introduction of motor buses outside Doncaster would necessarily lead to their replacing the trams within it. But this is to ignore the realities of contemporary bus operation. Granted, the initial intention to use buses primarily as feeders to the trams[5]--involving the buses to Edlington and Carcroft starting from the appropriate car terminus--was quickly dropped in favour of through services, Doncaster to Carcroft, for example.[6] But there were a variety of reasons why this action posed no immediate threat to the tramways themselves.

The first was legal. The Ministry of Transport would not allow the Corporation's buses to compete with their own trams. So, for example, the through bus to Edlington could only carry passengers wanting to go beyond Warmsworth.[7] The second was economic. Motor buses might be cheaper to install than trams, but they were not, in the early 1920s, cheaper to run. A request to reduce fares on the Skellow route was rejected because of the high operating costs.[8] On a vehicle mile basis these seemed very reasonable

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1. Revenue from E&TC, 12 Feb 1923, 82K, 227; number of vehicles from DCT Jubilee, 49. Granted, there were too many trams, as ten had been purchased for the very routes the buses were working.

2. SYT Letters, 26 Jan 1926, 353. 3. See above, 156.

4. SYT Letters, 26 Jan 1926, 353. 5. Ibid., 23 Sep 1921, 9.

6. Ibid., 13 Nov 1922, 919.

7. Ibid., 23 Nov 1925, 171; by a special concession, buses could take inward passengers at tram fares since, it was argued, all long-distance passengers were catered for once Warmsworth was passed.

8. Ibid., 18 Dec 1922, 969.

in 1924, when the figure stood at 8.7d.[1] in comparison to 15.17d. per car mile on the trams.[2] But this does not take account of the much higher capacity of a double-deck tram as opposed to a single-deck bus nor, of course, of the likely increase in costs as the buses grew older. By 1926 the picture was as follows.

TABLE 35

COMPARATIVE DATA FOR DONCASTER TRAMS AND MOTORBUSES 1925-6

	Trams	Buses
Average Working Expenditure per car mile (d)	15.02	10.19
" Number of Passengers per car mile	10.50	3.70
" Fare per Passenger (d)	1.82	3.70
" Traffic Revenue per car mile (d)	19.31	13.80
Car Miles	871,860	570,186

SOURCE: SYT Letters, 17 Jul 1926, 898.

Comparing Table 35 with the figures cited in the previous paragraph, where working costs are concerned the trams had slightly improved their position whereas the buses were costing more to run. This may have had something to do with the fact that some of the buses were now about eighteen months old, but another factor which would have pushed up working costs would have been the introduction of double-deck buses on the Wheatley Hills route in April 1925.[3] But the motor side of the undertaking still enjoyed a sizeable cost advantage over the trams when calculated in mileage terms. However buses were not able to carry as many passengers as the trams did, so there was an even wider gap between tramway and bus revenue per car mile, this time to the advantage of the former. There is some evidence that this was compensated for by charging higher fares on the buses. The Woodlands

1. Ibid., 19 Mar 1924, 194.

2. Ibid., 19 Jan 1926, 333; these two figures are for different years, but the comparison is reasonably accurate as Table 35 shows.

3. DCT Jubilee, 50; further details of town bus services below.

tram fare in the early 1920s appears to have been 5d.[1] which, taking the length of the route as 3.5 miles,[2] makes the rate per mile 1.43d. In March 1923 bus fares were reduced as follows: to Skellow from 9d. to 8d., to Hatfield from 1s. 3d. to 1s. and to Stainforth from 1s. to 10d.[3] As the crow flies, the distance from Doncaster to the same three places is 5, 6 and 6.5 miles,[4] so the respective fare rates (at the lower prices) would be 1.6d, 1.67d. and 1.85d, or an average of 1.71d. This does not tell the whole story either, for cheap fares valid on the trams did not usually apply to the motor buses, so when weekly passes were introduced later in 1923[5] only tram passengers got the benefit. The large discrepancy between tram and bus fares in Table 35 would also be due to the fact that travellers on buses running outside the town would tend to travel longer distances than those on urban trams. Despite higher fares, the buses were unable to achieve as high an operating surplus as the trams in 1925-6, the respective figures being 3.61d. and 4.29d. per car mile.[6]

Because of their low capacity, at this time motor buses were a high cost mode when judged on a per passenger basis rather than the more usual mileage scale. It is probably for this reason that Mr. Potts considered them not to be suitable for heavy urban service, even though they were 'the only economical vehicle today' for services up to and including fifteen minutes headway.[7] Putting it simply, if a service required only one bus, the cheaper vehicle would be chosen. But if demand increased enough to require two buses, it would be chaper to run one 'double size' tram.[8]

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1. It was cut to 4d. in 1924, whilst the highest stage quoted the previous year was 5d.; see Doncaster Minutes, E&TC, 19 Feb 1924, 103K, 235; 16 Jul 1923, 183K, 488.

2. See Appendix DN3.

3. Doncaster Minutes, E&TC, 15 Mar 1923, 103K, 279.

4. Distances from map in Doncaster Official Guide.

5. Doncaster Minutes, E&TC, 16 Jul 1923, 183K, 488.

6. Calculated from Table 35. 7. SYT Letters, 19 Mar 1924, 194.

8. A 'ceteris paribus' statement, ignoring capital/renewal costs etc.

A third reason--which is really just another way of stating the above point--why Doncaster's early buses could not have replaced its trams is technological. The buses were too small to do the trams' work, and for a variety of technical and legal reasons could not easily be sufficiently enlarged. The figures of comparative costs used above are rather later than one might wish, but the Committee made a policy decision in 1924 not to publish bus operating statistics,[1] so these are only intermittently available from other sources. The point of mentioning this is that the comparative advantage of trams was probably greater in 1922 than it was in 1926. At the beginning of the 1920s there was therefore no question of using motor buses to replace the trams.[2] But the town tramways could not remain unchanged either. Quite apart from the need to replace rolling stock etc. from time to time, the town itself was expanding and its transport network had to grow with it. The population rose from 30,516 in 1911[3] to 54,052 in 1921.[4] Much of this must have been due to the 1914 extension of the Borough to include Balby, Hexthorpe and Wheatley,[5] but there was obviously 'real' growth as well, for by mid-1929 the total had risen again, to 59,890.[6]

An expansion of the housing stock was obviously necessary to meet this growth, whilst at the same time unfit property was being cleared. In 1929 for instance the Council envisaged the demolition of 305 houses over the following five years, 111 of which were in clearance areas, and the consequent displacement of 1,021 people; they themselves expected to build 997 houses and that about the same number of private dwellings would be built.[7]

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1. SYT, Letters, 5 May 1924, 304; so as not to assist competitors.

2. DCT Jubilee, 27 does link the process of seeking bus powers in 1921 with a management decision to wind up the tramways as early as economically possible, but contemporary evidence for so early a conversion plan is lacking.

3. Geoffrey M. Morris, Health and Housing in Old Doncaster (Doncaster, n.d.), 4.

4. DCT Jubilee, 26. 5. Morris, Health and Housing . . . , 4.

6. Doncaster Minutes, Council, 15 Dec 1930, 157.

7. Ibid., 157-8; totals only for 'working class type' houses.

Most local authority involvement in house building dated from the Housing and Town Planning Act of 1909, though not much had been done before World War I; afterwards the scarcity due to five years without new houses and a great increase in the number of families meant that municipal housing became much more significant as a proportion of the whole.[1] Doncaster seems to have followed this pattern, with some fairly minor developments taking place before the war--thirty flats at Wheatley for instance[2]--but not advancing major schemes until the inter-war period. The significance of this housing boom from the point of view of the tramways was that the new municipal estates tended to be on sites distant from the existing tram lines (though not always). One major development in the 1920s was on the Warmsworth Road[3] and thus presumably accessible via the Warmsworth tramway which, as noted above, had run through a largely rural area when built. But in most cases development naturally pushed beyond the tram lines which had more usually been laid to suit the needs of existing residential areas. Lee makes the interesting point in connection with Hull that council estates there tended to be built away from the tram lines because the land was cheaper, so in this case the Corporation itself caused a shift of passengers from tram to bus.[4]

This was also the effect of housing changes in Doncaster, although it may not have been intended at the time. Other estates built or begun in the 1920s were at Carr House,[5] Woodfield Lane,[6] Wheatley,[7] and Intake.[8] To

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1. Sayers, Economic Change, 131-2.

2. Doncaster Minutes, C-in-C, 20 Jan 1913, 42M, 169; these were not even built under the 1909 Act, but under the Housing of the Working Classes Act 1903 and the Doncaster Corporation Acts 1904 and 1908.

3. Housing Committee, 31 May 1923, 334S, 403; 10 Oct 1923, 31S, 38. 275 houses were involved at this initial stage.

4. Lee, 'Tramways of Hull', 235-6.

5. Doncaster Minutes, Housing Committee, 20 May 1919, 218S, 403.

6. Ibid., 4 Sep 1925, 384S, 564. This was still only at the layout stage in 1928; see ibid., 17 Feb 1928, 33, 326 (from about this time suffix letters cease to be used for paragraph numbers).

7. DCT Jubilee, 34.

8. Doncaster Minutes, Housing Committee, 12 Jan 1928, 24, 259.

provide access to the first of these Carr House Road was to be extended to Bennetthorpe[1] after which it was intended to build a tramway along the new road linking the Racecourse and Hyde Park termini.[2] Woodfield Lane estate was fairly near the Balby tram route and might thus be assumed to have public transport provision, though some houses would be at least a mile from the main road.[3] Wheatley Hills was beyond the Avenue Road terminus,[4] whilst the Intake estate formed a completely new area of the town and was without any existing transport provision.[5] This was a further pressure on the tramway department. Not only were the growing colliery villages demanding links to Doncaster but, as Lee says in connection with Hull, the policy of another municipal department was making additional transport services necessary within the town itself. Clearly, the original intention was to meet these needs through the tramways, either by building estates near a tram line--as on Warmsworth Road--or by building a new tram line, such as that planned along Carr House Lane. The latter was never constructed, however, and no plans were ever made to serve any of the other estates by tram.

The reasons would not be quite the same as those which caused the abandonment of the 'out of town' schemes. For one thing, housing estates do provide a fairly dense population, reasonably well suited to tramways. However, capital costs would be higher on urban lines than on semi-rural ones because of the need to use fully-paved street track, which was a good deal more expensive than the sleeper track which might have sufficed to, say, Rossington.[6] Had the urban extensions been considered 'standing alone' as

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1. Highways Committee, 24 Apr 1923, 199W, 347.

2. E&TC, 12 Apr 1920, 97P, 416. 3. Distance from current town map.

4. DCT Jubilee, 34. Wheatley Hills normally refers to private housing in this area and the reference in the book to encouraging development of the estate may well apply to this, though a council estate was also developed on the other side of the main Thorne Road.

5. This greenfield site was bought in the mid-1920s from the Earl Fitzwilliam; see Housing Special Sub-Committee, 30 Nov 1926, 89S, 134.

6. DDLR estimates per mile in 1919 were £8,960 for fully-paved track and £6,610 for sleeper track; see SYRO, 8/UD28/363, Estimate of Expense.

new tramways, they would almost certainly have been rejected on building costs alone as, at about the same time, all impartial advice insisted the DDLR should have been.[1]

It is, however, sometimes worth improving an existing capital asset to prolong its life, even if it would not then be acquired as a wholly new item. To some extent such improvements were made in Doncaster. In 1921 an application was made for powers to build a town centre line--described as a circular route--from Station Road via Factory Lane and Trafford Street to North Bridge Road; the Trafford Street part was to be laid immediately.[2] The idea was to relieve congestion at the foot of North Bridge by running cars in a loop via St.Sepulchre Gate.[3] However the missing link in Factory Lane was first deferred[4] and then abandonned, after which it was decided to use the tracks in Trafford Street as a stub terminus.[5] However the work to connect it to the main line had still not been carried out at the end of 1924,[6] so it may have been 1925 before it came into use for Bentley and Brodsworth cars. Rather more successful attempts were made to rebuild and double lines elsewhere, mainly to Balby.[7]

Meanwhile the new housing areas were being developed. The first few houses went up on the Wheatley Hills estate just beyond the Avenue Road tram terminus in 1919-20;[8] the following year it was decided to build 113 more houses[9] and in 1926 a further site was acquired,[10] by which time housing or

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1. See above, 85.

2. Doncaster Minutes, E&TC, 11 Jul 1921, 84-5P, 596.

3. Doncaster Gazette, 16 Sep 1921, 7.

4. Doncaster Minutes, E&TC, 21 Nov 1922, 41K, 81.

5. Ibid., 9 Jul 1923, 179K, 487. 6. Ibid., 16 Dec 1924, 66K, 114.

7. See for example, ibid., 5 Jun 1920, 76P, 441; 8 Jan 1923, 70K, 174; the usual municipal haggling plus difficulties over road widening etc. caused the scheme to drag on over a long period.

8. DCT Jubilee, 34.

9. Doncaster Minutes, E&TC, 12 Sep 1921, 113K, 737.

10. Housing Materials Sub-Committee, 13 Mar 1926, 211S, 283.

planned housing must have extended well beyond the tram lines. The Avenue Road service had probably always been unprofitable. Presumably for this reason a small one-man car was bought in 1917 to run it, but this was (1) inadquate for the traffic[1] and (2) was always operated with a conductor,[2] possibly because of union objections. In 1922-3 the tram service earned £2,391 per route mile.[3] Over the whole system of about 14.25 route miles[4] working expenditure in 1922-3 was £73,055[5] or £4,106 per route mile. The Avenue Road route, with a restricted service on a single track, may not have cost this much to run, but must undoubtedly have made considerable losses. A likely reason was that the short section of route not shared with the Beckett Road service went through a good class housing area consisting of large detached houses and which would not have provided much demand for public transport. Some confirmation of this is given by the fact that the Beckett Road trams, whose route was almost exactly the same length but passed through an area of fairly densely packed terrace houses,[6] earned nearly £4,000 in 1922-3,[7] probably enough in practice to take the service past the break-even point so far as working costs were concerned; even here, however, there would have been little to spare to meet capital charges. Thus in 1924 it was decided to replace the Avenue Road trams by motor buses, which would run past the old terminus to Wheatley Hills, though initially only for a three month experimental period. Two double-deck buses, the first in the fleet, were ordered at the same time.[8] They took over after an official inaugural

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1. DCT Jubilee, 20. 2. SYT Letters, 1 Mar 1922, 480.

3. These are the actual earnings from Doncaster Accounts, Tramways Revenue a/c, because the line was almost exactly one mile long.

4. Doncaster Statistics, 1922-3.

5. Doncaster Accounts, Tramways Revenue a/c, 1922-3.

6. Details of housing in this area, which appears to have changed very little since the trams were running, from personal observation as compared to photographs.

7. Doncaster Accounts, Tramways Revenue a/c, 1922-3.

8. Doncaster Minutes, E&TC, Special Sub-Committee, 10 Oct 1924, 2-3K, 636. In fact, three were purchased; see Flint, DCT Fleet, 6.

run from the Mansion House on 28 Apr 1925;[1] one source implies regular service began the following day.[2] The event was significant because it was the first time a Corporation motor bus service had been instituted purely within the Borough[3] and also the first time one had directly replaced a tramway service. If the experiment had proved successful, it would have shown that motor buses had advanced sufficiently since the beginning of the decade to take over the tramcar's traditional area of dominance in the built-up part of the town itself.

The bus service was not in fact an unmixed success. By the end of 1925 it was clear that the buses were unable to cope with peak loads and it was decided to reinstate a tram in the periods 1--2.30 p.m. and 5--7.00 p.m.[4] There was evidently a pro-tram group on the Council since a motion was put early the following year requiring the reintroduction of a full twelve minute tram service[5] on top of the existing Wheatley Hills buses, but this was referred back to the Committee,[6] who decided to run a twelve minute bus service for a trial period,[7] which started on 8 Mar 1926[8] and was given a further month's extension from April.[9]

The initial replacement of a limited tram service is not mentioned in any of the existing histories, and it is not at all clear what happened afterwards. The presumption must be that the tram was taken off again in March and that there was never a regular service to Avenue Road again. In the autumn Mr. Potts wrote to a fellow manager, 'I have scrapped the Avenue

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1. SYT Letters, 20 Apr 1925, 418. 2. DCT Jubilee, 50.

3. Flint and Fowler, 'Corporation Transport', 113.

4. Doncaster Minutes, E&TC, 17 Nov 1925, 33K, 67.

5. Presumably this was a tram service which was being discussed, and not a strengthened motor bus service, although the former is not stated in so many words.

6. Doncaster Minutes, Council, 3 Feb 1926, 210.

7. E&TC, 16 Feb 1926, 101K, 221. 8. SYT Letters, 2 Mar 1926, 496.

9. Doncaster Minutes, E&TC, 20 Apr 1926, 137K, 310. This hesitant start to the first urban motor bus service, taking a full year to get into its stride, shows how much of an experiment it was then seen to be.

Road tram service altogether, and substituted with Motor Omnibuses'.[1] But to confuse the issue, a special tram was chartered in October to run from Woodlands to Avenue Road 'or at any rate as near to that point as possible';[2] the implication is that the now disused tracks could only be negotiated with difficulty.

Though the motor buses probably coped adequately with the traffic once they got established—four more double-deckers were acquired in 1926 to supplement the original three[3]--they were not judged satisfactory for other reasons. In a report to the Committee in 1926 Mr. Potts said that petrol buses were expensive to operate on town services because of the frequent stops[4] and also because the vehicles had such a short life compared with trams. For these and other reasons he believed trolleybuses were preferable.[5]

Conclusion

As already noted what at first sight appears to have been the most significant event in the period 1914 to 1925--World War I--did not affect Doncaster's tramways very greatly at the time, indeed rather less than a cursory examination of the facts would suggest. The problems of the next few years were however partly a legacy of the war. These included inflation, industrial troubles affecting local industry and the transport service itself, a deterioration in the physical condition of the tramways and the rise of motorised competitors; these last two matters are dealt with in more detail in the following chapter. Against this unstable background it was very

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1. SYT Letters, 22 Sep 1926, 73. 2. Ibid., 10 Oct 1926, 120.

3. Flint, DCT Fleet, 7; two of these vehicles were ex-demonstrators, one of which had seen service in Birmingham.

4. Causing high fuel consumption presumably.

5. Flint and Fowler, 'Corporation Transport', 114. This is said to be part of a report to the E&TC in 1926, though oddly no such details can be traced in the minutes. Mr. Potts's preference for trolleybuses is well known, however, and he said at the time that he would have preferred to use them on the Wheatley service from the start had a suitable turning place been available; see, SYT Letters, 22 Sep 1926, 73.

difficult to justify the extensive programme of tramway construction that would have been required to serve (1) the outer ring of colliery villages and (2) newly developing housing estates in Doncaster itself. In the case of the former, it quickly became clear that motor buses were a much more viable means of serving these areas. The situation in the town was less clear-cut, in that the motor bus was not self-evidently capable of superseding the tram, and also less urgent because the earliest housing estates on Carr House and Warmsworth Roads were on or near existing tram routes. But as housing extended into as yet untapped areas, the question of new services had to be faced. The use of motor buses to replace and extend the Avenue Road tram route had two advantages; it eliminated a loss-making tram service and it was a means whereby a new housing area could be economically provided with transport. The efficiency of the new mode, in such matters as passenger capacity and fuel economy, was not convincing enough to recommend the use of petrol buses throughout the town. But although the larger part and the most heavily trafficked part of the tramway system remained intact, there were two reasons why a decision whether to rebuild it or to scrap it could not be long delayed. These were the rise of motor bus competition and the poor condition of the tramways themselves.

CHAPTER 10

EXTERNAL ATTACK AND INTERNAL DECAY

Motor Bus Competition

Competition between transport modes will exist even within a monopolistic supplier as, say, in an East European city transport undertaking today which must decide between the relative merits of trams, trolleybuses, motor buses and underground railways. Doncaster Corporation Tramways were not a monopoly, but even so they had to decide whether to use trams or motor buses for out-of-town extensions and, later, experimented with motor buses on town services too. Not being a monopoly, however, the tramways' department was greatly influenced in its actions by the threat, real or imagined, of external motor bus competition.

Possibly the first public motor vehicle licensed in Doncaster was a charabanc owned by one of the former horse bus operators and put on the road in 1908.[1] The first regular motor bus services seem to have come in from the Dearne valley which, of course, lacked any mechanised road transport till than. A Mr. Jefferson was licensed to run to Goldthorpe in 1913,[2] to be followed less than a year later by the B&DETC to the same destination.[3] A few bus licences were issued during the war[4] and others refused;[5] there

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1. Doncaster Minutes, 11 May 1908m 115M, 292.

2. Sanitary Committee, 12 Aug 1913, 323N, 604.

3. E&TC, 31 Mar 1914, 43P, 354; at the time responsibility for issuing licences was not clearly allocated to one committee.

4. For instance, C-in-C, 29 Apr 1915, 107M, 370; 26 May 1915, 114M, 431.

5. For instance, C-in-C, 1 Dec 1915, 16M, 135.

were perhaps a dozen applications in all.[1]

By 1920 the pace had quickened markedly, with twenty-seven applications for bus licences being granted in that year and still others being refused.[2] Initially licences were dealt with as and when requested, but from the early 1920s regular half-yearly licensing inspections were held. The numbers of licences granted are given in Appendix DN4. Taken on their own, these figures give a slightly false view of the situation. In the early days at least the numbers of vehicles licensed over-exaggerate the extent of the problem because so many of the buses were extremely small and primitive. In the first four months of 1920, for example, eight vehicles were licensed; of these, four seated fourteen or less, whilst the remainder, though having up to thirty five seats, were charabancs without any permanent weather protection.[3] Some so-called buses were really only lorries with canvas sides and longitudinal benches reached from a rear step; one was used by a man called Goodyear on a route between Carcroft and Doncaster.[4] The capacity and standard of comfort offered by independent bus proprietors thus did not compare with that given by the larger companies such as the B&DETC or, later, the Corporation. As the decade passed, however, the size and all-weather capability of vehicles improved considerably. In August 1923, for instance, seven buses were licensed. All were saloons and only two were small, with eight and fourteen seats apiece, the remainder being twenty or twenty-five seaters.[5]

On the other hand, the figures for vehicles licensed under-estimate the extent of competition because a lot of the small men either did not trouble to get a licence at all or cheerfully evaded the conditions attached thereto.[6]

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1. Doncaster Minutes, passim. 2. Watch Committee, 1920, passim.

3. C-in-C, 28 Jan 1920, 69M, 209 and 4 Feb 1920, 80M, 270; Watch Committee, 17 Mar 1920, 69F, 348 and 8 Apr 1920, 81F, 414.

4. Reminiscence of Mrs. R. Roberts, Goodyear's daughter; the bus was called 'Ruby' after her.

5. Watch Committee, 20 Aug 1923, 169-70F, 563.

6. DCT Jubilee, 35.

An example is F. Stewardson of Goldthorpe who ran a service despite being continuously refused a licence by Doncaster Watch Committee.[1] Probably Appendix Table DN4 is about right on balance therefore, if one bears in mind both the primitive nature of many early buses and also the fact that an unknown but probably considerable number were not licensed at all.

It has already been noted in connection with the DDLR that large bus operators, like the B&DTC, had a distinct cost advantage over trams, anything from 25 to 50 per cent.[2] Small bus proprietors or 'pirates' were in an even more advantageous position. The reasons for this were partly economic and partly legal. The one or two vehicle operator was able to run at costs way below the large firms or municipalities. He had few overhead charges to meet, with no large garages or maintenance facilities to build and no 'headquarters staff' to pay. Many small bus owners appear to have had more than one business over which they could spread their overheads as well. An operator called Camplejohn, for example, owned the Empire Palace theatre/cinema at Adwick-le-Street.[3] In many cases buses did not need to be bought outright either, but came on hire purchase,[4] meaning that there was no capital outlay needing servicing as there was for the 'majors'. In other cases the vehicles were often 'more or less scrap'.[5]

Small owners had distinct operating advantages too. In the first case, they often only ran when it was profitable to do so, although this was usually illegal. Early in 1924 Mr. Potts referred to 'intolerable pirating'

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1. Sykes, Yorkshire Traction, 56; actually Doncaster Minutes, Hackney Carriage Sub-Committee, 18 Apr 1923, 77F, 341 do show that Stewardson was licensed after appeal to the Ministry of Transport, but that the licence was later withdrawn due to failure to observe the timetable (Ibid., 6 Mar 1925, 100F, 268).

2. See above, 146.

3. From an agreement in the possession of Mrs. R. Roberts between Camplejohn and W. E. Goodyear to perform at the Empire in 1914; this, of course, meant that Goodyear also had another profession to fall back on. He also later ran a small garage/motor cycle shop.

4. Sykes, Yorkshire Traction, 57-8; doubtless this was true of the Doncaster area too.

5. SYT Letters, 24 Jan 1924, 35.

and to small Ford buses running without licences from various streets to the collieries; in slack hours the vehicles were used for general carting work.[1] Above all, the independents had working costs which must have been way below those of the established operators. One of Camplejohn's conductors worked 16 hours a day, 6 days a week for £2 10s. He had no regular meal breaks, but was dropped off at the owner's home for a scratch meal and picked up as the bus returned.[2] This made an hourly rate of about 5½d., which was actually about what Corporation tram conductors had been getting pre-war.[3] Corporation hours were about half too, being 54 as early as 1902, reducing to 48 by 1939.[4] A week's wages on private buses, Mr. Potts said, often did not equal one day's trades' union pay and this, together with the poor vehicles used, made it impossible to compete on fares.[5] Pirate buses were thus bound to undercut the Corporation on price, even where motor bus services alone were concerned.[6] They were also frequently more convenient, like those referred to above which went direct to the collieries. This was especially the case where the trams were concerned, for neither the Brodsworth nor Warmsworth cars actually ran to the pit gates. The latter service, involving a longish walk from Edlington to Warmsworth terminus, was wide open to competition, a fact recognised by the early introduction of a municipal bus to Edlington.

A local authority was, perhaps, in an invidious position in the 1920s. As a local authority it had the duty of controlling bus transport, a control it could hardly avoid exercising for the sake of the safety and convenience of the public and to minimise traffic congestion. This might be regarded as a disinterested task, yet if the particular authority was also a transport

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1. Ibid., 20 Jan 1924, 33. 2. Ibid., 15 Feb 1924, 102.

3. See above, 196. 4. DCT Jubilee, 11.

5. SYT Letters, 24 Jan 1924, 36.

6. Though the new municipal buses seem to have coped fairly well with the competition. Revenue per bus was £842 per annum in 1922-3 and then £2,006, £1,925 and £1,945 in the next three years, a better performance than the trams' was (calculated by dividing income in Doncaster Accounts, Motor Bus Revenue a/c by the number of buses in DCT Jubilee, 49).

operator, it was clearly very much in its own interest to limit putative competitors. This was, in view of the economic facts, almost the only way Doncaster could defend its transport undertaking.

The difficulties of attempting to control motor buses with the weak Victorian legislation available have already been discussed, both in general and in the particular case of the DDLR.[1] In 1924 Doncaster Watch Committee revised its licensing conditions. Some of these conditions seem to have been relatively uncontroversial, matters like the safety and cleanliness of vehicles, but others were more obviously protective in nature; things such as a prohibition on picking up or setting down short-distance passengers until tram termini had been passed and an insistence on charging a protective bus fare or surcharge of 2d. over and above the tram fare.[2] The Corporation naturally reserved the right to refuse licences too, which was often done.[3] These regulations were the strongest yet, following less stringent versions in 1921[4] and 1923.[5] Fully applied, they might have been quite effective, but there were several major difficulties. First, private bus owners had the right of appeal to the Ministry of Transport on both licence conditions and on refusals. A particularly significant case involved W. T. Underwood Limited, which had been a large operator in the area since at least 1922, when they took over another company's licences.[6] Their relations with the Corporation were always strained[7] and in 1925 they appealed to the Minister over the new licence conditions; although his initial advice was to

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1. See above, 46-9 and 106-9.

2. Doncaster Minutes, Hackney Carriage Sub-Committee (hereafter, HC/SC). 8 Feb 1924, 64F, 245-6.

3. For instance, in May 1922 various applications were turned down because of the large number of buses already running in the Borough; Watch Committee, 17 May 1922, 97F, 385.

4. Ibid., 19 Oct 1921, 5F, 22. 5. Ibid., 21 Feb 1923, 50F, 237.

6. Ibid., 18 Jan 1922, 45F, 176.

7. In 1922, for instance, the Company withdrew its services over the planned Corporation routes before the latter was ready to start; E&TC, 12 Oct 1922, 17K, 19.

sort the matter out locally,[1] it proved impossible to agree on the protective fare,[2] which the Minister eventually reduced from 2d. to 1d.[3] A penny was simply not enough to deter passengers from using private vehicles,[4] so the Council had a major leg of its policy knocked out from under them by the Ministry itself. Licensing appeals proper did not always go against the Watch Committee,[5] but most did; five licences were issued on 'suggestions' from the Ministry in April 1923 for instance.[6] Mr. Potts was very bitter about the Ministry's policy which was, he believed, to license all-comers;[7] the Ministry seemed to sympathise with the small companies[8] and were glad to get 'licence fees for any old vehicle'.[9] From references like this and frequent mention of successful appeals by owners in the Minutes, it is obvious that the attitude of higher officialdom was seen as extremely damaging to municipal transport undertakings. The private bus firms received support from other quarters too. They had an effective trade organisation to plead their cause. The Commercial Motor Users' Association raised queries about licence refusals with the Watch Committee on a number of occasions,[10] though they were not always heeded.[11]

Another reason why the control of private buses was unsuccessful was that operators, both large and small, flouted the regulations more-or-less openly. The YTC's buses were known to pick up passengers along the Corpor-

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1. Watch Committee, 11 Feb 1925, 86F, 225.

2. Ibid., 13 May 1925, 138F, 376. 3. Ibid., 15 Jul 1925, 177F, 463.

4. See above, 164.

5. One of Underwood's appeals was turned down in 1925, for example; see Watch Committee, 11 Feb 1925, 85F, 225.

6. HC/SC, 18 Apr 1923, 76-7F, 341. 7. SYT Letters, 24 Jan 1924, 35.

8. Ibid., 33; obviously more than one letter was usually written each day, but the page number distinguishes these.

9. Ibid., 26 Jan 1922, 409.

10. For example, Doncaster Minutes, Watch Committee, 20 Jan 1922, 32F,,,, 138.

11. For example, ibid., 16 Apr 1924, 100F, 361.

ation's routes,[1] whilst the conditions of an agreement between the Corporation and the East Midland Company[2] were all broken by the latter.[3] Violations by smaller concerns were even more numerous. They ran without any licence at all[4] and to unauthorised termini;[5] they drove dangerously[6] and with overloaded vehicles[7] and withdrew their services without notice.[8] There are countless references to these and other misdemeanours which made the Manager conclude that 'so far as we are concerned in Doncaster any Rule or Regulation made for the protection of the Tramways from unauthorised Motor Omnibus competition has been futile'.[9] A further cause for frustration was the failure of certain bodies to give the support which Mr. Potts believed was due to the municipal transport undertaking. The Watch Committee did not consult the Tramways Committee and even though there was some common membership[10] there was obviously some bad blood between the two at times.[11] However there does seem to have been some concerted attempt at committee level to deal with the problem of excessive motor bus competition, even if it was ultimately unsuccessful.[12] Mr. Potts may have been on stronger ground in feeling that the police did not act against those breaking regulations, such as those against overcrowding,[13] and he wrote many times to the

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1. SYT Letters, 31 Dec 1930, 143; this and the next example are later than the period now being discussed, but there is no reason to suppose the major companies suddenly became more aggressive after 1930, rather the reverse if anything.

2. In 1927 Underwoods changed their name to the East Midlands Motor Services Limited; see Cummings, Railway Buses 1, 107.

3. SYT Letters, 31 Mar 1932, 23. 4. Ibid., 16 May 1924, 349.

5. Ibid., 11 May 1925, 465. 6. Ibid., 11 May 1925, 467.

7. Ibid., 6 Apr 1925, 271. 8. Ibid., 16 May 1924, 349.

9. Ibid., 7 Mar 1927, 581. 10. Ibid., 23 Jul 1926, 923.

11. Ibid., 29 Mar 1926, 582.

12. Outside the Borough where much of the tramways and most of the bus routes lay, the Corporation was at the mercy of the licensing policy of outside authorities, who had no particular reason to favour Doncaster Corporation vehicles; see for instance, ibid., 6 Mar 1925, 271 and 30 Apr 1924, 285.

13. Ibid., 6 Mar 1925, 211.

Chief Constable pointing out the operations of unlicensed vehicles,[1] the obvious implication being that the police were not acting on the matter. The Manager also felt that organised labour should support a publicly-owned undertaking which paid trade union rates; yet prominent unionists were advising members to ride opposition buses in order to force Corporation fares down[2] and tramways' department employees were chartering independent buses and even repairing them in the Corporation's time.[3] There was, Potts concluded, no way of dealing with competitors under Hackney Carriage law, backed up as the former were by the Ministry and by organised labour,[4] and, as we have seen, when the regulations imposed were so regularly flaunted.

The effect of this barely restrained competition upon the Corporation's services is extremely difficult to estimate. As Table 36 below shows, most

TABLE 36

DONCASTER CORPORATION TRAMWAYS: PERFORMANCE 1920-1--1924-5

		1920-1	1921-2	1922-3	1923-4	1924-5
Passengers (millions)	(1)	10.21	8.25	8.49	a	8.95
Receipts per tram (£)	(2)	1,596	1,538	1,554	1,415	1,510
Passengers per car mile	(3)	13.03	11.40	10.70	a	a
Passengers per head/population	(4)	127.60	103.00	106.00	a	a

SOURCE: Lines (1), (3) and (4) from Doncaster Statistics for the years concerned, except for passenger total for 1924-5 from SYT Letters, 4 Dec 1925, 222; Line (2) is calculated from the receipts given in Appendix DN1 divided by the number of cars in the fleet.

a. Figures not available.

indices relating to the tramways show a severe fall in 1921-2, after which there is some small and hesitant recovery in passenger levels, though not in much else. Clearly, some quite serious event must have caused the loss of two million passengers between 1920-1 and 1921-2. Mr. Potts made two quite contradictory statements about this. In the first place, he said that com-

1. Ibid., 11 May 1925, 465 for example. 2. Ibid., 24 Jan 1924, 35.

3. Ibid., 15 Feb 1924, 102. 4. Ibid., 24 Jan 1924, 35.

petition had reduced receipts by about £5,000 in the first half of the financial year 1921-2.[1] But in May 1921 he said that the service was operating 'at a tremendous loss to the undertaking' because running cars to the colliery villages when the men were on strike simply did not pay; the undertaking was doing it purely to keep the staff employed.[2]

One could hardly have two more diametrically opposite statements, but luckily the figures tell their own story. The 1921 coal strike has been discusssed above.[3] Potts later compared the receipts between 1 Apr 1921 and 14 Jul 1921--roughly the period of the strike--with a similar period the preceding year, finding that revenue had fallen by £3,861;[4] there was later some slight recovery, and apart from the time of the strike revenue was actually up by 10 per cent.[5] This matches the decline in receipts over the whole year, which was about £3,000. It seems highly likely that by far the major cause of the tramways' loss of passengers and revenue in 1921-2 was the trouble in the coal industry. There were, after all, only fifty to sixty licensed motor buses in the area at the end of this period, and it is not likely that there was so great a number of unlicensed vehicles to add to these. As a new threat this was doubtless very alarming to the municipal authorities, but it was not yet enough to cause real economic harm. In 1923-4, however, tramway revenue suffered another and larger collapse, this time by over £6.500. So far as is known, there was no serious industrial trouble in the area during 1923-4, so a different explanation must be sought. By this time the number of licensed motor buses had increased by about half (twelve were municipal though)[6] and, more ominously, Potts now refers to 'intolerable pirating' even within the Borough and to unlicensed vehicles running in from outside and evading regulations by issuing return tickets;

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1. Ibid., 19 Sep 1921, 974. 2. Ibid., 31 May 1921, 703.

3. See above,226. 4. SYT Letters, 27 Jul 1921, 846.

5. Ibid., 26 Oct 1921, 24; revenue ought to have risen after the November 1920 fares rise (see above,).

6. Unacknowledged data above from Appendices DN1 and DN4.

revenue, he said, was dropping away week by week.[1] It would seem, then, that by the mid-1920s private bus competition was having a severe effect on tramway traffic and revenue, rather as it had done in London over a decade previously.[2]

The curious fact is, however, that over the self-same period the tramway section of the undertaking was turned round from a £5,500 deficit in 1920-1 to a surplus of £5,600 in 1924-5, the main reason being a steep and rather fortuitous decline in working costs,[3] itself a consequence of the then general deflation in prices. But revenue was actually rising from the low point of 1923-4, probably because of an alteration in the fare structure designed to meet the pirate bus competition. In the first place a cut in off-peak fares was given a trial,[4] but this was evidently unsuccessful, probably because the real threat of the pirates was to peak traffic, such as that to and from the collieries. So later in the year an imaginative scheme for weekly tickets was introduced costing, for instance, 2s. 6d. over a 2d. tram stage.[5] These tickets, almost unique in the country, gave unlimited rides over the chosen section and were designed to encourage regular riders to use the trams, which ran regularly themselves as opposed to the pirate buses, which did not.[6] Some traffic was undoubtedly regained by this means. Sales of weekly passes achieved £3,953 in the first, incomplete year and then rose to £7,269 in 1924-5 and to £8,175 in 1925-6; after the collapse of 1923-4 ordinary ticket sales remained more-or-less steady until 1926-7, so the returns from passes were a bonus which helped to bring traffic receipts almost back to the their 1922-3 level by 1925-6.[7]

To sum up, during the first half of the 1920s the Doncaster tramways

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1. SYT Letters, 24 Jan 1924, 33; issuing returns meant that, strictly speaking, the buses were not plying for hire in the Borough.

2. See above,36 . 3. See Appendix DN1.

4. Doncaster Minutes, E&TC, 15 Mar 1923, 103K, 279.

5. Ibid., 16 Jul 1923, 183K, 488. 6. DCT Jubilee, 42.

7. Doncaster Accounts, Tramways Revenue a/c, passim.

suffered two severe falls in revenue. The first appears to have been almost entirely due to strikes in the coal industry in the early part of the financial year 1921-2, despite some contradictory statements from Mr. Potts ascribing the difficulties to competition from private buses. The second, in 1923-3, was, however, the result of intensified motor bus competition. The introduction of weekly passes succeeded in stemming some of the loss in revenue, but the greater part of the concurrent improvement in the tramways' financial health was a consequence of declining working expenditure.

It would probably be fair to say that the tramways were not abandoned because of competition from pirate or larger bus companies. It is true that this was a serious problem, but it was one that did not go away when the trams had begun to disappear and which affected the Corporation's motor and later trolleybus services too. During 1931 the last but one tramway route, to Warmsworth, was closed,[1] but the Manager was still fearing a concerted attack from the major bus companies, although he intended to 'die kicking';[2] a little later he was advising his Committee to reduce expenditure or be 'run off the road'.[3] In the mid-1920s it was still possible for the tramways to rally from an increased level of competition, to recapture some of their traffic and to remain profitable. It was in just those years that the decision to abandon the tramways was taken and so, obviously, primarily for other reasons. The most important of these were:

1. the need to replace or improve much of the working capital, a point dealt with below;

2. the need to extend services to new areas, which could be more economically done by newer modes of transport;

3. the fact that several of the tram routes were not paying their way even under existing circumstances.

All of which is not to say that private and company motor bus competition could have been resisted indefinitely. In the late 1920s there was a

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1. DCT Jubilee, 50. 2. SYT Letters, 4 Feb 1931, 297.

3. Ibid., 18 Sep 1931, 231.

remarkable growth in the numbers of private motor buses. Between March 1927 and March 1929 there was an 149 per cent increase in the numbers licensed to a total of 653;[1] many of the owners evaded conditions put upon the licences or did not license their vehicles at all, so in 1930 there were actually 746 buses running in and out of town[2] as opposed to the official number of 579.[3] The official history quotes some figures to show how these buses were affecting the tramways. The Warmsworth service is said to have taken £5,500 in 1923 and only £1,100 in 1930; over the same period through passengers fell from 312,761 to 78,745 and, by 1931, private buses were running 155 trips per day over the route. On the Brodsworth line, receipts are given as £15,132 in 1922 and only £11,092 in 1931, a reduction of 36.5 per cent; by 1931 there were 317 daily bus journeys over this section.[4] Only one of these figures can readily be checked, the Brodsworth receipts for 1921-2, which the accounts give as only £13,806.[5] There is no obvious explanation for the discrepancy, so some doubt must be cast on the other figures in DCT Jubilee. Moreover, it is too simplistic to ascribe the whole of any decline in revenue to motor bus competition. On the Brodsworth line again, the through fare in 1921-2 seems to have been 5d.,[6] but in 1924 it was reduced to 4d.[7] and then cut again to 3d. in June 1930.[8] So more-or-less between the dates in question, fares fell by 40 per cent, which could well account for the whole decline in receipts. One has to say therefore that the impact of private motorbus competition does not seem to have been as great as municipal apologists, both at the time and later, made it out to be.

However, when in 1932-3 it is possible to pick up the receipts for the Brodsworth route on its own again, revenue is down to £7,955 per annum.[9]

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1. See Appendix DN4. 2. DCT Jubilee, 35.
3. See Appendix DN4; 39 were municipal buses. 4. DCT Jubilee, 23.
5. Doncaster Accounts, Tramways Revenue a/c, 1921-2.
6. See above,232. 7. Doncaster Minutes, E&TC, 19 Feb 1924, 103K, 235.
8. Ibid., 4 Jun 1930, 136, 574.
9. Doncaster Accounts, Tramways Revenue a/c, 1932-3; individual route

This is just 37 per cent of the figure ten years previously in 1922-3, when it had been £13,462,[1] a fall far greater than can be accounted for by fare cuts alone. The route, like that to Warmsworth, was particularly vulnerable to competition because most of it lay outside the Borough and thus escaped even the minimum control exercised by the Watch Committee. A long-running battle between the Corporation and the YTC began in 1927 when the (then) B&DTC made an attempt to get a licence for a service to Huddersfield via Brodsworth, but the Hackney Carriage Sub-Committee rejected the application on the grounds that the section from Brodsworth was already adequately served.[2] In May the Company got onto part of the tram route from Barnsley Road/Sun Inn inwards, following a successful application for a Barnsley service.[3] In September two other operators wanting to run via Brodsworth were rejected.[4] The B&DTC's General Manager, Mr. Robinson, failed again to get his services extended in from Woodlands later that year.[5] The issue dragged on until after the Traffic Commissioners had taken over licensing from the Borough in 1932, and they evidently did allow the YTC to extend their Barnsley to Woodlands service into Doncaster; the Corporation appealed to the Minister, but in vain.[6] At the Committee's next meeting Mr. Potts gave a report on the effect of the extension of the YTC services and other decisions of the Traffic Commissioners affecting the Corporation's services, and it was decided to protest to the Ministry and to the Municipal Tramways Association.[7] These events coincided almost exactly with the collapse in takings

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receipts were last recorded in 1922-3, but from 1932-3 onwards only the Brodsworth tramway remained, so its revenue can be known.

1. Ibid., 1922-3.

2. Doncaster Minutes, HC/SC, 18 Mar 1927, 277 (these entries lack paragraph numbers); this was a common ground of refusal.

3. Watch Committee, 11 May 1927, 404. 4. HC/SC, 13 Sep 1927, 634.

5. Watch Committee, 12 Oct 1927, 22.

6. E&TC, 8 Aug 1932, 157, 684; from 11 Jul 1931 the title became Electricity and Transport Committee (abbreviation unchanged).

7. Ibid., 12 Sep 1932, 167, 737.

on the tram route, from £11,092 in 1931[1] to £7,955 in 1932-3.[2]

The gradual worsening of the tramways' position in the last decade or so of their existence is displayed in Table 37. Leaving aside 1935-6, which as the last period of operation is probably exceptional, the Table demonstrates a gradual decline in the tramways' profitability, as measured by income per mile and by the operating ratio. Again, the temptation is to say

TABLE 37

DONCASTER CORPORATION TRAMWAYS: RESULTS 1927-8--1935-6

Year Ending 31st March	Income in pence per car mile	Income per mile £	Expenditure in pence per car mile	Operating[a] Ratio (%)
1928	18.57	4,975	13.96	73.79
1929	16.65	3,910	14.34	84.03
1930	16.83	5,948	12.98	75.21
1931	15.53	4,064	11.78	72.90
1932	15.35	3,240	13.34	81.40
1933	14.30[b]	2,287	13.39[b]	92.73
1934	11.91	2,188	11.38	83.01
1935	11.07	2,225	10.35	82.61
1936	9.83	-	13.36	135.79

SOURCE: Tramway Returns.

a. The Income per car mile is based on traffic revenue only, but for some reason the Operating Ratio is obviously based on total revenue and thus does not quite match the Income and Expenditure figures given here.

b. These figures are transposed in the original, but clearly require the larger amount under Income.

that because this coincided with the great increase in the numbers of private motor buses in the late 1920s, up from 262 in March 1927 to 540 in March 1930,[3] this is necessarily effect and cause. However, there were certainly other causes too. In the middle of the 1928-9 financial year the Bentley tram route was converted to trolleybus operation.[4] Since this was one of

1. DCT Jubilee, 23.

2. Doncaster Accounts, Tramways Revenue a/c, 1932-3.

3. See Appendix DN4. 4. See below, 268.

the most profitable tram routes,[1] this must have affected the income overall. The same would be true of the closure of the Balby section, in 1931-2.[2] It is not clear whether the fare cut of June 1930 applied to all trams or only those to Brodsworth, but even so there was a fare reduction over what was by then about half the entire tram system; this must have influenced the fall in income between 1930-1 and 1931-2. From then on, only the Brodsworth route remained, and it is true that letting in the YTC in 1932 does seem to have caused a sharp fall in revenue then. But this adverse effect of the Road Traffic Act was probably a fairly isolated instance, for normally the Traffic Commissioners tended to work in favour of established operators.[3] Later on, the Act worked to the Corporation's benefit, making it possible to reach co-ordination agreements with the larger companies and to buy out smaller competitors together.[4] In other words, it is likely that competitive pressures on other parts of the tram system, if still existing, would have been reduced rather than increased. So one cannot argue that the Brodsworth experience would have been repeated system-wide.

Despite all the sound and the fury, one has to conclude that there is very little evidence that motor bus competition did serious harm to Doncaster tramways, and certainly none to lead one to suppose that this was the main reason for their abandonment. In 1921-2, a bad year, the tramways earned £72,285; in their last full year of operation, 1927-8, and in the midst of the massive rise in motorised competitors, they earned £72,586.[5] This was also of course a period of falling fares on the tramways. 8,491,701 passengers were carried in 1922-3;[6] in 1927-8 the total had risen to 10,439,623,[7] and in that year the tramways earned a surplus of £8,585,[8] the best in their whole history. This is not a picture of an industry wholly incapable of

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1. See below, 261. 2. See below, 269.

3. Dyos and Aldcroft, British Survey, 358. 4. DCT Jubilee, 30.

5. See Appendix DN1. 6. Doncaster Statistics, 1922-3.

7. Tramway Returns, 1927-8; part of Doncaster's individual annual entry.

8. See Appendix DN1.

meeting competition.

Two qualifications must be made however. First, where competition was let in on a large scale, as it was outside the Borough on the Brodsworth and Warmsworth sections, motor bus competition clearly was devastating in its effect. Competition was so serious here because legal controls were lacking to prevent it. In addition, because these were out-of-town routes, the motor bus's turn of speed must have shown to great advantage over the slower trams.[1] Tighter legal controls and slower speeds enforced by traffic congestion would have meant these advantages were greatly reduced in the town itself. But it remains true that if buses had been allowed to compete on equal terms on the other tram routes, the trams would probably not have been able to withstand this. And second, all the buses that were running must have carried a great deal of passengers between them, but how many the fragmented nature of the industry makes it impossible to tell. Many of these would have been to destinations beyond the tram routes, but by various means quite a number of possible tram passengers must have been siphoned off. If these people had travelled by tram, earnings would have been higher and investment in new equipment might have been viable.

Problems with the Permanent Way

As a whole, even if not in particular cases like Avenue Road, the tramways remained viable in the mid-1920s and achieved a reasonable surplus from 1922-3 onwards, except for the year of the General Strike.[2] Revenue was high enough and working and capital costs low enough to make this possible. Traffic recovered from both industrial troubles and intensified motor bus competition, whilst working expenditure remained fairly steady. The third variable, capital costs, did not change much either because it was dependent upon past expenditure. However, once it became necessary to spend large new sums on the tramways, annual capital payments could well rise beyond the level at which they could be met from revenue. It was the threat of this

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1. See above, 114-5. 2. See Appendix DN1.

which really brought the problems of the tramways to a head.

In dealing with track maintenance on a day-to-day basis minor irritation may have been caused by the fact that a different Council Committee was responsible for track repairs.[1] The Tramways (E&TC) Committee did once try to take the job back,[2] but instead liaison was improved by appointing a joint E&TC/Sanitary Sub-Committee.[3] Though many other tramways had similar arrangements, including over half those in the Croydon Survey,[4] the personal relationship between Doncaster's tramway Manager and the Borough Surveyor seems not to have been warm or co-operative. Mr. Potts wrote numerous notes about necessary repairs, such as points which were causing derailments,[5] and sometimes complained about work which had not been done.[6] Obviously, had the Manager been able to give his own instructions for repairs, these situations would probably not have arisen. He obviously did feel his lack of overall control was unsatisfactory, but experienced considerable opposition from the Highways Committee[7] when he tried to change the arrangement.[8] Lee found this to be a most serious problem in Hull, partly on the grounds of divided managerial responsibility[9] and partly of splits between the Tramways Committee and their Managers.[10] Doncaster's problems were in no way so severe. In one sense, municipal control probably helped tramways, for the slow decision-making may have kept some of them open longer than might have been the case under private ownership. There are other reasons for this, but

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1. DA, TC, 13 Jun 1904, 67P, 188; by this minute the Sanitary Committee and the Borough Surveyor assumed responsibility for the track.

2. Doncaster Minutes, E&TC, 10 Feb 1913, 41P, 234.

3. Ibid., 14 Apr 1913, 66P, 341. 4. DA, Croydon Survey, passim.

5. SYT Letters, 21 Jan 1927, 428; 4 Feb 1927, 487.

6. Ibid., 13 Jul 1927, 893.

7. This Committe took over some of the Sanitary Committee's functions when the latter was disbanded in 1914; see Doncaster Minutes, C-in-C, 9 Nov 1914, 6-7M, 7.

8. SYT Letters, 10 Mar 1926, 519. 9. See above, 70-1.

10. Lee, 'Tramways of Hull', 143, 186-7, 191, 212-14.

but thirty-one of the forty-one tramways closed between 1917 and 1930 were company operated.[1]

The track joints, always a weak point in tramway construction, began to give trouble a little over a decade after the Doncaster tramways had been built; some new joints were bought,[2] but many more were welded and retreaded through a contract with the Tudor Accumulator Company.[3] The problem was serious, but no more than any other tramway had to put up with at the time.[4]

More general problems had appeared even earlier, and the Surveyor had been asked to report on the cost of paving all routes with granite setts or wood blocks and of putting track and foundations into thorough repair.[5] By 1915 both the Balby and Bentley tracks needed urgent relaying and as an experiment it was decided to relay a short length of line on Nether Hall Road,[6] the specification for which indicates some of the things which were deficient or missing in the original track: ferro-concrete foundations, sett-paved margins, tarred macadam centre and new rail.[7] It is obvious, by the way, that though reduced maintenance during the war may have made the track deteriorate more rapidly, this was not the cause of the problems, which had shown themselves before or in the early stages of the conflict. The worst trouble was on the Bentley route. The difficulties were undoubtedly exacerbated by inter-local authority rivalry. Bentley UDC had no responsibility for either the tramway or the road, and was thus free to complain

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1. Numbers compiled from Appendix G5.

2. Doncaster Minutes, Highways Committee, 11 Apr 1916, 143W, 419.

3. H/E&TC Joint, 11 Dec 1916, 12P, 100.

4. Even a large system like Liverpool's used the Tudor process, which involved a quasi-arc type of electric fusion welding, but still using fish plates, which were arc welded into place; see Horne and Maund, Liverpool Transport 2, 84.

5. Doncaster Minutes, E&TC, 11 Dec 1911, 16P, 135.

6. H/E&TC Joint, 20 Jan 1915, 21P, 172; this was actually on the Avenue/Beckett Road routes, showing how general the problems were.

7. Ibid., 24 Nov 1915, 13P, 87; it seems highly probable that the tar macadam specified in the plans for the original routes was actually replaced by ordinary water-bound macadam.

vociferously about both; nothing was done about either, because the County, who were the road authority, would not act unless Doncaster raised the level of their tram lines, which they refused to do.[1] This squabbling had two effects--it probably initially magnified the problem beyond its real dimensions and it delayed effective action so long that the track really did get into bad condition. In many cases the road was worse outside the tracks and other traffic drove along the lines,[2] which must have increased the difficulties for the tramways' department.

Bentley UDC first raised the issue with Doncaster in 1912,[3] only ten years after the original route had been constructed; later experience showed that tram track should usually last about twenty years.[4] The dispute simmered on well into the war without much being done on the ground, until in 1916 the Corporation finally decided to relay the portion from Bentley Church to the old terminus,[5] but then found themselves blocked by the refusal of the Ministry of Munitions to give the necessary clearance.[6] A threat to close the line[7] had the desired effect, and the work went ahead.[8] One other minute recorded a refusal of a track work certificate from the Ministry, this time upheld,[9] and doubtless the Corporation was inhibited from applying in other cases knowing the likely negative response. It was one manifestation of the wartime difficulty in getting materials and skilled labour to carry out repairs, with the result that the post-war condition of the tramways was worse than it would otherwise have been. The Bentley saga continued

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1. Doncaster Gazette, 19 Feb 1915,

2. SYT Letters, 1 Sep 1922, 779.

3. Doncaster Minutes, E&TC, 12 Feb 1912, 29P, 228.

4. See above, 57.

5. Doncaster Minutes, H/E&TC Joint, 21 Jul 1916, 530 (no paragraph number); this was only a few hundred yards.

6. C-in-C, 21 Aug 1916, 527.

7. H/E&TC Joint, 16 Aug 1916, 83P, 530.

8. C-in-C, 6 Sep 1916, 123M, 557. 9. E&TC, 15 Jun 1917, 89P, 328.

unabated after the war, with the UDC[1] and County[2] complaining about the tracks every month or so; this went on right until closure.[3] The 'coup de grace' was given quite early on, however, by the decision of the WRCC to repave Bentley Road with modern materials, so involving the Corporation in the expense of reconstructing their tracks[4] and raising the levels.[5] As it happens, it would have made no difference in this case if the tracks had been in superb condition, because the County Council had the legal authority to enforce the alteration of levels,[6] which effectively meant the complete reconstruction or repaving of the tram lines. It was because of this that the Tramways Committee decided in June 1923 to abandon the Bentley Road line[7] and to substitute trolleybuses.[8]

This was the first time it had been decided to abandon an existing tramway (though in the event Avenue Road was closed first[9]) as opposed to deciding not to build a proposed one. The Bentley case was particularly significant because the route had always been amongst the most profitable; it was not like Avenue Road, which probably never even met working costs,[10] nor Brodsworth, which became unable to cover capital costs from about 1921.[11] Table 38 overleaf displays the results on the Bentley line from 1919-20 to 1922-3. Even though working and capital costs may not have been wholly average for this line,[12] the results show pretty conclusively that the Bentley trams more than earned their way; and that was in a four year period when for three years in succession the system as a whole showed a loss after

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1. For instance, ibid., 12 May 1919, 60P, 380.

2. For instance, ibid., 14 Jul 1919, 85P, 511.

3. The last reference seems to be in November 1927 when a special 'Bentley Road Sub-Committee' was appointed; see E&TC, 10 Nov 1927, 21, 86.

4. E&TC, 13 Feb 1922, 72-5K, 223-4. 5. Ibid., 18 Jun 1923, 162K, 436.

6. E&TC Special Committee, 19 Jul 1923, 185K, 533.

7. E&TC, 11 Jun 1923, 157K, 435. 8. Ibid., 18 Jun 1923, 162K, 436.

9. See above, 238. 10. See above,237. 11. See above, 224.

12. Higher, if anything, because of the recent investment in the line and because of a more intensive service than on the shorter routes.

TABLE 38

DONCASTER CORPORATION TRAMWAYS: BENTLEY ROUTE RESULTS 1920--1923

Year ending 31st March	Revenue/mile: Bentley £	Working Costs/ mile: system £	Capital Costs/ mile: system £	Surplus/mile: Bentley £
1920	6,284	3,962	602	1,710
1921	7,901	4,845	805	2,251
1922	8,286	4,387	767	3,132
1923	8,888	4,808	834	3,246

SOURCES: costs and revenue for Bentley route and for tramway system as a whole from Doncaster Accounts, 1919-20—1922-3. Calculated on a per mile basis from the total mileage in Doncaster Statistics (14.25 miles) and on an estimate for the Bentley route (2 miles) taken from the map in Figure 6.

capital payments.[1] It shows that the abandonment of this line was not due to its being loss-making (and thus not to motor bus competition) and, more importantly, that closure was a very serious step indeed, as it effectively meant depriving the system of one of its two really profitable sections.[2]

The consequence was, that if it was not worth reconstructing one of the most economically viable tram routes, it was scarcely going to be worth rebuilding those which were less financially sound. This conclusion was quickly drawn, and at a special committee meeting in August 1924, and after considering a report from the Borough Surveyor on the track and another from the Manager on alternative policies, it was decided that the 'tramway track be gradually substituted by a system of trackless vehicles'.[3] It was not specified whether these were to be petrol buses or trolleybuses, and the Avenue Road conversion was obviously intended to be a test-bed for the future wholesale conversion. The results of this were sufficient to convince the Committee that trolleybuses were preferable, so the Doncaster Corpor-

1. See Appendix DN1.

2. The other was Balby, which on the same measure as in Table 38 was earning £7,152 per mile in 1922-3. The mileage for the route is calculated from data given above in Table 30 and on page above and divided into gross revenue from Doncaster Accounts, Tramways Revenue a/c, 1922-3.

3. Doncaster Minutes, E&TC Special Sub-Committee, 6 Aug 1924, 210K, 553.

ation Bill, 1926, primarily seeking County Borough status for the town, also included application for trolleybus powers. Specific authority was given in it only for the Bentley conversion, but general powers to extend the system, subject to statutory control, were also included.[1]

Part of the reason why these general enabling powers were sought was evidently the condition of the track on the other routes (as the August 1924 special meeting implied, of course). For instance, the Balby track was in poor repair in 1920 and it was decided to rebuild part of it and to double some at the same time.[2] Tenders for one section were accepted in 1921[3] and for another in 1923,[4] but this still left the track beyond Balby church so bad that trolleys were constantly leaving the wire, whilst many joints had given way and a piece of track on one loop had completely broken away.[5] A couple of years later the lines in St. Sepulchre Gate needed raising because the road surface was to be replaced with bituminous asphalt.[6] This was a similar problem to that faced on the Bentley Road at the beginning of the decade, but this time the expense was imposed by another department within the same authority. It was not, of course, evidence of malice on the part of the Highways Committee, merely that tramway legislation required owners to maintain the area between their tracks and for eighteen inches either side. This was a source of much aggravation to tramway managers however.

Why, Mr. Potts asked, should Doncaster tramways have to fund the improvement of the Great North Road for the benefit of increased motor traffic, as they were now expected to do? This situation arose on the Racecourse route in 1926-7. The Manager wrote that the Surveyor's department 'now calmly come along and inform the Tramways Committee that they are satisfied that the Macadam road will not bear the weight of modern traffic, and that they propose ripping the whole of the surface up, and replacing with Asphalt, and

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1. Finance and General Purposes Committee, 30 Jun 1926, 159H, 419-20.
2. E&TC, 14 Jun 1920, 127P, 553. 3. Ibid., 13 Jun 1921, 80P, 532.
4. Ibid., 8 Jan 1923, 70K, 174. 5. SYT Letters, 2 May 1924, 294.
6. Doncaster Minutes, Highways Committee, 27 Apr 1926, 174W, 322.

that the Tramway Department's contribution . . . will amount to £12,000'. This was merely for the surface, not the track, which only had about three years more life left in it, and even then would be about three years short of its loan repayment period. Average yearly receipts were only 6.5d. per car mile. 'Is it any wonder that Tramway Managers get worried?', Mr. Potts concluded.[1] The Committee's subsequent decision to investigate an alternative method of traction for this route[2] is scarcely surprising in the circumstances.

Examples of track problems could be multiplied many times, but enough has been said to show that this was a crucial factor in the decision to dispense with tramways in Doncaster. Of course, it was not only the track which was worn out; the cars, Mr. Potts said in 1925, were 'in like condition'.[3] The first two of the original fleet were withdrawn at the end of the same year. Even so, Doncaster was a good deal better off, or should have been, than many other towns of similar size. Ten cars were only five years old in 1925, another four were nine years old and seven were twelve years old, all of which were quite new in terms of tramcar life-expectancy.[4] The small company tramways in South Yorkshire were certainly a lot worse off than this; Barnsley had only one tram built after 1905[5] and the M&STC none built after 1908.[6] Rotherham Corporation, which ran a system comparable in many ways to Doncaster's, had no genuinely new trams dating from later than 1909, except for four bought in 1920; nine of their older cars were fairly thoroughly rebuilt in the same year, but the only new part was the lower deck.[7] Photographic evidence does bear out Mr. Potts's description of his cars, however.[8] One reason for their poor condition as compared to pre-war would be lack of maintenance during World War I, another would be their

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1. SYT Letters, 21 Jan 1927, 437-9.

2. Doncaster Minutes, E&TC, 12 Dec 1927, 46, 170-1.

3. SYT Letters, 28 Oct 1925, 84. 4. See Appendix DN2.

5. Bett and Gilham, SY&H Tramways, 40. 6. Ibid., 42. 7. Ibid., 44.

8. See Richard J. Buckley, Tramway Memories of Old Doncaster (Doncaster, 1986); compare for example pictures on pages 4, 18 and 26.

increasing age, so far as the original cars were concerned; also, a small undertaking like Doncaster's would not have the workshop facilities to make the best of their cars. A major tramway like Glasgow's could almost completely reconstruct and refit a large number of their older 'standard' cars (over 300 by the beginning of 1930) in their own workshops,[1] a task quite beyond Doncaster's resources of space or skill.

The condition of the trams was not, however, the decisive factor in the course of events which led to the closure of the tramway system in Doncaster. It is clear from the volume of references to the matter that it was the track which was uppermost in everyone's mind. There were three reasons for this. First, the original track had been built with economy in mind and using methods which were not the best practice even then. This led to the need for extensive and costly repairs, sometimes within as short a time as ten years. Incidentally, 'second generation' construction was no better than the first, for the Warmsworth track needed rebuilding by 1925, also ten years after being laid.[2] Second, very little of the original track actually was properly rebuilt, partly because of the difficulties caused by wartime shortages; a short length of the Bentley route was reconstructed during the war and quite a lot of the Balby line afterwards, but no major work seems to have been done on any of the other routes. A further reason why matters were allowed to get to such a pitch may have been the deficiencies in local authority decision-making referred to above. For one thing, day-to-day control of the tram track lay with the Borough Surveyor, not the Tramways' Manager, a partnership which did not work too well in practice. For another, tramway business could be batted back and forth not only between these two gentlemen and the Committees to whom they were responsible, but between these and the full Council; the end result was often either delayed action or no action at all, not aided by the fact that government bodies, such as the Board of Trade or the Ministry of Munitions, often had to be involved

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1. Oakley, The Last Tram, 82.

2. Doncaster Minutes, E&TC, 30 Mar 1925, 137K, 312.

as well. Third, and perhaps in the end most crucially, the road surfaces in which the tracks had been laid in the early 1900s needed modernising to withstand increasing motor traffic in the 1920s. This involved the reconstruction or renewal of the tram lines. It would obviously be unfair to blame the planners of 1899 for not taking account of the requirements of post-World War I road traffic, but the money saved then on cheap foundations was clearly a false economy. It was the need to rebuild both tracks and roads which materially helped to push the Doncaster tramways into crisis after 1919.

The replacement of the existing tram lines was not, however, the full extent of the problem. It was one of the possible options and would have involved minor improvements such as lengthening some of the passing loops. But a layout dating back to plans made in 1899 would have been too slow and cumbersome for the changed conditions of the mid-1920s. If the trams were to be retained, the lines really had to be relaid with double track and extended to newly-built areas of the town. This was carefully considered, but the costs involved were large; £151,000 to rebuild the existing system properly and a further £60,000 to build the extensions necessary to bring in increased revenue, making a total debt of £211,000. The third option, which was adopted, was to scrap the trams in favour of petrol or trolleybuses.[1] A further factor was that at the time the existing debt on the tramways was not extinguished. From the Manager's comments on the Racecourse route[2] it is evident that the original tracks were financed by loans over a thirty year period and would thus fall due for repayment in 1932-3. Later routes were probably financed over twenty years, since that was the time the Corporation wanted to keep the Brodsworth trams running for;[3] some debts would therefore have been outstnding until at least 1943, twenty years after the last major track work was done on the Balby route. Any new expenditure would thus have to be added to the old, averaging about £11,000 per annum in

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1. Flint and Fowler, 'Corporation Transport', 114.

2. See above,263. 3. Doncaster Minutes, E&TC, 9 May 1932, 119, 489.

the 1920s.[1] The annual cost of simply rebuilding the old system was calculated to be £11,500,[2] which is 7.6 per cent of the gross cost (£151,000); applying this percentage to the cost of extending the system as well (£60,000), one gets a total annual capital bill of £16,036 on new works plus £12,951[3] on the old, a grand total of £28,987. It was difficult to envisage even a rebuilt and reinvigorated tramway earning enough to cover such a debt.

Conclusion

The series of decisions which led to the dismemberment and closure of the tramway system were mostly taken on the grounds of the prohibitive cost of replacing or renewing capital assets, especially the track. During the same period private motor bus competition was a growing threat, but as a whole the tramways proved surprisingly well able to combat this and to return adequate surpluses throughout the 1920s, except during periods of industrial strife. There is some evidence that this ability to meet competition was being eroded by the early 1930s, but this evidence applies to out-of-boundary routes which were not necessarily typical of more urban tramways. It might thus have been possible for trams to continue to pay their way, had expensive renewals not been necessary. Since they were, however, the vehicles with the cheaper first cost immediately became more attractive.

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1. See Appendix DN1.
2. Flint and Fowler, 'Corporation Transport', 114.
3. The 1925-6 figure from Appendix DN1.

CHAPTER 11

THE TROLLEYBUS TRIUMPHANT

The Conversion of the Tramways

By 1926 the decision had finally been taken that the trolleybus was to become the main mode of urban transport in Doncaster. The first tramway to be converted was that to Bentley, which had been a bone of contention for so long. There was some initial contact with the RET, the pioneer of trolleybuses in Britain,[1] but which by the 1920s was giving way to larger firms.[2] The whole contract eventually went to the established firm of Clough, Smith and Company,[3] which had formed a marketing arrangement with two vehicle manufacturers, Straker Squire and Karrier.[4] Only four of the first eight trolleybuses were Karriers though; the others were Garretts.[5] The trolleybus wires were to be extended in a loop from New Village tram terminus via Victoria Road and Askern Road back to the former tram route; there was also a proposal for a spur from this loop to Bentley Toll Bar.[6] Only the loop was actually constructed though.[7] Between March and April 1928 trolleybus 1 started driver training duties on the Racecourse route, which was then only partially equipped with a negative return wire; on the other sections a rail

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1. See for example, SYT Letters, 30 Oct 1925, 90; 11 Nov 1925, 128.
2. Owen, British Trolleybus, 36. 3. DCT Jubilee, 42.
4. Owen, British Trolleybus, 39.
5. Flint and Fowler, 'Corporation Transport', 116.
6. SYT Letters, 30 Oct 1925, 90.
7. Figure 6 above shows completed but not projected trolleybus routes.

'skate' was used in the tram rail. On 22 Aug 1928 an official party travelled to Bentley in trolleybus 4, after which bus 6 inaugurated the public service.[1]

By May the decision was taken to convert all the remaining tram routes to trolleybus, with the exception of Balby and Brodsworth.[2] These two were probably retained for a while because large sums had been spent on them relatively recently; the Brodsworth line had only been built in 1916[3] and extensive doubling had taken place even more recently to Balby.[4] Additionally, nine of the trams were only six years old.[5] Because the Nine Arch Bridge carrying the Hexthorpe route over the railway was being widened, the Town Clerk asked the Ministry of Transport to anticipate permission for trolleybuses so the tram tracks could be lifted at once.[6] Permission was given in February 1929.[7] Hexthorpe was thus the next route to be converted, though the date on which trolleybuses took over is not at all clear. Two sets of notes in the back of the Employees Register, the first probably contemporary with the events described, give conflicting dates--either Sunday 23 Jun 1929 or 1 Jul 1929. A possible explanation is that the earlier date refers to a trial, since this did happen on Beckett Road, where normal trolleybus service began on 31 Jul 1929 after a trial run the previous Sunday. The Hyde Park dates are also doubtful, being either 16 or 19 Jan 1930.[8] In this case the trolleybuses were probably extended at the same time via Carr House Road to the Racecourse, as had been previously planned.[9] There are no discrepancies for the later conversions, which were as follows--Racecourse 20 Mar

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1. Flint and Fowler, 'Corporation Transport', 116; DCT Jubilee, 42 has 19 August for the official opening, but gives 22 August in an appendix (page 50). That the latter date is correct is confirmed by an entry in Doncaster Accounts, Trackless Trolley Income a/c, 1928-9.

2. Doncaster Minutes, E&TC, 14 May 1928, 139, 499-500.

3. See above,222. 4. See above,236. 5. See Appendix DN2.

6. Doncaster Minutes, E&TC, 17 Dec 1928, 39, 158.

7. Ibid., 18 Feb 1929, 67, 278. 8. SYT Register, 677-8.

9. Doncaster Minutes, E&TC, 13 May 1929, 122, 466. Alternatively this may have been done when the Racecourse route opened two months later.

1930, Wheatley Hills 4 Mar 1931 and Balby 26 Jul 1931.[1] Trams are believed to have ceased the previous day in all cases[2] (except Wheatley of course), though the original plans had allowed for interim motor bus services.[3]

The decision to extend trolleybuses to Balby was taken in May 1930 after considering a report on the state of the tram track. The portion within the Borough could be converted under the 1926 Act, but a new Bill would be necessary for the section to Warmsworth; it was intended to extend the wires to Edlington at the same time.[4] The YTC and the Omnibus Owners' Association objected to the Bill however,[5] so the overhead was initially erected only as far as the Borough boundary[6] at Austen Avenue, with the rest of the route to Warmsworth being covered by an augmented motor bus service to Edlington.[7] One note in the minutes raises the intriguing possibility that the through Warmsworth cars continued to run for a short while after the Balby service had been taken over by trolleybuses. On 10 Aug 1931, a fortnight after the conversion, the Committee resolved to notify the WRCC of its intention (my emphasis) to cease running the Warmsworth cars.[8] Maybe they had just forgotten to do this and were merely covering themselves legally by phrasing the minute in this way, or perhaps the trams did run a little longer to maintain the Corporation's rights on the route until alternative arrangements could be made. It is one of those interesting but ultimately unimportant little puzzles. Trolleybuses never did run to Warmsworth anyway, though a further short extension was made in July 1942, taking the wires to Barrel Lane.[9] In other cases the trolleybuses did not only run

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1. SYT Register, 678. 2. DCT Jubilee, 50.

3. Doncaster Minutes, E&TC, Special Sub-Committee, 18 Aug 1925, 237K, 512.

4. E&TC, 12 May 1930, 123, 509. 5. Ibid., 9 Feb 1931, 65, 298.

6. Ibid., 17 Feb 1931, 72, 299.

7. Flint and Fowler, 'Corporation Transport', 116.

8. Doncaster Minutes, E&TC, 10 Aug 1931, 177, 701.

9. DCT Jubilee, 50.

over the complete former tram route but beyond it. Two have already been mentioned--the New Bentley loop[1] and the connection between Hyde Park and the Racecourse.[2] The latter was used to operate a circular service along the two former tram routes. The Beckett Road route was also extended a fairly short distance at the time of conversion[3] and then a further half mile in April 1941.[4] The Wheatley route was obviously longer than the former Avenue Road tramway too, since it was actually replacing the extended motor bus service; the trolleybuses went a bit further even than that.[5] Various additional pieces of wiring were also needed to make the town centre layout suitable for trolleybus operation[6] and a few minor extensions were made as late as 1958.[7] Even before that, in 1955, the Bentley route had closed due to the rebuilding of the Don bridge and during the 1960s the rest of the system was gradually run down; the final trolleybus ran to Beckett Road on 14 Dec 1963.[8]

Going back to 1931 however, the trolleybus conversion programme had still left one tram route running to Brodsworth. The fifteen newest trams seem to have survived the Balby closure, though by the time the Woodlands service itself was withdrawn there were only eight trams left.[9] In 1932 the WRCC was evidently proposing some road works which would have affected the off-street tram tracks, but stayed its hand on being assured by the Corporation of their intention to close the route within about twenty years of its opening.[10] The intention was obviously to get the maximum life out of the assets, such as they were, for the track was already giving trouble.[11] In

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1. See above, 267. 2. See above, 268.
2. Flint and Fowler, 'Corporation Transport', 116. 4. Ibid., 152.
5. Ibid., 116. 6. See the map, Figure 6.
7. Flint and Fowler, 'Corporation Transport', 156.
8. Tuffrey, Electric Transport, Introduction.
9. Appendix DN2; the falling fleet is an indicator of falling traffic.
10. Doncaster Minutes, E&TC, 11 Jul 1932, 144, 614-5.
11. Ibid., 13 Feb 1933, 71, 304.

November 1933 therefore it was decided to seek legal powers to abandon the line.[1] The last tram ran on 8 Jun 1935 and motor buses took over on the following day.[2] Why trolleybuses were not used is not stated, but probably the difficulties over the Warmsworth replacement made the Corporation think that it would be easier to get permission to run motor buses outside their boundary and over a route shared with the YTC. The last trams were sold to a scrap dealer for £130.[3] Four elderly employees who could not be found alternative work were pensioned off.[4] And arrangements were made to lift the track,[5] bringing to an end thirty-three years of tramway operation.

The Advantages of Trolleybuses

Most of the discussion in Doncaster related to the merits of trolleybuses over motor buses, rather than over trams, probably because once the decision had been taken in 1924 to scrap the trams in favour of a railless system, the debate was not about trams versus the others, but about which of the two alternatives was better. Some of the obvious advantages of trolleybuses as opposed to trams were, however, that the former required no expensive permanent way, that they were quiet and smooth running,[6] and that they did not need to load and unload in the middle of the road.[7] Also, writing about the projected Bentley conversion, Mr. Potts said that the trams were being replaced because they and their tracks were practically worn out; it was no use merely relaying the line, whilst trolleybuses 'lent themselves admirably to cheap extensions'[8] since, of course, it was fairly economical to extend the wires without tracks. To this first cost advantage needed to be added the fact that trolleybuses were popular with the public. The local press described the new Bentley vehicles in 1928 as the last word in comfort

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1. Ibid., 13 Nov 1933, 25, 30. 2. DCT Jubilee, 50.
3. Doncaster Minutes, E&TC, 14 Oct 1935, 182, 720.
4. Ibid., 8 Jul 1935, 144, 571. 5. Ibid., 14 Oct 1935, 186, 720.
6. Pilcher, Road Transport Operation, 43. 7. Wilson, L. U. T., 177.
8. SYT Letters, 28 Oct 1925, 84.

as well as being speedier than the trams.[1] As opposed to motor buses, trolleybuses were preferred because they had better and steadier lighting and were noiseless and free from fumes.[2] Operators would presumably expect to see this public approval translated into terms of increased rides and revenue.

Electric power was attractive to some operators in itself, particularly to those already using trams. Electric motors were simple and trouble free,[3] making trolleybuses reliable vehicles.[4] Mr. Potts also made much of a point not usually mentioned elsewhere, that electric motors were not running when the bus was stopped, whereas petrol engines were; this could be as much as a quarter of the journey time. He believed this saved wear and tear[5] and maybe had fuel economy in mind too. Electric traction was favoured in Doncaster anyway because it provided a continued load for the municipal power station[6] and because the current was ultimately derived from coal, which was a local industry.[7]

According to Mr. Potts there was only one problem with continued reliance on electric traction; the fuel cost was greater than with motor buses.[8] It is arguable whether this actually was the case at the time of conversion from tram to bus however. Pilcher, no friend to trolleybuses, numbers among their advantages in his 1930 book the fact that they had low operating

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1. Doncaster Gazette, 24 Aug 1928, 16.

2. SYT Letters, 28 Nov 1930, 52. 3. Ibid.

4. Tuffrey, Electric Transport, Introduction.

5. SYT Letters, 3 Jan 1931, 158. In practice this is unlikely, since there is little wear on an idling internal combustion engine; see Flint and Fowler, 'Corporation Transport', 114.

6. Tuffrey, Electric Transport, Introduction.

7. Not directly stated in a Doncaster source, but can be presumed to have been in mind. Rotherham and the M&STC used this as part of their apologia for putting trolleybuses on their joint route in 1929; see, Maltby--Rotherham--Conisborough: Souvenir issued by the Rotherham Corporation Transport Department and the Mexborough & Swinton Tramways Company to celebrate the Inaugeration of the Trolley Vehicle System between Rotherham and Conisborough (Rotherham, 1929), 6.

8. Potts, Doncaster Cavalcade, 7.

costs because of lesser electricity prices as against petrol. He quotes certain case studies in support, such as Hull, where the relative prices of electricity and petrol were estimated as 1.012d. and 2.650d. per car mile.[1] On the other hand, the figures for the DDLR and the YTC in the early 1930s reverse the relationship in favour of petrol costs.[2] Presently available figures for Doncaster itself do not provide anything like a proper comparison, but in 1925-6 petrol for buses was costing 2.19d. per bus mile,[3] whereas trolleybus power costs only once exceeded 2.09d. per bus mile in the first eight years of operation and showed a consistent decline from 1932-3 onwards.[4] So it would probably be true to say that trolleybuses did have the advantage over petrol buses in respect of fuel costs in the second half of the 1920s. One might assume, as mentioned in connection with the DDLR,[5] that the introduction of oil-engines would have swung the balance against the trolleybus during the 1930s, but this was certainly not inevitably so. Portsmouth Corporation Transport reported on comparative costs in 1939 when its omnibus fleet was presumably mostly dieselised; motor bus and trolleybus power expenses were then 1.62d. and 1.46d. per bus mile.[6] Only after World War II did the difference in overall operating costs force authorities like Darlington and Ipswich to introduce their first motor services to supplement their trolleybus systems,[7] so it may well be to this post-war scenario that Mr. Potts is referring in his 1948 article. When trolleybuses were actually coming on to Doncaster's streets, it is fairly clear that they had a dis-

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1. Pilcher, Road Transport Operation, 44 and 50; the figures are from estimates drawn up for a proposed rather than an actual trolleybus route.

2. See above,149; relating to trams versus buses here of course.

3. Calculated from gross fuel costs in Doncaster Accounts, Motor Omnibus Revenue a/c, 1925-6 and bus miles in SYT Letters, 17 Jul 1926, 898.

4. From gross fuel costs and mileage in Tramway Returns, passim.

5. See above,149.

6. City of Portsmouth Passenger Transport Department, Comparative Expenses per Mile (hereafter Portsmouth, Comparative Expenses), 24 Jun 1939; in a file of papers formerly belonging to C. T. Humpidge.

7. Klapper, Tramways, 271.

tinct advantage over internal combustion engined vehicles in terms of fuel costs.

Be that as it may, Mr. Potts certainly assumed in 1930 that trolleybuses were cheaper to run 'in toto' than petrol buses were.[1] This is supported by certain examples from other towns, such as Wolverhampton, where the relative costs per 100 seat miles were 24.173d. and 29.590d. in 1929, or Hull, where a projected comparison by Mr. Rayner costed trolleybuses at 12.824d. per bus mile and petrol buses at 14.694d.[2] On the other hand, Pilcher was able to quote fourteen towns operating both kinds of buses, ten of which gave the advantage to motor buses.[3] As he said, such comparative figures have to be taken with reserve because costs were not allocated in the same way in different towns. Whether or not Portsmouth was one of his sample is not stated, but by 1939 motor buses there had a slight edge over the trolleybuses, with working costs of 12.40d. per bus mile as against 12.48d.[4] The balance of advantage was obviously a pretty fine one, for when Hull actually did start running trolleybuses, they were cheaper to run than motor buses for four out of the first eight years during which they were both in use, whereas the motor buses had the edge for the other four.[5] There is no reason to doubt, therefore, that petrol buses appeared more expensive to run at the time when conversion of the tramways was being considered in Doncaster, but equally it is unlikely that the advantage remained with the trolleybus for any long or continuous period.

In late 1930 or early 1931 Mr. Potts was involved in correspondence with a ratepayer, a Mr. Pearce, who strongly supported the new 'crude oil engines' as against trolleybuses. Potts was obviously rather sensitive to this criticism, and replied to the effect that diesel engines in buses were very much untried technology at that time. For instance, he said, the eng-

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1. SYT Letters, 28 Nov 1930, 52.
2. Pilcher, Road Transport Operation, 50-1. 3. Ibid., 46.
4. Portsmouth, Comparative Expenses.
5. Lee, 'Tramways of Hull', 2, Table D.12, 95-100B.

ine fitted to a bus on the Sheffield to Doncaster run had been scrapped after only 103 days.[1] The usual hostages to fortune were lined up as witneses, including Sir Herbert Austin, who was reported by Potts as saying that 'a crude oil engine could never be a success in any Motor Car or Motor Omnibus'.[2] Any prudent management would have taken Potts's attitude at the time, but his reaction to Pearce does seem to show that he was aware that there were two sides to the trolleybus versus motor bus debate.

One further point in favour of the motor bus was admitted; it was faster than the trolleybus. However this high maximum speed was not usable in town traffic, where the trolleybus's maximum of about twenty-eight miles per hour was quite adequate, especially where stops were frequent.[3] One of the electric bus's great advantages, in fact, was its rapid acceleration,[4] which enabled it to maintain a high average speed over the route as a whole;[5] this, Potts believed, would ensure that working costs were considerably less than for the slower trams.[6]

These are the reasons why trolleybuses were chosen as the main tramway replacements in Doncaster. Charles Klapper's general comment is very apposite--that trolleybuses relied for their success partly on the 'electrical affections of the management and largely upon economic circumstances'.[7]

The Economic Performance of the Trolleybus and the Tram compared in practice

Three major economic or commercial points arise out of the above summary of the expected advantages of trolleybuses as against trams. These are

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1. Owned by Sheffield Corporation, this was the first municipal diesel bus in the country; see Chas. C. Hall, Sheffield Transport (Glossop, 1977), 228.

2. SYT Letters, 26 Nov 1930, 32. 3. Ibid., 28 Nov 1930, 52.

4. Pilcher, Road Transport Operation, 43.

5. The combination of fast acceleration and relatively low average top speed used to be noticeable when cycling behind trolleybuses in Hull; one was always catching them up at stops only to have them swoop ahead to the next, where the process was repeated (personal reminiscence).

6. SYT Letters, 28 Oct 1925, 84. 6. Klapper, Tramways, 271.

that capital and running expenses would be less and that revenue would be higher. Starting with capital, the contract for the first conversion went to Clough, Smith for £12,990 for the wiring etc. and £16,840 for eight buses.[1] The accounts show the actual costs to have been £11,718 and £20,620[2] plus £674 (the expense of raising the capital), making a total of £33,012.[3] The total planned length of the Bentley route was 4 miles, 4 furlongs and 7.8 chains, but the spur to Toll Bar, amounting to 5 furlongs and 8.9 chains[4] was not built, so the actual length was 3 miles, 6 furlongs and 8.9 chains. This is about 3⅞ or 3.875 miles.

Taking the expenditure from the accounts, the overall cost of constructing and equipping the route works out to £8,518 a mile; the cost of overhead and feeders alone was £3,024 per mile whilst each bus cost £2,062.[5] The cost of overhead wiring only was £8,196[6] or £2,115 per mile. Here a direct comparison with trams is possible, for Pilcher quotes £2,000 per mile for trams in his 1930 book;[7] one would actually have expected double trolleybus wiring to be relatively more expensive than it was.

So far as vehicles were concerned, some conventional trams delivered to Walthamstow Corporation in the early 1930s cost £2,444 10s. 0d. each; the really modern Feltham cars built for London at the same time cost £3,420 apiece.[8] Both were bogie cars, which Doncaster never had, and the Felthams were more advanced than anything a small-town system would have been likely

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1. DCT Jubilee, 42.

2. Almost certainly including two extra buses bought in advance of the next conversions or in anticipation of higher traffic levels.

3. Doncaster Accounts, Trackless Trolley Capital a/c, 1928-9.

4. Distances from, SYT Letters, 3 Jan 1927, 368.

5. Assuming the global figure was for ten buses. This seems likely, as ten further vehicles were bought in 1931 for £19,750 or £1,975 each; see Doncaster Minutes, E&TC, 24 Nov 1931, 23.

6. Doncaster Accounts, Trackless Trolley Capital a/c, 1928-9.

7. Pilcher, Road Transport Operation, 71.

8. K. C. Blacker, The Felthams: the story of the Union Construction Company (Blackpool,1962), 21.

to buy. According to Pilcher, the difference in price between four wheel and bogie trucks was £132, so a likely 'Doncaster car' might have cost about £2,300, a little more than a comparable trolleybus. Evidently trolleybus wiring and vehicles were not all that much different in price from tramway overhead and cars. The key difference was that no track was needed. Pilcher estimated that one mile of double track would cost £15,776 to renew.[1] So to the actual expenditure on the Bentley trolleybus route one might add £300 per vehicle, or £3,000, and £15,776 per mile, or £61,132, if trams had been used instead. This puts the theoretical expenditure up to £97,144, almost three times the actual cost of construction.[2] The moral is obvious.

Moving on to running costs, it was expected by Potts that these would be reduced as against trams because of the trolleybuses' higher speed.[3] As shown in Appendix DN5, trolleybus working costs were indeed consistently below those of the trams. The difference varied between only 2 per cent (in 1930-1) to 29 per cent (in 1932-3) and averaged 16 per cent.[4] This was obviously a distinct advantage for trolleybuses. In seeking to discover why they were cheaper to run than trams, it seems best to take a year when the latter were still a going concern and before the major part of the system had been abandoned. Thus the comparison is made for 1929-30, for much of which trams were still running on most routes, yet in which trolleybuses were also becoming well established; as a check that this is not an atypical year, the figures for 1933-4 are also tabulated in Table 39 (overleaf).

Various interesting facts arise from the comparison. First of all, trolleybuses used more electricity per car mile than trams. This may reflect the original reason why trams were a success in the first place, that steel

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1. Pilcher, Road Transport Operation, 56; although the Bentley track had been single, it would probably have been doubled if renewed.

2. Trolleybus costs may have been reduced by re-using tramway poles or feeders, but this would not have done much to close the gap.

3. SYT Letters, 28 Oct 1925, 84; the logic is that if vehicles are faster, less of them are needed to move the same number of passengers, and hence running costs such as wages are reduced.

4. Percentages calculated from figures in Appendix DN5.

TABLE 39

DONCASTER CORPORATION: COMPARISON OF TRAM AND TROLLEYBUS WORKING COSTS IN PENCE PER CAR MILE FOR 1929-30 AND 1933-4

Item	1929-30		1933-4	
	Tram	TB	Tram	TB
Repairs	3.49	1.84	2.07	1.80
Traffic	6.15	5.74	6.45	4.97
Power	1.41	2.47	0.77	1.77
Rates etc.	0.89	0.26	0.99	0.24
Other	1.03	1.22	1.09	1.14
Total	12.97	11.53	11.37	9.92

SOURCE: Tramway Returns, costs divided by mileage.

wheels on steel rails have a lower rolling resistance than road wheels on macadam. In the two years in question, the trams used 1.41 and 1.03 and the trolleybuses 2.47 and 2.36 units of electricity per car mile.[1] So in this case the trams had a definite advantage.

But traffic expenses, which were mainly wages, did favour the trolleybuses, probably because of the speed factor noticed by Potts. As an indication of this, the Bentley trolleybus route was 1.4 miles longer than the old tram route, but the journey time was ten minutes less.[2] Repairs also favoured the trolleys, partly as one might expect when comparing new buses with old trams. But the main difference was accounted for by the addition of permanent way costs to the trams' total. In 1929-30 track cost 1.23d. per car mile,[3] leaving 2.26d. for other repairs, not greatly in excess of the trolleybus figure. The smaller gap under this head in 1933-4 is not significant, for by then track repairs had almost ceased, only 0.20d. per car mile being spent then. Trams also had to pay rates on their tracks, the trolleys only on their wiring and depot, which will account for the

1. Tramway Returns, 1929-30 and 1933-4.

2. Flint and Fowler, 'Corporation Transport', 116.

3. This and the 1933-4 figure calculated as for Table 39.

difference in this item.

So where working expenses were concerned trolleybuses were more costly than trams in terms of power consumption. But this was more than compensated for by two other savings. First and most important the trolleybus ran on public roads and thus saved (in 1929-30) 1.23d. per car mile in repairs and 0.63d. in rates, a total of 1.86d. Second, there was a reduction in traffic costs, though this was only 0.41d. per car mile in 1929-30; perhaps significantly, this had increased to 1.48d. by 1933-4 when the trolleys had become more established.

One should be cautious about reading too much into a single set of figures. Odly enough, the fact that trolleybuses were cheaper to run on a car mileage basis did not necessarily mean that they were cheaper overall. A rather more significant measure is the cost of providing a certain amount of passenger accommodation. Pilcher cites from figures from Wolverhampton for costs per 100 seat miles. These show that tram and trolleybus costs there were more evenly matched in the late 1920s that the car mileage figures from Doncaster might lead one to expect. Total working expenses from 1925 to 1929 were as follows for tram/trolleybus in pence per 100 seat miles--29.48/29.75, 29.665/29.745, 25.746/30.150, 24.579/24.373, 28.568/24.173. However although trams had the edge overall in the first three of these five years, maintenance and repair costs for trolleybuses were always less, 4.5d. versus 6.39d. in 1925 for instance, and from 1928 onwards a clear cost differential in favour of trolleybuses does seem to be opening up.[1]

The reason for the differences between the seat mileage and car mileage figures is that trams tended to be larger than buses. Hence, for every vehicle mile, they could move more seats (and passengers), so reducing the unit cost per seat. As a matter of fact this is irrelevant as far as Doncaster is concerned, for the older trams replaced by the first trolleybus conversions had only fifty-six seats[2] whereas the new trolleybuses had more

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1. Pilcher, Road Transport Operation, 50-1.

2. Appendix DN2 gives dates of withdrawal and seating for trams.

at sixty each.[1] So the vehicle mileage costs presented in Table 39 are a perfectly fair measure as far as Doncaster is concerned.

Turning to revenue, there can be no doubt that the trolleybuses earned more per mile than the trams did, and they did so in every year from the inception of the trolleys until the closure of the tramways.[2] Too much ought not to be made of the widened gap between the two after 1932-3, for by then only the Brodsworth tram route remained and this was, as noted above,[3] extremely susceptible to motor bus competition. Nontheless the difference was dramatic enough. Mr. Potts reported an immediate 50 per cent rise in revenue on the Bentley route after conversion. The change was less on the other routes, but even so the average increase was 38 per cent.[4]

Various reasons may be surmised for this. One thing, of course, was that in most cases like was not being compared with like. Out of seven tram or motor bus routes converted to trolleybus, five were extended beyond the old terminus.[5] This would naturally account for some of the increased revenue. Another reason would be the higher speed of trolleybuses, which might make short journeys more worthwhile as against walking. A third reason would be the general attractiveness of the new vehicles as opposed to the old trams.

It seemed a fairly general experience for traffic to rise on conversion. Wolverhampton recorded increases in receipts varying from 64 per cent down to 13 per cent after converting various tram routes to trolleybus between 1923 and 1927.[6] This town was one of the first to envisage and carry out the complete changeover of a medium sized tramway to trackless operation and its Manager, C. Owen Silvers, was a noted propagandist for trolleybuses.[7] Mr. Potts had some contacts with him prior to the Bentley conversion.[8]

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1. SYT Letters, 21 Nov 1930, 23. 2. See Appendix DN5.

3. See above,253. 4. Potts, Doncaster Cavalcade, 7.

5. See above,270. 6. Pilcher, Road Passenger Transport, 52.

7. Yearsley, 'Bus and Coach'.

8. SYT Letters, 27 Apr 1927, 769; 3 May 1927, 795.

Between 1927 and 1936 the Doncaster tram fleet declined from 44 to nil, the motor bus fleet rose from 21 to 38 and the trolleybus fleet, starting at 16 in 1929, rose to 37. In the first five of those ten years, the transport department returned a profit after capital payments in only one year, 1928. The losses were actually caused more by the motor bus side than by the trams,[1] which were usually marginally but not deeply in the red. In the last five years of the period a regular and usually rising surplus was earned. This was greatly aided by a sharp recovery in motor bus profits, but the largest contribution was made by the trolleybuses, which earned as much as £10,000 in 1936. Meanwhile the trams remained stuck in deficit.[2] In commercial terms, the decision of the Manager and Committee to dispense with trams was amply justified. In fact, between 1903 and 1935 when the trams were running, the department earned a surplus in only eighteen years out of thirty-five; yet from 1932 to 1952 it was never in the red at all.[3] It would not be correct to ascribe the entire change in fortunes to scrapping the trams. It is probably no coincidence that the long period of prosperity began in 1932, the year the effects of the Road Traffic Act began to be felt. The department benefitted greatly by the Act. By it, a 1d. protective fare was secured against long distance operators.[4] Some pirating still took place though, evidence for this occuring in September 1931 when flooding caused motor buses to be substituted for the Bentley trolleybuses and long distance buses to be withdrawn; revenue on the route went up by a further 25 per cent during that period.[5] But the 1930 Act gave the road transport industry stability and made it possible to eliminate competitors, which over time must have increased the transport department's income by a considerable proportion.

It is true as well that a modernised tramway would have been capable of

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1. Which must have confirmed the management in the wisdom of their decision to opt for trolleybuses to replace trams.

2. See Appendix DN6. 3. DCT Jubilee, 49.

4. Potts, Doncaster Cavalcade, 7. 5. DCT Jubilee, 42.

attracting increased revenue.[1] It was not so much that trolleybuses themselves were better than trams; it was that they were new and comfortable. However the fact that the debt on a rebuilt tramway was unlikely to be recoverable from increased revenue[2] clearly meant that new trams were not actually an option for Doncaster. This was because even if trams were able to increase receipts by an equal percentage to trolleybuses, the higher cost of installing a tramway would still have made it difficult to cover the annual capital costs, especially as tramway working costs were also higher.

Postscript

Trolleybuses continued to provide the bulk of Doncaster's town services until well after World War II. New Corporation Transport Offices and a motor bus garage were opened at Intake in 1937, but the outbreak of war meant that the original plan to transfer the trolleybuses there too was not carried out[3] and they remained at Greyfriars Road.[4] The fleet was improved in 1943 by the purchase of the first two-axle fifty-six seat trolleybus, which was later joined by other batches, mostly secondhand.[5] After the war trolleybuses began to run into some of the same problems which had affected the trams. The cost of installing overhead had risen to between £8,000 and £11,000 a mile and recovery of such capital expenditure was becoming doubtful. As trolleybuses declined elsewhere, the supply of spares and replacements became difficult.[6] The town centre was being redeveloped as well, and the trolleybus became accused of the same sin as the tram--inflexibility. The Bentley route--by a strange coincidence--was the first to close, in 1955, because of the need to reconstruct a bridge. Despite minor extensions in 1958, the whole system was closed in the early 1960s; the last trolleybus

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1. See above, 60 . 2. See above, 266.

3. One of the entrances actually has 'Trolley Vehicles' carved on the lintel.

4. Potts, Doncaster Cavalcade, 7.

5. Tuffrey, Electric Transport, Introduction; other towns did the same.

6. DCT Jubilee, 42.

ran to Beckett Road on 14 Dec 1963.[1]

Even before this, motor bus services had long ceased to be purely 'out of town'. In 1929 a new housing estate was being built at Intake, an area never served by trams. So on 28 Mar 1930 a motor bus route started;[2] there seems not to have been any intention to convert this to trolleybuses. The Woodlands tram service went over to motor bus in 1935, of course, and various other routes were initiated both before and after the war.[3] Pneumatic tyres began to be fitted to buses in 1930 and in 1934 the first diesel buses were introduced, on the Intake route.[4]

Doncaster Corporation Transport Department lost its independence on 1 Apr 1974, when as a result of local government reorganisation the South Yorkshire Passenger Transport Executive took over all municipal bus services in the county.[5] At the time of writing the whole bus industry is in the throes of the most severe reorganisation since 1930 as a result of the Transport Act, 1985. Doncaster's publicly-owned buses are now operated by a 'hands off' Company, South Yorkshire Transport. The main feature of the legislation is deregulation, taking the industry in some respects back to the conditions of the 1920s.[6] Whether deregulation will work any better in the 1980s remains to be seen. The uncertainties caused by this legislation, together with public spending restrictions, are likely to mean that an ambitious plan to reintroduce trolleybuses to Doncaster (and Rotherham) will be unlikely to see fruition for a long time, if ever. In August 1985 a two-year test programme was inaugurated in Doncaster of a new British-built trolleybus. About a mile of overhead wiring has been installed along a private road on the Racecourse, and the installation will be used to evaluate

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1. Tuffrey, Electric Transport, Introduction. 2. DCT Jubilee, 34.

3. Ibid., 50. 4. Ibid., 36.

5. South Yorkshire Passenger Transport Executive (SYPTE), Transport Development Plan (Sheffield, 1978), 1.

6. South Yorkshire Passenger Transport Authority, The Price of Change (Barnsley, 1986); passenger information leaflet (no page numbers).

the commercial and technical viability of modern trolley vehicles.[1] It would be rather ironic, considering all the effort which has gone into phasing out electric transport from Doncaster's streets, if it were to return in the future.

1. SYPTE, News Release, 5 Aug 1985.

CHAPTER 12

CONCLUSION

There is nothing very remarkable about the fact that the Doncaster tramways were replaced by another form of transport. By 1962 all Britain's tramways, with one exception, had closed, making this a commonplace. What is interesting, however, is why Doncaster Corporation decided to dispense with its trams when it did. Certainly it is fair to assume common factors behind the closure process in Doncaster in the 1920s and, say, Sheffield in the 1950s. But it is also reasonable to suppose that there were differences too, if only because there was such a lapse of time between the two events and because of the disparity in size and importance between the two towns and their tram systems. So the bald question, 'Why did Doncaster's trams close?', may elicit an answer of no greater weight than, 'For the same reasons as everywhere else' (though of course the Doncaster experience may help to clarify those general reasons). But an answer of more significance may result from a slightly different question, 'Why did Doncaster Council decide to do away with its trams at the time it did?'.

The future of the tramways was actually put into doubt quite early on, less than twenty years after their opening. This was not directly related to World War I, which affected the tramway system rather less than a cursory examination of the statistics might suggest. However, the next few years brought up many problems to assail the tramways which were partly or even largely the result of the war. They included a marked deterioration in the physical condition of the trams and of their infrastructure, partially a

consequence of deferred maintenance during the war; rapid inflation coupled with industrial conflict, particularly in the vital coal industry; and the rise in motorised competition owing to the 'hothouse' development of the internal combustion engined vehicle during the war and to the release of thousands of vehicles and qualified men into the civilian market.

The tramways' declining physical and financial health meant that they were less able to meet competition when it came. Inflation meant that the costs of new construction were now far greater than they had been before or even during the war. The arrival of the motor bus on the scene meant that a viable and cheaper alternative (in capital if not yet in operating terms) was now available. The Oxford Street fiasco had also shown the folly of constructing tram lines for which there was insufficient demand.

The result for Doncaster was that extensive and well-advanced plans for new tramway construction after the war were not realised. It was quickly decided, and probably partly under the influence of the new manager, that long tram lines serving the outer ring of colliery villages were not economically feasible, even though routes such as that to Brodsworth had been capable of paying their way up until about 1919. The motor bus, already being used by private enterprise, was seen as the obvious means of serving these outlying communities. The town itself was also changing as new municipal housing estates were built. At first these might be on existing tram routes, but where they were not, the problem arose of how to serve them. Should it be by tramway extensions? as was proposed along Carr House Lane. Or should it be by another mode? In the end, nothing was done to extend the tramways.

The initial result of these debates was stagnation for the tramways. They ceased to grow in terms of route mileage, and from having served the whole of the local transport area, were reduced to serving only a part of it. In any enterprise, ceasing to grow is almost always a precursor to decline, and this was the case here. Without either saying so or even realising it, the decision of management and councillors not to expand the tramways was effectively the first step towards their closure.

In the mid-1920s four decisions were taken about the future of the tramways. In order of time these decisions (though not their execution) were as follows--to replace the Bentley trams with trolleybuses, in 1923; to replace all trams by trolleybuses or motor buses, in 1924; to replace and extend the Avenue Road trams by double-deck motor buses experimentally, also in 1924; and to replace both the latter and the remaining trams (except, at the time, those running to Warmsworth and Brodsworth) by trolleybuses, in 1926.

The initial plan to withdraw the Bentley trams was undoubtedly due to the track problem. The tracks themselves needed rebuilding, partly because of normal wear and tear, but also because of poor initial construction. The urgent need to replace a section of line in 1916, well before tram track's normal twenty year life span, demonstrates the effect of earlier penny pinching. However this section, between Bentley Church and the old terminus, was only a small part of the whole and so the problems could only worsen after the war. Reconstructed or not, however, the lines also required raising in the 1920s to match new road surfaces required by the road authority, so the expense of partial rebuilding would have been necessary in any case, had the trams been retained.

Clearly, the need to reconstruct the tracks lay behind the second decision, to replace all trams by a trackless mode, and it also dictated the timetable of abandonment; the Hexthorpe route went early, for example, because of the concurrent need to rebuild the railway bridge and the Balby route lasted late because much of its track had been attended to in the early 1920s.

Relaying of the tracks was of course a technically feasible option. It was not taken up for a variety of reasons. Underlying them all was the fact that the capital cost of new tramway construction was at an historically high level in the 1920s, far higher than it had been when the lines were first laid down. One obvious corollary of this was that lines which were not commercially viable at the old costs would never be so at the new. Cer-

tain lines, such as those to Avenue Road or the Racecourse, were probably always loss-makers, even in terms of the revenue account; there was and never had been a surplus available to meet even the pre-war capital costs on these lines, and post-war costs could certainly never have been covered. One way of making these short urban routes pay might have been to extend them to the new housing estates further out of town. Again, however, the capital costs of doing so were so great that even the increased traffic gained would almost certainly not have compensated for the increased expenditure.

It was this combination, of a loss-making tramway which stopped short of new housing development, which provided the justification for the third policy decision, the replacement of the Avenue Road trams by motor buses. Later trolleybus routings, notably along Carr House Lane, in New Bentley and beyond Beckett Road terminus, showed the need for expanded services elsewhere too.

Adding to fears that the revenue on even modernised and extended tram routes would not be enough to meet loan costs was the fact that receipts were already, or were feared to be vulnerable to private motor bus incursion. This appears to have worried the tramways' management more than any other matter in this period. However it has been shown that such competition was not really a serious threat to the tramways in the early 1920s and that the fall in revenue which was experienced then was much more related to industrial troubles, especially in the coal industry. Even when competition did get more severe in the mid-1920s, the tramways proved surprisingly resilient, with the introduction of weekly passes being a particularly effective weapon in the battle to retain passengers. The series of decisions taken in the mid-1920s about the trams' future were <u>not</u> therefore taken because of competitive pressures, or not greatly so. Insofar as this was a factor, it was more a question of fearing what might happen, rather than reacting to what actually did occur.

Three caveats must be entered to this conclusion though. First, even

though revenue was relatively buoyant, receipts would obviously have been higher without competition and might, in such a case, have been sufficient to encourage investment in tramway renewal. Second, by the early 1930s bus competition was severely affecting the rump of the tram routes, to Brodsworth and Warmsworth, and the whole system would probably have suffered, if not so badly as these out-of-town routes (though the 1930 Road Traffic Act would have accorded some relief). Third, the weapon used to beat competition was reduced fares. This merely accentuated the trams' reliance on low fares, already noticed in connection with workers' tickets before World War I, bringing to prominence the obvious difficulty of reconciling a high cost transport mode with low fares.

None of the above would have mattered if the choice in 1923 had been the same as in 1903; between public transport using trams and no public transport at all, bar horse-drawn vehicles. Even in 1903 motor buses were just about a viable alternative, though very few towns were yet prepared to risk them, but by 1923 both these and trolleybuses were proven transport modes. After experimenting with an urban motor bus service from 1925 the management decided, for the reasons discussed above, that trolleybuses would be their preference for tramway replacement. This provided a solution to most of the problems affecting the tramways. Trolleybuses needed no track, which meant that worn-out or badly-placed lines did not need to be renewed or relocated. As a consequence, trolleybuses were much less capital intensive than trams were, which diminished the problem of loan debt, meant that they would be much more likely to pay than a modernised tramway, and made necessary extensions far more viable.

The commercial viability of the trolleybus was not only due to lower capital costs, but to an ability to earn more at lower running costs than trams. Obviously, that left a larger surplus to meet the already reduced loan debt. But it also meant that trolleybuses would withstand a fares' war better than trams could and were far more competitive with low-cost pirate or company buses. In addition, trolleybuses had a proven ability to attract

passengers through their comfort, speed and silent, fume-free progress, which meant that as motorbus competition became more severe, the municipal undertaking was able to fight back more effectively than if it had retained its trams. The trolleybus was, in short, the answer to a hard-pressed manager's economic problems.

To sum up, Doncaster's tramway undertaking took a decade from its inception in 1903 to become financially self-sufficient. Once it did so, a successful period of expansion followed, not greatly dampened by the effects of World War I. In post-war conditions, however, planned extensions were shelved and severe difficulties were caused to the existing tram system by industrial decline in the area and private motorbus competition. The trams rallied from both these problems however, but the question of replacing them still became acute relatively early because of the condition of the tracks and of the need to improve the road surfaces. Capital costs by that time were at a level which made relaying a scarcely viable proposition, particularly as several routes did not pay and/or needed extending. Thus a trackless alternative was decided upon, the early preference being for trolleybuses with their attendant advantages over both trams and motor buses. Tramways, as opposed to trolleybuses, cost too much to lay and too much to run, whilst they also earned too little. If municipal transport was to survive in the area, it needed to remain attractive to passengers and commercially viable. For an undertaking serving a dispersed population around a relatively small town, the combination of motor buses and trolleybuses made far more economic sense than even a modernised tramway. By 1926 all the arguments had been rehearsed and the key decisions taken, so when the last tram ran in 1935 it was already an anachronism in the town's transport system. Fifty odd years later publicly-owned buses still operate from Leicester Avenue garage; had the wrong decisions been taken in the inter-war years there might have been none left to do so.

PART IV

SHEFFIELD CORPORATION TRAMWAYS

THE CITY TRAMWAY

CHAPTER 13

INTRODUCTORY AND FINANCIAL

Introduction

The history of Sheffield tramways has been fully dealt with in two published works, one concerned with trams alone[1] and the other with the buses also.[2] No attempt is made here to cover the same ground.[3] Three things are broadly lacking in both these books. First, there is no detailed treatment of finances. Second, neither author attempts any reasoned analysis of the reasons for the trams' removal in the 1950s nor of why this did not happen in the 1930s. Third, the usual convention for tramway histories encourages an author to describe 'his' system in isolation, but since cities similar to Sheffield were following different policies in the 1930s, an element of comparison is desirable, the main example taken being Manchester.[4]

Once the Sheffield tramways were municipalised, they were extremely successful. In 1878-9 the former private horse trams had carried 4,633,010 passengers for revenue of £34,967;[5] in the first seven months of mixed electric/horse service by the Corporation in 1899-1900 the respective totals were 7,715,314 and £30,105, whilst by 1913-14 they exceeded 104 million and £386,000.[6]

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1. Gandy, Sheffield Tramways. 2. Hall, Sheffield Transport.
3. For a table of dates and events, see Appendix S1.
4. For Manchester dates and events, see Appendix S2.
5. Tramway Returns, 1878-9.
6. See Appendix S3, columns (5) and (6).

Sheffield's tramway system seems to have been less affected than most by World War I and there is no evidence of an acute decline in standards similar to, say, Liverpool's. Progress continued in the inter-war years, though the really spectacular growth was now on the motor bus side.[1] Early in World War II the blitz caused severe interruption to services and the loss of some trams, but these were later replaced.[2] Record traffic[3] meant that secondhand trams from Bradford[4] and Newcastle[5] had to be pressed into service. A further thirty-six new trams were added after the war,[6] but closure was recommended in 1951[7] and was achieved by 1960.[8]

This closure decision was, in comparison with other undertakings, taken at a very late date. The total number of British electric tramways was 152. Of these 77 per cent or 117 had already closed by 1940[9] and several more had already abandonned large parts of their systems.[10] In that year Sheffield's tramways were largely intact and there was no plan to replace them. Local policy thus appeared to be going against the national trend, even despite the fact that all other South Yorkshire tramways had also closed by then, with one exception. The Barnsley, Dearne District, Doncaster and Mexborough trams were all replaced between 1929 and 1935,[11] and so were most of Rotherham's except for the joint service with Sheffield; this was kept only because the latter would not agree to a trolleybus service.[12] So Sheffield's isolation in transport terms prompts the question, 'Why did Sheffield not abandon or decide to abandon its trams in the 1930s, as most small and many larger operators had already done?'.

Sheffield was not alone in its pro-tram policy though. At least six other towns continued to improve their tramways up until after World War II,

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1. See below, 327ff.2. Gandy, Sheffield Tramways, 79-81.

3. See Appendix S3, column (5). 4. Gandy, Sheffield Tramways, 83.

5. Ibid., 81. 6. Hall, Sheffield Transport, 299-300.

7. Ibid., 261. 8. Ibid., 268.

9. Calculated from data in Appendix G5. 10. See above, 52.

11. Dates in Appendix G5. 12. Gandy, Sheffield Tramways, 67.

either by putting new cars into service or by building new extensions. These were Aberdeen, Blackpool, Edinburgh, Glasgow, Leeds and Sunderland. A few other towns, such as Dundee, put their tramways back into pre-war order and showed no signs of abandoning them, although no new investment was made. However another former tramway stronghold, Liverpool, had already announced a closure programme in 1945, and it was not long before all the others named, except for Blackpool, had made similar decisions. So the second major question relating to the experience which Sheffield shared with other post-war tramway survivors is, 'Why was transport policy changed in post-war conditions? What had made an undertaking worth investing in up to the early 1950s something thereafter to be disposed of as quickly as possible?'.

The basic difference between those towns and cities which retained trams and those which replaced them was the ability to choose. In a majority of cases there was really no rational choice once the trams began to wear out and there were alternatives available in the form of motor or trolleybuses. In the worst examples like the Dearne District this was because the trams were losing money at an insupportable rate and any alternative which offered lower operating costs and even a possible profit was preferable. In other cases like Doncaster's the trams might earn a profit in good years, but only on the basis of old and relatively cheap capital assets. Once renewal of a major part of the track or fleet was faced, it became clear that there was little prospect of earning enough to pay for this; the equation was tilted even more strongly towards tramway closure when it was realised that buses were not only cheaper to buy but could earn more than trams. It was really only a relatively few tramway operators whose finances allowed any reasonable latitude of choice.

Conversion to motor bus or trolleybus was itself expensive, of course, and a number of operators found ways of avoiding this. Some, like the Dearne District, sold out to or co-operated with rival bus operators. Others found

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1. Joyce, Tramway Twilight, 33, 45, 54-5 and 65.

cheaper ways of continuing with tram services by buying equipment second-hand; the best pre-war example is the Llandudno and Colwyn Bay Electric Railway, which bought fifteen cars in the 1930s and managed to keep them running until 1956.[1] Quite a lot of cars changed hands after World War II[2] and the practice is still common abroad; the Innsbruck tramways, for example, have run for years almost exclusively on secondhand purchases.[3] Usually, however, this was not a long-term option, particularly for major cities.[4]

Before World War II, however, Sheffield had the financial freedom to make its own choices about the future of its tramways, for the reasons given below:

1. the tramways covered all costs and earned a surplus;

2. that surplus was sufficient to finance necessary new investment and without recourse to the secondhand market;

3. the required investment was limited because it was never necessary to replace all or most of the capital assets at once; and

4. largely because of this last fact, tramway retention and motorbus conversion were not very far apart in terms of capital cost, which allowed other advantages of tramways, such as lower running costs, their due weight.

The Profitability of the Tramways

Reference to Appendix S3 and particularly to columns (12) and (16) to (19) shows that between 1919-20 and 1939-40 Sheffield Corporation Tramways were always in profit. The operating ratio was invariably positive, indicating that working costs were easily covered leaving an adequate margin for meeting other obligations, notably Income Tax and Debt Payments and, from the net balance remaining, amounts for Rate Relief and Renewals. Table 40

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1. Edward Marshall, 'The Llandudno and Colwyn Bay Electric Railway', lecture given to the Sheffield Light Rail Transit Association, 16 Jan 1978.

2. Joyce, Tramway Twilight, 106-11 (Appendix IV).

3. R[ichard] J. Buckley, Tramways and Light Railways of Switzerland and Austria, ed. by W. J. Wyse (Milton Keynes, 1984), 99.

4. Though Leeds bought a lot; see the source cited in note (2) above.

shows how this contrasted with Doncaster and the DDLR.

TABLE 40

COMPARISON OF TRAFFIC REVENUE AND WORKING COSTS ON THE SHEFFIELD, DONCASTER AND DEARNE DISTRICT TRAMWAYS FOR SELECTED YEARS FROM 1919-20 TO 1935-6 IN PENCE PER MILE

	Traffic Revenue			Working Expenditure			Operating Ratio		
Year	Sheff. d.	Donc. d.	DDLR d.	Sheff. d.	Donc. d.	DDLR d.	Sheff. %	Donc. %	DDLR %
1919-20	19.27	20.72	-	15.84	19.58	-	82.07	94.04	-
1920-1	21.94	22.60	-	17.98	21.15	-	81.86	92.04	-
1921-2	21.76	23.70	-	16.85	20.70	-	77.33	86.50	
1922-3	20.49	21.65	-	15.46	17.70	-	75.33	80.10	-
. . . . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
1927-8	17.60	18.57	11.62	13.51	13.96	10.65	76.66	73.79	88.45
1928-9	17.17	16.65	11.16	13.09	14.34	10.79	76.25	84.03	96.65
1929-30	17.16	16.83	10.88	13.12	12.98	10.49	76.35	75.21	96.38
1930-1	16.02	15.53	9.48	12.43	11.78	10.08	77.48	72.90	102.60
1931-2	15.35	15.35	8.87	11.77	13.34	9.85	76.54	81.40	107.13
1932-3	14.86	13.39	7.92	11.18	14.30	9.41	75.25	92.73	114.21
1933-4	15.29	11.91	7.59	11.66	11.38	8.91	76.24	83.01	111.58
1934-5	14.76	11.07	-	11.46	10.35	-	77.63	82.61	-
1935-6	14.62	9.83	-	11.60	13.36	-	79.38	135.79	-

SOURCES:

Sheffield: Annual Reports, Statistical Information (most figures reduced from three to two places of decimals).

Doncaster: Doncaster Statistics 1919-20--1922-3; Tramway Returns 1927-8--1935-6.

DDLR: Tramway Returns, 1927-8--1933-4.

The DDLR was the cheapest of the three tramways to run. Reasons for this would include new equipment, light service and, latterly, reduction in maintenance as closure loomed. But revenue was also low, sometimes no more than 50 per cent of Sheffield's and often inadequate to meet working costs. As the DDLR's early critics had said, a high cost transport mode like a tramway needed a heavy traffic in order to make it pay, and this the DDLR lacked. In its best year (not in Table 40), 1924-5, the DDLR carried 5.389 passengers per car mile as against Sheffield's 14.147. And even though

1. Calculated from Tramway Returns (Appendix D4).

2. Appendix S3, column (9).

Sheffield's fares were much lower at 1.353d. per passenger[1] as against 2.18d. on the DDLR,[2] earnings on the former were still higher, which meant that the larger system could cover its working costs and the smaller could not.

The comparison with Doncaster presents a more mixed impression, with the tramways there sometimes able to earn more than Sheffield's per mile and less frequently to run at a lesser cost. Except at the turn of the decade, however, the operating ratio was worse. Passengers per car mile in Doncaster--10.7 in 1922-3[3] for instance--still fell short of Sheffield's 13.948 in that same year.[4] So to achieve reasonably high earnings, Doncaster had to charge higher fares, an average of 2.02d.[5] as against 1.496d.[6]

Whereas the problem for the DDLR was one of inadequate revenue, for Doncaster it was more one of failure to keep working costs low enough. Sheffield's usual ability to achieve better results was probably due to economies of scale. Traffic in Doncaster was such that it could not run its cars intensively enough to maximise use of assets; track and cars still needed repairing, men had to be employed, but the expense could not be spread sufficiently to bring average costs down as far as desirable. So the miles run per car per annum in Doncaster and Sheffield in 1927-8, as one example, were respectively 20,891 and 30,375.[7]

For a tramway to be profitable, the operating surplus had to be large enough to meet capital charges. The DDLR, of course, could never do this,[8] whereas Doncaster managed to do so sometimes but not always.[9] The 'big city' had an advantage here too, for capital costs could also be spread over a higher mileage to produce a reduced charge. In 1921-2, for example, Sheffield

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1. Ibid., column (8). 2. Tramway Returns, 1924-5 (Appendix D4).

3. Doncaster Statistics, 1922-3. 4. Appendix S3, column (9).

5. Doncaster Statistics, 1922-3. 6. Appendix S3, column (8).

7. Calculated from Tramway Returns, 1927-8; of course Doncaster was over-provided with cars, having bought ten for unbuilt extensions.

8. See Table 12 above,89 . 9. Appendix DN1.

needed 2.32d. per car mile to service its debt[1] whilst Doncaster had to find 3.60d.[2] The latter's ability to earn more per car mile sometimes was not of much value, because the undertaking normally had to pay higher working and capital costs than Sheffield,[3] the result being occasional deficits before and regular ones after 1927-8, when the closure programme began to affect revenue.[4]

The prosperity of Sheffield's tramways was not achieved through high fares either. Apart from brief flirtations with higher fares for longer distances, the principal of a standard City to terminus maximum fare was kept throughout. It was 1d. up to 1919, 2d. from then until 1923 (but with 3d. returns) and 1½d. from 1930.[5] This last reduction led to a marked fall in revenue, but there was still a surplus of £6,394 in 1930-1[6] after meeting all charges even with 'the cheapest through fare known'.[7] It was a close-run thing, though, since the trade depression was seriously affecting both tram and bus revenues; the following year's report said that 'Any Route Extension or Fare Adjustments will require most careful consideration, as the balance on the two services has been reduced to a minimum'.[8]

By contrast, in 1920 Doncaster's fares ranged from 1½d. to 5d. giving, for example, 2.17 miles for 2d.;[9] for the same amount the Sheffield traveller could go to the terminus, an average distance of 3.125 miles but a maximum of just over five.[10]

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1. Calculated from debt payments and mileage given in the Statistical Information published with the Annual Report (hereafter, Sheffield Statistics), 1921-2. Full reference to Annual Reports in note 7 below.

2. Doncaster Statistics, 1921-2. 3. See Table 40 above.

4. See Appendix DN1.

5. Gandy, Sheffield Tramways, 178-9; numerous other concessions, such as the usual stages fares and central zone fares, are detailed here.

6. Appendix S3, columns (6) and (20).

7. Sheffield Corporation Tramways (for later title changes, see Appendix S4), Report and Statement of Accounts for the Year Ended 31st March (25th March prior to 1920-1) (hereafter, Sheffield Reports), 1930-1,

8. Ibid., 1931-2, . 9. Doncaster Statistics, 1920-1.

10. Gandy, Sheffield Tramways, 178.

To some extent the one followed from the other. Sheffield's low fares meant high traffic, high traffic permitted low fares, whereas Doncaster was unable to afford low fares. But the same demand was not there anyway, because Doncaster had had to build an uneconomic length of tramway in order to serve a low density population. In 1921-2 there was a mile of route to 2,907 people there,[1] whereas in Sheffield it was a mile to 12,482.[2] Sheffielders used the trams more too, 282 times per head per annum[3] as opposed to 106.[4] This may partly have been because Doncaster faced more severe motor bus competition,[5] but also because city dwellers use public transport more because residential and shopping/work areas tend to be a very long way apart.[6] By contrast around 1920 in Doncaster 'It was the exception rather than the rule to travel long distances to work. With very few cars, most workmen walked or cycled and usually came home for their dinners in the middle of the day'.[7]

Sheffield's tramways were thus in the happy position of having a heavy traffic, relatively high earnings and relatively low working and capital costs per mile and low fares; almost the ideal package from both the supplier's and customer's point of view. Because Sheffield tramways made an operating profit, the interest and sinking funds on loans taken out for their construction were easily payable, leaving a substantial net balance.[8] There was a small outstanding debt on the Petre Street route, closed in 1925, but this was the only time this happened.[9] By contrast, the DDLR debt had to be paid off almost entirely from the rates and from a share in YTC motor

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1. Calculated from figures in Doncaster Statistics, 1921-2.

2. Ibid., Sheffield Statistics, 1921-2. 3. Appendix S3, column (13).

4. Doncaster Statistics, 1921-2. 5. See Ch. 15 for Sheffield buses.

6. This would have been increasingly so as the concept of zoning was introduced into town planning; see opening section of Ch. 14 below.

7. W. M. Renshaw, An Ordinary Life: memories of a Balby Childhood (Doncaster, 1984), Ch. 31, first page (no pagination).

8. See Appendix S3, columns (16) and (17).

9. Gandy, Sheffield Tramways, 48.

bus profits[1] and when the Doncaster tramways were being closed £58,200 had to be contributed from the rates towards liquidating the debt.[2] Sheffield was able to pay large sums into the rate fund in most years, to a grand total of £585,731 when payments ceased in 1927-8;[3] this was due not to any financial crisis but to a change of political control on the Council.[4] Additionally, up to 1929-30 when this charge too was rescinded, the tramways had paid £292,475 towards servicing the debt on street improvements.[5] From all points of view, then, Sheffield Corporation Tramways were a financially viable undertaking during the inter-war years.

Financing New Investment

Investment designed to replace life-expired assets or to buy additional ones came from three basic sources as displayed in Appendix S5. The first was the Renewals Fund, payments into which are shown in Appendix S3, column (19) and which usually came more-or-less directly from the surplus earned in any one particular year. The second source was capital, raised by new loans. From an early date the policy was to reduce reliance on loans, especially on the motor bus side[6] (not shown in Appendices), though from 1933-4 loans more or less disappear as a source of tramway expenditure too; right up until then, however, they were the most important way in which new trams were financed. Partly to replace this source, towards the end of the period the accumulated reserves of the tramways were drawn upon to pay for renewals and replacements. This is really the only item which did not come from current earnings, for of course the capital had to be serviced from revenue, as shown in Appendix S3, column (16). A relatively small amount did come from the Unemployment Grants Committee;[7] the total provided for 'construction of

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1. See Part II above, passim.
2. Doncaster Accounts, Tramways Net Revenue a/cs, 1931-2--1935-6.
3. Appendix S3, column (18). 4. Gandy, Sheffield Tramways, 49-50.
5. Sheffield Reports, 1929-30, 2. 6. For example, ibid., 1924-5, 2.
7. A government unemployment relief scheme.

tracks etc' was only £75,803 in the period 1921-2--1938-9,[1] barely a year's capital and renewal expenditure and thus not likely to have influenced policy between trams and buses. Appendix S5 may not include absolutely all funds spent on track, overhead and cars, but certainly covers most; it does not include items such as buildings, because the capital accounts do not distinguish between, say, bus garages and tram depots. In the inter-war years from 1919-20--1938-9 Appendix S5 shows that a total of £2,346,550 was spent on tram track, overhead and cars, in the percentages of 58.98, 1.33 and 39.69. The sources of finance were the renewals fund (52.1 per cent), loan capital (39.84 per cent) and other, largely reserves (8.01 per cent). Over half the expenditure came direct from revenue via transfers to the renewals fund,[2] about 40 per cent was deferred as a burden on later earnings through service of debt, and a small percentage came from savings. As already noted above, it was possible to finance all this expenditure from revenue throughout the period.

Taking a typical year, 1923-4, track expenditure included new extensions like that from Owlerton to Parson Cross, and also widespread relaying and track doubling, seven completed schemes being mentioned; in addition four and a half miles of overhead wire were renewed and two automatic points and one trolley reverser installed.[3] Virtually all the track and overhead must have been replaced at least once in the inter-war period, quite apart from normal repairs. On the fleet side, older cars were brought up to modern standards, especially by fully-enclosing the upper decks[4] and later by fitting upholstered seats.[5] The main expenditure was on new cars, a total of 432 being built between 1919 and 1939, the earlier ones usually by outside builders but latterly from Queens Road Works. All these cars were, of

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1. Sheffield Reports, passim.

2. Not much of this fund was usually carried over from year to year; it was more of a 'rolling fund' topped up annually to cover planned needs.

3. Sheffield Reports, 1923-4, 3; 'Parson Cross' was more usually known later on as Wadsley Bridge, being some way short of the Parson Cross estate.

4. Gandy, Sheffield Tramways, 56. 5. Ibid., 63 and 66.

course, fully-enclosed from the start and were basically of three types, the Standard 1919-27 Class, the Standard 1928-35 Class and the Improved Standard. Mechanical improvements included better trucks of the Peckham P22 type—on all cars[1]—and more powerful motors, of 40 h.p. on the earliest class and of 50 h.p. on the later cars. The first series still had wooden seating, including the traditional two longitudinal benches along the lower saloon. But on the later classes, which had more modern straight-sided bodies, most of the lower deck seats could face the direction of travel and all seats were upholstered on both decks. The Improved Standards were not greatly different from earlier models except for a more modern semi-streamlined body style.[2] In 1935 a brighter blue and cream livery was introduced.[3] By 1938-9, when the final cars were being built, it was expected that the last pre-1918 cars could be withdrawn, leaving none over twenty years old; no more would have been needed until 1944,[4] in line with the policy that trams should be replaced after twenty-five years service.[5]

Appendix S6 contrasts the amounts spent on renewals in Sheffield and Doncaster whilst the latter's tramways were still an on-going concern. Doncaster was unable to build up a large reserve owing to small margins or outright losses; the only other major items not in the appendix met later from this fund were £5,000 towards track reconstruction in 1925-6 and, later, the costs of lifting tracks and part of the loan debt.[6] So in contrast with Sheffield, a much larger proportion of any renewals had to come from new loans, which were a long term burden on the undertaking. Because of its lack of 'disposable income', Doncaster spent far less pro rata on track (20.76 per cent of Sheffield's expenditure) and cars (72.29 per cent) in the period covered by Apendix S6; the percentage for new cars is distorted by

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1. Bogie trucks were never used; see Hall, Sheffield Transport, 131.
2. Fleet details from text/pictures in Gandy, Sheffield Tramways, 150-2.
3. Hall, Sheffield Transport, 205. 4. Ibid., 207-8.
5. Bett and Gilham, SY&H Tramways, 7-8.
6. Doncaster Accounts, Tramways Reserve Fund, 1925-6 and 1928-9ff.

the purchase of ten in 1919-20, a quarter of the existing fleet. These facts support the conclusion in Part III that one major cause of Doncaster's problems was poor track; not only had it been badly built, but far too little was spent on maintenance too. Some allowance has to be made for the fact that Doncaster's lines were less intensively used, but in practice tracks seem to have needed attention at approximately similar intervals. A major section of Sheffield's original track, for example, was replaced in 1909, a decade after its construction.[1] Then Doncaster's Bentley line was giving trouble in 1912,[2] also a decade after being laid. Where the fleets were concerned, by 31 Mar 1927 535 trams (including works cars) had entered the Sheffield fleet, of which ninety-eight had been sold or scrapped. All the older cars had been top-covered, sometimes retaining open ends, but new all-enclosed cars were rapidly replacing these.[3] In Doncaster by 1927 just three of the forty-eight trams had been scrapped, seven (about 15 per cent) were still open-topped and none were fully-enclosed.[4]

City tramways, unlike smaller ones, thus had the earning power to finance the renewal of their capital assets and to keep the track and fleet in good condition and up to contemporary technical and 'passenger appeal' standards.

Continuous Improvement

It was not always possible to keep up these ideal standards; Sheffield had, for example, major arrears of maintenance to make up after World War I [5] and by the mid-1930s the 1928 Standard trams were a little dated.[6] But generally the tramways were kept in good order. There was thus never a need to do more than continue a process of planned replacement and improvement.

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1. Hall, Sheffield Transport, 120-1; this refers to city centre tracks from High Street to the Moor.

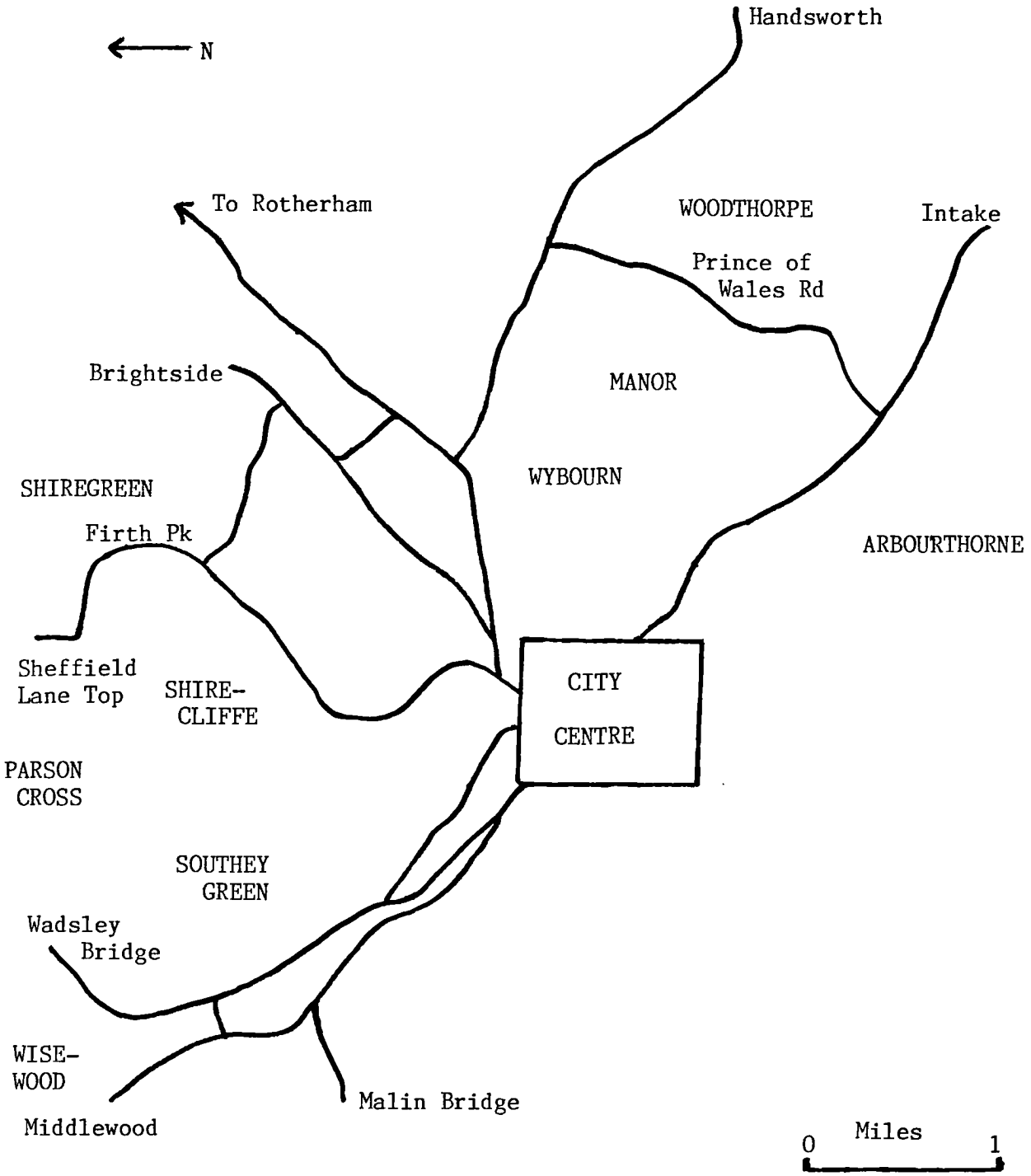
2. See above, 259. 3. Gandy, Sheffield Tramways, 161-2.

4. See Appendix DN2. 5. Sheffield Reports, 1919-20, IV.

6. Hall, Sheffield Transport, 205.

FIGURE 9

TRAM ROUTES TO THE NORTH AND EAST OF SHEFFIELD
COMPARED TO THE LOCATION OF INTER-WAR HOUSING ESTATES



Neither the DDLR, which was new, nor Doncaster, which did have some newish cars and tracks, is a particularly good example of the opposite trap into which so many small tramways fell whereby the original track and rolling stock was retained unaltered until the question of replacement became acute. Then the management was faced not with the necessity of acquiring a few new cars, but of replacing the whole lot at once. For instance, the small Kilmarnock system had fourteen trams dating from 1904-5. Admittedly the two latest came with early top covers, but apart from the necessity for major repairs to the original eleven cars from 1913, the only obvious later alteration made was the fitting of windscreens to just one car.[1] When reconstruction of the tramways was considered in 1923 the cost would have been £70,000, of trolleybuses £12,340 and of motor buses £12,000.[2] But not all small tramways remained as firmly stuck in the past. Burton-on-Trent and Chesterfield Corporation Tramways, started respectively in 1903 and 1904, each bought some balcony cars later and fitted top covers to others,[3] rather like Doncaster did. Even so, such cars were very dated by the time Sheffield was introducing its fully-enclosed and upholstered cars by the end of the 1920s.

Turning to South Yorkshire, of the six tramways existing up to 1929, only four had any post-war cars at all. The DDLR was a special case with 30 and Sheffield had a large number, but Barnsley had none, Doncaster 10 out of 47, Mexborough and Swinton none and Rotherham only 4 out of 68. Excluding the DDLR, the four other smaller systems had just 14 newish cars, all built in 1920[4] when standards were not far advanced over pre-1914 designs; that is, out of 147 cars barely 10 per cent were built after the war. Whereas by 1929 Sheffield had 201 cars built since 1919,[5] or nearly 50 per

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1. Brotchie and Grieves, Kilmarnock's Trams, 31-3. 2. Ibid., 24.

3. W[ingate] H. Bett and J[ohn] C. Gilham, The Tramways of the North Midlands, ed. J. H. Price (n.d.), 26.

4. Bett and Gilham, SY&H Tramways, 40-4.

5. Gandy, Sheffield Tramways, 150 and Hall, Sheffield Transport, 297-8.

cent of the 416[1] service cars.

A further example is a small tramway like that of Chester. By 1921 of its eighteen cars, twelve were said to need immediate replacement and five heavily reconditioning;[2] that is, two thirds of the fleet really needed replacing in one year and the remainder expensively repairing. It was no wonder that almost all small tramways took the alternative of abandoning their trams to their own or another operator's buses. Sheffield was never faced

TABLE 41

SHEFFIELD TRAMWAYS CAR BUILDING PROGRAMME 1919—1939

Year	Cars Built New[a]	Percentage of Fleet[b]
1919	25	6.13
1920	27	6.62
1921	24	5.88
1922	2	0.49
1923	-	-
1924	9	2.21
1925	16	3.92
1926	40	9.80
1927	11	2.70
1928	9	2.21
1929	37	9.07
1930	25	6.13
1931	20	4.90
1932	30	7.35
1933	24	5.88
1934	31	7.60
1935	29	7.11
1936	27	6.62
1937	22	5.39
1938	20	4.90
1939	4	0.98
Total	432	
Average p.a.	20.57	

SOURCES:

a. Hall, Sheffield Tramways, 296-9

b. Average inter-war fleet 408, calculated from data in Appendix S3, column (3)

1. See Appendix S3, column (3).

2. W. D. Clark and H. G. Dibdin, Trams and Buses of the City of Chester (Rochdale, 1979), 28.

with such a difficulty during the inter-war years, due to good housekeeping and prudent anticipation. Table 41 above shows that 432 new trams were built between 1919 and 1939, an average of 20.57 per annum. Such a number in any one year would have been almost impossible for a small tramway to finance and the only undertaking which did something like it was Falkirk. Here motor bus competition was reducing traffic in the 1920s, and worn out trams on dilapidated track were no match. However in 1920 the line came into the ownership of the Fife Tramway, Light and Power Company, under whose auspices the whole circular route (excluding an unprofitable branch) was rebuilt in the period 1921-9. Fourteen new 'Pullman' single deck trams were put into service in 1929-31, fully upholstered, completely enclosed, and capable of 35 miles per hour; all the old double deckers were scrapped. The new trams cost £1,900 each, so the total for these alone was £26,000, a not inconsiderable sum. Incidentally, five ex-DDLR cars were purchased and rebuilt for Falkirk in 1933. The management's faith in trams seemed justified as traffic rose each year, but in 1935 the Scottish Motor Traction group bought the company out and closed the tramway the following year.[1] It is impossible to know what long-term future such a modernised small system might have had, but one may assume the owning company would not have invested so much capital without reasonable hope of return. So maybe in favourable circumstances--in this case particularly the fact that the tramway company also controlled most of the local buses during much of the period[2]--a small tramway could succeed; but most did not try.

Returning to Sheffield, Table 41 shows that twenty new cars per annum was a relatively small matter for a major tramway. In no year was more than 10 per cent of the fleet replaced, and usually much less. Although not so easy to calculate, the track and overhead renewals would have been averaged out in the same way, to produce a programme that could be financed on a year

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1. Brotchie, Falkirk, 25-32, passim.

2. Ibid., 21-30, passim; the Falkirk case is a very interesting one about the financial and competitive details of which one would like to know more.

on year basis. Most small municipal tramways, which usually had opportunity to build up only a small reserve fund if any, could not cope with virtual 100 per cent renewal of assets.

The Cost of Replacing Trams

It is not known if anyone explicitly calculated the costs of tramway replacement for Sheffield around 1930; it is more likely that it was implicitly assumed that keeping trams would be cheaper than all-out motor bus substitution. But the ability to spread renewal over a number of years was the key to such an assumption. At 31 Mar 1927 there were 421 trams in service, whose seating capacity was as listed in Table 42 below. Double-deck motor

TABLE 42

SHEFFIELD TRAMWAYS CAR SEATING CAPACITY 31 MAR 1927

Number of Cars[a]	Seats per Car[b]	Total
69	51	3,519
52	58	3,016
18	51	918
21	72	1,512
13	56	728
6	56	336
73	62	4,526
4	58	232
2	62	124
9	62	558
79	76	6,004
75	68	5,100
Totals 421		26,573

SOURCES:

a. Gandy, Sheffield Tramways, 162.

b. Ibid., 140-50.

of standard size then only seated about fifty, although seventy plus could be achieved with a six-wheel chassis,[1] but except for trolleybuses the design did not prove permanently popular with operators.[2] The leader in the

1. Pilcher, Road Transport Operation, 128.

2. Humpidge, 'Development of the P.S.V.', 4; the design was necessary because of Ministry restrictions on axle-weights, but maintenance was costly.

field at this period was the Leyland Titan TD1 which, when redesigned with an enclosed rear staircase, seated only forty-eight; since this was the bus Sheffield was buying at the time[1] it makes the obvious comparison with the tram fleet. To obtain an equivalent seating capacity, 554 buses would have been needed. In 1930 the YTC at Barnsley was also buying Titans[2] which cost them £1,608 each.[3] Thus Sheffield's notional total requirement for tramway replacement would have cost £890,832. Further complexity is introduced by the fact that motor buses at this date did not have a very long life; Sheffield's 1928 batch of Titans were going by 1935 and its 1929 'closed back' sisters by 1937.[4] Manchester assumed a bus life of six and a half years,[5] so seven years seems a good average. Thus, if one assumes a tram replacement programme beginning in 1930 and ending in 1939, over that decade about 55 buses would have been needed annually. In 1937-9, though, replacements would also have been needed for those bought in 1930-2, a further 165 buses at a cost of £265,320. One could then go further to allow for the fact that no new trams were thought necessary after 1939 until 1944,[6] which would mean allowing for another four years' replacement of older buses at £353,760. On the other hand, four more years' expenditure on tram track etc. would also have to be allowed for, so it is probably best to leave the calculation as it is. The same goes for the fact that as the decade passed buses got larger with more seats,[7] so less than 554 vehicles would actually have been needed for tram replacement; however, in envisaging a conversion programme in 1930, one has to take the then-ruling size and capacity of buses. So adding £265,320 to the original total makes £1,156,152 for buses. Pilcher estim-

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1. Hall, Sheffield Transport, 224.

2. Sykes, Yorkshire Traction, 37.

3. YTC, Table with Letter to R. W. Birch (the Manager), 27 Oct 1944.

4. Hall, Sheffield Transport, 227.

5. Pilcher, Road Passenger Transport, 118. 6. See above, 302

7. Humpidge, 'Development of the P.S.V.', 4; increased weight limits allowed fifty-six seats on two axles from the mid-1930s.

ated that garage accommodation would cost about £150--200 per bus.[1] Tram depots could sometimes be converted, but were not usually ideal. In Sheffield's post-war conversion, Shoreham Street was re-used, with room for 110 vehicles, but no other tram depots were converted.[2] So that would, in this notional scheme, leave 444 buses to be housed at a minimum of £150 each, a total of £66,000, raising the whole capital cost for bus replacement to £1,222,752.

The policy actually followed of retaining the trams involved building 279 new cars between 1928 and 1939.[3] Twenty-five ordered from a firm in Sunderland in 1929 cost £1,190 apiece,[4] but that was deliberately pitched low to attract orders to the depressed north-east and the firm went bankrupt.[5] Thus the next lowest tender at £1,590[6] was probably a fairer indication of the current price of trams. 279 cars at £1,590 is £443,610. Actual expenditure on cars from 1928 to 1939 was £527,470;[7] the higher figure will reflect the fact that new trams were costing £2,200 by 1939.[8] Taking one's standpoint at the beginning of the period, however, one must once again take the lower figure. Finally, to obtain the total cost of retaining the trams, actual expenditure on track and overhead between 1928 and 1939 has to be added, that is, £690,873.[9] This makes a grand total of £1,134,483.

Granted, various relatively small items of tramway expenditure are not included here--improvements to depots and workshops, for instance--but the bus side is not complete either, in particular the cost of lifting disused tram tracks is missing. But there seems little argument that, to anyone

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1. Pilcher, Road Transport Operation, 127.

2. Hall, Sheffield Transport, 323.

3. Gandy, Sheffield Tramways, 151-2. 4. Ibid., 63.

5. Hall, Sheffield Transport, 202.

6. Gandy, Sheffield Transport, 63. 7. Appendix S5.

8. S. T. D., The Tramway Era, 27.

9. Appendix S5; expenditure on track and overhead varied greatly from year to year, so one cannot really form an estimate of costs in '1928 prices'.

planning the wholesale conversion of Sheffield's tramways to motor buses around 1930, there would be an appreciable capital advantage in keeping trams; certainly it would be just as economical to keep the trams as it would be to replace them, particularly as some renewals on the tramway side would have been inescapable during the run-down period. The tram option was only viable, though, because the system was efficient and well-maintained, needing only routine repairs and replacements; if, say, the whole tram fleet had needed replacing in the 1930s the attractiveness of buses would have become much greater. A further factor was the then-accepted dictum that buses cost more to run than trams did. Even Pilcher, in his 1930 book, admitted that the cost per seat mile of running a fifty seat bus was more than for a tram of equivalent size.[1] This was not so on a mileage basis, at least not by 1938-9 when the relative Sheffield working costs were 10.81d. for buses[2] and 11.957d. for trams (costs per car mile),[3] but the variance in capacity made all the difference. Even as late as 1951, bus operating costs were estimated to be in excess of those for an equivalent number of trams.[4]

Other qualifications could be made, such as the fact that motor buses were faster than trams and could do more work in a given time, though Pilcher had to admit in 1930 that trams still had the advantage in capacity.[5] It was also true that buses seemed to attract higher earnings than trams, even though the case Pilcher chose in 1930 largely related to trolleybuses not motor buses;[6] in any case in Sheffield modern trams were being compared to modern buses, not old trams with new buses, which was the usual case when a conversion was being suggested. In conclusion, two points seem fairly clear

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1. Pilcher, Road Transport Operation, 129. 2. See Appendix S7.

3. See Appendix S3, column (11).

4. Sheffield Transport Department, 'Report of the General Manager on a Scheme of Tramway Replacement', presented to the City Council, 4 Apr 1951; filed with Council Minutes, 1950-1, after page 603 (separate pagination and hereafter, Replacement Report), 5.

5. Pilcher, Road Transport Operation, 9.

6. Ibid., 52; the fact that motor buses might have improved their performance by the time Pilcher wrote his next book is irrelevant to this case.

from the viewpoint of about 1927-30. First of all, the capital cost of retaining a well-maintained city tramway and of replacing it with motor buses was pretty much the same, or even slightly to the advantage of the tram. Second, in city service, motor bus running costs were in excess of the tramcar's. Taken together, these facts make a powerful argument for the incremental improvement of existing capital assets represented by tramways rather than replacing them wholesale by motor buses; it is precisely this policy which Sheffield followed.

Conclusion

The evidence therefore supports the four points made at the opening of this chapter. Sheffield Corporation Tramways earned a large surplus after meeting both working and capital costs. This was partly because economies of scale permitted these costs to be spread over a high mileage and thus to be reduced on a car mileage basis as opposed to smaller systems. These good results were not a result of high fares, for Sheffield's were exceptionally low. Revenue, though not necessarily as much per car mile as elsewhere, was always amply sufficient because of high potential and actual demand due to a good ratio of population to length of tramway and to a high propensity to travel. 'Profits' of about £750,000 were paid to the city in the form of rate reliefs and contributions towards street improvements, and before the tramways closed their debt was fully paid off. About £2.35 million was spent in the period 1919-39 from renewals, loan capital and reserve funds on the track, overhead and fleet. Yet further sums, not quantified above, were spent on buildings and other items. Most of this money came from current or past earnings and the relatively small proportion financed by new loans could easily be financed from future income. It was thus possible to maintain the tramway at modern and efficient standards throughout the period. In contrast, other towns like Doncaster could not afford new investment from revenue or reserves, and any improvements had to be financed by loans, which usually meant that very little work was done.

Finally, Sheffield's continuous programme of investment in its tramway

meant that it was never necessary to replace a large part of the capital assets at once, as it often was for smaller undertakings; as a result, these usually tended to be closed rather than improved. The fact that a large sum did not need to be spent on the tramways in a short period of years meant, very importantly, that the capital cost of continuing to run trams was no more or even a bit less than that of converting to motor buses; in addition, the latter had higher running costs because relatively small buses were being compared to high capacity trams, making the retention of tramways an even sounder financial option. R. S. Pilcher should be allowed the last word. He remained convinced, he said in 1930, that 'tramways still form an essential part of the passenger transport in any large city'.[1]

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1. Pilcher, Road Transport Operation, 183.

CHAPTER 14

OTHER REASONS FOR CONTINUED TRAMWAY DEVELOPMENT

Tramways and Town Planning

Town planning is itself as old as towns themselves, but as a legislative concept in Britain is relatively new, one of the first major planning laws being the Housing and Town Planning Act, 1909.[1] Electric trams and planning thus grew up together and were to a certain extent seen as complementary. In 1914, for instance, Liverpool's City Engineer presented a paper to the Tramways and Light Railways Association on 'Town Planning in relation to Tramways'.[2] His ideas included segregation of fast and slow traffic and, a key objective of town planners, lower density housing; this could be served by fast tramways built on reserved 'grass tracks',[3] which were later built on a large scale in Liverpool where extensive suburban housing estates were combined with nearly thirty miles of reserved track tramways 'built in' to the schemes from the outset.[4] A contrary approach to solving the problem of the overcrowded inner city was the garden city concept, but even there the originator of the idea, Ebenezer Howard, saw a place for the tramway to act as a link between the small settlements forming a larger city-scale unit;[5] Letchworth was actually built with space for a segregated tramway,

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1. J[ohn] L[ewis] Womersley, 'Urbanity Lost--and Regained', The Municipal Journal, no.3129, 3 Feb 1953, 247.

2. Horne and Maund, Liverpool Transport 2, 92. 3. Ibid., 90.

4. Joyce, Town Transport, 51.

5. Hamilton and Potter, Losing Track, 76.

although the lines were never laid.[1] There was therefore no necessary conflict between town planning and the modern tramway.

One of the most well-known town planners before and just after World War II was Patrick Abercrombie.[2] In 1924 he produced an outline plan for Sheffield, and his generally positive attitude towards trams is instructive. 'Sheffield', he said, 'is exceedingly well equipped with Tram service in so far as the population is at present situated: it requires, however, the opening up of new areas and the use of the tram or bus as pioneer rather than as camp follower'.[3] He suggested a central tram station[4] and suburban extensions, the latter being related to a planning concept which has lasted largely unscathed to the present day, that of zoning. The Victorian jumble of works and terraces was to be sorted out by separating residential, business, light industrial and heavy industrial land useage;[5] in the latter areas some 500 acres of housing would eventually be eliminated.[6] Tramways could assist this process of dispersion, especially because Sheffield was a compact city, with areas of countryside close enough to need only fairly minor road connections to provide access to work. Thus 'there will be no long and wearisome tram rides through endless town streets, but quick transit along grass tracks at the side of wide boulevards'.[7] The Manor housing estate, already in the course of construction,[8] could be served by a modern reserved track tramway along Prince of Wales Road.[9] This road was of post-war construction and late in 1926 it was decided to seek powers for a tramway on the existing central reservation; when it opened on 25 Feb 1928 a new circular tram service was started via Darnall and Intake to/from the city centre.[10] The estate was a large one, and by 1926 the second to the sixteenth building schemes had already resulted in 2,361 new homes, the planned total

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1. Ibid., 78. 2. Womersley, 'Urbanity Lost--and Regained', 247-8.
3. Abercrombie, Civic Survey, 22. 4. Ibid., 56-7 and 60.
5. Ibid., 45. 6. Ibid., 49. 7. Ibid., 55. 8. Ibid., 22.
9. Ibid., Plate XLII; similar to the Liverpool 'grass tracks'.
10. Hall, Sheffield Transport, 190.

being 3,268,[1] equal to a population of at least 10,000. One other major reserved track line had been built a little earlier, along Abbey Lane and again forming a circular route serving new housing estates;[2] there were in fact to be no more such lines in Sheffield, which remained predominantly a street tramway.

Because of the way in which current town planning concepts of population dispersion could accommodate, even welcome tramways as a means to that end, and because of the specific recommendations of the Abercrombie Survey, it seems highly probable that Sheffield was influenced by planning considerations in adopting its tramway development policy. A particular advantage pointed out by Abercrombie was that only relatively short extensions were needed to take the transport network out into 'virgin territory'. A diagram shows the time taken by tram to the suburbs, and even the outermost zone, including only two tram routes, was only 25-30 minutes away.[3] A second diagram gives distances from the city, and again only two trams routes extend more than three miles as the crow flies. Certain existing or planned estates were already on or near tramways, and the plan showed the wide fingers of land open for development reaching to within a mile of the city centre;[4] one to the south-east was later used for the Manor and Wybourn[5] estates and a larger area to the north-west for the much larger Parson Cross development. The latter was served by extensions to Wadsley Bridge in 1924 and to Sheffield Lane Top in 1934,[6] though neither really penetrated the estate. Even when the various extensions mentioned were built, no tramways would have gone much more than three and a half miles from the centre. Moreover, except to the west where Sheffield's boundary stretched well out into the Peak Dis-

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1. City of Sheffield, Minutes of the Council and Minutes and Reports of Committees (hereafter, Sheffield Minutes), Estates Committee, 15 Sep 1926, 758.

2. Hall, Sheffield Transport, 189.

3. Abercrombie, Civic Survey, Plate XV11. 4. Ibid., Plate XVI.

5. Sheffield Minutes, Estates Committee, 15 Sep 1926, 758.

6. For dates of extensions etc. see Appendix S8.

trict, the longer tram routes already reached to more or less the boundary of the city by 1924.[1]

The Problem of Extensions

In the late 1920s and early 1930s Sheffield's tramways already therefore served the city fairly well; where extensions were needed, they could be quite short. In Manchester this was not so. The city's centre is the Royal Exchange; about a quarter of a mile to the west is the River Irwell and the boundary with Salford, so no development in that direction was possible. A plan of the city[2] shows that the built-up area extended roughly three miles north, south and east. In the latter case housing already more or less reached the boundary, and though there was about a mile of open land to the north, much of this was public open space. So the only room for expansion was in the south. By the 1920s new suburbs were already spreading this way[3] and new reserved track tramways--modelled on those already built in Glasgow and Liverpool--were constructed to serve them via Princess Road and Kingsway for distances of about two miles.[4] In 1926 Manchester bought a large area of land to house up to 100,000 more people. This was six to seven miles away at Wythenshawe, then outside the city boundary in Cheshire. In 1929 the Council decided to serve it by a modern tramway running about two miles further than the previous extensions and costing £50,000. However Stuart Pilcher, newly appointed as Manager that same year, produced a report favouring motor buses which would, he said, be faster, cheaper to introduce, more able to serve various parts of the new estate as it developed and well able to cope with expected demand. Moreover, since Wythenshawe was outside the city, a tramway could not be properly protected from competition. So the

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1. Abercrombie, Civic Survey, Plate XIX.

2. Sherratt and Hughes' Large Scale Plan of Greater Manchester and Salford (n.d., but possibly pre-World War I).

3. J. Joyce, Roads and Rails of Manchester 1900--1950 (hereafter, Rails of Manchester), 77-8.

4. Ibid., 65.

tramway was not built and buses, at a subsidised fare of 8d., were introduced instead.[1]

In Sheffield's case, though, trams could reach Manor via the Intake tramway after only one and three quarter miles; even when the Prince of Wales Road line was built, trams were never much more than three track miles from the city centre.[2] There was no advantage in construction costs, for the Sheffield line was about the same length as the proposed Wythenshawe extension. But the latter was much longer overall, and a motor bus could only manage one return journey per rush hour, packed with passengers from the estate travelling at subsidised fares and leaving no room for more profitable short distance passengers.[3] Wythenshawe was six to seven miles away, say six and a half, so a thirteen mile return trip at a Manchester bus's service speed of 11 m.p.h.[4] would take a theoretical 1.18 hours (1 hr. 11 mins.) plus, say, ten minutes layover time--total 1 hr. 21 mins. Trams round the Prince of Wales Road had to travel only about six and three quarter miles[5], but their average speed of 8.49 m.p.h.[6] meant that they were timed at exactly one hour including layovers.[7] This did give the trams an advantage in time and they could, theoretically, have completed four trips to the buses' three with an equivalent increase in earnings. Probably more important would be the reduction in running costs. Trams at the time cost less to run per seat mile than buses anyway, so over half the distance working costs per peak hour trip would be less than half, giving a very significant advantage to the Sheffield trams in this particular case. This advantage was shared with passengers through low fares. Wythenshawe return cost 8d. and whereas on a pro rata basis the Sheffield fare should have been 4d., up to 1930 it was 3d. and thereafter 1½d. single.[8]

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1. Ibid., 77-9. 2. Distances off a map drawn by J. C. Gilham.

3. Joyce, Rails of Manchester, 79.

4. Pilcher, Road Transport Operation, 116.

5. Distance from Gilham's map. 6. Tramway Returns, 1928-9.

7. Gandy, Sheffield Tramways, 177. 8. For fares, see above 298.

Even at such rates, Sheffield was able to operate its trams at a profit, whilst the Wythenshawe buses were subsidised, meaning that passengers there should actually have been paying more than they did. Sheffield commuters benefitted in another way too from the construction of the circular route, for it provided a direct connection to the city's East End where all the main works were. Morning and evening large numbers of special cars ran direct to/from Intake and Elm Tree and the East End,[1] providing cheaper and faster journeys for commuters and again, of course, reduced costs for the transport undertaking. Workers, instead of going into town and out again, could travel direct in one car, which could do more work in a given time at a lesser costs. A Manchester passenger going to, say, Trafford Park would have faced a further journey of two to three miles and an additional fare.[2]

It should be noticed, however, that establishing Sheffield's special advantages in this way also supports Pilcher's general case that trams were not suitable for long suburban routes. Because trams were slower than buses, journey times would have been greatly extended on a long route like that to Wythenshawe, which would have caused inconvenience to the public, a fall in earnings per vehicle and a rise in costs. Of course, some lengthy tramway extensions were built in this period, in Leeds for instance,[3] and it would be interesting to know how they were made to pay; higher speed is an obvious possibility, and about this time Leeds did get the speed limit raised to 30 m.p.h. on its Middleton Light Railway.[4] But whatever was done, distance was a problem in serving new areas, and Sheffield was obviously very fortunate in not having to build very far out.

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1. Although a later period, see Sheffield Tramway and Omnibus Timetable (1955), 20.

2. This is assuming a tramway had been built to Wythenshawe, though even then through works services might have operated; this would have been much easier with buses, which probably did run various direct services.

3. Hamilton and Potter, Losing Track, 79.

4. Andrew D. Young, 'Leeds Trams, 1939--1959: 3', MT 35 (Aug 1972), 269 (this is a multi-part article spread over numerous issues of the journal; future references are to 'Leeds Trams' with full journal citation).

Traffic Congestion

City tramways were laid down at a period when the only other street traffic was horse-drawn. This caused its own problems of congestion, but obviously the advent of the motor vehicle caused further difficulties, particularly during the interim period when there was still a large amount of horse-drawn traffic too. It was at this stage that Manchester City Council commissioned a report on traffic congestion,[1] much of which was concerned with the problems caused to and by trams. Difficulties caused to trams included being held up by other vehicles, especially by broken-down motor 'lurries' (sic), though the implication of this reference is more to point the virtues of more flexible vehicles which could avoid such hold-ups.[2] The report did recommend prohibiting passing trams on the nearside at stops,[3] but the main drift was that trams were an obstruction and a danger to other traffic, mainly because most Manchester streets were too narrow to allow for fast and slow lanes plus the tram tracks, so forcing the slow (then usually horse-drawn) and fast traffic into the same lane. Trams caused obstruction by their inflexibility, whereas motor vehicles, being able to deviate, did not. There was serious congestion in the central area, because streets were too narrow putting ordinary traffic under a severe handicap because of so many trams in such close succession; this was a 'serious and largely contributing cause to the present congestion of traffic'.[4]

A detailed traffic survey of the central area over one day in 1913 was undertaken and there were indeed a lot of trams. In Mosley Street, one-way for trams, 382 cars passed; in the central area as whole, 18,712 trams were recorded, up slightly from the 17,765 reported after a similar survey in 1911. One reason for the very large numbers may have been because of the inter-running arrangements with other authorities; on Deansgate, for example, there was a great majority of Salford cars. It was noticed that between

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1. City of Manchester Watch Committee, Traffic Congestion: Causes--Relief, Report of the Special Sub-Committee (hereafter, Report) (Manchester, 1914).

2. Ibid., 86. 3. Ibid., 166. 4. Ibid., 68-72.

10 a.m. and 4 p.m. only one third of tram seats were used; 111 of the cars along Mosley Street carried less than ten passengers apiece, for example. The Sub-Committee made an instant statistical deduction; if only one third of the seats were used, two thirds of the trams could be withdrawn during off-peak hours. Passengers would have been unlikely to have appreciated the corollary of tripled waiting times, and nor was there any logical reason for thinking that the trams would have been uniformly as lightly loaded on the outer portions of their routes. However, the Sub-Committee were impressed with certain cities where trams were banned altogether from the centre, which was served by motor bus instead; these cities included London, Paris and Berlin. It was therefore suggested that tram traffic be either reduced or banned in the city centre in off-peak hours; motor buses could carry the relatively few cross passengers onwards, with the least possible effect on normal traffic (my emphasis) because of their flexibility and mobility.[1]

At the same time as the Watch Committee's Report was commissioned, the Tramways' Committee was asked to enquire into ways of dealing with rising demand.[2] Joyce gives details of this and of a subsequent report by the General Manager following an overseas tour. Tram traffic was already very heavy, with three to four and a half million passengers per route mile per annum on the main arteries, comparable to that on some London tubes. It was obvious that saturation point had been reached on certain city centre roads, and the Manager's report favoured an eventual sub-surface rapid transit system linked to main-line railways. Tram subways were not favoured,[3] but as an immediate palliative various additional central area lines were proposed plus development of city termini rather than having cross-town tram services. The various reports on the traffic problem, together with another

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1. Ibid., 9-10, 68-73, 75, 125, 133-4, 167-8. 2. Ibid., 5.

3. Though it does appear one was proposed in 1914 between London Road (now Piccadilly) Station and Blackfriars. Today a light rapid transit system is proposed combining the best of both worlds, with light railcars providing surface connections between the railway stations and also running on certain suburban rail lines (lecture given by Dr. Tony Young, Principal Planning Officer, Greater Manchester PTE, to the Light Rail Transit Association's 1986 AGM).

from the Improvement Committee, were further considered by a Traffic Congestion Special Committee, which reported in 1917. It tended to combine elements from each approach, favouring central tram termini and also the use of motor buses to connect these following the withdrawal of trams from some busy streets. It was also hoped, rather optimistically, that as horse-drawn traffic was replaced by motor vehicles after the war, the latter would actually reduce congestion because of their speed and mobility.[1]

The available data on traffic congestion in Sheffield is not directly comparable. Abercrombie's report naturally dealt with the issue and recorded a great increase in traffic since before World War I. In fact, traffic seems to have been very light then. A traffic census taken between 26 Aug and 8 Sep 1910 from 8 a.m. to 9 p.m. on Abbeydale Road South, Chesterfield Road, Ecclesall Road South, Manchester Road and Middlewood Road recorded an average of between 32 and 129 motor vehicles and 279 and 719 horse-drawn vehicles passing per day on the various routes.[2] Granted these were suburban roads rather than the city centre, but in no way could these rates have been aggregated to produce the 67,000 plus vehicles reported in Manchester's city centre in both 1911 and 1913.[3] Abercrombie said that traffic on the Wicker had risen from 5,188 tons per day in 1914 to 14,085 in 1923; at Exchange Place the increase was of 377 per cent.[4] The tonnages do not include trams but, significantly, they do appear in a measure of obstructiveness used elsewhere in the report. This was based on a table of 'obstruction units' used by the Board of Trade, part of which is reproduced below in Table 43. As and when these are used, the 'traffic measurements' on streets go up sharply as against those based only on tonnages.[5]

Before continuing with the Manchester versus Sheffield comparison, it is worth following up the issue of congestion and especially the supposedly

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1. Joyce, Rails of Manchester, 57-64, passim.
2. Gandy, Sheffield Tramways, 31.
3. Manchester Watch Committee, Report, 9-10.
4. Abercrombie, Civic Survey, 20. 5. Ibid., 20-1.

TABLE 43

BOARD OF TRADE OBSTRUCTION UNITS
(SAMPLE VALUES ONLY)

Nature of Traffic	Values
Cycles	½
Cars	1
Cattle	2
Bus	3
Charabancs	4
Traction Engines	6
Heavy Vehicles, two or more horses	10
Tram	10

SOURCE: Abercrombie, Civic Survey, 21.

'scientific' basis of measurement. The origin of the 'Table of Co-efficient of Obstruction' is shrouded in mystery. Bond says that it was 'reputedly' drawn up by the London Traffic Branch of the Board of Trade, but that it was always 'strenuously denied' by the Board's Railway Inspectorate, who condemned it. It was however regularly used by the Metropolitan Police against the LCC and other London tramays. Incidentally, it appears that the original table did not even include traction engines, so apart from horse buses and slow motors at '5', there was nothing else to dispute the tram's and two-horse dray's position at the 'top'.[1] Presumably this table must have had some sort of justification at one time, though much of it seems based on impressions rather than anything worthy of being described as 'Obstruction Unit Values'. It is difficult to see how cattle or traction engines could be less obstructive than trams or even than horse vehicles, to all of which the tram could show a clean pair of heels. The way this table reappears in Abercrombie's report shows how figures of doubtful validity could--probably in the absence of anything better--find their way into academic or professional work and thus carry an undeserved weight.

1. Bond, History's Orphan, 57-8; he has a rather different version of the table.

For there is no doubt that the tram's real or supposed effect on traffic movement was a serious factor in the generally negative image it came to have in the 1930s.

Returning to the relative incidence of congestion in Sheffield and Manchester, it certainly appears that the problem was worse at an earlier date in the latter city. Even before World War I Manchester had built extra tram lines to parallel existing ones to relieve central area congestion and had also started to use locations like Albert Square as termini to keep trams out of the worst affected streets.[1] It was not until 1924 that Sheffield found it necessary to construct a central tramway loop via Exchange Street, to be used by cars on three routes to help reduce congestion in Haymarket, Fitzalan Square and Commercial Street by obviating the need to reverse the trolleys there.[2] A little earlier, in 1922, there had been some discussion of traffic problems caused by loading of vehicles in the centre, by parking and by tram stops;[3] this last came up again in 1924,[4] but in general the issue seems to have arisen later and bulked less largely on committee agendas than in Manchester. It was not until the late 1920s or early 1930s that traffic control began to worry the authorities in Sheffield seriously, nearly twenty years after the first of the series of Manchester reports was commissioned.[5] After consultation between the Chief Constable and the Watch Committee in 1930 trams stops were removed from one of the main streets, Fargate, and re-sited in Pinstone Street, which was made one-way except for trams. Traffic control between the two streets at the Town Hall was by a point duty policeman then, but early

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1. Joyce, Rails in Manchester, 57.

2. Sheffield Minutes, Tramways and Motors Committee (hereafter, T&MC), Engineering Sub-Committee, 26 Aug 1924, 772.

3. Joint Sub-Committee, T&MC, Watch and Markets Committees, 15 Dec 1922, 102.

4. Watch Committee, 19 Jun 1924, Report of the Joint Sub-Committee on regulation of traffic at tramway stopping places, 637-8.

5. In 1911; see Joyce, Rails in Manchester, 57.

in 1931 he was replaced by a manned kiosk with colour light and semaphore signals. In 1933 a third track was added in Pinstone Street giving facilities for some services to load from the kerb whilst others, which had stopped previously, could overtake. The police-operated signals were also removed and, oddly, Pinstone Street once again became two-way.[1] As Gandy points out in the passage just cited, these alterations were very much for the benefit of tram passengers, and the whole approach does not seem to betray any of the Police/Watch Committee anti-tram bias so evident in the Manchester reports.

It therefore seems fair to say that (1) traffic congestion was less severe; that (2) serious problems arose fifteen or more years later; and that (3) the attitude of the police etc. was more favourable to trams in Sheffield than was the case in Manchester. There are various obvious reasons for facts (1) and (2), notably that Sheffield was a smaller city than Manchester and was, with the exception of being contiguous to Rotherham, not the centre of a large conurbation. Undoubtedly, it would appear, the variation in the traffic problem was one reason why trams were kept in Sheffield but not in Manchester. It is a little curious, however, that Pilcher did not make more of this. In 1930--probably writing before he came to Manchester--he does refer to the motor bus's mobility in traffic and its freedom to move away from the road centre.[2] In 1937 he expanded a little, possibly with a hint of the issues raised in the Manchester report of 1913; buses could reduce congestion by spreading traffic over several streets and central termini, possibly even avoiding the main streets in the centre altogether, but the process is limited, he said.[3] However, as will be shown below, the equation 'Trams = Congestion' was to lose none of its force with the passing years.

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1. Gandy, Sheffield Tramways, 68-9; two-way for road traffic, of course, for trams had operated both ways throughout.

2. Pilcher, Road Transport Operation, 182.

3. Pilcher, Road Passenger Transport, 292.

Conclusion

It has been shown that in the inter-war years town planning objectives of population dispersion could be assisted by tramways, particularly where distances were relatively short; longer extensions, such as that proposed to Wythenshawe, were more problematic, and Sheffield was fortunate in having vacant sites close to the city centre to which tramways could be economically prolonged. Trams were perceived as major contributors to traffic congestion from early in the century, but do not appear to have been so viewed in influential quarters in Sheffield, which probably had a good deal to do with the fact that congestion was not so severe there as it was in a conurbation like Greater Manchester.

CHAPTER 15

MOTOR BUS POLICIES AND THEIR EFFECT ON TRAMWAYS

The Sheffield Policy

Appendices S9 and S10 show the development of motor bus services in and around Sheffield. Municipal services seem to have started about a year before private concerns entered the field, and this really epitomises the relationship from then on; the Corporation was almost always ahead of the competition, and took a leading role in initiating bus services over a wide area. The policy was succinctly put in a statement by the Tramways and Motors Committee in November 1925:

> The policy of the Sheffield Corporation in regard to road transport is, plainly stated, that they, being the owners of the large tramway system in the central area, feel that it is their duty to provide, in connection with that system, transport facilities for the less densely populated and surrounding areas within reasonable distance of the city. They recognise that the motorbus has a useful field of operation in conjunction with the tramways, and as the Transport Committee for the Sheffield area they are prepared to do all that is necessary in and around that area by providing motorbus services to the whole of the surrounding districts . . . The opinion of the Tramways & Motors Committee is that it is better for road transport to be co-ordinated in this way rather than that wasteful and unnecesary vehicles should be operated, which in the end would mean loss, inefficiency, unnecessary expenditure, and, finally, the waste of the effort and money of the competitors. (1)

The policy of limiting private motor bus competition was effected by exclusion, purchase and agreement. The initial policy was the almost total exclusion of buses from the city centre by making them stop at tram termini. This was true for municipal buses too until 1925,[2] with only one real exception

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1. Sheffield Minutes, T&MC, 24 Nov 1925, 71.

2. S.T.D., Brief History, 15.

between Fitzalan Square and Heeley Green.[1] There were a number of private services which started running in to the city from 1921 onwards,[2] but the scale of operation was such as to pose no real threat to the trams; for instance, when Battey's route was purchased by the Corporation he had only two vehicles.[3] Analysis of traffic returns[4] reinforces the common sense view that infrequent out-of-town bus services had little or no effect on the trams. Later in the 1920s, however, the pace of competition began to increase; more private services were established and most started to run in over the tram routes, partly as a result of a dispute between the Watch and Tramways Committees. In 1925 the former made it clear that they saw no reason not to licence local applicants who paid union wages, ran new buses and would provide an adequate service; it was in response to this that the Tramways Committee issued the statement quoted earlier.[5] The City Council ruled that a tramways' representative should attend further licensing hearings,[6] but of course some damage had already been done. Usually, however, every effort was made to enforce the exclusion policy where the Corporation's interests were felt to be threatened. Refusal of licences sometimes deterred applicants,[7] and where it did not actual or threatened prosecution might see the offender off, as it did with Machin, who withdrew his Chesterfield service after less than a year.[8] Other more determined operators paid the fines and appealed to the Ministry of Transport or, later, to the Traffic Commissioners against the refusal of licences; at the hearing the Corporation sometimes gained an advantageous compromise,[9]

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1. See Appendix S9. 2. See Appendix S10.

3. Hall, Sheffield Transport, 162. 4. See Appendix S11 and below.

5. Hall, Sheffield Transport, 164.

6. Sheffield Minutes, Watch Committee, 15 Apr 1926, 423.

7. For the refusal of a planned Millhouses--Dore service in 1921, see Hall, Sheffield Transport, 158.

8. Ibid., 160-1.

9. For instance, Kitson's two services to Treeton were reduced to one following a ruling from the Commissioners in 1932; see ibid., 217.

though there was a tendency on the Ministry's part to support established independents.[1] The most serious dispute was with the much larger firm of Underwoods, who appealed to the Ministry in 1922[2] and in 1924 secured an agreement to limit competition and to share services;[3] when this broke down in 1927 after provocation by the Corporation, the latter had to climb down and surrender certain services they had purchased.[4]

Where exclusion failed, the Corporation often purchased the services of small operators who had succeeded in becoming established. This policy began in 1924 with Battey's Bakewell service and eventually included most surviving independents, so although there were quite a number of these in total, at any one time there were very few on the road. By summer 1925, for example, 16 operators had started 25 services, but already 8 proprietors had surrendered all their routes to the Corporation, either through their own failure or by purchase, and a few other routes had been transferred by agreement; this left just 7 operators and 14 routes in private hands, and by 1934 almost all those in Appendix S10 had been purchased or put off the road.[5] By these means the Corporation was very successful in limiting the numbers of private competitors. Unfortunately a good 'run' of figures for buses licensed does not seem to be readily available, but in July 1924 82 vehicles were licensed,[6] rising to 147 in 1926.[7] This compares with 272 licences issued (about twenty being municipal) for the much smaller town of Doncaster in the latter year and to 653 (all private) in 1929,[8] a number which can never have been approached in Sheffield. The largest block licensed must have been the East Midland (ex-Underwood) fleet, which

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1. Wigmore's eventually gained a licence by this means; see ibid., 211.

2. Ibid., 158. 3. Ibid., 162. 4. Ibid., 168-9.

5. See Appendix S10.

6. Sheffield Minutes, Watch Committee, Stage Plays and General Sub-Committee (hereafter, Watch Sub-Committee), 17 Jul 1924, 699.

7. Ibid., 1 Jul 1926, 590; it is not made clear if these figures include municipal buses, but it is unlikely.

8. See Appendix DN4.

numbered 82 in 1928.[1] The Corporation was unable to deal with operators of this size by any of the means outlined, and so was forced to compromise. Sometimes routes were divided between themselves and a competitor, as happened with Underwood in 1924,[2] but more commonly individual services were shared with each participant contributing a set proportion of the vehicles and taking an equivalent share of the profits; the partners might be municipal, as on the route to Chesterfield,[3] or private, as on the Buxton and Castleton routes shared with the North Western Road Car Company.[4]

A new and serious threat arose around 1928 when the main-line railway companies were seeking general road transport powers. Fortunately Sheffield was far-sighted enough to open negotiations with the London Midland and London and North Eastern Companies at an early stage, and the result was the formation from 1 Jan 1929 of a Joint Omnibus Committee (hereafter, JOC) between the three parties. Routes were divided by distance into categories A (city), B and C, owned respectively by the Corporation, by both parties and by the railway companies alone. The existing fleet was officially split three ways too, but the whole remained under the operational control of the Corporation, whose Manager was also Secretary of the JOC.[5] In effect, this was a similar agreement to that reached by the railways with many of the area bus companies, like Yorkshire Traction; the railways took a financial stake but left operation to the professionals. Curiously, with all its obvious advantages, this type of arrangement never spread beyond Yorkshire, in which similar joint services were arranged with Halifax, Huddersfield and Todmorden Coporations; an agreement with Leeds was almost concluded but never put into effect.[6] C. T. Humpidge, when Manager of Sheffield Transport and Secretary of the JOC, commented that the scheme

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1. Sheffield Minutes, Watch Sub-Committee, 7 Jul 1928, 553.
2. Hall, Sheffield Transport, 162. 3. Ibid., 161 and 164.
4. Ibid., 169; for details of all joint services, see Appendix S10.
5. Ibid., 169, 171-2 and 210.
6. Charles F. Klapper, The Golden Age of Buses (hereafter, Buses) (1978), 49-50.

was most successful, worked well and was the envy of many; there was, he said, 'no competition', which in effect was true, for virtually all buses running in and out of Sheffield were under Corporation control and rules and were staffed by them.[1]

Protecting the Trams

Although by exclusion, purchase and agreement the Corporation was able to reduce private bus operations to very low levels indeed, the problem of competition with the tram services remained and indeed grew more serious as the inter-war years progressed.

In 1925 the Corporation began extending its own bus services from tram termini into the city centre.[2] There were at least four reasons for this. First, pressure was often put by or on behalf of the public to achieve the convenience of through services. So, for example, when the Corporation took over Battey's Millhouses to Bakewell service, Bakewell UDC threatened not to renew the licence if the buses did not run through, which they did from February 1925.[3] Second, extension of services was often a response to competition; this was why the Penistone and High Green routes started to run through the following month.[4] Third, as the Corporation began acquiring other operators' services, such as Glossop's routes in 1926,[5] it obviously made sense to continue to run from the city centre if this was already the case. Finally, and especially in the 1930s, there was an increasing need for purely urban services; these were sometimes established as tramway feeders, but not always, and even if they were, the pressure was always for through routes to be provided. Thus, for example, the long-established Wincobank service was run through to the Midland Station in 1931, only the first of a number of urban bus routes which were

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1. Humpidge, unpublished lecture notes, 2.
2. S.T.D., Brief History, 15; for full details, see Appendix S12.
3. Hall, Sheffield Transport, 162. 4. Ibid., 163-4.
5. See Appendix S10.

extended or established in that decade.[1] It will be necessary to return to this point later.

But it was still policy to protect the trams. This was done vis-a-vis external operators by imposing the usual conditions on picking up and discharging passengers along a tram route[2] and, second, by enforcing a protective fare, which in the case of Underwoods in 1924 was 100 per cent higher than the tram fare.[3] It is not known whether the first condition also applied to Corporation/JOC services, but the second certainly did. For example, the pioneer route to Lodge Moor had a 3d. maximum in 1913[4] at a time when the standard tram fare was only 1d. Of course, high fares were probably necessary then to cover the high running costs typical of buses; the short-lived Brocco Bank service in 1920 also had a 3d. fare, but ran at a loss.[5] Later fares were not so high pro rata, but were still kept above tram fares. Early in 1935 fares were fixed for the recently acquired Thorpe Hesley bus route. The tram fare of 1½d. only took passengers to Garter Street, a bit short of Newhall Road on the Brightside tramway; Brightside Station, roughly the tram terminus,[6] was 2d.; and to reach the city boundary at Deep Lane cost 3½d., whereas tram routes such as Middlewood and Intake reached the boundary for less than half that.[7]

A reasonable conclusion from Appendix S10 is that as rural or interurban services were extended into the city, they did little or no harm to the tramways. When tramway revenue on a particular route is measured before and after the incursion of a bus service, in most cases up to 1927-8 gross rev-

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1. See Appendices S9 and S12.

2. Sheffield Minutes, Watch Sub-Committee, 7 Jan 1926, 180 for example.

3. Hall, Sheffield Transport, 162.

4. Ibid., 122; of course this route did not compete with any tramway, so the intention here was not protective.

5. Ibid., 155; price rises would have made this fare much less in real terms than the Lodge Moor one.

6. Other tram routes went much further for the standard fare.

7. Bus fares in Sheffield Minutes, T&MC, 15 Jan 1935, 222.

enue actually goes up, though there does seem to be a tendency for revenue per car mile to fall, which could have been a problem. If these four-weekly results are translated into a notional annual increase/decrease, then the largest tramway 'loss' was £1,206 per annum on the Woodseats route following the introduction of the Chesterfield bus and of a short-working to Dronfield. This would obviously reflect the loss of the former 'feeder' traffic from the shuttle bus service. Overall, though, the imposition of carriage and fare restrictions on out-of-town buses seems to have been quite effective in this period in protecting tramway revenues. Protection was not the only reason why the buses had little impact. Another, already mentioned, was that the scale of services was insufficient to make much of a dent in tramway traffic. For example, when the Corporation bought Glossop's services he was running five separate routes, but had only six single deck buses,[1] clearly only allowing an infrequent and low-capacity service. In the same year, 1926, the tramcar fleet stood at 400[2] and a typical off-peak service varied from ten to three minutes, depending on the route.[3] As final confirmation that motor bus competition was not all that serious a threat to the tramways--or was at least prevented from becoming so by the Corporation's tough policies--after a shaky start around 1922-3, both tram passengers and revenue rose steadily over the rest of the decade, apart from a set-back in the 1926-7 period.[4]

The Policy in Manchester

Manchester by contrast seems to have been much more troubled than Sheffield by persistent pirate/private motor bus competition. One reason may have been that the Corporation failed to develop its own bus services early enough. It is true that Manchester started a service in 1906,[5] seven years

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1. Hall, Sheffield Transport, 165-6. 2. Appendix S3, column (3).

3. Gandy, Sheffield Tramways, 175; actually 1939 services, but 1926 service levels were probably not greatly different.

4. Appendix S3, Columns (5) and (6).

5. Joyce, Rails in Manchester, 68.

earlier than Sheffield, but development was slow. By 1914 there were only eight buses, which were commandeered, presumably bringing services to an end for the duration; in 1924 there were twenty-five buses running over twenty-three route miles.[1] In the same year, Sheffield had fifty-one buses[2] in service on routes as far out as Bakewell (about seventeen miles) and Penistone (about fifteen miles), plus quite a number of shorter routes.[3] The contrast is greater when the relative sizes of the cities are compared; in 1931 Sheffield's population was 518,257 and Manchester's 766,311.[4]

So far as private motor bus competition with trams was concerned, Manchester had a problem which Sheffield did not in that many of its routes extended beyond the city boundary where protection was not necessarily available. In one case the Corporation appealed to the Minister of Transport over the granting of a licence to A. Mayne and Company[5] for a Manchester to Droylsden service on the grounds that the tramway was inadequately protected. Mayne's were already prohibited from picking up or setting down local passengers in the city and had to charge ½d. excess fare per stage, but Manchester wanted the same rules to apply beyond the city plus even higher bus fares; this was not granted, on the interesting ground that the tramway was inadequate for a through service beyond Manchester.[6] In this case, buses gained a legal right to compete. In another, when private buses started running over the Altrincham tram route on 18 Nov 1929 through the areas of six local authorities, only one--Ashton-on-Mersey--had licensed them; curiously, it thus appeared they could operate anywhere without police control and on streets where Manchester buses were not allowed,

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1. Klapper, Tramways, 137; he dates the first bus service to 1908.

2. See Appendix S13. 3. See Appendix S9.

4. H.M.S.O., National Register, United Kingdom and Isle of Man, Statistics of Population on 29th September 1939 . . . Report and Table (1944), 10 and 24.

5. It is interesting to note that after the deregulation of bus services in 1986 buses with the fleet name 'Mayne' again appeared on Manchester streets, presumably owned by the same firm (personal observation).

6. Chester, Public Control, 131 and footnote thereon.

so taking some of the tram traffic.[1] When Manchester did begin to develop its own bus services seriously in the 1920s, these tended to be suburban feeders to the tramways,[2] as Sheffield's were at that time too. This was so rigid a policy that when the Middleton tram company's operations were taken over in 1925, an existing bus route to Heywood was cut back to the tramway.[3] However, partly in order to protect its own trams against bus competition, the city introduced express buses from April 1927 which ran over the tram routes.[4] It is worth noting that this change took place whilst Stuart Pilcher's predecessor was still in office and that Pilcher himself did not originally expect or even want these buses to take the trams' short-stage traffic.[5] The scheme was much more successful than expected, and the attractions of speed and comfort inevitably took passengers from the trams. Most neighbouring transport operators were quickly brought into the network, and even by 1928 there were sixteen routes; by 1930 there were twenty-seven. In effect, the tram system had been outgrown; it did not serve the new residential areas and was in any case fundamentally unsuited to providing long-distance services,[6] as the Mayne judgement and the popularity of express buses showed.

The almost inevitable result seems to have been that, where trams and buses ran together, the trams started to lose money. So for instance when Middleton Council asked for a through bus service to Manchester or Salford via Manchester Old Road in 1929, Manchester refused because most of the road was already covered by buses and trams, and the latter were losing money even then.[7] In the case of the Altrincham route, tram receipts fell

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1. A. K. Kirby, 'The Tramways of Sale and Altrincham' (hereafter, 'Tramways of Altrincham'), TR 14 (Summer 1981), 57.

2. Ibid., 56.

3. A. K. Kirby, Middleton Tramways (Rochdale, 1976), 56.

4. Ibid., 67. 5. Pilcher, Road Transport Operation, 131.

6. Joyce, Rails of Manchester, 74-6.

7. A. K. Kirby, Middleton Tramways, 67.

from £1,473 a week in 1927-8 to only £1,102 in 1930-1 (up to September) due, Pilcher thought, to their own express buses and to competitive private ones. Bearing this out was the fact that the Sale branch (off the Altrincham line) had suffered only a very small decline in revenue and had no express or other competitive buses along it; Pilcher was nontheless careful to add that 'the problem will shortly be the same as Altrincham'.

It was thus quite possible to have three types of vehicle operating along the one road--express buses, trams and competing stage buses. The obvious solution was to eliminate one or more, so ensuring the remainder were profitable. In Manchester it was unlikely that the loss-making trams would be preferred, particularly as expensive track renewals were becoming necessary too; £42,640 needed spending on one of the lines to Middleton, for example. In cases like this, Pilcher recommended tramway closure. Of course, since the replacing buses had to observe all the tram stops, they were slower than the express buses, by ten minutes in this instance. This was still faster than the trams, but the tendency as buses replaced trams was to eliminate the express buses also; it did not make sense to run two categories of the same vehicle, and in any case the Traffic Commissioners, once established, did not agree with the express services. So the result of tramway abandonment was largely to concentrate traffic on one sort of vehicle instead of three, which must obviously have made economic sense.

It is true that from 1925 Sheffield buses began to be extended into the city centre too, but initially these services were deliberately designed not to compete with the trams and were certainly not marketed as superior. The change does not appear to have affected tramway revenues very much, though by the 1930s new city bus routes were beginning to abstract traffic. Pilcher was probably right to say that 'the problem will shortly be the same

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1. Kirby, 'Altrincham Tramways', 59.

2. Kirby, Middleton Tramways, 71.

3. Joyce, Rails of Manchester, 76. 4. See Appendix S11.

as Altrincham', but Sheffield's policies succeeded in deferring the problem for a decade, which obviously made a great deal of difference to the survival prospects of the tramway.

Increasing Difficulties

In the 1920s and still more in the 1930s Sheffield continued to grow and expand as the planning aims of residential/industrial zoning and the transfer of residents to new estates were gradually achieved. In addition, the city boundary was extended and these new areas required better transport. The Manor estate was served by tram, but others were not; in 1927, for example, a bus service was provided to Norwood and two years later another to Southey Green,[1] both being some way off the Firth Park tram route. Some of these routes, such as those to Wisewood and Stannington in 1930, were started as tramway feeders in the old way. But this was generally a temporary expedient, and gradually these and other longer established routes were extended into the city, on the same pattern as the out-of-town services. Other routes were established as direct city to suburb services from the start. Three short tram routes were closed in the period 1925-36. Each was judged on its own merits and not as part of a general tramway replacement scheme.[2] It had originally been intended to renew and extend the Petre Street tramway, but the cost of this was £27,000 as against only £11,800 for buses; at the time receipts were only about £220 per week.[3] So the line was closed on 19 Apr 1925.[4] The same happened when the Nether Edge track came up for renewal in 1933;[5] buses started in March 1934.[6] Finally the Fulwood via Broomhill service was replaced on 25 Aug 1936.[7] It had, the Manager reported, run at a consider-

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1. For details of the bus routes, see Appendix S9.
2. Hall, Sheffield Transport, 194 and 196.
3. Sheffield Minutes, T&MC, 22 Jul 1924, 773.
4. Hall, Sheffield Transport, 189. 5. Ibid., 194. 6. Ibid., 195.
7. Ibid., 196.

able loss for many years and, except at peak hours, was not worth running as a tramway; an additional difficulty was that much of the track was laid very close to the kerb.[1] Cutting away dead wood like this would have been beneficial to the tramways[2] rather than the reverse, whilst in 1934 four tramway extensions were authorised for the Meadowhead (the only one not built[3]), Handsworth, Intake (extended again at the end of 1935[4]) and Firth Park (taking it to Sheffield Lane Top) routes; the total cost of the complete scheme would have been £54,099, all to be met out of revenue. No addition was to be made to through fares, but revised 1d. fares would be fixed.[5]

The long-standing Council policy of uniform maximum fares, whatever the distance, had serious financial implications to which Mr. Fearnley drew attention in a comprehensive report on fares in June 1935.[6] The extra mileage on the three extensions had then been operated only for a few months, but even so had reduced overall tramway receipts by 0.529d. per car mile as compared to 1931; a full year would show a larger drop.[7] Some actual results for the lines concerned are given below. It will be seen that a marginal increase in gross revenue (and for the longest extension to Intake, quite a substantial one of nearly 20 per cent) was achieved due to the increased ridership attracted. But in every case the revenue per car mile fell markedly, reflecting the fact that some passengers were travelling further for the same fare and also, probably, that more cars would be needed

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1. Sheffield Minutes, T&MC, 21 Jan 1936, 244.

2. As was the contemporary policy in Leeds of abandonning awkward single-and-loop lines in the city centre and also cutting back long routes outside the boundary and subject to bus competition; see A. E. Jones, Roads and Rails of West Yorkshire 1890--1950 (hereafter, Rails of Yorkshire) (1984), 124.

3. Hall, Sheffield Transport, 194. 4. Ibid., 195.

5. Sheffield Minutes, T&MC, 20 Feb 1934, 279.

6. Ibid., 18 Jun 1935, 720-3; drawn up in a successful move to oppose City Council pressure for yet lower fares.

7. Ibid., 722-3; revenue per car mile did fall by 0.73d between 1930-1 and 1933-4 and by a further 0.53d. in 1934-5 (Appendix S3, column (7)).

TABLE 44

SHEFFIELD CORPORATION TRAMWAYS: COMPARISON OF REVENUE PER CAR MILE ON SELECTED TRAM ROUTES BEFORE AND AFTER EXTENSION

Route	Gross Receipts			Average Revenue per Car Mile		
	Before £	After £	Change £	Before d.	After d.	Change d.
Firth Park	6,095	6,155	60	16.71	14.82	1.89
Handsworth	3,337	3,401	64	12.99	11.69	1.30
Intake	1,903	2,265	362	17.39	15.79	1.60

SOURCE: Traffic Returns in Sheffield Minutes, T&MC (page in parentheses), for the four weeks ending 17 Nov 1934 (58) for Firth Park and Intake and 16 Jun 1934 (634) for Handsworth; for all routes after extension, 15 Jun 1935 (724).

for the longer routes. Despite this, short tram extensions were (according to Hall) preferable to putting on buses to the new housing estates, because bus services would have competed with trams for most of their length.[1] However, it was a different matter when a longer extension to the newly developed part of Shiregreen was required. A tramway loop from Sheffield Lane Top back to Firth Park had been previously authorised, but it would have been two miles long and could not have been operated except at a loss. So a circular bus service was put on instead; three years later, in 1938, this was extended into the city. It was also decided to serve the developing Parson Cross estate by direct buses and another authorised tramway--a short extension from Wadsley Bridge--lapsed in the process.[2]

The management had always been aware of the dangers of parallel city bus and tram services, and usually resisted pressure to provide them. In 1932, for example, a request was made for a service from Birley Carr, just beyond Wadsley Bridge terminus; the Manager reported that the tramway had only been extended eight years previously at a cost of £30,000 and a bus service would seriously affect revenue,[3] so the proposal was rejected in the

1. Hall, Sheffield Transport, 194. 2. Ibid., 196.

3. Sheffield Minutes, T&MC, 19 Jul 1932, 649.

Council. It was impossible to avoid competition in every case and, Hall says, 'always, within the city, the tendency was for new bus routes to extract traffic from the trams'.[1] He quotes the Firth Park tramway, which shortly after the start of the through Shiregreen buses had lost receipts of £120 per week, equivalent to 20,000 passengers, the same as had transferred from the Intake cars a year before when a bus route had started to another new estate at Arbourthorne.[2] Appendix S11 shows monthly receipts for certain tram routes both before and after the institution of a competitive motor bus service. The losses are not always as great as in the examples quoted by Hall. The Handsworth via Woodthorpe bus, for instance, seems to have had little effect on competing tram routes. However the general trend in the 1930s is adverse, sometimes severely so. Of the routes analysed, Wincobank/Brightside lost £89 a week, Lodge Moor/Fulwood only £13, Bents Green/Ecclesall £97.50, Gleadless/Intake £48.25, Shirecliffe/Firth Park £135.75 and Shiregreen/Firth Park £62.25. The Intake and Firth Park losses are less than the £120 Hall quotes, one possible explanation being that the effect was worse immediately after a bus route opened and that after a year the tram passengers tended to rise again. On the other hand, though, the Firth Park route was actually losing more than Hall indicates, for it was not one but several bus routes which were imposed upon it. If one takes the revenue on Firth Park for the four weeks ending 16 Oct 1937 before any of the Shirecliffe, Shiregreen or Parson Cross bus services had begun[3] and then again in the month ending 15 Jul 1939, there is a fall in gross revenue of £926 (or £231.50 a week) and of revenue per car mile of 0.39d.[4]

There is no simple causative relationship between the financial performance of the trams and a rise in motor bus services and traffic. Reference to Appendix S3 shows that both passenger loadings and revenue fell

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1. City Council, 7 Sep 1932, 720.
2. Hall, Sheffield Transport, 222. 3. Ibid., 196.
3. See Appendix S9. 4. See the last two lines of Appendix S11.

away sharply after 1929-30, the decline continuing until 1932-3, after which there is a gradual recovery until 1937-8, when there is renewed evidence of weakness in these key variables.[1] The decline in traffic at the beginning of the decade cannot have been much affected by new or extended bus routes, for there were not many of these at the time,[2] the fall probably being more related to general economic conditions of the period. Additionally, revenue was bound to fall after the fare reductions of 1930-1, which would only have fully worked through in 1931-2. The peak in passengers and revenue in 1937-8[3] was followed by a further decline which can much more clearly be related to changes in the bus network in the late 1930s.[4] Significantly, also, the revenue per car mile figure does not again reach its 1931-2 level[5] until after the outbreak of war.[6] As shown above, the fall in revenue per mile run was partly related to the fares policy for tramway extensions, but competitive bus routes almost always reduced it too.[7]

The most illuminating contrast is between the general trend of tramway results and those for urban bus services. Table 45 below shows the changes in traffic revenue for trams and buses between 1929-30 and the outbreak of war. Tramway revenue, despite the partial recovery already noted, actually declines by 1.11 per cent over this period, whereas motor bus revenue overall rises by 184 per cent and that for Category A buses--the urban competitors to the trams--by a staggering 247 per cent. Overall bus revenue goes up from 22.23 per cent of tramway receipts in 1929-30 to 58.13 per cent in 1938-9. Motor buses were thus evidently rapidly increasing their market share. Most of this was obviously new traffic, because the trams did not lose £339,372 revenue over the decade.[8] But some existing tram traffic was

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1. Appendix S3, columns (5) and (6). 2. See Appendix S12.
3. Appendix S3, columns (5) and (6); the most passengers to date.
4. See Appendix S12. 5. The first full year of reduced fares.
6. Appendix S3, column (7). 7. See Appendix S11.
8. The amount gained by buses during the period of Table 45.

going to the buses, as the analysis in Appendix S12 demonstrates, and some of the new traffic picked up by the buses would have gone to the trams in the former's absence, particularly if certain planned tramway extensions had been built.

TABLE 45

TRAFFIC REVENUE EARNED BY SHEFFIELD CORPORATION TRAMS AND BUSES 1929-30--1938-9 IN POUNDS

Year	Trams[a]	Buses[b]		
		Category A	50% Category B	Total
1929-30	910,812	123,176	61,058	184,234
1930-1	849,531	134,055	60,732	194,787
1931-2	809,009	147,732	60,788	208,520
1932-3	785,631	158,632	58,871	217,503
1933-4	811,690	179,904	65,645(c)	242,549
1934-5	821,507	222,514	71,548	294,062
1935-6	851,682	254,213	76,875	331,088
1936-7	875,440	296,268	85,364	381,632
1937-8	905,099	379,558	94,690	474,248
1938-9	900,947	427,471	96,135	523,606

SOURCES AND NOTES:

a. Appendix S3, column (6).

b. Bus revenue from Sheffield Accounts (printed with Annual Reports), Motor Bus Revenue a/c.

c. From this year onwards these figures include a very tiny amount of miscellaneous revenue not strictly traffic revenue.

In spite of their difficulties the Sheffield tramways remained profitable throughout the 1930s. A net surplus was earned each year and the general trend for profits was upwards.[1] Most if not all of the routes must have remained individually viable too, or else moves would presumably have been made to close them like those which had already been replaced. There was something of a question mark over the Brightside route, but in the event all that happened was the replacement of trams by buses on Sundays;[2] it may have been thought necessary to keep the route, even if marginal, because of its heavy workers' traffic during the week. The relative prosperity of

1. Appendix S3, column (20). 2. Hall, Sheffield Transport, 194.

Sheffield tram routes, as opposed to those in other cities, probably had a lot to do with the fact that the transport department continued to make every effort to ensure that trams and buses did not run along the same roads. The Shiregreen bus route, for example, left the city by entirely different streets to the Firth Park tramway, paralleled it for just three quarters of a mile mid-way, and then struck off on its own again.[1] Whereas in Birmingham, by contrast, buses were running up to $4\frac{3}{4}$ miles along a particular tramway, causing passenger losses of 40,894 per week to the trams after the buses had been running for a year;[2] this was double the passenger losses mentioned by Hall for Sheffield. Manchester's express buses would have had a similar effect on parallel tramways. As against the latter too, there was no attempt in Sheffield to provide a city- or entire conurbation-wide bus service, as there was in Manchester, so though certain tram routes might lose traffic and revenue to buses, other parts of the system would maintain or even improve their position.

Managerial Attitudes

Using Manchester again as a contrasting example, the Tramway Manager there around the period of World War I was J. P. McElroy.[3] Not surprisingly at the time, he saw the tram as the main mode of urban transport and did not believe motor buses could cope with the traffic; in one hypothetical example, the tram rush hour service of a car every forty seconds would have required a bus every ten seconds, practically 'a long string of omnibuses nearly the whole length of Rochdale Road from Queen's Park to town'.[4] He was succeeded in 1922-3 by Henry Mattinson, under whose management new tram routes and several hundred new bogie tramcars were constructed, whilst buses were kept

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1. Based upon information from maps and timetables.

2. Bond, History's Orphan, 49; the figures are not as full as one would like, for whilst the loss of 24,315 passengers per week is recorded for three bus routes shortly after their introduction, the full year's figures cover only one route, obviously disguising the full effect.

3. Joyce, Rails of Manchester, 50. 4. Ibid., 62.

only as tramway feeders.[1] As already noted, however, this policy was changing by the late 1920s when express buses were introduced, there being sixteen routes as early as 1928.[2] In September 1928 Mattinson died at the early age of 51. In November R. Stuart Pilcher was appointed to the vacancy, taking up his duties in January 1929.[3] By April the track on route 53 needed renewal,[4] and in July the transport committee was recommending its replacement by motor buses.[5] Conversion followed on 3 Mar 1930.[6]

Pilcher made much of this example in his subsequent writings. The 53 was Manchester's busiest route, he said, with over a mile of awkward single and loop track. Old single-deck forty seat trams were replaced by double-deck fifty-six seat buses, of a special design which would pass under the low bridges on the route. For a week or so trams and buses ran together[7] and the buses were far more popular and earned almost 2d. per vehicle mile more than the trams. This was because the buses ran faster and could offer a more attractive and frequent service and also because the ease of kerbside loading attracted the old and women with children to ride.[8] All this was quite true, and Pilcher did have the grace to admit later that modern trams might have proved attractive too, though he qualified this immediately by saying that Manchester passengers still preferred buses over even high-speed cars with upholstered seats.[9] Ian Yearsley says that Pilcher did not lie, but presented his facts in such a way as to serve his cause.[10] That was certainly so in this example, which Pilcher really presented as proof that buses could replace city trams successfully. What

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1. Ibid., 64-5. 2. See above, 335.

3. Kirby, Middleton Tramways, 59. 4. Klapper, Tramways, 137.

5. Joyce, Rails of Manchester, 80.

6. Pilcher, Road Passenger Transport, 114.

7. Accounting for the fact that Klapper gives the date of conversion as 7 Apr 1930; see Tramways, 137.

8. Pilcher, Road Transport Operation, 114 and 116. 9. Ibid., 117.

10. Yearsley, 'Bus and Coach'; 'economical with the truth', perhaps.

he only mentioned in passing if at all was the quite unique nature of route 53. Unlike most city tramways it was not a radial line, but described a semi-circle around most of the city. Not only did it have to contend with low bridges and some single track, which Pilcher did say, it also crossed at least six other lines, with all the delays and jouncing over junctions that involved. Pilcher also stated the trams were old single-deckers, but did not elaborate on their curious design (so far as British cities were concerned). They were 'California' cars, with a central saloon flanked by long open ends, on which Mancunians could sit and enjoy the weather typical of their city.[1] No wonder passengers preferred the buses. Pilcher's policy thereafter was to run down the tramways in favour of motor buses. He usually isolated each route or group of routes and considered its rebuilding or replacement individually rather than as part of a linked system. For instance, he recommended closing one route to Middleton in 1930-1 because of the cost of relaying and because trams already lost money.[2] As he said, each line should be considered as a new tramway; would it be built under current circumstances? If not, it should not be reconstructed either.[3] Pilcher was unashamedly pro-bus, being a consultant to the fanatically anti-tram magazine Bus and Coach.[4] He later became known as 'the foremost advocate of omnibus substitution for tramways',[5] and indeed Bond suggests that he joined the move towards a change precisely to make a name for himself. It is true that 'in the ultimate he did not cause tramway abandonment, which would have taken place without him anyway, [but] he appeared as the standard bearer to his contemporaries'.[6] Manchester's trams clearly had major problems and deficiencies by 1929

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1. Details from Joyce, Rails of Manchester, 80-1; it is curious, as he says, that one of these untypical cars alone should have survived.

2. Kirby, Middleton Tramways, 67-8.

3. Pilcher, Road Passenger Transport, 112.

4. Yearsley, 'Bus and Coach'.

5. Joyce, Rails of Manchester, 88. 6. Bond, History's Orphan, 65.

(far more serious than Sheffield's did) and any manager would have had to address himself to them, as Mattinson had already begun to do. But with Pilcher there was never any doubt of the direction in which he would move, and though he may not have influenced the ultimate result, he certainly affected its timing.

In Sheffield A. R. Fearnley was in continuous office as General Manager from 1904 to 1936.[1] He was not blind to the advantages of motor buses, having suggested their use as much as thirty years before his retirement; he had also carried through the closure of three tram routes after 1925.[2] But this was all against the background of tramway modernisation, and there was little reason to doubt his belief in the tram's value for city service. Fearnley was succeeded by Mr. H. Watson, who was in office until 1945 and seems to have been a less dominant personality than Fearnley, though obviously the period of World War II was not one in which significant new developments could be undertaken. Insofar as one can tell, he seems to have regarded trams positively; in 1938 he even suggested an experiment with a Blackpool-style centre-entrance double-decker.[3] The lack of any impression of a 'new broom' may partly have been due to the fact that Watson had been Fearnley's assistant; his own sucessor was R. C. Moore,[4] and he was the first Manager to state that eventually trams would have to go.[5] Sheffield thus had a pro-tram management up until 1945, and this obviously must have influenced policy, just as Pilcher had done in Manchester. It is equally obvious that the financial and operational deficiencies of Manchester's tramways as compared with Sheffield's profitable and well-run system would have made differing approaches necessary anyway. But managerial style and belief, particularly when expressed with the crusading zeal of

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1. Hall, Sheffield Transport, 109. 2. S.T.D., Tramway Era, 21.

3. Hall, Sheffield Transport, 208.

4. Ibid., 253; though the example of Rayner and Potts in Doncaster shows another way in which former deputies could react.

5. Ibid., 255.

a Pilcher, were extremely significant in explaining the differences in attitudes to tramways taken in the two cities in the 1930s.

Conclusion

The discussion in this chapter has shown that it was possible for a large city like Sheffield to protect its tramway system against motor bus competition for most of the inter-war period, even though the policy proved less effective as time went on. Up until 1925 the tramways were protected almost 100 per cent by the exclusion of external competitors from the city. Thereafter such competition was kept at a minimum by the determined expansion of the Corporation's own services, by the purchase of competitors, by the development of joint services (especially later with the JOC) and by protective clauses levied on such competitors as remained. At the same time, the tramway system continued to develop. There were a few minor route closures, but these were more than matched by extensions. These were individually fairly short, but because of the uniform fare policy tended to reduce the trams' earning power. This meant that longer extensions would have been wholly uneconomic, which made further urban bus services necessary. These new services, joined by older 'feeder' routes extended into the city, caused quite serious losses of revenue and earning power on the tram routes concerned, although the tramways' income overall remained fairly steady. This, however, was against the background of rapidly rising bus traffic, brought about to a considerable degree by rigid adherence to the uniform fare which meant that trams were not used to serve large new estates like Parson Cross. Even so, the 'pro-tram' management in Sheffield helped to ensure that the system was maintained and improved right up until World War II.

CHAPTER 16

POST-WORLD WAR II FINANCIAL PROBLEMS

The preceding three chapters have identified a total of seven factors which may have contributed towards the retention of the Sheffield tramway system up to and including World War II. The first three relate to finance, namely that the tramways were profitable, that they could finance new investment from earnings (directly or via loans), and that the consequently practicable policy of continuous improvement meant that at any one time in the 1930s it was probably actually cheaper to retain the tramways than it would have been to replace them entirely with motor buses. As well as being economically viable, the tramways also fitted into town planning objectives and could be extended relatively cheaply into certain new housing estates. In the city centre traffic congestion was not yet a severe problem and, finally, a successful policy of motor bus development and control gave generally adequate protection to the trams.

Already during the 1930s certain trends were moving against the trams. As just discussed in the preceding chapter, for instance, there was a great expansion in urban bus services. The war was a kind of intermission during which no change in transport arrangements could be carried out. Financially, the transport department seems to have got through the war relatively unscathed. The only deficit came in 1940-1 after making a payment of £124,643 for renewals; the loss of £59,263 was the first in the undertaking's history, but thereafter surpluses were earned again until 1944-5[1], helped by

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1. See Appendix S14.

a rise in the through tram fare to 2d. in November 1941.[1] This was only a temporary respite, though, and public transport generally faced severe problems for the remainder of the decade. The result was to negate most of the factors which had formerly favoured trams and to make motor buses the most attractive option.

Working Results after the War

Appendix S14 shows the working results for both trams and buses. So far as the trams were concerned, the figures made very bleak reading. Over the twelve years 1943-4--1954-5 the trams earned a surplus only five times and clocked up a total deficit of £363,287 as opposed to a surplus of £188,108 on the motor bus side. It is true that merely reading the final column of the Table may be regarded as exagerating the financial crisis. The operating ratio[2] remained positive throughout, so traffic revenue always more than covered working costs. Also, column (1) of Appendix S14 shows that the tramways remained in the black after paying loan charges and taxes each year except 1946-7. Many less fortunate undertakings, such as the DDLR or Doncaster, would have been happy to earn enough to do this. It is really the renewals appropriations which caused the deficits. From one point of view these payments might seem excessive. It is noticeable that up to 1946-7 trams and buses were paying aproximately equal amounts into the renewals fund, but that thereafter the tramways's contribution about doubled. Had the sum been split 50:50 the tramways might have paid about £30,000 less per annum, though even so it would only have succeeded in reversing the deficit once, in 1953-4. The trams' higher contribution was probably justified anyway, given the heavy expenditure from the renewals fund on permanent way. Between 1943-4 and 1954-5 the tramways' contribution was £1,155,599[3] set against track renewals of £1,310,404.[4] Obviously, had a more prodigal policy been followed whereby

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1. Gandy, Sheffield Tramways, 178. 2. Appendix S3, column (12)
3. Sum of figures in Appendix S14. 4. Ibid., from Table 50 below.

sufficient funds were not set aside, the tramways would rapidly have declined into a run-down condition, whereas they were in fact maintained at a reasonably high standard.[1]

The problems were not entirely tramway ones, as the bus side of the undertaking also made losses after renewals payments, not as frequently, but in the early 1950s they were much worse than for the trams; in 1951-2 it was not even possible to cover loan charges. However Appendix S14 conceals the severity of the financial crisis facing the tramways in one important particular. Appendix S5 shows that the last time recourse was had to loan finance for major items of capital expenditure was in 1933-4. This meant that by the time the war ended most old loans had been fully paid off. Fully 87 per cent of capital on the undertaking as a whole had been repaid by 1940;[2] by 1946 this had risen to 94 per cent.[3] This meant that the tramways' working balance was having to meet very low loan repayments by this period, and hence that column (1) in Appendix S14 was normally well on the plus side. If the tramways had been asked to bear the same loan burdens pro rata post-war as they had before it, the financial situation would have been even more serious than it was. This helps to conceal another fact about the post-war situation. Although the operating ratio remained positive, reference to Appendix S3 will show that the gap between traffic revenue and working costs grew smaller from 1944-5 onwards; there were ups and downs, but the trend was adverse and the 1944-5 ratio of 78.65 per cent, quite reasonable even by late pre-war standards, was never approached again. By 1954-5 the ratio was 98.255 per cent, and it was only the fact that loan repayments were low which kept the tramway account in the black. From 1956-7 until the end of the tramways even this veil was torn away as the revenue account itself slipped into worsening deficit, with the operating ratio rising from 100.999 to 123.481 per cent over those final years.

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1. Gandy, Sheffield Tramways, 84. 2. Sheffield Reports, 1939-40, 2.

3. Ibid., 1945-6, 2.

In the decade between 1945-6 and 1954-5 the Sheffield tramways showed a deficit after renewals payments in seven of ten financial years because the operating surplus was getting smaller and less able to meet these payments; at the same time the renewals appropriation itself was doubled over pre-war rates, so putting even further pressure on the already falling surplus. These difficulties were related to the inflation which followed the war. It was not as severe as that immediately following World War I, partly because subsidies were used to keep the rate down, but there was also no deflation, fall in price levels or widespread unemployment as there had been in the 1920s. The causes of the inflation were various--post-war shortages or 'too much money chasing too few goods'; imported inflation due to a decline in the terms of trade; and the consequence of both, manufacturers raising their prices and workpeople demanding higher wages in self-defence.[1] Between 1946 and 1958 the retail price index rose by about 77 per cent; sometimes the rise was checked, but was generally steadily if not rapidly set on an upward course.[2] Naturally this had a considerable effect on the public transport industry, which had to raise its prices to meet increased costs.

Sheffield increased tram and bus fares six times up to 1960, raising the standard tram fare from 2d. to 7½d.[3] This means that any measure of money income over time shows a steady increase, with tramway revenue per car mile going up from 20.066d. in 1944-5 to 49.36d. in 1960-1; in the same period working costs rose from 16.705d. to 60.95d.,[4] rising by 265 per cent as against 146 per cent for revenue, which clearly failed to keep up with expenses.

There were three or four possible explanations for this. First, in a report on the undertaking's financial position in 1946 the General Manager

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1. For post-war inflation, see Michael Shanks, The Stagnant Society (1961), 34-5.

2. Political and Economic Planning, Growth in the British Economy (1960), 182.

3. Gandy, Sheffield Tramways, 178. 4. Figures from Appendix S3.

said that high wartime loadings gave a false impression of revenue, because each vehicle had been crammed to excess. The officially permitted number of standing passengers had already been cut, and might be reduced again, whilst passengers were in any case no longer agreeable to standing. So further vehicles would have to be put on the road, with no guarantee of any more revenue.[1] Actually Appendix S3 shows that this problem was of very short duration. Revenue per car mile had fallen back in 1945-6, but this was because less passengers were carried rather than more miles worked. In any case, revenue per car mile recovered to beyond its wartime peak in 1946-7[2] and car mileage never exceeded wartime totals. The basic reason was that ridership fell after the war, meaning that people could be carried comfortably whilst still working less car miles.

Revenue did, however, decline in real terms, but this was not related to a need to carry the same number of passengers with more vehicles, but to a quite steep fall in ridership from its 1944-5 peak of 204 million. There was a sharp fall in 1945-6, a slight recovery in 1946-7, and then a steady decline to 164 million in 1951-2; towards the end of this year the first two tram routes closed.[3] The decline continued until 1953-4, when the total was only about 145 million; after that the accelerating closure programme makes further comparison meaningless. In about a decade, some 25 per cent of traffic was lost.

To some extent, this was inevitable. Wartime workers' traffic naturally fell, as the General Manager had said in his 1946 report,[4] and it was unlikely that traffic in excesss of anything in peacetime before would be maintained. In fact, it seems surprising in some ways that it took until 1951-2 for tram traffic to fall below the 1938-9 level again.[5] An explanation

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1. Sheffield Minutes, Transport Committee (renamed in 1934; hereafter, TC) (Special), 24 Apr 1946, 247.

2. Before the first post-war fare increase in April. 3. Appendix S8.

4. Sheffield Minutes, TC (Special), 24 Apr 1946, 247.

5. See Appendix S3, column (5).

(relating to motor buses but equally applicable to trams) was offered by C. F. Klapper. This was the bus's golden age, he said, as pre-war traffic had risen because, for example, of petrol rationing; there were few outlets for cash, again because of rationing, so the cost of travel was not a great disincentive; and the main entertainment was the cinema or theatre, which boosted evening traffic.[1] Be that as it may, tram traffic did fall in the 1940s and early 1950s. Four reasons may be offered, most in fact relating to the erosion of the factors suggested by Klapper.

First, there were fare increases in April 1947, December 1950 and March 1952 (and in later years too).[2] From 1944-5--1953-4 there was an average loss of about 6.5 million passengers per annum. Between 1946-7 and 1947-8 the loss was nearly 13 million, between 1950-1 and 1951-2 it was average at 6.5 million[3] and between 1951-2 and 1952-3 it was up again to 12.8 million.[4] The obvious inference is that fare increases were meeting with resistance from travellers, although this is not mentioned as a specific cause of declining traffic until the Annual Report for 1957-8.[5] The same Report identifies two further changes which were affecting public transport. These were the increase in the number of private cars, motorcycles and--a phenomena of the period--scooters together with the decline in evening traffic caused by the popularity of television. A graph published in the following year's Report showed how car and motor cycle registrations in Sheffield had risen from about 33,000 in 1954 to over 140,000 in 1959, there being an almost exactly equal rise in the number of television licences issued.[6] However, given that both motor and television licences each only numbered 33-35,000 in 1954 and that the decision to abandon the trams was taken in 1951, neither are likely to have caused much traffic loss

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1. Klapper, Buses, 2. 2. Gandy, Sheffield Tramways, 178.

3. But 1950-1 includes three or four months at the higher fares.

4. Calculated from annual totals in Appendix S3; this last steep drop in passengers took place after the closure decision had been made.

5. Sheffield Reports, 1957-8, 9. 6. Ibid., 1958-9, 10.

prior to that or to have influenced the closure decision.[1] It is true that the number of cars in the UK did go up from 1,486,600 in 1945 to 2,257,873 in 1950, but this was only a fairly small rise of three quarters of a million doing little more than getting back to the 1939 total of 2,034,400;[2] in any case, Sheffield is now, and probably was then, a city with a relatively low proportion of car owners.[3]

A final cause of falling tram traffic had already become apparent before the war, namely the tendency of new city bus routes to abstract tramway passengers. There was not much scope for this after the war until 1948-9, because up until then it had been impossible to get enough vehicles or to repair the old ones in order to maintain existing services; private buses and coaches had to be hired as substitutes.[4] In 1948-9, however, potential competition was offered to the trams by a new city to Wordsworth Avenue route and by the (re-?) extension of the Dore to Ecclesall service.[5] In 1950 another new bus route was started touching each of the Meadowhead, Ecclesall/Fulwood and Millhouses/Abbey Lane tram routes.[6] Thus whereas by 1951 the trams were carrying 64 per cent of city passengers, four years before it had been 71 per cent, so the share of the buses had risen from 29 per cent to 36 per cent.[7] So the two main reasons why the number of tram passengers fell prior to the closure decision are thus the deterrent effects of fare inceases and the 'leakage' to the bus side of the undertaking.

The failure of revenue to keep up with costs was obviously closely related to the decline in traffic. Another important factor in this was that

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1. Declining traffic receives little mention in the Replacement Report.

2. William Plowden, The Motor Car and Politics 1896--1970 (1971), Appendix B, 456; the main interest of this study of the motor lobby is negative, in that it does not contain mention of tramways despite the known opposition of motoring organisations to them.

3. SYPTE, Transport Development Plan, 7-8; in 1971, incidentally, car ownership was a lesser proportion of the population in Sheffield than in Doncaster which, if so in the 1920s, could have affected decisions re. trams.

4. Sheffield Reports, 1946-7/47-8, 4. 5. Ibid., 1948-9, 4.

6. Ibid., 1951-1, 3. 7. S.T.D., Replacement Report, 1.

fare increases took too long to implement. The first post-war increase was proposed in April 1946,[1] applied for in August, subjected to an inquiry in November but not accepted by the Minister of Transport until March 1947, which meant that it was too late to affect the deficit for that year.[2] This was the worst ever loss for either the trams or for the undertaking as a whole.[3] The next increase was applied for in late 1949,[4] but not imposed till a year afterwards.[5] The third rise was granted more expeditiously, being proposed in November 1951[6] and put into effect on 9 Mar 1952,[7] though by that time it was too late to affect the future of the trams.

TABLE 46

SHEFFIELD TRANSPORT DEPARTMENT
PROPOSED FARES NOVEMBER 1951

Fare d.	Maximum Distance	
	Tram (Miles)	Bus (Miles)
2	1½	1[a]
3	3	2¼
4	4	3½
5	5 plus	4½
6	-	6
7	-	7 etc.

SOURCE: Sheffield Minutes, TC, 25 Nov 1951, 361.

a. Bus fares were also subject to tramway protective fares over appropriate stages.

A fourth and related possibility was that the pre-war policy of setting bus fares above tram fares--partly intended to protect the latter against loss of traffic to motor buses--might, if reversed by allowing tram fares to rise to bus levels, have benefitted the trams by increasing the amount of

1. Sheffield Minutes, TC (Special), 24 Apr 1946, 247.

2. Sheffield Reports, 1946-7, 4. 3. See Appendix S14.

4. Sheffield Minutes, TC, 15 Nov 1949, 335. 5. Ibid., 19 Dec 1950, 406.

6. Ibid., 20 Nov 1951, 361. 7. Ibid., 9 Feb 1952, 525.

their income.[1] Table 46 above shows a differential fare scale proposed in 1951, which was presumably later adopted; in any case, fares were not equalised until 1955.[2] But far from increasing tramway revenue vis-a-vis the buses, the advantage previously enjoyed by the trams seems to have been eroded, as Table 47 below shows. There would be other reasons, notably that

TABLE 47

SHEFFIELD TRANSPORT: TRAFFIC REVENUE IN PENCE PER CAR MILE FOR BUSES VERSUS TRAMS 1949-50--1960-1

Year	Buses[a]	Trams	Difference[b]
1949-50	23.403	25.220	1.187
1950-1	23.678	25.673	1.995
1951-2	26.108	29.229	3.121
1952-3	29.495	32.352	2.857
1953-4	29.772	32.007	2.235
1954-5	31.855	33.178	1.323
1955-6	36.350	39.900	3.550
1956-7	38.260	38.360	0.010
1957-8	42.090	40.720	1.370
1958-9	42.100	41.560	0.540
1959-60	42.160	49.390	2.790
1960-1	46.000	49.390	3.390

SOURCE: Sheffield Reports and Accounts, passim.

a. Includes Traffic, Hire and Sundry Revenue for Category A (city) buses only.

b. Tram revenue less bus revenue.

as the tramway system declined buses would be taking over the traditional tram services with denser loadings than their former routes. But it could well be that once the financial disincentive for using buses was removed, people used them rather than the trams; this was what happened when some protective fares were reduced or discontinued in Liverpool in 1949.[3] Tram revenue did actually go up, as shown by Table 47, but this corresponded to

1. Young suggests this might have been so in Leeds, where higher bus fares allowed the buses to be profitable without clearing the trams' debt; the trams, he says, were victims of pre-war ideas of cheap fares. See Young, 'Leeds Trams: 10', MT 36 (Apr 1973), 117.

2. Sheffield Minutes, TC, 15 Feb 1955, 567.

3. R. E. Blackburn, 'Post-war Liverpool', MT 30 (Nov 1967), 353.

fare increases in February 1955, January 1957 and May 1960 and showed no sustained improvement versus buses.

To sum up, revenue proved inadequate in the 1940s prior to the decision to abandon the tramways because passenger traffic declined. The most important reasons for this were that wartime loadings were not maintained, that fare increases met with passenger resistance and that city bus routes continued to attract tram passengers away. It is unlikely that two other factors--rising car ownership and decline in cinema-going--were especially significant in this period. Revenue suffered further because fare increases could not be implemented quickly enough though not, it would appear, because tram fares were kept below bus fares (rather the reverse in fact). This accounted for half the squeeze on the operating surplus; the other was a rise in working costs.

On the face of it, the considerable increase there actually was in cash receipts should have been more than sufficient to clear working expenditure by a large margin. Inflation took prices up by 77 per cent between 1946 and 1958, whilst tramway revenue rose by 106 per cent over the same period. The problem was that working costs increased by 133 per cent. Appendix S15 shows these costs from 1939 to 1950. The most important were Traffic, Repair and Power costs and, under these heads, wages of platform staff plus car and permanent way repairs.

It will be noticed first from Table 48 (overleaf) that total working costs were always at a higher level relative to 1938-9 than was traffic revenue. The former also always increased more rapidly, with the exception of the year between 1946-7 and 1947-8, when a fare increase suceeded in closing some of the gap, albiet temporarily. The varying percentage rises in the individual costs are surprising, with power costing only 28 per cent more by 1949-50, wages nearly 100 per cent and repairs far in excess even of that.

Even though they did not go up as rapidly as repairs, wages formed an important element in the overall cost increase because they were so large a proportion--41.03 per cent in 1938-9 and 39.50 per cent in 1949-50 (based on

TABLE 48

SHEFFIELD TRANSPORT: PERCENTAGE INCREASES OF SELECTED TRAMWAY WORKING COSTS FOR THE YEARS 1944-5—1949-50 AS AGAINST 1938-9 (a)

Year	Wages (Traffic)	P W Repairs	Car Repairs	Power	All Costs[b]	Traffic Revenue
1944-5	44.39	35.40	53.54	0.20	39.71	34.29
1945-6	53.69	44.44	70.62	10.35	51.67	32.04
1946-7	64.84	93.81	92.72	23.26	70.11	36.79
1947-8	79.03	128.89	128.86	25.18	83.76	66.64
1948-9	93.21	118.89	154.53	26.86	97.56	67.06
1949-50	96.25	126.51	173.20	27.94	103.86	68.79

SOURCE: calculated from data in Appendix S15.

a. The Table is taken to 1949-50 only because (1) costs from then on are recorded under slightly different and not strictly comparable heads and (2) since the decision to close the tramways was taken in 1951, only cost movements prior to that year are relevant to that decision.

b. This excludes costs attributable to World War II (such as air raid precautions) which the transport department clearly regarded as exceptional.

figures in Appendix S15). Wage increases were not within the control of the transport department, as these were negotiated through the National Joint Industrial Council for Transport Workers.[1] There was either an increase in pay and/or a reduction in hours in most post-war years. In 1945-6, for example, wage increases cost £37,000 per annum, whilst from 1 Jan 1946 additional Sunday pay was negotiated.[2] Every annual report mentions wages as a major cause of cost increases and/or deficits. Wages will have risen as a response to post-war inflation and also because transport undertakings found it very hard to attract and retain staff in a period of full employment; higher wages and more sociable working hours in manufacturing industry more than off-set the security of municipal employment.[3] This problem became even more acute in Sheffield in the mid-1950s,[4] after the tramway scrapping

1. Sheffield Reports, 1944-5, 4.

2. Sheffield Minutes, TC (Special), 24 Apr 1946, 246.

3. Jones, Rails of Yorkshire, 156.

4. See, for example, Sheffield Reports, 1955-6, 11.

decision, but wage costs themselves may have been influential because bus wage costs rose less rapidly.[1]

Electricity costs rose surprisingly little in this period. An increase in charges was mentioned in 1946,[2] but thereafter this did not appear in the litany of justifications for fare increases. The percentage increases which did occur were probably related to the price of coal and thus tied loosely to inflation. It is frequently said that nationalisation of the elecrtricity supply industry—which took place on 1 Apr 1948[3]—was detrimental to tramway (and trolleybus) operation.[4] For instance, a transport journal said in 1962 that 'The Electricity Boards have been extremely short-sighted in their attitude towards electric traction and particularly to trolleybuses. The threatened complete disappearance of these useful vehicles within a few years can be mainly attributed to high current costs'.[5] Actual increases in charges can be dismissed, however, as a reason for the closure of the Shefield tramways, both because of the slow rise in costs prior to 1951[6] and also because higher charges, though imposed under nationalisation, were not made until after 1951. Up until 1953 Electricity Boards had honoured existing contracts made with their predecessors, but these naturally varied from place to place. The Municipal Passenger Transport Association pressed for a standard rate, the result of which in Yorkshire was reduced charges in Bradford and Huddersfield but higher ones in Leeds and Sheffield.[7] These were imposed in two stages, from 1 Apr 1952 and again the

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1. For bus costs, see Appendix S7.

2. Sheffield Minutes, TC (Special), 24 Apr 1946, 246.

3. Andrew Shonfield, British Economic Policy since the War (1958, revised edition 1959), 8.

4. See, for example, Jones, Rails of Yorkshire, 156.

5. From Passenger Transport (1962), quoted in Joyce, Town Transport, 64.

6. In fact Appendix S15 shows that electricity costs tended to level out or even decline in the years immediately after nationalisation.

7. Young, 'Leeds Trams: 13', MT 36 (Aug 1973), 269.

following year.[1] This is not to say that the electricity industry, pre- as well as post-nationalisation, might not have given more favourable consideration to such large customers, nor to deny the general point that with the loss of municipal electricity departments, local authorities no longer had the same interest in maintaining electric transport.[2] But changes to charges as a result of nationalisation were introduced too late to influence the closure decision in Sheffield.

Repairs costs for cars and track showed the greatest increases in the 1940s and from being 17.90 per cent of costs in 1938-9 rose to 22.81 per cent in 1949-50.[3] Various factors combined to cause this sharp increase. Wages of engineering staff obviously rose like those of traffic employees. Moreover, just as shortage of labour helped to push up wages, the post-war shortage of materials doubtless encouraged manufacturers to push up their prices. Difficulty in getting materials was mentioned in 1947, for instance,[4] and rising costs in the previous year.[5] The problem was also one of post-war adjustment, as maintenance had been deferred during the war and had urgently to be done at higher cost.[6] One might also expect that as the tram fleet aged, repair costs would become proportionately higher. By 1951 17 per cent of the fleet was over twenty-five years old (twenty-six cars were over thirty years old) and a further 59 per cent over fifteen years; only 12 per cent could be described as new.[7]

Many of these problems were of course shared with the motor bus side of the undertaking, which was also subject to higher costs. Unfortunately the bus accounts were not presented in terms of pence per vehicle mile until

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1. Sheffield Reports, 1952-3, 4 and 1953-4, 4.
2. Joyce, Tramway Twilight, 46.
3. Calculated from costs per mile in Appendix S15.
4. Sheffield Reports, 1946-7, 4. 5. Ibid., 1945-6, 4.
6. Sheffield Minutes, TC (Special), 24 Apr 1946, 247.
7. S.T.D., Replacement Report, 1.

1950-1, but luckily a paper in the files of a later General Manager, C. T. Humpidge,[1] permits a comparison with 1939, displayed in Appendix S7. When the percentage cost increases for trams (Table 48 above) and for buses (Appendix S7) are compared, it becomes clear that motor bus costs rose less quickly than tramway costs in this period, overall by as much as 20 per cent. The major costs involved were again wages, repairs and power, and these increased respectively by 12.20, 12.54 and 19.27 per cent less than the equivalent tramway costs.

Taking the last first, some advantage probably accrued from the elimination of petrol-engined buses from the fleet. In 1938-9 there were about sixty such vehicles left, whereas by 1949-50 there were no more than one or two, mostly used as works vehicles.[2] Diesel engines return about twice the mileage per gallon as equivalent petrol engines.[3] Sixty buses formed 17 per cent of the 1938-9 fleet of 351,[4] so the elimination of these should theoretically have produced a fuel saving of half that--8.5 per cent. There was also something of a craze at the beginning of the 1950s for constructing lightweight bodies in the interests of fuel economy, meaning that the standard eight ton double-decker[5] could be replaced by one weighing as little as six tons;[6] it was not likely that this trend would have influenced Sheffield's fuel costs in the 1940s, however, particularly as the immediate

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1. Chaceley Humpidge, referred to several times above, joined Birmingham Corporation as an Assistant Engineer in 1928, moving to Liverpool in 1935 (during the tramway modernisation period there). He then became successively Chief Engineer at Portsmouth and Nottingham, before being appointed General Manager at Rochdale (1942), Bradford (1951), where he developed the trolleybus system, and finally Sheffield (1961). The various papers referred to under his name were part of a file of miscellaneous transport material in his private papers. Biographical details from The Journal (of the Tramway Museum Society), 9 (June 1969), 14-15.

2. See Hall, Sheffield Transport, 304-5; one cannot be entirely precise about numbers because of the way in which Hall records withdrawal dates.

3. Pilcher, Road Passenger Transport, 224. 4. See Appendix S13.

5. Gavin Booth, Bus Monographs 1: Leyland Atlantean (1984), 6.

6. A. A. Townsin, 'The Future of Bus Design in Great Britain', in in Buses and Trams [mid-1950s?], 32.

post-war tendency was to build stronger designs in the interests of long life and without too much regard to weight.[1] Ironically, severe increases in fuel oil costs came after the decision to abandon trams had been made. One reason why costs did not go up much in the 1940s was evidently that fuel oil taxation was kept at a fairly low level. The tax was raised in the 1950 budget, costing Sheffield £58,650;[2] in the following year it went up by another 4½d. a gallon at a cost of £40,000;[3] in 1952 a further 7½d. was imposed, making the tax rate a massive 200 per cent, equivalent to £200,000 per annum.[4]

Moving on to repairs, the increasing use of all-metal bus bodies from 1931 onwards meant that buses could be kept for at least ten years without drastic rebuilding, and the resultant savings in maintenance costs considerably increased profit margins.[5] Just how many Sheffield buses were of this type is not easy to determine. Some post-war buses were certainly still provided with what were known as composite bodies, which had metal cladding on wooden frames; Roe's of Leeds provided some for the JOC[6] in 1952, for example. By contrast, it is likely that the Roberts bodies on some 1948 deliveries[7] would have been of the all-metal type used by them for trams. In contrast, apart from the Roberts cars, all the trams were either composite or else wooden-bodied, with correspondingly high maintenance costs, especially as they grew older. The 'drastic rebuilding' mentioned in connection with the older buses was still necessary for trams, so that for instance between 1952 and 1956 twenty-three older cars had their lower saloons totally rebuilt to resemble those of the 'improved Standards'.[8]

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1. Ibid., 33. 2. Sheffield Reports, 1950-1, 2.

3. Ibid., 1951-2, 3; there was a price increase too.

4. Ibid., 1952-3, 3-4.

5. A. Millar, British Buses of the 1930s (Cambridge, 1982), 76.

6. Townsin, 'The Future of Bus Design in Great Britain', 32.

7. Hall, Sheffield Transport, 308-9. 8. Gandy, Sheffield Tramways, 91.

Finally, wages. The fact that the bus wage bill rose less quickly than the trams' can only have been due to increased productivity. Because the data is not readily available, this cannot be shown from Sheffield itself. But there is good evidence that productivity was rising in the industry as a whole. Table 49 is part of a larger table relating to the giant Midland Red bus company and shows the number of miles operated

TABLE 49

FLEET, MILEAGE, PASSENGERS AND STAFF OF THE MIDLAND RED BUS COMPANY 1934--1954 (WITH ADDITIONAL DATA)

Year	Fleet	Staff	Mileage			Passengers		
			Total	:Bus	:Staff	Total	:Bus	:Staff
1934	1,045	5,198	38,483,603	36,826	7,405	145,882,777	139,600	28,065
1944	1,432	6,362	43,525,542	30,395	6,841	327,424,183	228,648	52,587
1954	1,910	8,454	76,996,006	40,312	9,108	384,594,462	201,258	45,492

SOURCE: Fleet, staff and total mileage and passengers from R. C. Anderson, A History of the Midland Red (Newton Abbot, 1984), Appendix IV (no page number); the other columns are per bus and per member of staff and are calculated for this Table.

and passengers carried per vehicle and per employee. Especially as against 1944, employees in 1954 were operating many more miles apiece, which would obviously tend to reduce wage costs per mile, or rather to moderate the sharp pay increases typical of this period. Incidentally, each bus was also operating more miles, which would have a similar effect on repair costs per vehicle mile. It is noticeable that the number of passengers carried per vehicle/employee regressed over the decade, not too surprising when the base year was 1944, but evidence that earnings per mile might be on a less favourable trend than running costs. Turning to Sheffield trams, there is no reason to suppose that their productivity was getting any better during the second half of the 1940s, rather the reverse in fact. Car mileage was static or slightly falling, and the fleet, and presumably therefore the number of employees, remained the same throughout, so there could not be any

dramatic increase in labour productivity as there was for the Midland Red.[1] It is a reasonable assumption that part of the reason why buses and bus staff were able to cover much higher mileages was that the buses themselves were capable of running faster. Again, this would not be true of the trams, which were the same vehicles as had been running before the war, whereas a lot of the Sheffield buses were new.

Both motor buses and trams were, of course, becoming more expensive to operate in this inflationary period. However, because bus costs rose less fast, the trend was moving in their favour. It will be seen from comparing Appendices S7 and S15 that whereas buses were 9.6 per cent cheaper per vehicle to run in 1938-9,[2] by 1949-50 their advantage had risen to 22.8 per cent. Even allowing for the trams' higher capacity, the argument was moving very much in favour of the motor bus.

Costs of Renewal

The obvious inference from the fact that tramway repair costs were rising so rapidly after the war is that renewal costs would rise by an at least equal proportion. Table 50 overleaf shows the expenditure on permanent way between 1938-9 and 1950-1. Without knowing the mileage of track dealt with in each year, it is impossible to form an adequate estimate of costs per mile of line, but obviously renewal costs overall post-war were at least double those of 1939. This was partly due to rising prices; rails, for example, were costing about 60 per cent more than they had done by the 1940s.[3] But it was also a result of exceptionally high expenditure due to deferred maintenance during the war.[4] Nor were costs the only problem; by 1951 increasing difficulty in obtaining rail supplies was expected

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1. Fleet and car mileage in Appendix S3, columns (3) and (4).

2. The 1938-9 figure is the sub-total without the exceptional war costs.

3. Joyce, Tramway Twilight, 45.

4. Sheffield Minutes, TC (Special), 24 Apr 1946, 247.

TABLE 50

SHEFFIELD TRANSPORT: EXPENDITURE FROM THE TRAMWAYS' RENEWAL FUND ON PERMANENT WAY 1938-9--1950-1

Year	Expenditure £	Change over 1938-9 %
1938-9	44,237	-
1939-40	39,402	10.93
1940-1--42-3	Not available	
1943-4	91,437	106.70
1944-5	92,940	110.10
1945-6	109,479	147.48
1946-7	89,567	102.47
1947-8	124,003	180.32
1948-9	142,553	222.25
1949-50	115,281	160.60
1950-1	114,118	157.97

SOURCE: Sheffield Reports and Accounts, passim.

too.[1] Even so, the track had been maintained in 'satisfactory order' during the war,[2] and afterwards the level of expenditure showed that efforts were being made to restore it 'to its former quality and condition'.[3]

Although the cars too were kept in good order, little or no attempt was made to renew the fleet. The 1947 annual report refers to an unsuccessful effort to get an allocation of timber to build new trams,[4] and before that just one car of a new streamlined design had been built at Queens Road in 1946, largely to mark the Jubilee of the undertaking.[5] By 1947 the rolling stock problem was becoming acute, and of the actual fleet of 468 cars 93 were unserviceable and the peak hour requirement was short by 31.[6] It was therefore decided to order 35 new cars,[7] basically similar to the Sheffield-built prototype, but using the same constructional tech-

1. S.T.D., Replacement Report, 2. 2. Gandy, Sheffield Tramways, 84.

3. Ibid., 86.

4. Sheffield Reports, 1946-7, 4; presumably these bodies were to be built at Queens Road, as had been the rule for many years past.

5. Gandy, Sheffield Tramways, 86. 6. Hall, Sheffield Transport, 255.

7. Sheffield Reports, 1947-8, 4.

niques as contemporary buses with metal frames and pillars instead of the traditional wood; the only tender came from Charles Roberts of Horbury, a firm of railway wagon builders who had recently entered the bus body market.[1] The original tender for the complete cars was for £4,420 per car, plus 5 per cent contingencies and any increase in labour or material costs; the body shell itself was priced at £1,800.[2] By the end of 1949 Roberts were asking £3,280 per body,[3] and the eventual cost of the complete cars--delivered between 1950 and 1952[4]--was £254,452, or £7,270 apiece.[5] The original tender plus 5 per cent was £4,641, so the price had inflated by 57 per cent over three or four years. At the same period new double-deck buses--Metro-Cammell-Weymann bodies on Leyland chassis--were available at £4,206 complete,[6] less than the original quotation for trams. By the time the last new 'Roberts cars' were entering service, the decision to close the tramway had already been reached.

The whole episode of the fleet renewal, such as it was, illustrates the various difficulties which made the post-war situation so much harder than before it. First, the difficulty in obtaining supplies in the immediate post-war years stifled any attempt to return to previous programmes of regular fleet renewal. As it happens, the Replacement Report estimated that 293 trams would need replacing over fifteen years if they were to be kept;[7] this works out to about twenty per annum, almost exactly the same as pre-war. But this was achieved only by planning to scrap twenty-six cars without replacement[8] and, more significantly, by extending the 'book life' of new trams to thirty years[9] instead of the former twenty-five. The reason for

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1. Hall, Sheffield Transport, 255.
2. Sheffield Minutes, TC, 18 Nov 1947, 38.
3. Ibid., 20 Dec 1949, 408. 4. Gandy, Sheffield Tramways, 89.
5. Capital Account, 1949-50--1952-3, passim.
6. Sheffield Minutes, TC, 17 Jun 1952, 84.
7. S.T.D., Replacement Report, 1. 8. Because of lower traffic?
9. S.T.D., Replacement Report, 1.

this is not stated, but it may have been thought that modern metal-bodied cars would last longer. If so, previous tramway experience was not all that encouraging. For example, Johannesburg tramways had placed fifty all-metal bodied cars in service in 1936,[1] but by the early 1950s serious corrosion had appeared, as it had on the similar and contemporary cars in Edinburgh; rather than spend the necessary £600 per car, the undertaking laid them up. 'The premature withdrawal of these cars with body defects was probably a major factor in the demise of the tram in Johannesburg'.[2] So the Sheffield car modernisation plan may have been over-optimistic; if a twenty-five year life had been assumed as before, a further sixty-four cars[3] would have needed replacing during the envisaged time span. In any case, the Roberts cars came through too slowly for any full-scale replacement; thirty-five cars over three years averages about twelve per annum, whereas twenty were needed. This illustrates another problem, the difficulty in getting a supplier. Sheffield is a perfect example of the point mentioned by Ian Yearsley, that the habit of large tramways of constructing their own cars led to the atrophy of the commercial car-building industry. Of the 310 cars built for Sheffield since 1921, only sixteen were from outside manufacturers.[4] As a result, when the Corporation needed such manufacturers,[5] they were not there. Charles Roberts were not a large firm, and could only offer slow delivery and high prices, as opposed to the fairly cheap and mass-produced vehicles available from the bus manufacturers.

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1. Tony Spit, Johannesburg Tramways: a history of the tramways of the City of Johannesburg, revised and with additional material by Brian Patten (1976), 67-8.

2. Ibid., 96-7; it is worth pointing out that one of the Sheffield cars still runs regularly as the National Tramway Museum, Crich, and that another runs at the Beaumish Museum and also had a full season running in service conditions at Blackpool in 1985 (personal knowledge).

3. See S.T.D., Replacement Report, 1.

4. See Gandy, Sheffield Tramways, 151-2 and 155.

5. The inability to build locally was blamed on post-war restrictions; see S.T.D., Tramway Era, 26. It is also true that if metal bodies had been required, Queens Road would probably not have been equipped for this form of construction.

Virtually all of the few post-war new trams in Britain were built locally--principally by Glasgow--or by firms previously unknown in the industry, such as R. Y. Pickering, who built twenty cars for Aberdeen.[1] The price differential between new buses and trams in 1952--£3,000[2]--contrasts sharply with the situation about 1930, when trams and buses cost the same.[3] Some of the difference must have been because the few trams needed had to be virtually hand-built by small suppliers. In West Germany, on the other hand, post-war reconstruction was dealt with by re-equipping the tramways with small mass-produced cars,[4] which were probably relatively cheap to buy.

The difficulty in purchasing new trams meant that the price escalated in the period between ordering and delivery. When buses could be bought more-or-less off the shelf, their attractiveness was obvious. Another reason why buses were bought in preference to trams in the 1940s was that many pre-war buses were by then over-age and virtually had to be replaced, whereas trams were solidly-built enough to carry on for a while longer. Young makes this point in relation to Leeds, and also shows how, once new buses were bought, they put the old trams at a disadvantage.[5] Hall says of Sheffield that petrol-engined buses bought in 1930 with a life-expectancy of eight years were still running in 1945 and needed urgent replacement.[6] Investment plans as a whole favoured buses too, most of the capital schemes mentioned as post-war priorities being bus related--namely, Pond Street bus station, Herries Road garage, extensions to Queens Road works and a new employees club and canteen.[7] There were other reasons for this, but it added to the pro-bus thrust of the first five post-war years. By the time

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1. Joyce, Tramway Twilight, 33-6. 2. See above, 366.
3. See above, 309 and 310.
4. Hendlmeier, Handbuch der deutchen Strassenbahngeschichte 1, 153.
5. Young, 'Leeds Trams: 10', MT 36 (Apr 1973), 118.
6. Hall, Sheffield Transport, 253.
7. Sheffield Minutes, TC (Special), 24 Apr 1946, 247.

investment in new trams was possible, they were too expensive.

Nevertheless, when the capital costs of tramway renewal and bus replacement were estimated in 1951, there was not all that much difference between them, as Table 51 below shows. The capital advantage of using buses was only £30,000, and even this would have been reversed if fleet replacements had been calculated in a different way. The longer loan redemption period for the trams could have been argued, especially as the 'life' for trams had been raised from twenty-five to thirty years in the same report, but there was not much justification for reducing the loan period on buses, as these too were now more durable; vehicles being bought

TABLE 51

SHEFFIELD TRANSPORT: ESTIMATED ANNUAL COST OF TRAMS OR REPLACEMENT BUSES

Item	Trams £	Alternative £	Buses £	Alternative £
1. Annual Working Expenses	1,360,000	"	1,373,400	"
2. Annual Loan Charges				
a. On Capital Expenditure to date (amount still payable at the end of 15 years)	4,600	"	4,600	"
b. For new trams (over 15 years)	175,900			
OR ibid. (over 25 years)		121,000		
c. For new buses (over 10 years)			195,000	
OR ibid. (over 8 years)				237,000
d. For permanent way renewal	120,000	"		
e. For garages, road reinstatement etc.			56,100	56,100
Totals	1,660,900	1,606,600	1,629,700	1,671,100

SOURCE: S.T.D., Replacement Report, Appendix A, 4.

in 1950 were only withdrawn in the period 1961-7.[1] Taking a long view, it

1. Hall, Sheffield Transport, 309.

might have been argued that because buses were (still) shorter-lived than trams, they would need replacing again during the trams' life, thus doubling the £195,000 allowed for new buses. However although after the war reduced surpluses forced a reversal of the pre-war policy of buying buses from revenue or reserves,[1] it was always the intention to return to the previous arrangement[2] which, if achieved, would have meant that bus replacements would not have been a capital burden. Another point is that whilst the sum for garages, road reinstatement etc. was a one-off payment, that for track renewal would have needed paying perpetually. All-in-all, it is best to take the figures as they were presented, and on which the decisions were taken. What made buses cheaper on the bottom line was not working but capital costs. The obvious item which swung the balance was permanent way renewals, which were not chargeable to buses. But of course if trams had still cost roughly the same as buses, with their longer loan period they would have been cheaper to finance. So the high cost of cars was also an important factor influencing future policy. The argument from capital costs was clearly crucial, and this was so in other cities which were considering the future of their tramways about this time. In a 1945 report the Liverpool manager estimated that an all-bus solution would cost £3,779,450, whereas modernised trams would cost either £6,765,400 or £7,439,600, depending on the type of car chosen.[3] In Leeds, Young concludes, if a planned post-war extension had been built and 100 new cars bought, the loan debt would have crippled the undertaking financially for twenty years. What people wanted was cheap transport in British buses, which were the cheapest in the world seat-for-seat, and politicians had little choice but to follow suit.[4] A final and almost certainly decisive point is that by 1950 the trams in Sheffield were not earning enough to pay

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1. Sheffield Reports, 1946-7, 2. 2. Ibid., 1954-5, 3.

3. Blackburn, 'Post-war Liverpool', MT 30 (Aug 1967), 272; this was not merely for replacement of existing tramways, but for their complete modernisation and relocation off-street.

4. Young, 'Leeds Trams: 17', MT 37 (Feb 1974), 42 and 44.

for their renovation. In the 1940s after proper allowance was made for renewal, the trams were often in the red, and this in a period when the loan burden on the system was declining. Had loan charges been raised by £1.6 million, there was no way in which this could have been covered by earnings without massive fare increases. These would probably then have hastened the shift to private transport and been politically indefensible as well. There really was little choice.

Conclusion

This chapter has summarised the financial problems facing the tramways after World War II. In contrast to the situation before the war, Sheffield tramways were no longer profitable after making proper provision for renewal and were increasingly threatened with a working loss. They were also unable to earn enough to finance new investment either from revenue or by loans and when the situation was analysed it was clear that renewing the tramways would be more costly than an all-bus solution, which was the opposite of the situation before the war. Part of the difficulty lay in the fact that it was increasingly hard to protect the trams against municipal motor buses, which were taking a growing proportion of the traffic and thus, obviously, contributing to the tramways' financial weakness.

CHAPTER 17

PLANNING AND POLITICS

The Central Area Plan

The Sheffield Manager's report recommending closure of the tramways actually made very little of the financial argument, apart from saying that, with buses, vehicles were 'the first and last expense' and had no track costs.[1] Much more space was given to matters of town and traffic planning, and as with the finances, the positive pre-war image of the tram was giving way to a negative one. A crucial passage in the report read as follows:

> In view of the foregoing, and bearing in mind the City Council decision of 5th February 1947, in connection with the new Central Area plan, and with particular reference to the present growing traffic congestion in the City centre and the need for some early relief being provided, a scheme of gradual tramway replacement might be considered desirable for commencement at an early date.(2)

In common with most major cities, Sheffield was much exercised before and during World War II with planning and, later, with post-war reconstruction, in which a major concern seems to have been to fit the motor vehicle into towns which had been built for the use of men and horses only. The problems were naturally most acute in city centres, and Sheffield City Council first adopted a draft central area plan in December 1939.[3] There seems to have been some disagreement as to how best to proceed from principle to practice, and by the middle of the war three separate plans drawn up by the City Planning Officer, Architect and Engineer respectively were being considered. There does not seem to have been much consulation with the transport depart-

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1. S.T.D., Replacement Report, 2. 2. Ibid.

3. Sheffield Minutes, City Council, 6 Dec 1939, 8.

ment, though the Deputy Chairman of the Transport Committee, Councillor Bridgeland,[1] was a member of the Town Planning Committee. It was anyway decided to ask Mr. Manzoni, the City Engineer of Birmingham, to adjudicate on the three plans.[2]

His report, favouring plan B, was presented in 1944. All three plans were designed to keep trams running reasonably well whilst the schemes took shape; Manzoni said it had to be assumed trams might not be eliminated for ten years. But it was categorically stated that 'in order to derive the maximum traffic relief from any of the three plans, it is essential that trams should ultimately be removed from the principal traffic routes. The gyratory system of traffic controls cannot work with trams running, and a great part of all the schemes would, therefore, be abortive until trams were removed'. The 'gyratory system' here probably means roundabouts, but may refer as well to the idea of a City Circle around the centre, beyond which no PSVs at all were expected to penetrate.[3] The Council agreed to the plan in December 1944 and by 1947 the Planning Committee was making further proposals, including the following: that 'the Council . . . approve . . . the abandonment of trams <u>at surface level</u>[4] in the Central Area as soon as this course becomes practicable' and that the Moor[5] be redeveloped on the assumption that PSVs do not use it at all, but run along alternative streets to be provided east and west of the Moor. This scheme also involved the building of both a Civic Circle[6] <u>and</u> an inner ring road.[7]

These plans included a number of then fashionable concepts. The 'Civic Circle' was to enclose the core of the city and take most traffic around rather than through it. Public transport was to be excluded entirely (bring-

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1. Appointed in 1939-40 and then Chairman from 1944-5; see Sheffield Reports, passim.

2. Special Committee re. Town Planning and Civic Centres, 25th Report, in Sheffield Minutes, 1943-4, 208.

3. Town Planning Committee, 30 Nov 1944, 50. 4. My emphasis.

5. A city street, then used by trams. 6. An 'inner' inner ring.

7. Sheffield Minutes, Town Planning Committee, 27 Jan 1947, 141.

ing to mind the Manchester plans of a generation previous). This was not necessarily incompatible with tramways, as the Sheffield planners evidently believed it was, for both Leeds and Liverpool floated plans at about this time for inner rings complete with reserved track tramways, inside which trams would be banned.[1] But it did make trams more of a hindrance than a help, and in fact none of the schemes put forward ever received much support. The objections--such as the possible need for shuttle buses within the zone--were not insuperable, and there is at least one excellent example of such an arrangement which involves trams in Braunschweig, West Germany; here through motor traffic uses a 'box' around the historic centre, and though trams do not run right round, they use two sides currently and are being projected along a third.[2] In early post-war Britain, however, adoption of 'traffic free' zones was much more likely to lead to removal of tramways than to their relocation. A further idea which was doing the rounds at the time was that of underground tramways. Such a possibility was presumably implied by the amendment tabled in 1947 about removing trams 'at surface level'. If so, there appears to have been no real intention of carrying out further studies, and the amendment was doubtless only so phrased to defuse any possible opposition from the Council. A similar idea was pursued more seriously in Leeds during the war and a system of tram tubes reached the planning stage,[3] but eventually lapsed in the face of financial realities.[4]

A second issue raised by these events was the general attitude of town planners to tramways. As described above, in the 1920s and even into the early 1930s, trams could be seen as aids to better planning. Yet by the middle of the war, if not earlier, planners made the almost axiomatic assumption that trams had to go. It may have been simply that different problems required different solutions in the two decades concerned; in the 1920s

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1. See Young, 'Leeds Trams: 8', MT 36 (Feb 1973), 43 and Blackburn, 'Post-war Liverpool', MT 30 (Aug 1967), 270.

2. Personal knowledge.

3. Young, 'Leeds Trams: 8', MT 36 (Feb 1973), 43-4. 4. Ibid., 48.

it was population dispersion, for which the tram was often well-suited, whereas in the 1940s it was traffic congestion in city centres, for which the tram was seen as a cause rather than a solution. On the other hand it could have been more a matter of fashion; 'in the post-war world [the tram] was a thing of yesterday, something from the past that was obsolete in modern times'.[1]

Traffic Congestion

The Central Area Plan was largely designed around the need for traffic management, and trams were seen as an obstacle to this. The report on replacing the tramways mentioned 'relief in the central area' as an advantage to be derived from eliminating certain tram services and also that closing the Malin Bridge branch would reduce congestion at the terminus 'which has been a source of anxiety for some time and about which the City Police have made representations to the Transport Department'.[2] Traffic delays caused by trams running and picking up in the centre of the roads were mentioned in the report too. Clearly, pre-war days when traffic congestion was seen as either not particularly severe in Sheffield or as a problem in whose solution trams deserved as much if not more consideration than other vehicles were gone. Bearing in mind that the report came out early in the 1950s when car traffic was not all that much greater than in 1939,[3] this stress on traffic problems could seem a little surprising. However although the number of cars had only just recovered to pre-war levels, the total of motor vehicles as a whole was 25 per cent greater, a lot of them probably lorries which would have been prominent in an industrial city like Sheffield.[4] Also, the planners were obviously and rightly envisaging a still greater growth in motor traffic, and were laying long-term plans for the city centre

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1. Joyce, Tramway Twilight, 47-8. 2. S.T.D., Replacement Report, 9.

3. Of course, this is precisely when traffic planning for the city centre was beginning.

4. See Table 52 overleaf.

with this in mind.

TABLE 52

UNITED KINGDOM: MOTOR VEHICLES IN USE FOR SELECTED YEARS BETWEEN 1939 AND 1960

Year	Total	Cars
(Aug) 1939	3,148,600	2,034,400
" 1945	2,552,500	1,486,600
(Sep) 1950	4,409,223	2,257,873
" 1955	6,465,433	3,525,858
" 1960	9,439,140	5,525,828

SOURCE: Plowden, The Motor Car and Politics, Appendix B, 456.

Three specific arguments were deployed against the trams--that they caused delays by loading in the centre of the streets; that traffic could not pass between trams and parked cars, preventing overtaking; and that trams could not negotiate roundabouts.[1] The first was probably the most serious objection and had been causing concern to tramway operators themselves as traffic grew because of the danger to passengers; the problem was that though reserved tracks might be built in outer areas, this was not thought possible in city centres because of the cost.[2] In Sheffield there was scope for kerbside loading or pedestrian refuges at only a very few central locations like Pinstone Street and Exchange Street. The second point was largely irrelevant, for the report itself admitted that in the majority of Sheffield streets any other form of transport would run in the same position in the roadway if parking were permitted at the roadside[3] though, of course, it was true that buses could draw to one side when loading. Regarding roundabouts, when these began to be constructed in Sheffield trams did run straight through the middle. There is still one example at Firth Park,

1. S.T.D., Replacement Report, 2. 2. Joyce, Tramway Twilight, 46-7.

3. S.T.D., Replacement Report, 2.

where the tram tracks remain today, isolated in the centre of the roundabout.[1] There was, however, no real reason apart from cost why tracks could not be diverted to flow with the traffic; as late as 1951 London Transport was installing new tramway roundabouts.[2] So except for the difficulties caused by street loading, the effect of trams on traffic congestion was at least arguable. Joyce included this telling quotation in one of his books:

> Just over a year ago, Glasgow said goodbye to the last tram. They were regarded by the experts as the biggest contributory factor to traffic chaos. What difference has the tramless twelve months made? According to the police traffic department, 'the difference, if any, is negligible . . . At peak times, traffic is no faster in the centre of town than at this time last year'. (3)

Moreover, trams were probably at least as much sinned against as sinning, for increasing congestion slowed <u>them</u> down too. Glasgow's horse trams in 1872 had achieved an average speed of 9 m.p.h., yet by 1952 the city's electric trams could only manage 9.23 m.p.h.[4] In a sense, however, the actual effect of trams on street traffic is irrelevant in the present context; what mattered was that planners, and bodies such as motoring organisations, <u>believed</u> trams to be a major cause of congestion, so making this a reputable argument to use towards their replacement.

Extensions

A further point mentioned in the Manager's report was the cost of track laying in order to adjust routes.[5] This may refer to alterations in order to meet the Central Area Plan, but could also cover the ever-present need to expand services to new areas. The previous discussion has shown how in the 1930s plans for some tramway extensions were allowed to lie on the table, and that instead new motor bus routes were introduced. So when in 1949 the powers for extensions to Shiregreen and from Handsworth, Wadsley Bridge and

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1. Personal observation. 2. Joyce, <u>Tramway Twilight</u>, 36.

3. <u>Glasgow Evening Citizen</u> (1963); quoted in Joyce, <u>Town Transport,</u> 59.

4. 'Municipal Passenger Transport: Extracts from Mr. A. C. Findlay's Paper', <u>MT 16</u> (Dec 1953), 231; Findlay was then General Manager of Leeds City Transport.

5. S.T.D., Replacement Report, 2.

Meadowhead were approaching expiry, it was decided not to build them, except that housing developments in the Meadowhead area made the Committee leave this possibility open.[1] This is the last which is heard of the matter, though, and even before that it had been decided on the suggestion of Rotherham Corporation to make permanent the originally temporary withdrawal[2] of the joint Sheffield to Rotherham tram service;[3] the reason for this was that Rotherham's small tram fleet was worn out and would have needed replacement.[4]

Official Attitudes

This chapter has shown how after and to some extent also before the war the tramways became obstacles rather than aids to town planning, especially because of the presumed causative link between trams and traffic congestion and because of the real and heavy costs of diverting or extending tramway tracks.[5] There remains one factor which had formerly gone in favour of trams in Sheffield, that of attitudes. The professional management of the transport department had been alive to the merits of the various available forms of urban transport from an early date. Broadly speaking, a balanced attitude to the relative merits of buses and trams was maintained until World War II, though perhaps with a discernible swing away from trams and towards buses. By the late 1930s doubts about the trams' future were beginning to surface. Mr. Watson's idea for a new type of tram was condemned by the engineer for technical reasons, but also because 'the future programme is uncertain'.[6] This may have reflected awareness of the planning proposals then taking shape, though as already noted there seems to have been little liason, at least at Council and Committee level, between the

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1. Sheffield Minutes, TC, 15 Nov 1949, 336.

2. Closed for bridge reconstruction; see ibid., 19 Oct 1948, 592.

3. Ibid., 19 Jul 1949, 144. 4. Gandy, Sheffield Tramways, 86.

5. Leeds built a new line after the war at an infrastructure cost (no new cars were bought) of £250,000 (this may include the planned cost of an unbuilt depot); Young, 'Leeds Trams: 11', MT 36 (May 1973), 162-3.

6. Hall, Sheffield Transport, 208.

planning and transport departments. It almost seems as though the Central Area Plan was drawn up and accepted by the Council--which obviously included the members of the Transport Committee--without its radical conclusions in respect of tramways having any effect on day-to-day affairs. The Committee was reminded by the Manager in 1946 that heavy costs would be incurred 'whatever form of transport is ultimately decided shall be adopted to conform to the new road proposals'.[1] But in the same financial year unsuccessful attempts had been made to get materials for building new trams at Queens Road[2] and a quotation was received from Roberts for the thirty-five cars actually ordered;[3] in the following year it was also decided that the Rotherham service's closure should be only temporary, and that the reintroduction of tramways should at least be considered later.[4] The Meadowhead extension was also left on the table as late as 1949.[5] It is as if the Committee were continuing to discuss the development of the tramways without being aware of the almost irresistible tide of professional opinion which regarded their abandonment as a foregone conclusion.

The main strand in this expert assessment seems clearly to have come from the planners. It was they who, from at least the middle of the war, talked in terms which implied the rapid disappearance of the trams. And such discussion seems to have reached the level of stated policy on the Planning Committee much earlier than it did in the Transport Committee. However, when Harris Watson retired and was succeeded by R. C. Moore in 1945, the latter went on record almost at once to the effect that, in his opinion, trams would eventually be replaced by buses.[6] Mr. Moore was a for-

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1. Sheffield Minutes, TC (Special), 24 Apr 1946, 247; my emphasis.

2. Sheffield Reports, 1946-7, 4.

3. Sheffield Minutes, TC, 18 Nov 1947, 38; the explanation for the seeming conflict in policy is probably that any replacement programme would have to be long term, and that meanwhile fleet renewals were urgently needed to keep existing services going (see Hall, Sheffield Transport, 255).

4. Ibid., 19 Oct 1948, 592. 5. Ibid., 15 Nov 1949, 336.

6. Hall, Sheffield Transport, 255.

mer employee of the department; he had left for a post with a bus undertaking at Stockton-on-Tees in 1929[1] and had latterly been at Liverpool, a major tram operator,[2] so he was well aware of the arguments on both sides of the tram scrapping issue and probably represented the general though still not quite universal opinion of the day. Even so, the impression remains that the real push to get rid of the trams came not so much from the Transport Committee or its management, but from the planners, who obviously regarded the removal of trams as a 'sine qua non' of their redevelopment plan.

Politics

It is as well to dispose of one false trail here. In an article in Modern Tramway Philip Webb says that trams became a political issue in Leeds, Sheffield and Edinburgh and were scrapped after the anti-tram party gained power in local elections.[3] This was the case in Leeds, where the Conservatives made great efforts to deal with the losses on the trams when in power between 1951 and 1953,[4] but where Labour won the municipal election of the latter year with a tram scrapping policy which was quickly implemented against Conservative opposition and an initial reluctance on the part of the management.[5] A change in party political control was not, however, a factor in Edinburgh,[6] and nor was it in Sheffield. The Labour Party had been in almost continuous office since 1926, and it was their policy, rather than political control of the Council, which had changed. It seems rather curious to find, as in Leeds, that the Conservatives were the pro-tram party, particularly as they had opposed them pre-war;[7] but a split of this nature

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1. Sheffield Minutes, TC, 19 Nov 1929, 32.
2. Hall, Sheffield Transport, 253.
3. Philip Webb, 'The View from Toronto', MT 43 (Nov 1980), 370.
4. Young, 'Leeds Trams: 13', MT 36 (Aug 1973), 266-7.
5. Ibid., (Nov 1973), 366-72, passim.
6. John S. Wilson, 'The View from Edinburgh', MT 44 (Mar 1981), 85.
7. Gandy, Sheffield Tramways, 97.

was almost inevitable, given the adversorial nature of British politics.

The Sheffield Transport Committee quickly accepted the General Manager's scheme to replace trams by buses over a period of fifteen years.[1] The issue was fought quite strongly on the Council, where the initial motion to accept the Committee's decision was only won by fifty votes to thirty-one.[2] A further attempt was made to defer any action for two years, the request being related to a rearmament programme of the time which would, it was said, need all available labour and material, but this too was defeated.[3] There was considerable public reaction against the move; a Sheffield Tramways Development Association was formed,[4] and local residents' petitions were sent in from both Malin Bridge and Fulwood after the first closure.[5] The latter is slightly surprising, in that Fulwood is a high-class residential area where people were not supposed to like trams; maybe Sheffield's escaped being tarred with the 'working class image' brush said to be the case elsewhere.[6] Much of this particular protest, though, was due to the fact that the former through tram service was cut, bus passengers being decanted at less convenient termini. The Council's first reaction was to order the restoration of the tram service, but the eventual result, five months later, was a through bus route.[7] The largest protest was an 11,465 signature petition submitted in May 1952, but this was referred to the Transport Committee, who merely noted it.[8] Just about the last serious move to delay the changeover came a year later when two councillors tried unsuccessfully to get the Ecclesall to Middlewood conversion deferred.[9]

Two matters are worthy of further consideration. First, Webb made the

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1. Sheffield Minutes, TC, 28 Mar 1951, 582; the tramways actually closed more quickly, but this was usually found more economic than delaying.

2. City Council, 4 Apr 1951, 606. 3. Ibid., 6 Jun 1951, 75.

4. Ibid., 3 Oct 1951, 232. 5. Ibid., 13 Feb 1952, 499.

6. See above, 72. 7. Gandy, Sheffield Tramways, 98.

8. Sheffield Minutes, TC, 20 May 1952, 39.

9. City Council, 6 May 1953, 639.

point in the article already referred to that in Toronto the transit authority was much more independent of local political control than has traditionally been the case in Britain; party politics was in any case less important at the local level. Hence it was possible for a pro-streetcar citizen's group to have an effect when a change was proposed in 1972.[1] It may be that under such a system local feeling in Sheffield might have had more impact than it did, but in the British context, of course, the result would have been the same anywhere. But the formation of a 'Tramways Development Association' points the fact that no official thought seemed to have been given in Sheffield to the possibilities for really modernising the tramways, as opposed to merely renewing existing assets. The former was very seriously considered in Liverpool, where in 1945 the General Manager costed a scheme for a completely modern fleet running on segregated tracks;[2] the same was true of Leeds, where two new trams with the latest control equipment were actually built in 1953.[3] In both cases, however, the costs were found to be too high, and there is no reason to suppose that it would have been any different in Sheffield. This was still the era when subsidies for public transport were felt to be aberrations, and it was assumed that undertakings should be able to pay their way; if trams could not do this, which it appeared they could not, then they would have to go. All-in-all, party politics seems to have been of little importance in the course of events in Sheffield, less so than in, say, Leeds. The trams were seen to be dispensible because they could not achieve either financial or planning objectives, and on this both the majority party and the management agreed.

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1. Webb, 'The View from Toronto', 370.
2. Blackburn, 'Post-war Liverpool', MT 30 (Aug 1967), 270 and 272.
3. Young, 'Leeds Trams: 14', MT 36 (Oct 1973), 330.

CHAPTER 18

SHEFFIELD TRAMWAYS: CONCLUSION

Winding up the Tramways

The detailed timetable of tramway closures is given in Appendix S8; statistics showing the concurrent decline in route/track length and in the numbers of cars are given in Appendix S3. As tended to be usual in such circumstances, the closure programme was speeded up once underway. Originally some routes were to have survived as late as 1965, with long periods in the 1960s with no closures at all, but in the event the last tram service between Beauchief and Tinsley (Vulcan Road) closed on 8 Oct 1960 with, as was again usual by this time, a ceremonial procession.[1]

During this period an attempt was made to reduce annual charges for painting the fleet by £2,000 per annum for buses and £2,500 for trams by using a green colour scheme instead of the familiar blue and cream.[2] A number of both types of vehicle were repainted, but in the face of public disapproval, the idea was dropped;[3] to offset this, the Corporation decided to allow external advertising, which had not been done since World War I.[4] By 1955-6, £32,155 was coming from this source.[5]

As the expected life of the remaining tram routes grew shorter, it was

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1. Hall, Sheffield Transport, 266 and 268.

2. Sheffield Minutes, TC, 19 Feb 1952, 525.

3. Leeds did change its livery, achieving the lowest painting costs of any municipality; see Young, 'Leeds Trams: 12', MT 36 (Jun 1973), 196-7.

4. Gandy, Sheffield Transport, 94. 5. Sheffield Reports, 1955-6, 3.

obviously possible to cut down on maintenance without which, of course, the already rapidly rising working costs would have gone up even more. The impression of a youthful tramway enthusiast in 1959 was of worn track, which caused the trams to roll at speed, and of cars which were generally dirty and poorly maintained.[1] A slightly curious feature was that some of the older Standard trams survived until the end as well as some, though by no means all of the newer cars.[2] Most of the trams were scrapped by the local firm of T. W. Ward and a special track was laid across the road from Tinsley depot into their yard to facilitate this.[3] A total of eight trams eventually ended up in the hands of museums or preservation societies.[4]

The Results of the Conversion

During the 1950s the problems facing the transport department did not disappear and if anything worsened. Labour shortages remained serious, causing services to be curtailed.[5] Efforts to plug the gap included hiring 230 'coloured British nationals' as conductors, which aroused trade union opposition,[6] and also the introduction of new high-capacity 76 and 78 seater buses; the latter provoked a damaging seventeen day strike over the issue of standing passengers which cost £225,000 in lost revenue and, allowing for expenditure saved, a net loss of £100,000.[7] Wages and fares continued to rise,[8] and partly as a consequence traffic continued to decline.[9] The peak in travellers had been nearly 300 million in 1947, but by 1955 the total was only 256 million.[10] Nevertheless the severe financial crises of the late 1940s and early 1950s were not repeated in the rest of the latter decade. The deficit which had been accumulated was dealt with by transferring sub-

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1. Personal reminiscence. 2. Gandy, Sheffield Tramways, 110.
3. Hall, Sheffield Transport, 258. 4. Gandy, Sheffield Tramways, 116.
5. Sheffield Reports, 1955-6, 11. 6. Ibid., 1956-7, 9.
7. Daily Telegraph, 5 Nov 1959.
8. Sheffield Reports, 1957-8, 1. 9. Ibid., 9.
10. Hall, Sheffield Transport, 261.

stantial sums from reserves and, exceptionally, by a transfer from the rates of £131,694 in 1952-3. This left the Reserve and Renewal Funds with a nil balance and a continuing overall deficit of £18,127. During 1952-3 the first surplus for five years was earned, of £74,533, and by the following year it was possible to eliminate the deficit entirely, leaving £26,245 to put into reserves.[1] In 1954-5 the Renewals Fund was re-established in the hope of purchasing future bus replacements without recourse to loans.[2] The following year the fund was still £147,000 below the sum needed to achieve this, and tram replacement buses being bought from loans in any case,[3] but by 1957-8 replacement of the large number of immediate post-war buses was said to be possible from the Renewals Fund, which now totalled £608,708;[4] this was a remarkable turn-around for a fund which had been exhausted only five years before. By the time the trams closed, all tramway loans had been fully paid off and all road reinstatement charges met.[5]

Where did all this money come from? As a matter of book-keeping, the trams continued to pay their share of renewals, contributing £93,000 to the buses' £83,000 in 1954-5; but the result was only to put the tramway account into deficit, which then had to be covered from the surplus earned by the buses.[6] After a better year in 1955-6, thereafter the trams never again covered their working costs, so were a net drain on the department's finances.[7] That being so, the financial recovery was almost entirely due to the buses' earning capacity, except during 1951-2 and 1952-3 when the trams did earn good surpluses to help reduce the deficit.[8] From 1952-3 to 1968-9 there was a net surplus every year, which was a good deal better than in the immediate post-war period before it had been decided to dispense with trams. A further crisis did hit the undertaking in 1969-70 and 1970-1; the Reserve

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1. Sheffield Reports, 1960-1, 30, Finances of the Transport Department (Table).

2. Ibid., 1954-5, 3. 3. Ibid., 1955-6, 5. 4. Ibid., 1957-8, 3.

5. Ibid., 1960-1, 5. 6. See Appendix S14. 7. See Appendix S3.

8. See Appendix S14.

and Renewal Funds were again reduced to nil, and in the second year recourse was had to the rates, to the tune of £240,191, only for the second time in the department's history. But matters improved dramatically in the subsequent two years, the money was repaid to the rate fund and over £300,000 was put to reserves.[1]

Could these results have been achieved by a revivified tramway? So many variables must be conjecture, for by 1970 there was no British city tramway to provide any yardstick by which to judge; what would track renewal, priced at £120,000 per annum in 1951, have cost twenty years later, for instance? But even on the facts which can be known, the answer is pretty conclusive. The most damning statistic is the trams' operating ratio, which Appendix S3 shows to have worsened fairly steadily ever since World War II and to have become regularly negative from 1956-7 onwards. The trams, in short, could not earn enough to pay capital and other charges and even, latterly, their own working expenditure. During this period motor buses could, for though their earnings might be slightly less per vehicle mile, their costs of operation were markedly less. Had the tramway been renewed, the higher capital cost of this would have pushed annual costs--as calculated in 1951--to £31,200 above the bus option. From 1954-5 until 1960-1 the net surplus for the undertaking as a whole after renewals was never as much as this, so tramway capital costs would necessarily have put the department into the red.[2] Of course, renewals payments could have been reduced, but this would only have forced necessary replacements on to loan finance, so putting up later annual redemption costs which, of course, the trams were already incapable of meeting.

Given the general assumption of the time that local transport should pay its way from revenue, there was really no choice but to dispense with trams, which were expensive to buy and run, and to replace them with buses, which were cheaper on both counts. A quarter of a century later, the

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1. Sheffield Reports, 1972-3, 9.

2. Net surplus from Sheffield Reports, passim.

expectation had changed, and South Yorkshire County Council, which had taken over Sheffield's transport responsibilities in 1974,[1] could adopt a policy whereby 50 per cent of expenditure on revenue account came from various forms of subsidy.[2] It might, under such a regime, have been possible to adopt better if more costly transport modes without worrying about the price, but in 1960 and still more in 1951 such an option was not open to Sheffield City Council; they had to make the same commercial judgements as any company, and trams were not an affordable option.

Conclusion

The two key questions asked originally about Sheffield's tramways were, why were they retained and developed up to 1939? and why did the policy change thereafter? The reasons why the city had the option of keeping the trams and why, in contrast to (say) Manchester, it made good sense to do so, may be briefly summarised as follows. The tramways were profitable and could finance new investment from earnings. A very important point was that on a well-run tramway only a relatively small proportion of assets needed replacing annually at or more likely below the cost of an all-bus option. In the 1920s, too, tramways fitted town planning objectives of zoning and population dispersal, Sheffield being particularly favourably placed in this respect because of the fairly short distances required to reach some of the new housing estates. In the city centre, traffic congestion does not seem to have been as serious as it was in Manchester and, again in contrast to that city, the transport management in Sheffield had a balanced attitude to the uses and merits of both trams and motor buses. The latter were enthusiastically developed in and around Sheffield, but care was taken to avoid direct competition with the trams as far as this was possible.

Even in the 1930s some of these advantages were being eroded. Traffic congestion was worsening, various Corporation officials were beginning to question the trams' long-term role, and urban bus routes were causing serious

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1. SYPTE, Transport Development Plan, 1. 2. Ibid., 72.

losses of revenue and traffic to some tram routes. Tramway extensions were made particularly diffficult to justify because of the Council's rigid adherence to the standard maximum fare, which was uneconomic for longer distances. After an enforced standstill during the war, the position of the trams worsened rapidly after 1945, and during the first five years of peace it became quite evident that the tramways were no longer a viable entity.

Financial difficulties showed themselves in a variety of ways. First of all, earnings were usually insufficient to meet renewals appropriations, meaning that deficits were more common than surpluses after 1945. It was occasionally not even possible to cover the existing and by then much reduced loan debt, showing how unlikely it was that any new capital expenditure could have been serviced from revenue. Reduced earnings were obviously reflected in a worsening operating ratio, which was a consequence of falling revenue and rising working costs. Traffic, and therefore revenue fell because of the decline in loadings immediately after the war, because of the negative effect of sharp fare rises and because of the 'leakage' of passengers to buses. Revenue was also adversely affected by the fact that fare increases, despite their deleterious effect on passenger totals, were applied too long after their necessity became apparent. Although the fare increases did succeed in increasing income in money terms, the operating ratio was put under pressure by the even faster rise in working expenditure, mainly a result of rises in the costs of wages and repairs. Meanwhile, motor buses established an advantage by keeping the increases in their working costs below those of the trams. The same was, of course, true of renewal costs, and it became increasingly obvious that buses would be cheaper in capital terms than a rebuilt tramway would be, and this outweighed any residual advantage which the trams might possess in terms of working expenditure. When the decision to replace the trams was taken in 1951 the cost of renewal was the crucial factor. But as the decade progressed the trams' operating surplus declined further and was eventually eliminated. By then the tramways had reached a stage where an outworn capital asset could neither be

replaced nor even operated profitably.

Other chapters in this section cover the influence of town planners, traffic congestion and official or political attitudes on the tramways' position. It seems to have been taken for granted from World War II onwards that trams could not be adapted to meet modern planning objectives and that they were a major cause of traffic congestion; it is arguable whether these assumptions were correct in all particulars, but the important point is that they were believed and formed a part of planning orthodoxy. The formation of the Central Area Plan, with its clear statements about eliminating trams, pre-dates the severe post-war financial crisis described above. This would in any case have rendered the tramways unviable in a period when public transport was required to break even, but the plans were laid before this became apparent. So one has to assume that planning issues were the key influence behind the closure decision as, in fact, the balance of evidence in the 1951 Replacement Report indicated. It is most interesting to note that in his survey of Hull's tramways Lee concluded that the traffic problem, due in turn to poorly planned British cities with narrow streets, was the decisive cause of tramway abandonment there too.[1] Had tramways been thought desirable on planning grounds, it would no doubt have been possible to make financial and physical arrangements to accommodate them. This was, for example, done in Hanover soon after the war, when a joint report of the operating company and the City recommended keeping trams on all main radial routes for reasons which included their ability to carry more people than buses whilst using less road space and the greater opportunities for segregating public from private transport.[2]

One or two suggested reasons for the disappearance of tramways have been found not to be significant for Sheffield in the 1940s. These are the growth in private car and television ownership, both of which really took off later, and also party politics.

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1. Lee, 'Tramways of Hull', 274-5.

2. R[ichard] J. Buckley, 'Post-war Hannover: 1', MT 44 (May 1981), 152.

It seems therefore that the future of the tramways in Sheffield was really decided by the planners during and immediately after World War II. Later financial difficulties made the choice of motor buses attractive on commercial grounds too, so 'if the plans had not existed, they would have had to be invented'; that is, if planning imperatives had not forced the removal of trams, financial ones would have done so later.

It is somewhat ironic, therefore, to find South Yorkshire PTE promoting a scheme for a new 'Supertram' network for Sheffield almost exactly a quarter of a century after the final closure of the original tramway. 'Supertram', the PTE said, 'will mean fast, efficient, lower cost Public Transport ideally suited to carrying large numbers of people in urban areas and giving direct access to the heart of the city'.[1] There are a great many reasons for doubting the plan's ultimate success, but one of them has a certain feeling of deja vu about it; outside the local public, it is town planners who have the greatest doubts about the scheme.

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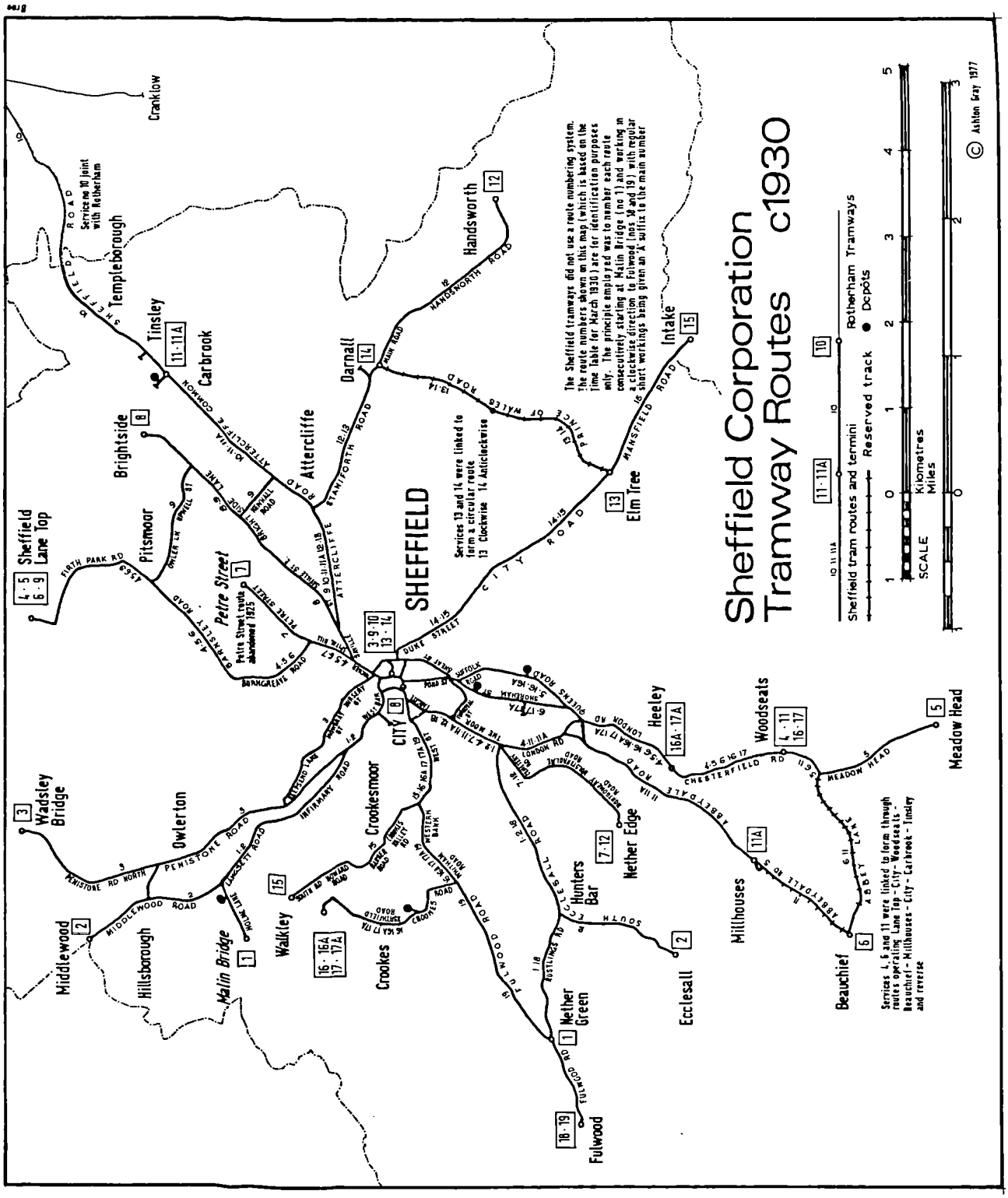
1. SYPTE, Press Release, 4 Jul 1985, 2.

FIGURE 10



SOURCE: Hall, Sheffield Transport, endpapers.

PART V

SUMMING UP

CHAPTER 19

CONCLUSION

The rise and decline of the British street tramway industry is broadly contained within the single century 1860 to 1960. Both the omnibus and the railway were established beforehand and are still important contributors to inland transport today, as are tramways in other parts of the world. What caused the British tram to disappear as swiftly as it did? A large number of possible explanations have been identified in the introductory chapters of this work and a large amount of evidence accumulated from the three case studies. It now remains only to draw general conclusions.

Even before World War I financial problems were becoming apparent. First, some marginal tramways were already making losses. Although the DDLR was not built until afterwards, the pre-1914 inquiry into its construction provided interesting confirmation of this, as well as identifying tramways running outside towns as particularly at risk; later experience showed that those built tended to have shorter lives than tram systems in more built-up areas. The DDLR was thus always a marginal proposition and would probably never have been built had the consulting engineers not disguised the likely level of working costs.

Doncaster tramways were also loss-making over much of the pre-World War I period, but at least in the short term this was not a sign of permanent unviability, but merely a reflection of the fact that building up business took time. Later experience showed, however, that certain individual lines always ran at a loss, with obvious implications if profits earned elsewhere were ever reduced.

A second early weakness, which was exemplified in Doncaster, was an inability (or in some other cases, unwillingness) to set aside adequate reserves to cover depreciation of assets. It was usually the smaller tramways where this was the case, however, and Sheffield tramways illustrate the opposite tendency: for electric tramways to be profitable and successful from the start, giving the undertaking the ability to cover all loan debts, to make adequate allowance for depreciation and also to pay large sums towards rate relief and road improvements. Sheffield itself stopped making these two latter payments in the 1920s, but the tramways remained profitable because of (1) heavy traffic due to a high population per mile of track and (2) economies of scale, which meant that working and capital costs could be spread over a high mileage.

The financial weakness identified in some cases could have been partly a consequence of certain legal restrictions placed on tramways. The 1870 Act required tramway owners to repair the road surfaces and also to pay full rates. Neither seems to have been a particularly significant matter in Sheffield or to the DDLR. All three systems were municipal, which meant that payments for rates and repairs were, in a sense, merely matters of internal book-keeping to the authority. Doncaster and the Dearne District both paid lesser rates as light railways too. But Doncaster laboured under a disadvantage in that several of its longer lines reached into the areas of other authorities. Rates would have been payable, but more importantly major disputes arose over road repairs, causing the closure of the otherwise profitable Bentley tramway; road charges were also mentioned as a reason for favouring trolleybuses for the town.

A quasi-legal factor which could have affected tramways vis-a-vis motor buses was that tramway pay was set by a wages council, whereas company bus pay was not. The DDLR provides some evidence of a higher wage bill for tramways, but this was due much more to higher productivity on the motor bus side than to lower pay scales (though this <u>was</u> true where the independents or 'pirates' were concerned).

A further restriction was that tramways were normally required to offer special workmen's fares and services, whereas buses were not. This was not a limitation on any of the three South Yorkshire undertakings, though, for the ordinary fare on each was usually the same as the statutory workman's fare. Both Doncaster and the DDLR found it necessary to introduce yet lower fares, by offering either half fares or discounted tickets, but this was not due to legal impositions but to competitive pressures and/or the need to build up traffic. This policy proved a success in Doncaster, both before World War I, when workmen's fares helped to encourage the riding habit, and also in the 1920s, when weekly passes proved a valuable weapon against pirate bus competition. The fares battle in the Dearne valley, when fares were reduced to very low rates, also succeeded in increasing DDLR revenue, though not by sufficient to break even. The Croydon Survey did show, however, that most pre-1914 tramway managements--including Doncaster's--believed the ½d. fare likely to be offered to workmen was unprofitable; in the 1920s, too, the DDLR Manager would have liked to dispense with workers' concessions. So workmen's fares were obviously a bit of an Achilles' heel to tramways, and if ordinary traffic was low for any reason could drag the undertaking into deficit.

The effect in Sheffield was rather different. Here the tramways were profitable right up to and including World War II, whilst at the same time charging very low fares (much lower than Doncaster's standard fares, for example). But the rigid adherence to a standard city to terminus fare meant that even quite short route extensions caused severe falls in revenue per car mile. For longer lines, this was insupportable, so motor buses were used instead; once extended into the city centre, they provided damaging competition to the trams.

Tram fares were also usually lower than bus fares, intended as a protection to the former. Young suggested that after World War II this harmed the trams by reducing their income, but the evidence is that when fares were equalised, trams lost both revenue and traffic. Undoubted harm was

however done by the statutory machinery for raising fares above the maximum set at the time of a tramway's construction. It was a slow and time-consuming business to increase fares, and this was especially damaging during the inflation following the World Wars since fares could not be raised quickly enough to meet rising costs; there is evidence from both Doncaster and Sheffield for this.

National economic performance naturally affected tramways, not least via inflation. Though serious after World War I, stability was eventually re-established, the most important consequence for trams being the reluctance of costs--in particular, of wages--to fall as fast as prices. Post-World War II inflation was more damaging for surviving tramways because the fare increases made necessary helped to reduce passenger totals, whilst at the same time both working and renewal costs rose disproportionately and less fast than comparable motor bus costs.

Both Doncaster and the DDLR were seriously affected by the more local economic difficulties of the coal industry. It was the 1921 coal strike which caused significant loss to the Doncaster tramways in that year, rather than--as alternatively claimed at the time--pirate bus competition. All three tramways naturally suffered from the strikes in 1926--Sheffield was still a mining area at the time--but it was the fledgling DDLR which was hardest hit because it was so dependent upon the employees of one industry.

Because tramways were a capital intensive industry, anything affecting capital assets or charges was important. In the early days the period of loan redemption was often too long, so that equipment had worn out before the loans were paid off; this was true in Doncaster. Of course, this was partly related to the financial strength of the undertaking itself and Sheffield--with one minor exception--had no difficulty in paying off its entire loan debt (though latterly partly from motor bus earnings).

An interesting variant on this difficulty was where a tram line was so misconceived as to fall into disuse long before its capital debt was extinguished. The Oxford Street line was a small but real burden on the

Doncaster undertaking, though the DDLR Joint Committee succeeded in solving its problem very neatly by becoming a sleeping partner in the Yorkshire Traction bus business. A further problem was that equipment had sometimes not worn out or been fully paid-off before it became out-dated. This was certainly true for the DDLR, whose wooden-seated cars and single line were no match for the motor bus, and also to some extent of Doncaster, where most routes were also single track and whose older open-topped trams were very archaic by the end. The implication of having the millstone of old capital tied to them when renewal became necessary was, of course, that undertakings sought the least capital intensive replacement to avoid having the problem compounded; this did not usually favour the tramcar.

Either by obsolescence or by wear and tear, most tramways became due for relaying or re-equipping by the 1920s or 1930s. The DDLR was of course an exception, but its construction in those very years demonstrates the difficulty other tramways were facing, which was that inflated capital costs would be difficult or impossible to cover from any reasonable assessment of earnings. In Doncaster, it was decided that planned and partially executed extensions into the coalfield should not after all be built, as it became evident that older lines built at lesser cost were becoming unable to meet their capital charges. So motor bus services were started instead. If new construction was not worthwhile, neither was renewal of old lines. This was so even if existing routes, like the Bentley line, were profitable, because they were built on old capital. Doncaster's tramways were forced into crisis at an early date because of the inadequate methods used to build its original tracks, which had poor foundations and paving. Trouble arose during and even before World War I, barely a decade after construction.

This was not a purely economic matter though. At least as important was the statutory obligation to maintain the road surfaces around the track. When other local authorities--or Doncaster's own Borough Surveyor--wished to improve roads to modern standards, the tram tracks had to be relocated or rebuilt. The difficulty was excacerbated by inter- or intra-local authority

disagreements, but the root of the matter was the obligation imposed by the 1870 Act. So it was decided to convert the profitable Bentley tram route to a trackless mode, whereas without the road problems the trams would probably have continued to run for several years longer.

When Doncaster went on to consider the wholesale rebuilding and improvement of its tramways, it was quickly decided that this could not be financed, and that a cheaper alternative was desirable. This was partly because of the problem already mentioned, that struggling undertakings like Doncaster could not set aside adequate funds for depreciation. That would, of course, have been difficult in inflationary times anyway, but Doncaster was never able to build up anything like an adequate reserve, so that almost all improvements which were made had to be financed by fresh loans, with all the attendant disadvantages of that course. The DDLR, obviously, was never in a position to put aside any funds.

Between the wars, by contrast, Sheffield always had adequate funds available to service loans, and in addition to set aside large sums for renewals or reserves. Although new loans continued to be taken out, much renewal was paid for from current or past earnings, so reducing the burden of capital payments. The most significant reason why trams continued to be an affordable option for the city was that a rolling programme of renewal and improvement had been carried on throughout the undertaking's existence, and so the question of wholesale replacement never arose, as it did for less financially well-endowed systems. The most dramatic consequence of this was that further gradual improvement of the tramways was, in the 1930s, cheaper than all-out bus replacement. Following World War II, however, Sheffield found itself in the same situation as other tramways after World War I. Only the much-reduced pre-war capital charges could now be met, and renewals, let alone full-scale modernisation, could not be financed out of the declining surplus.

Poor management practices within local authorities have sometimes been cited as a weakness of the, mostly municipal, tramway industry. This does

not appear to have been a difficulty in South Yorkshire. It was quite general for responsibility for tramway track to be left to the highways' department, as it was in Doncaster, but here the relationship between the two officials concerned does seem to have been less than cordial and so less effective than it should have been. Relations between local authorities themselves have also been mentioned. Doncaster's long tram routes meant that both neighbouring UDCs and the WRCC had the opportunity to be obstructive and critical, which they were. It is clear that far from working together to ensure a good public transport service,each authority was concerned only to protect its own interest. This was undoubtedly a major reason behind the series of decisions which led to the substitution of trolleybuses for trams.

Also in the case of Doncaster, it was noticeable that a policy change followed the appointment of a new manager in 1919, and this was to some extent effect and cause. It is also undoubtedly true that Sheffield's pro-tram management in the inter-war years was a sharp contrast to Pilcher's advocacy of the motor bus in Manchester, and that transport policies in the two cities did reflect the personal preferences of their General Managers. Equally, other factors underlay these divergent policies, as was also the case when R. C. Moore changed Sheffield's policy after World War II.

One particular problem after 1945 was the difficulty in obtaining new cars. Sheffield had, like most other large operators, built most of its large requirement of cars itself for many years, thus starving commercial builders of markets. When either shortage of materials or of the necessary skills to build modern cars forced a reversion to outside supply, there was only one small firm prepared to tender. The price must almost inevitably have been higher than an 'in-house' cost because of the profit element, was possibly inflated because it was the only tender, and may also have been higher than a large firm could have offered, had such a firm still existed. Slow delivery was also a problem.

The case studies throw little further light upon Yearsley's point that

tramways were never properly modernised anyway, except by an argument from silence. Certainly Doncaster's tramways never progressed beyond early 1920s technology, and though Sheffield kept its system up to date until 1939 and even ordered new cars after World War II, the latter were really no more than semi-streamlined bodies on traditional trucks and equipment and did not signal any radical change in design or operating method.

The decision to abandon Sheffield's tramways owed little to the competitive impact of the the private car, for closure was agreed before motor traffic really began to expand with the end of post-World War II austerity. The troubles experienced by the remaining trams and by the buses later in the 1950s are evidence that cars would have abstracted tramway traffic, but this effect was not yet serious in 1950; the same goes for the impact of television on evening patronage.

Competition, in its broadest sense, between trams and buses was the key factor behind the decline of the tramway industry. The financial advantages of buses were threefold--that they were always cheaper to install; that after their early experimental days they became cheaper to run, first on a vehicle mile and then on a seat mile basis; and finally that they earned more.

The fact that the capital cost of road vehicles was less than that of trams was not of particular importance when the former were at an early stage and too unreliable and too small to cope with major traffic flows in cities and towns. Even before World War I, and certainly after it, these deficiencies were being remedied. Doncaster in the early 1920s exhibits an interim stage in this process. By then motor buses were clearly the cheaper option for the coalfield services, but they were not yet thought capable of taking over the urban routes operated by trams. Equally, buses were quite well able to deal with the traffic offering in the Dearne valley,and their advantages over the trams of speed, comfort and direct services meant that the DDLR was unable to compete effectively. It was in these semi-urbanised areas, with relatively light traffic, that the capital advantage enjoyed by

buses first came into its own. Later a fairly successful experiment was made with motor buses on the Avenue Road route in Doncaster itself, though in the event it was decided to use trolleybuses for tramway replacement. The capital cost of trolleybuses was only one third that of a comparable tramway, which was a major reason for preferring the railless option.

One of the most interesting results of the case studies is that in inter-war Sheffield the wholesale replacement of the modern and well-kept tramway would not have been cheaper in capital terms than continuing to maintain and improve the trams. This was partly because double-deck buses still did not match the seating capacity of larger trams--whereas in Doncaster trolleybuses did--and also because Sheffield's tramways needed only incremental improvement, rather than wholesale replacement. It may have been perfectly correct for Pilcher to argue that worn out tram routes in Manchester should be replaced by buses at lesser cost, but in Sheffield the tram routes were not worn out, and it was more economical to keep them. But after 1945 this capital advantage was lost and buses became the cheaper option even for cities like Leeds and Sheffield.

The second major point about buses was that they were cheaper to run. The Dearne area provides striking confirmation of this. Company bus costs were markedly less than the trams' for these reasons--(1) economies of scale; (2) lesser repair costs; (3) lower 'track' costs; (4) smaller fuel bills; and (5) reduced wage costs, due in turn to higher productivity, mostly consequent on the buses' higher speed. In Doncaster motor buses were still more costly to run on a seat mileage basis in the early 1920s. But a few years later larger buses were quite capable of operating an extended urban route satisfactorily. Trolleybuses too were cheaper to operate than trams per car mile and, since they were larger than most of the trams, also per seat mile. This was because payments for repairs and rates were less since there was no track. Wage costs were also lower because the trolleys ran faster than trams; the electric bus had higher power costs though.

In Sheffield, of course, the high capacity trams could still be run

more cheaply than the smaller buses on a seat mile basis. Sheffield also had a particular advantage in that the expanding city could be served by relatively short tramway extensions; these were more economical to run than longer suburban bus routes were in Manchester. After World War II, however, tramway working costs went up more sharply than those of the buses, and the trams gradually lost most of their former advantage.

The third financial benefit derived from using motor buses was that they could earn more than trams, often, of course, taking traffic from competing trams to do so. Motor buses were very successful in the Dearne valley and Doncaster Corporation also faced severe competition from pirate buses, particularly in the mid- to late-1920s. Once they introduced their trolleybuses, it was found that they earned more than the trams had done, for three reasons--(1) their routes were often longer; (2) they were faster, so making short rides better value; and (3) they were generally attractive to passengers. Even in Sheffield from the mid-1930s onwards motor buses allowed to compete with the trams were proving more attractive and abstracting passengers and revenue. In all three cases, once the tramways ran into financial difficulties, it was only after conversion to motor bus or trolleybus that the undertaking was able to earn a surplus again.

In the Dearne valley the economics of operation decisively favoured the bus. It may seem curious that the moral was not drawn earlier in Sheffield. Two reasons for this have already been noted, the fact that larger trams could still carry more people more cheaply than smaller buses could and also that, in Sheffield, capital costs still favoured trams in the 1930s. A further reason why buses advanced much more slowly in Sheffield was that the tramways were effectively protected against competition, which was not the case for either the DDLR or Doncaster. There were six difficulties in the way of imposing adequate controls--(1) weak legislation; (2) lack of support from the Ministry of Transport; (3) flouting of regulations by bus operators; (4) pressure from motor owners' trade associations; (5) lack of liason between the Watch and Tramways Committees; and (6) lack of trades'

union backing. In Doncaster tramway revenue suffered two severe falls in the 1920s; analysis has shown that the earlier one was largely not a result of pirate bus competition, but the second was. An interesting fact is that it was still feasible to counter external competition by a change in fares policy, but by the early 1930s it seemed impossible to defend the remaining tram routes against outside bus operators. One reason, as listed above, was lack of support from the Ministry and, by that time, the Traffic Commissioners, both of whom seemed at times to work against the interests of municipal transport and in favour of private firms. The DDLR had exactly the same experience. Even Sheffield Corporation found that its decisions on licensing were sometimes overthrown, and this general bias against the municipal operator was clearly a negative influence on tramways, which were primarily publicly owned.

Generally in Sheffield, though, private bus competition was severely limited by a three-pronged policy of exclusion, purchase and protective agreements. These measures were broadly successful in keeping all the tram services free of external competition, and also in establishing Sheffield Corporation and the Joint Omnibus Committee as the major motor bus operators over a very wide area. Comparison with Manchester has shown that trams were far more at risk there, for these reasons--(1) the Corporation was slow to start its own motor bus services; (2) trams ran outside the city, where they had no protection; (3) there was severe illegal pirating; and (4) partly in self-defence, Manchester and surrounding authorities introduced express buses which competed with their own trams.

Eventually, of course, private and Corporation buses did begin running into the centre of Sheffield too. This was not really because the city lacked the power and the will to protect its own undertaking--though there was a short-lived split between the Watch and Tramways Committees--but for two other reasons. Through travel to the city without changing was demanded by the public and, as well, bus routes were established to outer estates in preference to extended tramways because the latter would have been unec-

onomic with a flat fare. This tendency was not particularly serious when it was confined to rural bus services, but more intensive urban services later began to cause significant losses of passengers and revenue to the tramways, a process which was continued after World War II.

Considerable capital was made during the tramway conversion period from the supposed flexibility of the motor bus, a rather vague concept which covered three issues--traffic congestion, extension of routes to new estates and deficiencies in existing tram services. Traffic congestion was not mentioned as a reason for dispensing with trams in either the Dearne valley or in Doncaster, probably because it was not yet a serious problem in either place. It does not seem to have been regarded as serious enough to threaten the position of tramways in the inter-war period in Sheffield either, in contrast to Manchester, where the traffic problem was clearly much worse at an earlier date. The supposed causative relationship between trams and traffic congestion was cited at some length in the later Sheffield closure report, but most of the problems said to be caused by trams were either not unique to them or could have been overcome by proper planning. To some extent, however, the truth of the allegations was irrelevant; what mattered was that they were believed.

Turning to extensions of routes, the option of rebuilding and extending the tramways was not taken up in Doncaster because the high cost of new tramways could not be justified by the traffic offering. A point often made about buses earlier in the century had been that their low first cost meant they could be used to prove a route's traffic potential, and in a sense that was just what was done with motor buses on the Wheatley Hills route. Once the traffic had built up, this and the other town tramways were converted to trolleybus, again a more flexible mode in the sense of being easier and cheaper to install than a tramway, and one which proved capable of earning a return on the capital invested.

In Sheffield the reason why some planned tramway extensions were not built before 1939 was rather different. A rigid policy of a single standard

maximum fare, regardless of distance, meant that even short extensions were found seriously to reduce the earnings per car mile. Longer extensions were not feasible under these conditions, though with the introduction of higher fare stages they could well have been made to pay. Once again, the flexible, low cost bus was used, though not really because of inordinate capital costs for trams, but of an artificial restriction on their earning ability. After World War II, of course, building costs had become excessive, and the tramways' balance sheet was such that no large capital projects could be financed, so all question of extensions was soon forgotton.

The third point about flexibility covers two perceived deficiencies of tramways, that sometimes systems were isolated from each other and that cross-city services were not possible, in both cases providing an opening for bus competition. The former was true of the DDLR, which was denied access to Barnsley town centre and never made any effective use of its link with the Mexborough line. Buses were also able to offer more direct services than the straggling tramway could do. The problem was less acute in Doncaster, though some pirate bus operators did offer direct trips to the pits. In Sheffield it was not a difficulty at all, for trams provided good access to the city centre and the only possible tramway link--to Rotherham--was fully exploited.

Traffic congestion was one focus for opposition to trams in general. The introductory chapters above identified four sources of opposition, the press, town planners, automobile organisations and politicians. The case studies have not really thrown any further light on the first and third of these and the others have really only come up in relation to Sheffield. Politics, in the party sense, did not affect the decision to abandon the city's tramways, even though it did in near-by Leeds. Which leaves only the very interesting question of town planning.

It has been shown that town planning and tramways were perfectly compatible in the first decades of the century, and that the main aims of planning at that period--zoning and population dispersal--could be assisted

by tramway extensions, particularly those built on fast reserved tracks. Sheffield's topography, with large greenfield sites fairly close to the city centre and to industry, was ideally suited to this, needing only fairly short additions to existing tramways, which were thus relatively cheap to build and to operate. This is probably a major reason why tramways continued to be developed in the late 1920s and early 1930s.

From 1939-45 onwards, however, the emphasis of planning switched to the city centre and to the need to reduce actual or projected congestion there. It was regarded as axiomatic that trams could not be accommodated to a redesigned central core, and also that they themselves were a cause of congestion. Perhaps as early as 1939, and certainly by 1944, the planners had decided that trams must be eliminated and the first political decisions to implement this had been taken. This was in advance of the post-war downturn in the tramways' finances, and thus it must be assumed that planning considerations carried more weight than commercial ones; this was what the balance of evidence in the replacement report indicated as well.

In many ways this research project has simply confirmed earlier knowledge and assumptions, though because local transport history tends necessarily to be written about individual places, a comparative approach has been lacking previously. Certainly, even with Lee's detailed study of Hull and Sleeman's national synopsis, there is no academic survey of the decline of tramways to match McKay's authoritative study on their rise. This work goes some way towards remedying the deficiency, by comparing local events to national trends and also by putting together studies of three widely differing tramways.

This supports Finer's comment about 'eccentric local economic entities' quoted at the end of chapter 2. If one cause had to be chosen for the demise of each of the three tramways, in each case it would be a different one--for the Dearne District, motor bus competition; for Doncaster, the cost of track and road repairs; for Sheffield, planning objectives in which trams were seen as irrelevant or a hindrance.

There are also of course many common features too. Bus competition, either as an external threat or as an attractive alternative to trams, is one. The gap between motor bus and tramway operating costs in the Dearne valley around 1930 is remarkably wide, and it was only the higher capacity of trams which enabled them to retain an advantage in city conditions. Buses were cheaper to run--and install--for the obvious reason that they lacked track costs, but also because their higher speed increased staff productivity; these advantages were shared by Doncaster's trolleybuses. Sheffield's trams were, however, atypical in the 1920s in that, under certain circumstances, they were cheaper to run than a comparable bus service elsewhere. The advantage lay in the fact that the first estates being built under new planning regimes could be built quite close to the city, meaning that trams could actually serve them at a lesser running cost than, say, Manchester's buses could serve Wythenshawe.

It was generally accepted from their first appearance that buses were cheaper than trams in terms of capital cost. This was broadly true, and when tramways became due for renewal in the 1920s, the inflated costs of reconstruction compared very unfavourably with the low first cost of buses. This was why Doncaster opted to serve the coalfields with motor buses and to replace most of its existing trams with trolleybuses. Again, Sheffield provides a most interesting contrast, for it appears that for a large tramway needing only incremental improvement and replacements, purchasing buses was <u>not</u> necessarily cheaper before World War II.

The difficulties of protecting trams against motor bus competition are well known, and were not ameliorated by what clearly appears as a bias of the authorities against municipal tramways. Once more, Sheffield provides a contrast, but even there the Corporation's own buses made increasing inroads into the trams' traffic and revenue, which ceased to grow in the 1903s as bus services expanded. After World War II the trams gradually lost market share to the buses. This was partly a consequence of the City Council's standard fare policy, which made it uneconomic to build extensions to

the more distant estates being established in the 1930s.

Fares were an important influence on tramways' viability in other ways. Statutory restrictions on raising them made losses worse after both World Wars and, after the Second, and rather paradoxically, steeply rising fares caused passenger totals to fall. A much earlier weakness in tramway finances was the large proportion of traffic carried at discount fares, many of which were probably uneconomic.

Differences between tramways are perhaps the most informative aspect of this study. The advantages enjoyed by Sheffield Corporation Tramways as against the other local lines have been mentioned already, but the contrast with Manchester is also interesting. Extensions were one area where Sheffield enjoyed an advantage, and another was the relatively low level of traffic congestion in the smaller city. Policies were also influenced by personalities such as R. S. Pilcher.

The broad sweep of tramway history in the half century up to 1950 is well described as a process of marginalisation. Tramways are inevitably a high cost transport mode, and anything which puts up those costs further or decreases revenue threatens their survival. Even as the last (but one) electric tram systems were being built in 1913, it was clear that some were already at or beyond the margin of commercial viability; a class of line particularly at risk was the out-of-town tramway, which does much to explain the fate of the Dearne District. As time passed, and particularly during the inflation and economic difficulties after both wars, more tramways became marginal as costs rose (or, in between the wars, failed to fall with prices) and revenue fell. First it was the small town tramways, like some of the Scottish ones mentioned above; then slightly larger ones, like Doncaster's; later, middling undertakings like Hull's were brought into the net, and though large cities could still justify tramway retention before World War II, afterwards this was difficult to do--even city tramways had become marginal.

This is not a total explanation though. Non-commercial factors were

also important, and the primacy of town planning considerations in the decision to abandon the Sheffield tramways--taken in principle before the dismal post-war financial results were known--is good evidence of that. In large towns and cities it would still have been possible to plan physically and financially for trams, had that been desired, as many European towns did at the time. Rather belatedly, that is now being realised in Britain as well, and by the 1990s we may yet see a new generation of 'super-trams' running in our cities.

APPENDICES

GENERAL APPENDICES

G1: CONVERSION TABLES

G1/1: Money

Until February 1971 the British currency was based upon pounds, shillings and pence (£. s. d.), with 20 shillings to the pound and 12 pence to the shilling. The two smaller denominations were written as 5s. and 6d. or, in combination, 5/6. The penny could be further subdivided into halfpence (½d) or farthings (¼d.), though the latter was rarely relevant to the tramway industry and the coin was in any case withdrawn well before decimalisation. This monetary system was in use throughout the period covered by this work and is thus retained unaltered in original data. Enough decimal equivalents are given below to provide a basis of comparison, bearing in mind of course that a simple conversion says nothing about relative values.

£. s. d.	Decimal
¼d.	0.104p
½d.	0.208p
1d.	0.417p
6d.	2.5p
1s.	5p
2s.	10p
4s.	20p
5s.	25p
10s.	50p
15s.	75p
£1	£1.00

As a rule of thumb, it is sufficient to take ½d. as equivalent to 0.25p, 1d. to 0.5p and so on, though the exact equivalent is 2.4d. to 1p.

Examples:-

16s. 9d. = 84p
£1 5s. 2½d. = £1.26

G1/2: Length

	Imperial	Metric
Mile (1760 yards)		1.61km
Furlong (⅛ mile or 220 yards)		200m
Chain (1/80 mile, 22 yards or 66 feet)		20m
Yard (3 feet)		0.91m
Foot (12 inches)		30.5cm
Inch		2.54cm

G1/3 Speed

Miles per Hour	km/h
10	16
20	32
30	48
40	64
50	80
60	96

G1/4 Other Measures

	Imperial	Metric
(Area)	Acre	0.405 hectares
(Capacity)	Gallon	4.546 litres
(Weight)	Pound	0.450 kilograms
	Ton	1.016 tonnes

G2: LOCAL GOVERNMENT IN ENGLAND AND WALES EXCLUDING LONDON

Municipal Corporations Act 1835

Reformed and democratised the old 'rotten boroughs' and provided a framework for those towns--including many large cities such as Sheffield--later given a charter.

Local Government Act 1888

Set up elective County Councils to replace administration by justices of the peace; large towns (over 50,000 inhabitants[1]) were excluded from the jurisdiction of these Councils as County Boroughs.

Local Government Act 1894

Transformed previously created ad hoc sanitary authorities into Urban or Rural District Councils, in the second of which Parish Councils became third tier authorities.[2] Interestingly, in the old Boroughs at least, the two functions were kept legally separate; thus in Doncaster the Borough Council was also the Urban District Council and met separately to transact the business of each.[3]

Local Government Act 1972

Replaced all the above authorities by unitary counties, except for six Metropolitan Counties, which also had a District Council tier.[4] South Yorkshire was one such Metropolitan County.

NOTES AND SOURCES:

1. Frangopulo, Tradition in Action, 138.
2. W. A. Robson, Local Government (n.d., reprinted from Esso Magazine, 1958 issues), 3-9.
3. See Doncaster Borough Council Minutes, passim.
4. Frangopulo, Tradition in Action, 238-9.

G3: LEGISLATION AFFECTING LOCAL TRANSPORT

G3/1 TRAMWAYS

Private or Special Acts

The earliest tramways were laid with only local authorisation, but in 1862 it was held that statutory authority was required. Only two Acts were secured in the next six years, for a short line in Portsmouth in 1863 and for the first real town tramway in Liverpool in 1868. An increased number of applications thereafter led to consideration of general legislation, but even thereafter some tramways continued to be promoted by means of Private Bills; in rare cases, such as Paisley's, it was possible for a company to circumvent a local authority's opposition in this way.

Tramways Act 1870

An earlier Bill proposing advantageous conditions for tramway promotion was defeated by pressure from vested interests, and a Select Committee was appointed to consider the matter, the result being the 1870 Act. This was an enabling Act, providing legal provisions applicable to all subsquently constructed tramways as well as a simpler method of obtaining statutory powers for such lines. Its most important provisions were as follows:-

(1) instead of following the tedious and expensive Private Bill procedure, promoters might obtain a Provisional Order (an Order made by a Minister of the Crown which has no legal force until approved by Parliament) from the Board of Trade which could later be confirmed with several others by an Act, whose expenses would then be shared between a number of promoters;

(2) local authority (and the highway authority, if different) approval consent was essential, except that if several authorities were involved, the consent of two thirds was sufficient;

(3) if the lines came within 9ft. 6in. of the kerb for 30ft., one third of the frontagers had to consent;

(4) no land could be acquired by compulsion;

(5) if not themselves the promoters, local authorities could acquire tramways after twenty-one years, and could exercise the option every seven years thereafter; the Act gave no powers for them to operate trams however;

(6) powers were given to the Board of Trade (whose powers relating to tramways were later transferred to the Ministry of Transport) to supervise and regulate tramways;

(7) owners had to maintain the road surface between the tracks and for eighteen inches either side;

(8) two years were allowed for completion of works.

Regarding the power to purchase, the price was to be the 'then value', and later legal judgements established that this was to be virtually scrap price with no allowance for goodwill, profits etc.

Light Railways Act 1896

This Act was largely introduced to encourage rural light railways, but because it nowhere defined what a light railway was (nor the 1870 Act a tramway) and was less severe than the Tramways Act, it became commonly used by promoters of urban tramways. The relevant provisions were as follows:-

(1) three Light Railway Commissioners were to be appointed, under the Board of Trade;

(2) anyone might apply to the Commisioners for a Light Railway Order, which then went to an inquiry. If favourable, the Board of Trade could merely confirm it without referring it to Parliament, though exceptionally they might do so;

(3) local authorities had no absolute veto over construction;

(4) land could be purchased by compulsion;

(5) five years were allowed for completion;
(6) as compared to tramways, a 75 per cent rate rebate was allowed.

Light Railways Act 1912

Cleared up some loose ends left by the 1896 Act.

G3/2 MOTOR BUSES

Town Police Clauses Acts 1847 and 1889

Originally these referred to Hackney Carriages, but the 1889 Act extended the provisions to omnibuses. It was an offence to ply for hire without a local authority licence in an area where the Act applied. But the legislation was permissive only, so it was rarely applied in rural areas and not always in towns; in such areas anyone could set up a bus or charabanc business without restriction. The licence applied only to the vehicle and not to the service.

Locomotives on Highways Act 1896

Freed motor vehicles from the four miles per hour speed limit imposed on steam carriages by an Act of 1865; the maximum permitted speed was raised to twelve miles per hour.

Motor Car Act 1903

Raised speeds of light motor cars to twenty miles per hour by a Heavy Motor Car Order issued under the Act. Most control over bus speed, design etc. has been by administration regulation rather than by new legislation; for example, it was the Ministry of Transport which raised the top speed for buses with pneumatic tyres to twenty miles per hour in 1928.

London Traffic Act 1924

In order to control pirate buses the Minister of Transport could designate restricted streets along which no additional buses could run; only applied to London.

Road Traffic Act 1930

Introduced to regulate motor bus services (trams and trolleybuses--which were controlled in broadly the same way as trams--did not come within the Act). Public service vehicles were divided into stage (short distance), express (long distance) and contract (unlike the others, not taking separate fares) carriages. All needed a PSV licence issued by the Area Traffic Commissioners set up under the Act, which was issued only when a prior Certificate of Fitness was obtained. Stage and express services could only be operated if a Road Service Licence was also obtained, and this was only issued if the Commissioners were assured that there was a real demand for a service not already being met by existing operators.

SOURCES:

Barker and Robbins, London Transport 2, 210.

G. A. Bonner, British Transport Law by Road and Rail (Newton Abbot, 1974), 255-9, 283, 299 and 352-5.

J. Graeme Bruce, A Source Book of Buses (1981), 12-13 and 26.

Claydon, 'Tramways Act', 280-3.

Davies, Light Railways, 55 and 284-98 (Appendix G).

G4: PRICE INDICES

G4/1 Ministry of Labour Indices of Retail Prices (Cost of Living)

Food and All Items 1915--38; 1914 (July) = 100

Year	Food	All Items
1915	131	123
1916	160	146
1917	198½	176
1918	215	203
1919	219	215
1920	256	249
1921	229½	226
1922	176	183
1923	169	174
1924	170	175
1925	171	176
1926	164	172
1927	160	167½
1928	157	166
1929	154	164
1930	145	158
1931	131	147½
1932	126	144
1933	120	140
1934	122	141
1935	125	143
1936	130	147
1937	139	154
1938	141	156

G4/2 Board of Trade Wholesale Price Indices 1900--38

First Series		Second Series (1913 = 100)		Third Series	
1900	100.0	1920	307.3	1930	100.0
1901	96.7	1921	197.2	1931	87.8
1902	96.4	1922	158.8	1932	85.6
1903	96.9	1923	158.9	1933	85.7
1904	98.2	1924	166.2	1934	88.1
1905	97.6	1925	159.1	1935	89.0
1906	100.8	1926	148.1	1936	94.4
1907	106.0	1927	141.6	1937	108.7
1908	103.0	1928	140.3	1938	101.4
1909	104.1	1929	136.5		
1910	108.8	1930	119.5		
1911	109.4	1931	104.2		
1912	114.9	1932	101.6		
1913	116.4	1933	100.9		
1914	117.2	1934	104.1		
1915	143.9				
1916	186.5				
1917	243.0				
1918	268.1				
1919	296.5				
1920	368.8				

SOURCE: Brian R. Mitchell and P. Deane, Abstract of British Historical Statistics (Cambridge, 1962), 466 and 476-7.

G5: OWNERSHIP AND DATE OF CLOSURE OF BRITISH ELECTRIC TRAMWAYS

Town or Company	Company	Municipal	Year of Closure
Aberdare		*	1935
Aberdeen		*	1958
Aberdeen Suburban	*		1927
Accrington		*	1932
Ashton-under-Lyne		*	1938
Ayr		*	1931
Barking		*	1929
Barnsley	*		1930
Barrow-in-Furness		*	1932
Bath	*		1939
Birkenhead		*	1937
Birmingham		*	1953
Birmingham District	*		1929[a]
Blackburn		*	1949
Blackpool		*	(Open)
Bolton		*	1947
Bournemouth		*	1936
Bradford		*	1950
Brighton		*	1939
Bristol	*		1941
Burnley		*	1935
Burton & Ashby	*		1927
Burton-on-Trent		*	1929
Bury		*	1949
Cambourne	*		1927
Cardiff		*	1950
Carlisle	*		1931
Chatham	*		1930
Cheltenham	*		1930
Chester		*	1930
Chesterfield		*	1927
Cleethorpes		*	1937[b]
Colchester		*	1929
Colne		*	1934
Coventry		*	1940
Cruden Bay	*		1932
Darlington		*	1926

APPENDIX G5 continued

Town or Company	Company	Municipal	Year of Closure
Darwen		*	1946
Dearne District		*[c]	1933
Derby		*	1934
Dewsbury, Ossett	*		1933
Doncaster		*	1935
Dover		*	1936
Dudley, Stourbridge	*		1930
Dumbarton	*		1928
Dundee, Broughty Ferry	*		1931
Dundee		*	1956
Dunfermline	*		1937
Edinburgh		*	1956
Exeter		*	1931
Falkirk	*		1936
Gateshead	*		1951
Glasgow		*	1962
Glossop	*		1927
Gloucester		*	1933
Gosport & Fareham	*		1929
Gravesend & Northfleet	*		1929
Great Crosby	*		1925
Greenock	*		1929
Grimsby		*	1937
Grimsby & Immingham	*		1961
Halifax		*	1939
Hastings	*		1929
Huddersfield		*	1940
Hull		*	1945
Ipswich		*	1926
Isle of Thanet	*		1937
Jarrow	*		1929
Keighley		*	1924
Kidderminster	*		1929
Kilmarnock		*	1926
Kircaldy		*	1931
Lanarkshire	*		1931
Lancaster		*	1930

APPENDIX G5 continued

Town or Company	Company	Municipal	Year of Closure
Leamington & Warwick	*		1930
Leeds		*	1959
Leicester		*	1949
Lincoln		*	1929
Liverpool		*	1957
Llandudno & Colwyn Bay	*		1956
Llanelly	*		1933
London		*	1952
Lowestoft		*	1931
Luton		*	1932
Lytham St. Annes		*	1937
Maidstone		*	1930
Manchester		*	1949
Mansfield	*		1932
Merthyr	*		1939
Mexborough & Swinton	*		1929
Middlesbrough		*	1934
Musselburgh	*		1928
Nelson		*	1934
Newcastle		*	1950
Newport		*	1937
Northampton		*	1934
Norwich	*		1935
Nottingham		*	1936
Notts & Derby	*		1932
Oldham		*	1946
Perth		*	1929
Peterborough	*		1930
Plymouth		*	1945
Pontypridd		*	1931
Portsdown & Horndean	*		1935
Portsmouth		*	1936
Potteries	*		1928
Preston		*	1935
Rawtenstall		*	1932
Reading		*	1939
Rhondda	*		1934

APPENDIX G5 continued

Town or Company	Company	Municipal	Year of Closure
Rochdale		*	1932
Rotherham		*	1949
Rothesay	*		1936
St. Helens		*	1936
Salford		*	1947
Scarborough	*		1931
Sheerness	*		1917
Sheffield		*	1960
South Lancashire	*		1933
South Shields		*	1946
South Staffs	*		1930
Southhampton		*	1949
Southend		*	1942
Southport		*	1934
Stalybridge		*[d]	1945
Stockport		*	1951
Stockton & Thornaby		*	1931
Sunderland		*	1954
Sunderland District	*		1925
Swansea & Mumbles	*		1960
Swansea	*		1937
Swindon		*	1929
Taunton	*		1921
Torquay	*		1934
Tynemouth	*		1931
Tyneside	*		1930
Wakefield	*		1932
Wallasey		*	1933
Walsall		*	1933
Warrington		*	1935
Wemyss & District	*		1932
West Hartlepool		*	1927
Weston-super-Mare	*		1937
Wigan		*	1931
Wolverhampton		*	1928
Wolverhampton District	*		1929[e]

APPENDIX G5 continued

Town or Company	Company	Municipal	Year of Closure
Worcester	*		1928
Wrexham	*		1927
Yarmouth		*	1933
York		*	1935
Yorkshire Woollen	*		1934

SOURCE: E. Jackson-Stevens, 100 Years of British Electric Tramways (Newton Abbot, 1985), 94-5.

a. The Birmingham District ceased operations on its own account on 31 Mar 1928, but a sister company ran over its metals until 17 Nov 1929, which is the date preferred above; even then, some of the company lines were leased and worked by Birmingham Corporation until 1939. See Webb, Black Country Tramways 2, 217-8.

b. Cleethorpes and Grimsby tramways were originally worked by a single company, but were later separately municipalised, and so are given distinct entries above (though not in the original source); see Bett and Gilham, Networks, 67.

c. Jackson-Stevens wrongly puts the Dearne District into the company sector.

d. Ibid. for Stalybridge.

e. Although the Wolverhampton District ceased operations on 31 Aug 1928, once again a sister company operated its final route until 28 Sep 1929; see Webb, Black Country Tramways 2, 217.

The above list omits quite a number of entries in the original. Some are Irish and Isle of Man tramways, which do not come within the scope of this work. Others are formerly independent tramways which were amalgamated before closure, such as the London lines (Barking alone receives a separate entry, because although it retained ownership of a short section of tramway it ceased independent operations in 1929 before the formation of the LPTB; see Bett and Gilham, Networks, 114); this table is intended to illustrate the progressive effect of management decisions to abandon tramways rather than the closure of particular sections of line, so constituent parts of larger undertakings are not of interest.

DEARNE DISTRICT APPENDICES

APPENDIX D1

DDLR ESTIMATED AND ACTUAL FINANCIAL RESULTS CALCULATED IN PENCE PER CAR MILE AT CONSTANT 1913 PRICES[a]

Estimate or Result	Car Miles p.a.	Total Revenue			Working Costs			Net Receipts		
		£	pcm d.	pcm (1913) d.	£	pcm d.	pcm (1913) d.	£	pcm d.	pcm (1913) d.
Sellon (1913 prices)[b]	844,147	35,500	10.14	–	21,000	5.97	–	14,500	4.17	–
Chivers (1913 prices)[c]	844,147[d]	18,318	5.21	–	14,308	4.07	–	4,010	1.14	–
Waller (1919 prices)[e]	683,500	31,250	10.97	5.10	46,662	16.38	7.62	15,412	5.41	2.52
Stanley (1920 prices)[f]	700,000	63,000	21.60	8.67	59,000	20.23	8.12	4,000	1.37	0.55
Hoare (1920 prices)[g]	750,000	[h]84,000	26.88	10.80	[i]50,875	16.28	6.54	33,125	10.60	4.26
1927-8 (1928 prices)[j]	721,617	36,205	12.04	7.25	32,009	10.65	6.42	4,196	1.39	0.83
1932-3 (1933 prices)[j]	744,200	25,557	8.24	5.89	29,189	9.41	6.72	3,632	1.17	0.83

Estimate or Result	Operating Ratio %	Capital Expended £	Sinking Fund/Interest			Balance		
			£	pcm d.	pcm (1913) d.	£	pcm d.	pcm (1913) d.
Sellon	58.88	150,000	9,750	2.77	–	4,750	1.40	–
Chivers	78.12	160,000	10,400	2.96	–	6,390	1.82	–
Waller	149.32	(k)	29,693	10.43	4.85	45,105	15.84	7.37
Stanley	93.65	360,000	27,000	9.26	3.72	23,000	7.89	3.17
Hoare	60.57	300,000	22,500	7.20	2.89	10,625	3.40	1.37
1927-8	88.41	297,500	19,155	6.37	3.84	14,959	4.97	3.01
1932-3	114.21	264,061	19,464	6.28	4.49	23,096	7.45	5.32

NOTES AND SOURCES:

a. Constant prices are calculated using the Cost of Living Index reproduced in Appendix G4.

b. SYRO, Brief 1914, 11.

c. SYRO, Proceedings 1914, 644; Chivers was a witness for the opponents.

d. No mileage figure stated; it is assumed he was working from Sellon's figure.

e. SYRO, Proceedings 1920, 82-6; also a witness for the opponents.

f. SYRO, Stanley 1920, 3-5; he gives various estimates, this being the most favourable to the DDLR.

g. SYRO, Hoare 1920, passim; Hoare is most imprecise about many figures and is clearly hedging.

h. Hoare gives no precise figure for revenue, but mentions charging higher fares; Stanley is using a fare of 1½d. and 10,080,000 passengers, so it is assumed here that Hoare's fare is 2d. for the same number of people.

i. Again, no figure given; but Hoare admits that standing charges will be £4,000 p.a. and working costs 'over 1/-'; 1s. 3d. or 15d. is thus taken, plus the £4,000.

j. Details from Tramways Returns (Appendix D4), except for Sinking Fund/Interest (Loan Charges) from Table 12 in the text.

k. Not stated.

D2: INTERURBAN, RURAL AND SUBURBAN TRAMWAYS IN GREAT BRITAIN WITH OWNERSHIP AND DATE OF CLOSURE (a)

Tramway	Company	Municipal	Closed	Notes
Aberdare		*	1935	
Aberdeen Suburban	*		1927	
Birmingham District	*		1930	b
Blackpool & Fleetwood		*	Open	c,d
Burton & Ashby	*		1929	
Cambourne	*		1927	
Dearne District		*	1933	
Dewsbury, Ossett	*		1933	
Dudley & Stourbridge	*		1930	b
Dumbarton	*		1928	
Dundee, Broughty Ferry	*		1931	
Dunfermline	*		1937	
Gosport & Fareham	*		1929	
Greenock	*		1929	
Grimsby & Immingham	*		1961	
Isle of Thanet	*		1937	d
Kidderminster & Stourport	*		1929	b
Lanarkshire	*		1931	
Leamington & Warwick	*		1930	
Llandudno & Colwyn Bay	*		1956	d
Mexborough & Swinton	*		1929	
Notts & Derby	*		1932	
Portsdown & Horndean	*		1935	
Potteries	*		1928	
Rhondda	*		1934	
Rothesay	*		1936	d
South Lancs.	*		1933	
South Staffs.	*		1930	b
SMHD (Stalybridge)		*	1945	e
Sunderland District	*		1925	
Swansea & Mumbles	*		1960	d
Tynemouth	*		1931	
Tyneside	*		1930	
Wakefield	*		1932	
Wemyss	*		1932	
Wolverhampton District	*		1929	b
Wrexham	*		1927	
Yorkshire Woollen District	*		1934	

NOTES:

a. Because of problems of definition, it is difficult to say just how many 'interurban' tramways existed in Great Britain. These are chosen on a fairly subjective basis and not on any precise statistical test (such as number of cars relative to length of line). However these thirty-eight lines may reasonably be classified as either not-at-all or more-than purely urban. There are other feasible candidates, particularly in South Lancs., where long tram routes between towns were common. But this was generally (1) within built-up areas and (2) between independent and essentially urban undertakings. Many large systems, such as Glasgow, had out-of-town branches too, but these are not included, even when formerly independent. Details are taken from Appendix G5.

b. All owned by the BET and, except for the detached tramway at Kidderminster, operated as a unit under the auspices of the Birmingham and Midlands Tramways Joint Committee. Some parts continued for a while under municipal ownership.

c. Company-owned until 1919.

d. Lines with considerable holiday traffic.

e. One service retained until the end of World War II; rest closed by 1936.

D3: DEVELOPMENT OF MOTOR BUS SERVICES OPERATED BY THE YORKSHIRE TRACTION AND PREDECESSOR COMPANIES IN THE DEARNE VALLEY 1913--33

Route :Extensions and Changes	Date	Sources & Notes
Woodman		
Barnsley--Wombwell--West Melton	3 May 1913	a
:West Melton--Woodman Inn	1 Oct 1919	b
:some buses diverted via Brampton	15 Oct 1921	c
:Woodman Inn--Mexborough	1928	d
Manvers		
Barnsley--Wath--Manvers--Mexborough--Doncaster	1921	e
Circular		
Barnsley--Hoyland Common	3 May 1913	a
:Hoyland Common--Wombwell--Stairfoot--Barnsley	c1920	e
:short workings, Barnsley--Stairfoot & Kendray	c1920	e
Thurnscoe via Wath		
Barnsley--Wath--Bolton--Goldthorpe--Thurnscoe	1923	f
:Wath--Thurnscoe withdrawn	1928	d
:reinstated	1933	g
Direct Services via Darfield		
Barnsley--Darfield--Goldthorpe	3 May 1913	a
:Goldthorpe--Doncaster	Jun 1914	a
Barnsley--Darfield--Great Houghton--Thurnscoe	Jun 1914	a
:Thurnscoe--Doncaster	1923	f
Mexborough		
Mexborough--Bolton--Goldthorpe via Montague Road	mid-1920s?	e
:took over similar M&STC service via Manvers	15 May 1929	h
:Goldthorpe--Thurnscoe--Great Houghton	15 May 1929	i

GENERAL NOTE: this Table does not purport to list all YTC services in the Dearne valley, but merely to indicate the development of those local services most affecting the DDLR. Some of the services mentioned extended further afield and other long-distance services passed through.

NOTES AND SOURCES:

a. Sykes, Yorkshire Traction, 12; all these pre-World War I services were suspended by May 1915 and later reinstated, except for that to Melton.

b. SYRO, Brief 1920, 12.

c. SYRO, 1/14, Wombwell UDC Minutes, Council, 11 Oct 1921, 259.

d. SYRO, Clerk's Reports, 27 Sep 1928; the Thurnscoe via Wath service was withdrawn as a result of an agreement between the YTC and the DDLR, the former being compensated by being allowed to extend their Woodman service to Mexborough.

e. Denton, D. D. L. R., 18. f. Sykes, Yorkshire Traction, 14.

g. Ibid., 26. h. Goode, M&STC History, 26.

i. Sykes, Yorkshire Traction, 26.

D4: MINISTRY OF TRANSPORT RETURNS FOR DEARNE DISTRICT 1924-5--1933-4

PART I: CAPITAL (POUNDS)

	1924-5	1925-6	1926-7	1927-8	1928-9
Capital authorised	300,000	"	"	"	"
Capital paid up	274,581	284,731	298,200	297,500	"
Capital redeemed	-	-	-	n.a.[a]	4,529
Funds for redemp--tion of capital	439	1,141	1,196	n.a.[a]	8,406
Total	439	1,141	1,196	n.a.[a]	12,935
Net Liability	274,142	283,590	296,214	n.a.[a]	284,565
Capital Expended on:					
Permanent Way	220,218[b]	139,102	"	139,453	"
Electrical Equip-ment of Line	-	26,493	"	"	"
Substations	-	4,918	"	"	"
Street Improvements	6,634	7,560	7,758	7,725[c]	"
Land & Buildings	-	15,739	"	"	"
Cars & Equipment	-	41,318	"	"	"
Other	-	2,865	2,995	"	"
Total	226,852	238,025	238,353	238,671	"
Preliminary Expenditure	42,947	42,089	42,110	"	42,118
Total on Tramways	269,799	280,114	280,463	280,781	280,789
Other Businesses	9,416	10,883	12,706	"	"
Total	279,215	290,997	293,169	293,487	293,495

PART II: REVENUE (POUNDS)

Income:					
Passengers	22,966	33,015	26,799	34,952	31,629
Advertising etc.	289	851	878	1,252	1,270
Total	23,255	33,866	27,677	36,204	32,899
Expenditure:					
Repairs etc:					
Permanent Way	558	2,490	2,283	2,759	2,428
Electrical Equip-ment of Line	439	917	823	1,111	1,036
Cars & Equipment	1,717	2,920	3,074	3,243	3,575
Miscellaneous	362	423	311	408	201
Total	3.076	6,750	6,491	7,521	7,240
Other:					
Traffic	9,430	14,207	12,386	14,039	14,075
Electric Power	4,773	7,034	7,514	6,074	6,418
Rates & Taxes	391	1,214	1,156	1,799	1,343

APPENDIX D4 continued

PART I: CAPITAL (POUNDS)

	1929-30	1930-1	1931-2	1932-3	1933-4
Capital authorised	"	"	"	"	"
Capital paid up	294,150	295,068	"	"	"
Capital redeemed	5,626	10,227	15,697	25,218	31,007
Funds for redemption of capital	11,210	10,737	9,521	5,789	2,665
Total	16,836	20,964	25,218	31,007	33,672
Net Liability	277,314	274,104	269,850	264,061	261,396
Capital Expended on:					
Permanent Way	"	"	"	"	"
Electrical Equipment of Line	"	"	"	"	"
Substations	"	"	"	"	"
Street Improvements	"	"	"	"	"
Land & Buildings	"	"	"	"	"
Cars & Equipment	"	"	"	"	"
Other	"	3,650	"	"	"
Total	"	239,326	"	"	"
Preliminary Expenditure	" Plus 655[d]	43,086	"	"	"
Total on Tramways	281,444	282,362	"	"	"
Other Businesses	12,706	"	"	"	"
Total	294,150	295,068	"	"	"

PART II: REVENUE (POUNDS)

Income:					
Passengers	32,810	29,565	27,769	24,548	11,464
Advertising etc	1,028	1,040	1,019	1,009	604
Total	33,838	30,605	28,788	25,557	12,068
Expenditure:					
Repairs etc:					
Permanent Way	2,537	2,493	2,456	1,698	663
Electrical Equipment of Line	1,046	1,108	1,147	974	464
Cars & Equipment	3,775	3,401	3,352	3,040	1,354
Miscellaneous	306	207	182	74	34
Total	7,664	7,209	7,137	5,786	2,515
Other:					
Traffic	13,860	13,774	13,583	13,330	6,435
Electric Power	6,741[e]	6,521[f]	6,451	6,201	2,843
Rates & Taxes	1,238	1,163	1,024	975	515

APPENDIX D4 continued

PART II continued

	1924-5	1925-6	1926-7	1927-8	1928-9
Insurance	509	590	393	589	104
Other	1,546	2,424	2,262	1,986	2,617
Total	19,725	32,219	30,202	32,008	31,797
Balance	3,530	1,647	2,525	4,196	1,102

PART III: STATISTICAL INFORMATION

Passengers carried	2,526,279	3,896,549	3,039,438	4,235,832	3,661,072
Car miles run	475,876	695,710	611,816	721,617	707,470
Car hours worked	61,672	84,395	74,468	81,774	84,727
Car miles per hour	7.71	8.24	8.22	8.82	8.35
Traction units used	785,400	1,206,127	1,038,363	1,213,208	1,169,706
Ditto, per car mile	1.65	1.73	1.70	1.68	1.65
Fare paid per Passenger (d)	2.18	2.03	2.12	1.98	2.07
Fare per mile: Ordinary (d)	1.13	"	"	"	"
Workmen (d)	0.63	"	"	"	0.62
Traffic Income: per car mile (d)	11.58	11.39	10.52	11.62	11.16
per route mile (£)	1,620	2,329	1,890	2,466	2,321
Working Expenditure per car mile (d)	9.95	11.11	11.84	10.65	10.79
Operating Ratio (%)	85.00	95.13	109.12	88.45	96.65
Route miles authorised	15.11	(following items unchanged in subsequent years except as noted)			
Route miles open: Single	10.38				
Double	3.80				
Total	14.18				
As single track miles	17.98	(17.97 in 1925-6 only)			
Sidings & depot track	0.25				
Grand total	18.23	(18.22 in 1925-6 only)			
Cars under 40 seats	30				
Seating capacity: Total	1,080	(1,065 in 1926-7 and 1,060 1927-8ff)			
Average per car	36	(35.50 in 1926-7 and 35.33 1927-8ff)			

APPENDIX D4 continued

PART II continued

	1929-30	1930-1	1931-2	1932-3	1933-4
Insurance	590	588	372	374	-
Other	2,520	2,162	2,275	2,523	1,158
Total	32,613	31,417	30,842	29,189	13,466
Balance	1,225	812	2,054	3,632	1,398
PART III: STATISTICAL INFORMATION					
Passengers carried	3,798,018	3,458,065	3,277,841	2,974,220	1,337,938
Car miles run	746,205	748,125	751,591	744,200	363,595
Car hours worked	89,370	89,609	90,011	89,125	42,409
Car miles per hour	8.35	"	"	"	8.55
Traction units used	1,275,105	1,228,852	1,220,845	1,154,675	538,916
Ditto, per car mile	1.71	1.65	1.62	1.55	1.49
Fare paid per Passenger (d)	2.07	2.05	2.03	1.98	2.06
Fare per mile: Ordinary (d)	"	"	"	"	"
Workmen (d)	"	"	"	"	"
Traffic Income: per car mile (d)	10.88	9.48	8.87	7.92	7.59
per route mile	(£) 2,386	2,085	2,029	1,731	-
Working Expenditure per car mile (d)	10.49	10.08	9.85	9.41	8.91
Operating Ratio (%)	96.38	102.60	107.13	114.21	111.58

SOURCE: Ministry of Transport Returns for Street and Road Tramways (the original column headings have sometimes been abbreviated for convenience).

NOTES:

a. These items noted as 'not applicable' in this year; reason unknown.

b. Obviously the Return was filled in wrongly in this first year, and all capital expenditure except for Street Improvements was put under the Permanent Way heading.

c. The small reduction here is probably due to the transfer of some earlier expenditure to Permanent Way.

d. £655 added for 'Other Displaced and Superseded Works'.

e. £606 shown separately as 'Other Tractive Power'.

f. £539 ditto.

APPENDIX D5

DEARNE DISTRICT REVENUE ACCOUNT 1924-5--1933-4

Year	REVENUE (POUNDS) Traffic Revenue	Bank Interest	Deposits Account	Advertising	Rent of Land	Rent of Substation	Rent of Houses	Accumulator Charging	Discounts	Traction Bill Costs	Total Revenue	Working Costs	Balance
1924-5	22,966		25		4		245		14		23,255	19,725	3,530
1925-6	33,015				4	31	801		15		33,866	32,219	1,647
1926-7	26,799	66				30[a]	834	2	13		27,744	30,202	2,458
1927-8	34,953	296			3	25	901	11	15		36,205	32,009	4,196
1928-9	31,629	272			1	25	919	43	11		32,899	31,797	1,102
1929-30	32,810	8		36		25	901	45	12		33,838	32,614	1,225
1930-1	29,565			53		25	901	48	13		30,605	31,417	812
1931-2	27,769			21		25	901	62	10		28,788	30,842	2,054
1932-3	24,548					25	919	60	5		25,557	29,189	3,632
1933-4	11,464			112		13	451	21	1	7	12,068	13,503	1,435

NOTE: a. Combines the previous item.

APPENDIX D5 continued

PAYMENTS (POUNDS)

Year	Traffic Expenses: Superintendance (Wages)	Motormen & Conductors	Other Traffic Employees	Cleaning, Oiling Cars	Cleaning, Sanding Track	Fuel, Light, Water for Depot	Ticket Check	Uniforms, Badges	Traffic, Miscellaneous	Total
1924-5	174	6,969	32	806	134	140	1,086	7	81	9,430
1925-6	261	10,291	53	1,210	233	223	1,820	89	26	14,207
1926-7	273	8,780	54	1,047	214	189	1,564	228	37	12,386
1927-8	273	10,366	56	1,177	309	154	1,482	200	21	14,040
1928-9	278	10,288	104	1,205	270	160	1,404	349	17	14,075
1929-30	273	10,283	118	1,187	248	204	1,318	207	23	13,860
1930-1	273	10,417	87	1,183	246	170	1,034	339	26	13,774
1931-2	273	10,389	82	1,214	258	165	904	136	57	13,478
1932-3	278	10,189	81	1,199	299	138	939	19	83	13,225
1933-4	137	4,976	41	598	105	54	448	9	68	6,435

APPENDIX D5 continued

Year	General Repairs & Maintenance: Track, Roadway	Electrical Equipment of Line	Repairs to Buildings	Cars, Mechanical	Electrical Equipment of Cars	Workshop, Tools	Total	Electrical Power & Energy: Wages of Attendants	Electrical Energy	Total
1924-5	558	439	224	985	732	137	3,076	374	4,399	4,773
1925-6	2,490	917	310	1,494	1,425	113	6,750	557	6,476	7,034
1926-7	2,283	823	248	1,725	1,349	62	6,490	585	6,929	7,514
1927-8	2,759	1,111	232	1,850	1,394	175	7,521	644	5,430	6,075
1928-9	2,428	1,036	89	1,983	1,593	111	7,240	661	5,757	6,418
1929-30	2,537	1,046	208	2,114	1,661	97	7,664	607	6,135	6,741
1930-1	2,493	1,108	101	1,939	1,462	106	7,209	495	5,981	6,476
1931-2	2,456	1,148	124	1,940	1,413	58	7,138	569	5,882	6,451
1932-3	1,698	974	35	1,694	1,346	39	5,786	584	5,617	6,201
1933-4	663	464	16	712	642	18	2,515	282	2,561	2,843

APPENDIX D5 continued

Year	Salaries of General Office Staff	General Expenses	Stores, Expenses	Printing, Stationary	Fire Insurance	Rates, Taxes, Licences	Audit Stamp	Telephone Rent & Fees	Miscellaneous	Carriage & Cartage	Law Charges & Deputation Expenses
1924-5	880	39	302	509	322	-	37	216	25	43	
1925-6	1,197	139	230	590	1,101	100	40	140	44	346	
1926-7	1,208	135	189	543	1,156	75	40	74	22	147	
1927-8	1,224	146	177	589	1,380	50	37	72	21	85	
1928-9	1,244	153	140	610	1,343	50	38	104	11	194	
1929-30	1,230	153	221	590	1,238	50	47	128	15	411	
1930-1	1,310	147	149	588	1,208	50	46	113	13	17	
1931-2	1,248	141	173	566	1,129	-	39	111	10	-	
1932-3	1,257	71	102	571	1,078	100	52	105	6	305	
1933-4	595	41	69	-	552	75	28	50	1	65	

APPENDIX D5 continued

Year	Bad Debts	Workmen's Compensation	Hospital Contributions	Income Tax	Housing Expenses (Rates, Taxes)	Accumulator Charging	Bank Commission	Accident Claims	Bank Interest	Advertising Expenses	Tithe Charges	Total	Total Payments
1924-5	-	-	-	-	69	4	-	-	-	-	-	1,567	19,725
1925-6	59	-	27	-	113	3	25	9	68	-	-	3,032	32.219
1926-7	23	-	19	-	156	-	25	-	-	-	-	2,603	30,202
1927-8	20	18	21	419	133	-	-	-	-	-	-	3,150	32,009
1928-9	28	-	21	-	113	-	-	-	-	13	-	2,820	31,797
1929-30	57	-	21	69	116	-	-	-	-	-	-	3,118	32,614
1930-1	15	-	21	-	233	-	-	-	44	-	3	2,647	31,417
1931-2	61	-	21	-	89	-	16	-	108	-	5	2,529	30,842
1932-3	5	-	20	-	130	-	14	-	155	3	2	2,720	29.189
1933-4	18	-	5	-	141	-	-	6	63	-	2	1,116	13,503

APPENDIX D5: SOURCES

The main source is SYRO, 8/UD29/558-67, DDLR Financial Statements 1924-5--1933-4. The following provisos apply:

1. Figures are rounded to the nearest pound; thus lines may not sum precisely.

2. The Financial Statements themselves only include major sub-totals--Traffic or General Expenses, for instance. However from 1927-8 onwards a manuscript sheet is included giving the details within these categories and reproduced above. The detailed costs for the three preceding years are taken from SYRO, 8/UD28/548, Ledger; this volume contains a miscellaneous selection of accounts, these working costs appearing on pages 150-5.

3. Occasionally it was necessary for the District Auditor to add small amounts to the totals at the audit. The largest amount is about £200 in 1925-6, but in other years either no or very small corrections were made. These changes are <u>not</u> reflected in the figures above, because the original, un-audited figures were obviously used as the basis for the Ministry of Transport Returns; for the sake of consistency the errors are not corrected here.

D6: DDLR ELECTRICITY CONSUMPTION AND CHARGES

D6/1: STATEMENT OF UNITS CONSUMED AND CASH PAID TO THE BARNSLEY CORPORATION FROM 6TH JUNE 1924 TO 31ST DECEMBER 1932

Year	Units	Cash £	s.	d.	Average per Unit d.
1924	138,751	982	16	5	1.70
1925	325,455	2,255	6	2	1.66
1926	304,894	2,086	0	9	1.64
1927	338,303	2,327	6	7	1.65
1928	304,292	2,089	6	9	1.64
1929	325,227	2,246	16	1	1.65
1930	323,793	2,210	16	6	1.63
1931	316,662	2,180	4	8	1.65
1932	315,907	1,728	15	7	1.31

D6/2: STATEMENT OF K. V. A. DEMAND UNITS CONSUMED AND CASH PAID TO THE YORKSHIRE ELECTRIC POWER COMPANY FROM JUNE 1924 TO 31ST DECR. 1932 TOGETHER WITH AMOUNTS DR. AND CR. FOR COAL CORRECTION CLAUSE

Year	K. V. A.	K. V. A. Charge £	s.	d.	Units	Units Charged £	s.	d.	Dr. C. C. C. £	s.	d.
1924	2,418.67	1,024	6	10	444,806	926	13	7	152	11	10
1925	4,133.83	2,066	18	3	1,011,210	2,016	13	9	168	2	7
1926	3,627.81	1,813	18	2	868,570	1,809	10	5	248	19	3
1927	3,420.19	1,710	1	11	1,024,100	2,133	10	10	1,086	10	11
1928	3,186.66	1,593	6	7	1,006,510	2,096	17	11		-	
1929	3,190.81	1,595	8	2	1,060,571	2,209	10	6		-	
1930	3,217.80	1,608	18	3	1,057,472	2,203	1	4		-	
1931	3,134.76	1,567	7	8	1,074,780	2,239	2	6		-	
1932	3,145.14	1,572	11	5	1,067,660	2,224	5	10		-	

Year	Cr. C. C. C. £	s.	d.	Amount Paid £	s.	d.	Per Unit d.
1924	22	1	10	2,081	10	5	1.12
1925	63	10	0	4,278	4	7	1.01
1926	79	16	3	3,792	12	1	1.05
1927	730	1	1	4,200	2	7	0.98
1928	51	10	5	3,638	14	1	0.86
1929	18	18	8	3,786	0	0	0.85
1930	15	11	4	3,796	8	8	0.86
1931		-		3,806	10	2	0.85
1932		-		3,796	17	3	0.85

SOURCE: SYRO, Misc. Papers, 18 Feb 1933.

APPENDIX D7

COMPARISON OF OPERATING COSTS BETWEEN THE YORKSHIRE TRACTION CO. LTD. AND THE DEARNE DISTRICT LIGHT RAILWAYS IN PENCE PER CAR MILE, YEARS ENDING 31ST MARCH

YTC	1931	1932	1933	1933	1932	1931	DDLR
Running Costs:							Running Costs:
Fuel	1.53	1.33	1.70	0.19	0.18	0.16	Power: wages
Car Lighting	0.05	0.06	0.07	1.81	1.88	1.92	Power: energy
	1.58	1.39	1.77	2.00	2.06	2.08	
Lubricants	0.07	0.06	0.08				
Cleaning	0.16	0.16	0.17				
	0.23	0.22	0.25	0.39	0.39	0.38	Cleaning, Oiling Cars
Drivers	1.57	1.53	1.57				
Conductors	0.85	0.82	0.85				
	2.42	2.35	2.42	3.29	3.32	3.34	Wages: Motormen & Conductors
Inspections, Tickets etc.	0.26	0.27	0.25	0.30	0.29	0.33	Ticket Check
				0.03	0.03	0.03	Wages: other traffic employees
				0.03	0.02	0.01	Traffic, Misc.
				0.01	0.04	0.11	Uniforms, Badges
				0.09	0.09	0.09	Superintendance
				0.04	0.05	0.05	Fuel, Light Water for Depot
				0.10	0.08	0.08	Cleaning, Sanding Track
Sundry Running	0.10	0.12	0.13	0.30	0.31	0.37	
Tyres	0.44	0.30	0.24				
TOTAL RUNNING	5.03	4.65	5.06	6.28	6.37	6.50	TOTAL RUNNING

APPENDIX D7 continued

YTC	1931	1932	1933	1933	1932	1931	DDLR
Other Costs:							Other Costs:
Running Repairs:							
Chassis	0.62	0.54	0.59	0.55	0.62	0.62	Cars: Mechanical
Body	0.14	0.15	0.17	0.43	0.45	0.47	Cars: Electrical
	0.76	0.69	0.76	0.98	1.07	1.09	
				0.01	0.04	0.03	Repairs to Buildings
				0.01	0.02	0.03	Workshop, Tools
Buildings etc	0.13	0.13	0.16	0.02	0.06	0.06	
Staff Cars & Lorries	0.02	0.01	0.02				
Publicity	0.02	0.04	0.04				
Garage Staff & Office Charges	0.18	0.17	0.20				
Insurance	0.16	0.15	0.17				
Administration	0.23	0.19	0.21				
	0.61	0.56	0.64	1.29	1.20	1.27	Office Staff & General
Licences	0.34	0.34	0.36				
				0.55	0.78	0.80	Track, Roadway
				0.31	0.37	0.36	Electrical
				0.86	1.15	1.16	
TOTAL AS PER DDLR a/c	6.87	6.37	6.98	9.43	9.85	10.08	TOTAL AS PER DDLR a/c
Unspecified[a]	0.01	0.01	0.02				
Depreciation	1.48	1.39	1.44				
TOTAL YTC COSTS	8.36	7.77	8.44				

NOTE: a. Specified as 0.01 Employees' Bonus and 0.01 Parcels in 1933.

D7: SOURCES

DDLR costs based on those in Appendix D5, converted into costs per car mile with the car mileages given in the Ministry of Transport Returns (Appendix D4).

YTC figures from YTC, Quarterly Returns, passim. There are two difficulties in making a direct comparison with the DDLR's costs:

1. The YTC Returns exist only from June 1931 to March 1933. The year ending 31 Mar 1931 can, however, be covered by using the figures for the same quarter the previous year which were inserted into the Returns as a comparison.

2. The YTC Returns are based on calendar years ending 31st December and the DDLR's on a financial year ending 31st March. So instead of taking the YTC's results for any one year, which would not be precisely comparable with the DDLR, each item of expenditure is summed for the four quarters up to 31st March and divided by the mileage run in that period (also given in the Returns) to give a result in terms of pence per car (at this period the Company still used the tramway term 'car') mile.

D8: ORIGINAL TRAMWAY OPENING DATES FOR TRAMWAYS SURVIVING AFTER 1950

Town	First Tramway (usually non-electric)	Notes
Aberdeen	1874	a
Birmingham	1872	b
Blackpool	1885	c
Dundee	1877	d
Edinburgh	1871	e
Gateshead	1883	f
Glasgow	1872	g
Grimsby & Immingham	1912	c
Leeds	1871	h
Liverpool	1869	i
Llandudno	1907	c
London	1870	j
Sheffield	1873	k
Stockport	1880	l
Sunderland	1879	m
Swansea & Mumbles	1860	n

NOTES AND SOURCES:

a. Aberdeen Corporation Passenger Transport Department, Sixty Years of Progress (Aberdeen, 1958); no page numbers.

b. Webb, Black Country Tramways 1, 2; horse tramway operation actually began outside the then city boundary in 1872 and not within the city until 1873.

c. Jackson-Stevens, 100 Years, 94-5; unlike the others, these were all electrified from the start.

d. Alan W. Brotchie, Tramways of the Tay Valley (Dundee, 1965), 23.

e. D. L. G. Hunter, Edinburgh Tramways Album (Sheffield, 1972); introduction (no page numbers).

f. H. A. Whitcombe, History of the Steam Tram, ed. and with an introduction by Charles E. Lee (South Godstone, Surrey; 1954), 40.

g. Oakley, The Last Tram, 21.

h. H. Brearley, Tramways in West Yorkshire (South Godstone, Surrey; 1960), 25.

i. Horne and Maund, Liverpool Transport 1, 30.

j. R. W. Kidner, The London Tramcar 1861--1952 (Lingfield, Surrey; revised 3rd? ed., 1965); 2-4. G. F. Train had laid three experimental lines in 1860, but these were soon removed, so the first permanent horse tramways date from 1870.

APPENDIX D8 continued

k. See Appendix S1.

l. Gray, Manchester Carriage Company, 65.

m. Tyne and Wear Passenger Transport Executive, Sunderland Transport: the first 100 years (Newcastle, 1979), 1

n. Charles E. Lee, The Swansea and Mumbles Railway (South Godstone, Surrey: 1954), 5 and 13. The first railed passenger service in the world began in 1807, but permanent service only started in 1860.

DONCASTER APPENDICES

DN1: DONCASTER CORPORATION TRAMWAYS PROFIT AND LOSS ACCOUNT 1903--1936 ROUNDED TO THE NEAREST POUND

Year ending 31st March	Revenue	Working Expenditure	Working Balance	Positive Interest Payments	Capital[a] Payments	Balance
1903	7,288	4,316(b)	2,972	1,109	3,210(b)	871(b)
1904	11,246	10,151	1,095	879	4,147	2,174(c)
1905	11,111	11,621	510	246	4,286	4,550(d)
1906	11,586	9,906	1,680	-	4,018	2,338
1907	12,397	9,859	2,538	-	3,900	1,362
1908	12,865	10,612	2,253	-	3,894	1,641
1909	12,908	10,461	2,447	24	3,948	1,477
1910	15,172	11,186	3,987	131	4,252	135
1911	16,513	12,207	4,306	92	4,317	81
1912	17,669	13,254	4,415	133	4,601(e)	53
1913	20,262	13,779	6,483	85	5,277(f)	1,290
1914	23,209	17,027	6,182	16	4,971	1,226
1915	25,348	16,657	8,691	88	5,922	2,856
1916	29,349	21,274	8,075	254	7,573	757
1917	37,874	28,229	9,645	250	7,813	2,083
1918	44,519	33,069	11,450	267	7,879	3,838
1919	53,528	37,566	15,962	486	8,101	8,347
1920	60,193	56,607	3,586	414	8,572	4,572
1921	75,008	69,041	5,967	-	11,467(g)	5,501
1922	72,295	62,537	9,758	500(h)	10,928	670
1923	73,055	58,516	14,539	-	11,887	2,665
1924	66,484	52,337	14,147	48	11,479	2,715
1925	70,947	54,993	15,954	444(i)	10,782	5,615
1926	71,434	54,592	16,842	450	12,951(j)	4,342
1927	62,479	55,201	7,278	535	11,806(k)	3,992
1928	72,586	53,605	18,981	576	10,971	8,586
1929	57,611	48,460	9,151	787	10,945	1,007
1930	45,843	34,612	11,231	715	11,767	178
1931	31,707	23,121	8,586	318	10,809	1,906
1932	17,373	14,149	3,224	361	9,403	5,818
1933	10,268	9,525	743	58	5,650	4,849
1934	10,161	8,501	1,660	-	4,301	2,642
1935	9,841	8,140	1,701	-	3,139	1,438
1936	1,169	1,586	417	680(1)	2,802(m)	2,539

SOURCE: Doncaster Accounts, Tramways a/cs, passim.

a. This item occasionally includes contributions to new capital assets as opposed to payments on the old. These items are noted below, but are never a high proportion of the whole.

b. DCT Jubilee, 49 has these figures up to 1922. There are occasional minor discrepancies due to rounding errors, but in 1903 the sums for working and capital expenditure differ more and the balance is £932; it is not possible to explain this conflict with the evidence available.

c. The actual balance in the 1904 account is only £1303, but this because the previous year's profit of £871 was carried forward, contrary to later practice.

d. Both DCT Jubilee, 49 and the accounts have a deficit of £3,248 because of the inclusion of £1,304 paid from the Borough Fund to cover the previous year's deficit. This is adjusted in the present Table to accord with the convention from from 1906 onwards, whereby each year's balance is

APPENDIX DN1 continued

isolated from subsequent years' accounts by being put into a separate Net Revenue Account.

e. Includes £107 for switches, spanners etc.

f. Includes £665 towards motor tower wagon.

g. Includes £1,200 towards culverting the river Cheswold and £200 to providing a shelter in Adwick-le-Street.

h. Income tax adjustment.

i. Includes £254 income tax adjustment.

j. Includes £793 for alterations and additions to car shed and £235 to new Morris motor truck.

k. Includes £219 to new Morris motor truck and car.

l. Transfer of balance of Reserve Fund.

m. Includes £1,353 to removing track and re-instating roadway.

DN2: DONCASTER CORPORATION TRAMWAYS FLEET LIST

Nos.	Date Built	Date Scrapped	Body Type	Body[a] Builder	Seats[b]	Truck Type	Motor Type[a]	Controller Type[a]	Notes
1-15	1902	1927-30	Open-top	ER&TCW	22/34	6' Brill 21E	2x25hp DK25A	DK DB1 Form B	c,d,e
16-20	1903	1925-30	"	"	"	"	"	"	c,d,e
21-25	1903	1929-30	"	"	"	"	"	"	c,e,f
26-31	1913	1931-2	Balcony	UEC	"	7'6" Peckham P22	4x40hp DK20A	DK DB1 Form K3	
32	1913	1931	"	"	30/44	13'6" Peckham Radial	"	"	g
33-36	1916	1931-3	"	"	26/40	8'6" Peckham P22	"	"	
37	1906	1925	Single	Milnes Voss	20	5'6" Mountain & Gibson 40	2x27hp Westinghouse	Raworth	h
38-47	1920	1933-5	Vestibuled	EE	26/40	8'6" Peckham P22	4x40hp DK30B	DK DB1 Form K3	
(1)	1903	1935	Water Car	ER&TCW	-	6' Brill 21E	2x25hp DK25A	DK DB1 Form B	
-	?	1935	Works	?	-	?	-	-	i

SOURCE: Buckley, Tramway Memories of Old Doncaster, inside back cover. The main sources which lie behind this are Bett and Gilham, SY&H Tramways, 40 and Flint, DCT Fleet, passim; detail alterations are taken from assorted references in Doncaster Minutes and SYT Letters.

a. The body and equipment manufacturers indicated only by initials are in fact different departments of, or different periods in the evolution of the same firm, as follows: DK = Dick,Kerr; EE = English Electric; ER&TCW = The Electric Railway & Tramway Carriage Works; UEC = United Electric Car Company.

b. x/x = lower/upper deck seats.

c. Cars 5-16 and 22-25 received top covers between 1907 and 1913, all from Dick,Kerr except nos. 5-8

from the Brush Electrical Engineering Company.

d. Cars 7, 14 and possibly 16 had their trucks altered to 7' Peckham P22s in 1921.

e. 1-25 had their controllers replaced with British Thomson-Houston type B18 later on.

f. 23 and 24 were fitted with 7' 6" Peckham P22 trucks in 1922.

g. Original truck replaced by 8' 6" Peckham P35 in 1935.

h. Bought from Erith Tramways in 1916.

i. Former York horse-drawn tram used as a salt and sand trailer.

DN3: EARNINGS OF THE BRODSWORTH TRAMWAY

EARNINGS OF THE BRODSWORTH AND OTHER TRAM ROUTES
COMPARED TO WORKING COSTS IN POUNDS

Year Ending 31st March	Traffic Revenue per Route Mile		Working Costs per Route Mile
	Brodsworth	Other Lines	Entire System
1917	2,415	2,414	1,821
1918	2,884	2,845	2,113
1919	3,546	3,403	2,424
1920	4,275	3,743	3,652
1921	4,657	4,795	4,454
1922	3,944	4,789	4,035
1923	3,846	4,830	3,775

SOURCES AND CALCULATIONS:

Traffic Revenue and Working Costs, Doncaster Accounts, Tramways Revenue a/c, 1916-17—1922-3. The revenue for each line is stated separately at this period, so it is possible to obtain the exact revenue for Brodsworth and for the other lines. From 1919-20 certain small items (such as 'conveyance of police' and never more than £313 p.a.) are credited entirely to the other lines for the sake of simplicity.

The Route Mileages used to convert gross revenue and costs from the accounts into amounts per route mile are as follows: Brodsworth 3.5, other lines 12.0 and entire system 15.5 miles. These are somewhat a matter of guesswork. During World War I a mistake was made in the Tramway Returns by adding in some new mileage twice.[1] The undertaking's own figures obviously repeat the error, giving 11.25 miles in 1915, 16.00 in 1916, 14.75 in 1920 and 14.25 in in 1922.[2] It is likely that the first and last of these are correct; the final figure agrees with the Tramway Returns 1927-8,[3] which was after the error had been discovered. Since only the Brodsworth line was built between the financial years ending 31st March 1915 and 1922, its length was 3 miles;

1. SYT Letters, 13 Jan 1921, 389.

2. Doncaster Statistics, passim. 3. Tramway Returns, 1927-8.

comparison with the system map shows this to be about right. The map also shows that half-a-mile needs adding for the common section with the Bentley line to obtain the total route mileage.[1] The track mileage for the rest of the system was, of course, 11.25 (the figures quoted above are for track and not route mileage), but common sections need adding to obtain the route mileage, as follows:

	Furlongs	Chains	
Avenue/Beckett Roads	4	4½	(2)
Racecourse	1	3½	(3)
Hexthorpe	2	-	
Hyde Park	-	1	(4)

Adding the total of 7 furlongs and 9 chains to the track mileage of 11 miles 2 furlongs makes a route mileage of 12 miles, 1 furlong, 9 chains or 12 miles to the nearest mile, which is the figure used in the table.

A Check on the soundness of the calculations can be made by working out the operating surplus for the whole system from the above table and then comparing it with the actual figures shown in Appendix DN1. Taking two years at random, in 1920 the surplus from this table is £3,272 and the actual one £3,576 and in 1923 the two sums are £12,908 and £14,539. So the above calculation results in shortfalls of some 9-12 per cent; that is, it tends to under-estimate earnings.

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1. Figure 6 in the text above.

2. The outer ends of the two routes are about the same length, so the as-built length of Beckett Road is subtracted from that for Avenue Road to give this figure; lengths from Tables 30 and 31 above.

3. The length of the Priory Place line is about right for the extra length of this route along St. Sepulchre Gate and Station Road; see Table 31.

4. Extra sections of these last two routes from the map in Figure 6.

DN4: MOTOR BUS LICENCES ISSUED BY DONCASTER WATCH COMMITTEE 1922--1930

Date (page of minute)	Buses Licensed[a]	Corporation Buses[b]	Private Buses[b]
16 Mar 1922 (279)	51		
26 Sep 1922 (577)	61		
21 Mar 1923 (288)	41	6	35
20 Sep 1923 (594)	52		
13 Mar 1924 (307)	90	12	78
(Sep 1924 figures do not appear to be recorded)			
6 Mar 1925 (267)	134	15	119
29 Sep 1925 (552-3)	146		
19 Mar 1926 (272)	231	17	214
17 Sep 1926 (539)	272		
18 Mar 1927 (277-8)	283	21	262
19 Sep 1927 (635)	369		
9 Mar 1928 (381)	380	24	356
20 Sep 1928 (738)	422		
8 Mar 1929 (345)	681	28	653
19 Sep 1929 (706)	629		
7 Mar 1930 (379)	579	39	540
18 Sep 1930 (752)	622		

SOURCES: Buses Licensed from Doncaster Minutes, Watch Committee, Hackney Carriage Sub-Committee (19 Sep 1929 is Watch Committee proper); Corporation Buses from DCT Jubilee, 49.

a. A certain margin of error should be allowed on these figures, because it is not always made quite clear if certain licences mentioned especially (such as vehicles which were unsatisfactory and needed replacing) were included in the grand totals or not; the error, if any, is certainly no more than ten and usually much less. The licences were issued per vehicle, so the number of operators would be considerably less in any one year.

b. The total for buses licensed is only broken down when the number of municipal buses is known.

DN5: COMPARATIVE TRAFFIC REVENUE AND WORKING EXPENDITURE IN PENCE PER CAR MILE FOR DONCASTER TRAMS AND TROLLEYBUSES 1929--1936

Year Ending 31st March	Traffic Revenue[a]		Working Expenditure		Working Surplus[b]	
	Trams	TBs	Trams	TBs	Trams	TBs
1929	16.65	17.28	14.34	11.53	2.31	5.75
1930	16.83	17.13	12.98	11.71	3.85	5.42
1931	15.53	16.19	11.78	11.56	3.75	4.63
1932	15.35	15.56	13.34	10.14	2.01	5.44
1933	13.39	15.01	14.30	10.16	0.91	4.85
1934	11.91	15.09	11.38	9.92	0.53	5.17
1935	11.07	15.00	10.35	9.77	0.72	5.23
1936	9.83	15.27	13.36	10.01	3.53	5.26

SOURCE: Tramway Returns, 1928-9--1935-6.

a. Revenue is based only on traffic income (excluding advertisement revenue for the trams and this with a few other small items for the trolleybuses), though total income was used in Doncaster's own accounts to calculate the working surplus; in 1932-3 this extra income was sufficient to cancel out the deficit shown here for the trams. However the above figures give the clearest impression of the comparative earning power of the two types of vehicle.

b. Revenue minus expenditure.

DN6: FLEET AND FINANCIAL STATISTICS FOR DONCASTER CORPORATION TRANSPORT 1927--1936

Year Ending 31st March	Number of Vehicles[a]			Profit/Loss[b]			
	Tram	TB	Bus	Tram £	TB £	Bus £	Total £
1927	44	-	21	3,992	-	5,539	9,531
1928	38	-	24	8,585	-	968	9,554
1929	38	16	28	1,007	556	5,105	6,668
1930	18	22	39	178	1,869	5,159	3,112
1931	14	30	42	1,906	480	2,965	5,351
1932	11	31	42	5,818	7,328	533	2,043
1933	9	31	38	4,848	6,274	420	1,846
1934	9	32	38	2,641	5,011	4,637	7,007
1935	9	32	36	1,438	9,304	4,800	12,666
1936	-	37	36	2,539	10,252	8,229	15,942

SOURCES:

a. DCT Jubilee, 49.

b. Doncaster Accounts, Tramways, Trackless Trolley and Motor Bus Net Revenue a/cs; the sum of these given here agrees with the total profit/loss given in DCT Jubilee, 49 except for rounding errors.

SHEFFIELD APPENDICES

S1: CHRONOLOGY OF LOCAL TRANSPORT IN SHEFFIELD

1852	First urban horse bus services.
1872	Sheffield Tramways Act authorised the construction of about 9 miles of tramway.
1873	First horse tram route opened.
1876	Trials with a steam tram engine.
1896	Corporation takeover of company-operated tramways and decision to electrify them.
1899	First electric tram service Tinsley to Nether Edge.
1902	Last horse cars withdrawn.
1905	Through running with Rotherham Corporation.
1907	Authority obtained to operate motor buses.
1912	Authority (never used) obtained to operate trolleybuses.
1913	First motor bus service Manchester Road to Lodge Moor.
1914	Former tramways' generating station at Kelham Island transferred to the Corporation Electricity Supply Department.
1915	Women conductors employed.
1916	Advertising contract cancelled due to wartime conditions; trams kept free of advertising for many years afterwards.
1919ff	Rapid development of motor bus services within and beyond the city, aided by the purchase of vehicles and services from private operators and by joint running agreements.
1924	Air brakes began to be fitted to tramcars.
1925	Bus routes began to be extended into City instead of terminating at a tramway; Petre Street tramway converted to motor bus operation.
1927	Introduction of transverse seating on lower decks of tramcars.
1927-8	Reserved track tramways built round Abbey Lane and Prince of Wales Road.
1929	Joint Omnibus Committee formed between Sheffield Corporation and the LMS and LNER, involving the transfer of certain long distance Corporation services to railway ownership, but with operation remaining in Corporation hands.
1930	Diesel-engined bus put into service.
1934	Nether Edge tramway converted to motor bus operation.
1936	Fulwood via Broomhill also converted to motor bus service.
1940	Severe damage to tramways and temporary suspension of service during the Blitz.
1946	Final new tram built in the Corporation's workshops; 35 more built later by an outside firm.
1948	Tram route between Rotherham and Sheffield closed due to rebuilding of a canal bridge.
1951	The Council adopted the General Manager's report recommending the replacement of tramways by motor buses over a period of fifteen years.
1960	The final tram service was withdrawn, earlier than originally planned in order to achieve further economies.

SOURCES:

S.T.D., Brief History, 11, 13, 15 and 17 (all details up to 1940).

S.T.D., Tramway Era, 26-8 (subsequent details).

Much fuller information is to be found in Gandy, Sheffield Tramways and Hall, Sheffield Transport, passim.

S2: CHRONOLOGY OF LOCAL TRANSPORT IN MANCHESTER

1877	Horse tram services begun by the Manchester Carriage and Tramways Company; at its peak in the 1890s the Company ran about 500 cars over 140 miles of route in Manchester and surrounding towns.
1901	Municipal electric trams started in Manchester.
1907	The fleet was now over 500 and route mileage over 90.
1911	Manchester was only one of ten municipal tramway operators in the area, and by this time they served a population of nearly $2\frac{1}{2}$ million with about 1,000 trams on more than 300 miles of route carrying well over 300 million passengers p.a. Through services were provided by joint working arrangements between operators, whilst some smaller local authorities owned tramways which were worked by the larger towns' trams. There were also three company-owned systems in the area. Manchester also offered a tramways' parcels express service throughout Manchester and Salford and over a wide area beyond.
1920s	Sleeper track extensions were built to the south of the city. About 350 high-capacity bogie trams were built in this decade, making a total of 638 versus 240 two-axle cars by the end of the decade.
1928	The final tramway extension was opened.
1930	The first tram route, inner circle route 53, was closed.
1931	Three further major routes closed.
1932	The final new trams, of a new lightweight two-axle design, were delivered.
1939	A decision was made to abandon all trams within eighteen months, though the war held up completion of the programme.
1949	The last tram ran.

SOURCES:

Joyce, Rails of Manchester, 16, 39, 41, 45, 65-6 and 139.

Kirby, Middleton Tramways, 47.

Kirby, 'Tramways of Altrincham', 58.

Klapper, Tramways, 136.

Manchester Corporation, Parcels Express (a brochure advertising the service, reprinted, Rochdale, 1972).

Sleeman, 'Municipal Transport', 53.

There is no full-scale history of Manchester's tramways yet available, but the early years are covered in A. K. Kirby, Dan Boyle's Railway (Rochdale, 1972).

S3: SHEFFIELD CORPORATION TRAMWAYS STATISTICAL INFORMATION

(1) Year[a]	(2) Route Mileage m.f.yd.	(3) Fleet	(4) Car Miles	(5) Passengers	(6) Traffic Revenue £	(7) Revenue pcm d.	(8) Revenue per Passenger d.	(9) Passen-gers pcm	(10) Working Costs £	(11) Costs pcm d.
1899	10-6-0	67	841,871	10,548,445	57,504	16.39	1.308	12.530		
1900			527,292	7,715,314	30,105	13.703	0.936	14.632	23,961	10.900
1901			1,186,415	27,464,259	106,652	13.569	0.932	14.559		
1902	22-4-0		3,525,999	45,093,876	173,874	11.825	0.924	12.789	106,300	7.235
1903	28-4-0		4,777,146	54,946,915	206,729	10.386	0.903	11.502	132,294	6.646
1904	31-6-0		5,768,231	61,450,993	232,351	9.667	0.907	10.653	156,403	6.507
1905	35-6-136	248	6,049,899	63,952,283	240,566	9.543	0.903	10.571	163,283	6.477
1906	35-7-7	257	6,236,561	68,244,937	256,437	9.868	0.902	10.952	157,070	6.055
1907	"	263	6,804,656	73,966,299	276,907	7.767	0.898	10,870	168,419	5.940
1908	36-5-81	268	7,065,380	77,568,686	289,745	9.842	0.896	10.979	177,940	6.045
1909	37-6-151	"	7,364,305	76,356,031	285,953	9.319	0.899	10.368	180,606	5.886
1910	39-6-105	264	7,459,911	78,620,798	296,251	9.531	0.904	10.539	181,517	5.840
1911	40-0-44	"	7,618,383	84,500,351	316,739	9,978	0.900	11.092	186,025	5.860
1912	40-0-217	269	7,720,026	90,458,851	337,801	10.502	0.896	11.717	196,607	6.112
1913	40-1-105	279	8.071,188	96,330,252	358,571	10.662	0.893	11.935	207,824	6.176
1914	40-6-6	335	8,883,576	104,851,408	386,060	10.430	0.884	11.803	232,761	6.298
1915	40-5-193	339	8.810,252	107,023,195	391,482	10.664	0.878	12.147	246,830	6.568
1916	"	"	8,867,726	123,429,410	449,894	12.176	0.878	13.919	270,939	7.333
1917	"	349	9,662,012	142,551,547	519,223	12.897	0.876	14.754	335,766	8.340
1918	"	347	9,761,994	153,506,213	595,080	14.630	0.930	15.725	413,730	10.172
1919	"	350	9,468,186	163,799,188	653,326	15.560	0.958	17.300	488,726	12.388
1920	"	373	10,268,345	151,667,534	824,268	19.266	1.299	14.770	677,743	15.841
1921	"	374	10,909,237	158,640,353	997,149	21,937	1.150	14.542	817,313	17.980
1922	41-0-49	394	9,920,208	144,465,114	899,691	21.766	1.495	14.563	696,415	16.848
1923	45-4-55	381	9,958,200	138,895,200	850,147	20.489	1.469	13.948	641,615	15.463
1924	46-0-42	371	10,357,352	145,708,494	841,202	19.492	1.386	14.068	617,845	14.317
1925	47-2-56	392	10,958,132	154,880,962	873,034	19.138	1.353	14.147	633,888	13.896
1926	48-0-48	400	11,752,714	158,577,429	871,616	17.799	1.319	13.493	653,257	13.340
1927	48-3-35	420	11,514,712	151,245,498	833,082	17.364	1.322	13.135	620,577	12.935

APPENDIX S3 continued

(1) Year	(2) Route Mileage m.f.yd.	(3) Fleet	(4) Car Miles	(5) Passengers	(6) Traffic Revenue £	(7) Revenue pcm d.	(8) Revenue per Passenger d.	(9) Passen-gers pcm	(10) Working Costs £	(11) Costs pcm d.
1928	52-5-89	413	12,209,655	162,868,054	895,647	17.605	1.320	13.339	687,494	13.514
1929	54-0-15	416	12,544,924	162,825,040	897,485	17.170	1.323	12.979	684,349	13.092
1930	"	418	12,740,183	165,182,138	910,812	17.158	1.323	12.965	696,333	13.118
1931	"	413	12,730,385	160,926,818	849,531	16.016	1.267	12.641	659,175	12.427
1932	"	410	12,648,392	154,070,859	809,009	15.351	1.260	12.181	620,148	11.767
1933	"	412	12,689,482	149,353,342	785,631	14.859	1.262	11.770	591,186	11.181
1934	52-7-49	411	12.741,832	154,145,732	811,690	15.289	1.264	12.098	618,834	11.656
1935	54-4-94	418	13,358,598	155,325,461	821,507	14.759	1.269	11.627	637,742	11.458
1936	54-5-156	426	13,988,121	159,706,744	851,682	14.612	1.280	11.417	676,062	11.600
1937	53-2-93	431	14,233,653	162,984,205	875,440	14.761	1,289	11.451	699,071	11.787
1938	"	437	14,504,291	168,230,594	905,099	14.977	1.291	11.599	712,924	11.797
1939	"	442	14,468,290	166,936,014	900,747	14,942	1.295	11.538	720,820	11.957
1940	"	444	13,946,546	166,204,852	901,722	15.517	1.302	11.917	723,538	11.451
1941			13,531,004	166,148,315	901,600	15.992	1.302	12.279		
1942			13,962,130	180,046,368	1,016,248	17.468	1.355	12.895		
1943			14,436,946	195,047,466	1,165,477	19.375	1.434	13.510		
1944	53-2-194		14,489,008	201,900,945	1,196,902	19.826	1.423	13.935	941,336	15.593
1945	"	468	14,412,413	204,169,943	1,204,997	20.066	1.416	14.166	1,003,178	16.705
1946	"	"	14,282,823	199,093,006	1,174,148	19.730	1.415	13.939	1,079,254	18.135
1947	"	"	13,999,898	201,702,333	1,192,237	20.439	1.419	14.407	1,186,492	20.340
1948	"	"	14,344,475	188,769,688	1,488,151	24.899	1.892	13.160	1,313,226	21.972
1949	"	467	13,983,148	185,176,760	1,454,352	24.962	1.885	13.243	1,376,309	23.622
1950	52-2-144	443	13,038,885	175,417,657	1,370,173	25.220	1.875	13.453	1,342,050	24.371
1951	"	459	12,928,594	168,894,755	1,383,014	25.673	1.965	13.064	1,284,486	23.844
1952	50-3-52	435	12,454,580	163,857,044	1,516,807	29.229	2.222	13.156	1,352,713	26.067
1953	"	413	11,841,470	151,050,742	1,596,233	32.352	2.536	12.756	1,411,958	28.617

APPENDIX S3 continued

(1) Year	(2) Route Mileage m.f.yd.	(3) Fleet	(4) Car Miles	(5) Passengers	(6) Traffic Revenue £	(7) Revenue pcm d.	(8) Revenue per Passenger d.	(9) Passen-gers pcm	(10) Working Costs £	(11) Costs pcm d.
1954	"	370	11,527,300	145,676,849	1,537,328	32.007	2.533	12.638	1,430,560	29.784
1955	44-7-202	356	9,556,344	115,839,851	1,321,081	33.178	2.737	12.122	1,298,421	32.609
1956		338	8,854,521	106,728,723	1,471,901	39.896	3.310	12.054	1,305,751	35.390
1957		265	7,605,456	88,361,648	1,215,519	38.357	3.301	11.618	1,227,565	38.740
1958		200	5,788,297	67,237,543	982,128	40.720	3.506	11.616	1,020,890	42.330
1959		130	4,257,025	49,494,824	737,183	41.560	3.575	11.627	790,940	44.590
1960		60	2,705,303	34,040,000	506,587	44.940	3.572	12.580	547,260	48.550
1961			543,251		111,728	49.36			137,967	60.950

Year	(12) Operating Ratio %	(13) Journeys per Head p.a.	(14) Total Revenue £	(15) Revenue pcm d.	(16)[b] Capital Payments £	(17)[c] Net Balance £	(18)[c] Rate Relief £	(19)[c] Renewals Fund £	(20)[c] Net Surplus £	Notes
1899	62.300							3,288		d,e,f
1900	78.720		30,437				12,000	Nil		g
1901							10,000	Nil		g,h
1902	60.543		175,575				5,000	Nil		g,i
1903	63.310		208,963				15,671	20,000		g,i
1904	66.277		235,982				10,468	33,771		
1905	67.235	147.700	242,842	9.634	63,982	41,341	13,000	Nil		j
1906	60.708	154.956	261,567	10.066	66,107	61,736	12,773	36,017		
1907	60.239	165.121	283,427	9.996	69,312	45,496	24,783	22,119		

APPENDIX S3 continued

Year	(12) Operating Ratio %	(13) Journeys per Head p.a.	(14) Total Revenue £	(15) Revenue pcm d.	(16) Capital Payments £	(17) Net Balance £	(18) Rate Relief £	(19) Renewals Fund £	(20) Net Surplus £	Notes
1908	60.860	170.274	295,842	10.048	67,421	47,472	22,532	22.066		
1909	62.524	164.830	291,867	9.512	74,626	36,635	15,000	21,455		
1910	60.676	166.938	302,836	9.743	82,067	39,252	12,193	21,606		
1911	58.176	176.497	323,098	10.178	83,864	53,209	26,541	21,396		
1912	57.655	198.465	344,133	10.698	86,192	68,736	26,889	25,412		
1913	57.389	206.536	365,186	10.760	80,065	77,297	30,234	30,187		
1914	59.732	218.594	392,397	10.527	82,029	77,608	30,582	30,123		k
1915	61.116	220	396,229	10.747	85,027	69,939	22,876	30,018		1
1916	59.926	264	455,609	12.236	88,889	95,780	41,856	30,115		1
1917	64.451	301	525,685	13.050	101,441	88,478	40,098	34,699		1
1918	69.489	322	601,446	14.786	103,812	83,903	41,512	47,250		1
1919	74.699	346	662,536	16.794	110,592	63,218	9,229	39,065		1
1920	82.067	310	838,191	19.589	103,035	57,413	Nil	45,221		1
1921	81.861	322	1,009,251	22.203	119,744	72,194	Nil	60,684		
1922	77.334	282	903,427	21.857	123,891	83,122	6,495	60,340		1
1923	75.330	266	854,452	20.587	118,320	94,516	13,214	67,489		
1924	74.550	278	845,447	19.591	121,373	106,229	21,234	60,151		
1925	72.530	295	878,383	19.255	125,068	119,427	40,000	60,013		
1926	74.860	300	878,062	17.931	126,333	116,355	39,012	64,815		
1927	74.390	289	837,038	17.446	120,131	96,330	15,653	60,456		
1928	76.660	310	902,697	17.744	127,348	101,581	26,888	60,920		
1929	76.25	316	906,571	17.343	132,854	89,368		61,240		
1930	76.350	319	920,024	17.314	126,688	94,101		62,589		
1931	77.480	311	864,375	16.195	131,775	82,426		71,747	6,394	
1932	76.540	298	824,875	15.652	125,331	89,051		72,693	3,790	
1933	75.250	291	800,429	15.139	127,459	81,784		63,361	13,927	
1934	76.240	301	827,680	15.590	110,684	105,753		70,997	30,085	

APPENDIX S3 continued

Year	(12) Operating Ratio	(13) Journeys per Head p.a.	(14) Total Revenue	(15) Revenue pcm	(16) Capital Payments	(17) Net Balance	(18) Rate Relief	(19) Renewals Fund	(20) Net Surplus	Notes
1935	77.630	298	835,257	15.006	105,812	84,975		81,295	25,623	
1936	79,380	307	861,907	14.778	86,319	127,773		88,679	37,282	
1937	79.850	314	886,042	14.934	80,035	121,937		75,057	43,448	
1938	78.780	325	915,242	15.144	82,805	125,744		66,415	56,982	
1939	80.020	321	908,456	15.098	86,168	102,435		63,111	39,324	1
1940	80.240	320	911,752	15.690	81,436	87,104		61,300	25,804	1
1941										1,m
1942										1,m
1943										1,m
1944	78.65	387	1,198,726	19.856	120,622	108,488		60,000	48,488	1
1945	83.250	391	1,206,747	20.095	112,014	70,088		60,000	10,080	1
1946	91.92	398	1,175,445	19.51	85,021	356		60,000	59,644	1
1947	99.52	403	1,193,855	20.466	73,796	67,769		60,000	127,769	1
1948	88.25	371	1,489,806	24.926	42,537	134,053		120,000	14,043	n
1949	94.63	360	1,456,021	24.990	29,383	50,329		120,000	69,671	n
1950	96.630		1,371,627	25.247	24,592	22,985		120,000	97,015	
1951	92.880		1,384,592	25.702	24,592	78,904		120,000	41,096	
1952	89.180		1,518,385	29.259	33,063	132,609		120,000	12,609	
1953	88.46		1,603,151	32.492	30,427	160,765		116,240	44,526	
1954	93.055		1,544,855	32.164	34,025	80,269		106,066	25,796	
1955	98.285		1,329,661	33.393	26,829	21,245		93,295	72,049	
1956	88.706		1,481,983	40.170	29,493					o
1957	100.999		1,223,888	33.620	43,860					o
1958	103.954		987,140	40.930	38,441					o
1959	107.291		740,187	41.740	35,436					o
1960	108.033		507,758	45.050	33,644					o
1961	123.481		112,172	49.550	29,833					o

APPENDIX S3 Notes and Sources

SOURCE: most figures come from the Statistical Information published with the Annual Report and Accounts annually until 1954-5; other sources are cited individually below.

GENERAL NOTES:

1. Where an entry is left blank, the information is usually not available from the original; in the case of Rate Relief, payments ceased after 1927-8.

2. In certain column headings, 'pcm' = per car mile.

OTHER NOTES:

a. Years ending 25th March up to and including 1920, thereafter 31st March; in 1900 the period recorded is only from 5th September 1899.

b. Capital Payments include Income Tax and Service of Debt.

c. Columns (17) to (20) may not balance, as other smaller appropriations--not recorded here--were also subtracted from the Net Balance.

d. The 1899 data applies only to horse traction; the number of cars is taken from Gandy, Sheffield Tramways, 15.

e. The amount shown in column (19) as Renewals was actually put to Depreciation in this year; see 'Table showing the Progress in the Finances of the Department . . . ' (hereafter, Table I), Annual Report, 1919-20, XIII.

f. Columns (8) and (9) are not in the original, but have been calculated from other data.

g. Electric traction only, omitting results of remaining horse cars.

h. The 1901 Annual Report is missing; the available data comes from a second Table, 'Tramways, Comparative Statement of Miles Run etc.' (hereafter, Table II), Annual Report, 1928-9.

i. Column (9) comes from Table II.

j. Table I shows Total Revenue (column 14) as £245,562, but the amount given here is confirmed by Sheffield Minutes, TC, 3 Jul 1905, 1,137.

k. The 1914 Annual Report is missing; details from Sheffield Minutes, 1913-14, 910.

APPENDIX S3 Notes and Sources, continued

l. Costs related to both World Wars, such as payments to employees in the forces, are not included in columns (10) and (11).

m. Annual Reports and Accounts were not published for the years 1940-1 to 1942-3; details available are from Table II (updated version in Annual Report, 1956-7, 31).

n. Column (13) did not appear in the Statistical Information in these last two years and is calculated using a Sheffield population figure appearing elsewhere in the Report; thereafter the latter too is removed.

o. The Statistical Information table ceases to appear in 1955-6 following. Figures in columns (4) to (9) thereafter come from Table II until 1956-7 only, after which this source too ceases. All other data for the final years thus comes from various other sections of the Annual Report and Accounts.

S4: SHEFFIELD CORPORATION TRAMWAYS ORGANISATION

Title of Department

Sheffield Corporation Tramways	1896--1916
Sheffield Corporation Tramways and Motors	1916--1934
Sheffield Transport Department	1934ff

Chairmen of Committee

Alderman	Sir William Edwin Clegg	1896--1926
"	Moses Humberstone	1926--1927
"	Charles William Beardsley (Deputy Chairman 1926--1927)	1927--1929
"	Alfred James Bailey	1929--1932
"	Albert Harland	1932--1933
"	Alfred James Bailey	1933--1944
"	Thomas William Bridgeland	1944-- ?
Cllr.?	S. J. Dyson	? -- ? (a)

General Managers

Henry Mallyon	1896--1900
Aubrey Llewellyn Coventry Fell	1900--1903
Arthur Robinson Fearnley	1903--1936
Harris Watson	1936--1945
Rowland Claude Moore	1945ff

SOURCE: S.T.D., Brief History, 2.

a. Since the above was published in 1946 it naturally does not give subsequent information. There may have been other Chairmen between Bridgeland and Dyson, but the latter was certainly Chairman in 1960 when the trams closed; see S.T.D., Tramway Era, 2.

S5: SHEFFIELD CORPORATION TRAMWAYS RENEWAL AND CAPITAL EXPENDITURE 1920--1939

Year[a]	Permanent Way				Electrical Equipment of Line			
	Renewal £	Capital £	Other[b] £	Sub-Total £	Renewal £	Capital £	Other[b] £	Sub-Total £
1920	79,720	2,820		82,540		7,243		7,243
1921	136,070	14,204		150,274		500		500
1922	52,822	33,973		86,795		904		904
1923	48,994	22,778		71,772	997	2,032		3,029
1924	60,682	41,340		101,722	120	2,897		3,017
1925	49,857	10,707		60,564	147	1,008		1,155
1926	61,737	10,601		72,338		930		930
1927	29,430	49,321		78,751		2,770		2,770
1928	51,069	53,031		104,100		5,476		5,476
1929	34,416	30,151		64,567		3,088		3,088
1930	31,989	138		32,127				
1931	39,665	24		39,689				
1932	60,320	3,350	2,510	66,180				
1933	53,630			53,630				
1934	55,191		1,088	56,279			128	128
1935	45,700		39,021	84,721			2,722	2,722
1936	48,686		3,371				228	228
1937	40,356		252	40,608			1	1
1938	40,884		67	40,951				
1939	44,237			44,237			34	34
	1,065,155	272,438	46,309	1,383,902	1,264	26,848	3,163	31,275

APPENDIX S5 continued

Year[a]	Tramcars				Total
	Renewal	Capital	Other[b]	Sub-Total	
1920	2,120	98,587		100,707	190,490
1921	9,512	38,447		47,959	198,733
1922	237	70,975		71,712	158,911
1923	11,239	1,798		9,441	84,242
1924		1,942		1,942	102,797
1925		58,031		58,031	119,750
1926		3,239		3,239	76,507
1927		115,256		115,256	196,777
1928		2,479		2,479	112,055
1929		42,670		42,670	110,325
1930		69,607		69,607	101,734
1931		43,413		43,413	83,102
1932		46,309		46,309	112,489
1933		49,771	952	50,723	104,353
1934		550	42,453	43,003	99,410
1935	57,956 (c)			57,956	145,449
1936	49,024 (c)			49,024	101,309
1937			50,962	50,962	91,571
1938			44,048	44,048	84,999
1939	27,276 (c)			27,276	71,547
	157,364	635,561	138,415	931,373	2,346,550

SOURCE: Annual Report and Accounts, 1919-20--1938-9, passim.

a. Years ending either 25th March or 31st March (as listed in Appendix S3).

b. 'Other' usually means the Accumulated Surplus Fund (Reserve Fund from 1937-8), except for £2,510 for Permanent Way renewals from the Appropriations Account in 1931-2.

c. Shown in the Capital Expenditure a/c as a transfer from the Renewals Fund.

S6: DONCASTER AND SHEFFIELD CORPORATION TRAMWAYS COMPARISON OF RENEWAL AND CAPITAL EXPENDITURE 1919-20--1923-4

Table 1
Actual Expenditure on Track and Cars for Doncaster
(See Appendix S5 for Sheffield)

Year	Permanent Way and Overhead			Tramcars			Total £
	Reserve £	Capital £	Sub-Total £	Reserve £	Capital £	Sub-Total £	
1919-20		2,636	2,636		19,300	19,300	21,936
1920-1	2,847		2,847		1,033	1,033	3,880
1921-2	732	4,178	4,910				4,910
1922-3	674	5,247	5,921				5,921
1923-4		7,603	7,603				7,603
	4,253	19,664	23,917	Nil	20,333	20,333	44,250

SOURCE: Doncaster Accounts, 1919-20--1923-4.

Table 2
Expenditure on Permanent Way & Overhead per Single Track Mile

Year	Doncaster		Sheffield	
	Miles	Expenditure £	Miles	Expenditure £
1919-20	18.50	142	79.00	1,136
1920-1	"	154	79.25	1,903
1921-2	18.25	269	80.125	1,095
1922-3	"	324	82.50	907
1923-4	"	417	83.75	1,251

Table 3
Expenditure on Tramcars per Service Car

Year	Doncaster		Sheffield	
	Cars	Expenditure £	Cars	Expenditure £
1919-20	47	411	373	270
1920-1	"	22	374	128
1921-2	"	-	394	181
1922-3	"	-	381	25
1923-4	"	-	371	5

SOURCE: data for Tables 2 and 3 from Doncaster and Sheffield Statistical Information.

S7: SHEFFIELD TRANSPORT DEPARTMENT MOTORBUS OPERATING COSTS IN 1938-9 AND 1949-50 AND THE PERCENTAGE CHANGES BETWEEN THOSE DATES (CATEGORY 'A' BUSES ONLY)

Operating Costs	1938-9 per bus mile d.	1949-50 per bus mile d.	Percentage Change %
Running Costs:-			
Drivers' & Conductors' Wages	4.77	8.779	84.05
Uniforms	0.08	0.396	395.00
Power	2.03	2.206	8.67
Tyres	0.23	0.767	233.48
Licences	0.63	0.663	5.24
	7.74	12.811	65.52
Traffic Costs:-			
Traffic Supervision	0.60	1.270	111.67
Cleaning Passenger Vehicles	0.27	0.598	121.48
Other	0.16	0.050	68.75
	1.03	1.918	86.21
Maintenance Costs:-			
Repairing PSVs & Lubrication	1.43	3.497	144.55
Establishment Costs:-			
General Officers & Staff	0.23	0.304	32.17
Other	0.38	1.320	247.37
	0.61	1.624	166.23
	10.81	19.850	83.63

SOURCES:

1938-9: 'Economics of PSV Operation, 1939 compared with 1966', paper in C. T. Humpidge's files.

1949-50: Sheffield Annual Report, 1950-1, Motorbus Revenue a/c.

Since the two sources do not use exactly the same categories, there may be minor errors due to ascribing small items to different heads.

S8: OPENING DATES OF ELECTRIC TRAMWAY TRACK AND ROUTE CLOSURES

Route	Date	Section
TINSLEY	5 Sep 1899	High St--Weedon St
	20 Jun 1905	Connected at Tinsley to Rotherham Corporation's tracks; through service began 11 Sep 1905 and ownership of tracks to Templeborough transferred to Sheffield 1 Jan 1926.
	11 Dec 1948	Rotherham through service withdrawn
	8 Oct 1960	Closed throughout
NETHER EDGE	5 Sep 1899	High St--Nether Edge
	24 Nov 1934	Closed
WALKLEY	18 Sep 1899	Church St--South Rd
	7 Apr 1956	Closed
FIRTH PARK[a] (via Barnsley Road)	27 Sep 1899	Wicker Arches--Bolsover Rd
	25 Aug 1909	Bolsover Rd--Firth Park (Bellhouse Rd bottom)
	18 Nov 1934	Firth Park--Sheffield Lane Top
	3 Apr 1960	Closed
INTAKE	10 Jan 1900	Wicker--Manor Lane via Blonk St
	17 Apr 1902	Manor Lane--Woodhouse Rd
	2 Feb 1903	Diversion via Commercial St & Sheaf St
	8 Feb 1935	Woodhouse Rd--Hollinsend Rd
	29 Dec 1935	Hollinsend Rd--Birley Vale
	7 Apr 1956	Closed (n.b. workmen's cars continued to operate to Intake via Prince of Wales Rd)
	6 Oct 1956	Closed throughout
NETHER GREEN	13 Apr 1900	The Moor--Hunters Bar
	28 Oct 1901	Hunters Bar--Hangingwater Rd
	14 May 1904	Hangingwater Rd--Nether Green
	5 Jan 1952	Closed (i.e. Fulwood via Hunters Bar)
MILLHOUSES (and Abbey Lane)	28 Jul 1900	The Moor--Woodseats Rd
	1 Mar 1901	Woodseats Rd--Bannerdale Rd
	17 Apr 1902	Bannerdale Rd--Millhouses Rd
	31 Jul 1926	Millhouses Lane--Wagon & Horses
	14 Apr 1927	Wagon & Horses--Woodseats via Abbey Lane
	28 Feb 1959	Closed (Abbey Lane)
	8 Oct 1960	Closed (Millhouses and Beauchief)
WOODSEATS[b]	1 Aug 1900	Highfields--Lowfields, also Lowfields to Queen's Rd Works, used only for access until 1 Nov 1900
	1 Nov 1900	Highfields--Albert Rd
	1 Nov 1902	Albert Rd--Woodbank Crescent
	6 Apr 1903	Woodbank Crescent--Chantrey Rd
	19 May 1904	Fitzalan Sq via Pond St & Shoreham St--Havelock Bridge
	4 Nov 1904	Leadmill Rd--Queen's Rd Depot
	22 Jan 1923	Chantrey Rd--Abbey Lane
	12 Jul 1928	Abbey Lane--Meadowhead
	3 Oct 1959	Woodseats service closed
	3 Apr 1960	Closed throughout.
BRIGHTSIDE	26 Nov 1900	Twelve O'Clock Junction--Brightside
	6 Dec 1958	Closed
WADSLEY BRIDGE	26 Jan 1901	Wicker via Nursery St--Parkside Rd Top
	12 Feb 1903	West Bar--Hillfoot Bridge via Penistone Rd
	7 Jun 1924	Parkside Rd bottom--Wadsley Bridge
	3 Oct 1959	Closed

APPENDIX S8 continued

Route	Date	Section
FULWOOD (via Broomhill)	25 Mar 1901	Winter St--Manchester Rd
	1 Aug 1901	Manchester Rd--Ranmoor P.O.
	12 Oct 1901	Ranmoor P.O.--Storth Lane
	12 Jul 1923	Storth Lane--Canterbury Ave
	22 Aug 1936	Closed
CROOKES	1 Apr 1901	Crookes Junction--Lydgate Lane
	28 Apr 1902	Lydgate Lane--School Rd
	26 Nov 1913	School Rd--Heavygate Rd
	4 May 1957	Closed
HANDSWORTH	11 Apr 1901	Staniforth Rd Junction--Darnall (Main Rd)
	29 May 1909	Darnall--Finchwell Rd
	7 Sep 1934	Finchwell Rd--Orgreave Lane
	4 May 1957	Closed
FIRTH PARK (via Attercliffe)	27 Dec 1901	Newhall Rd
	9 Aug 1902	Idsworth Rd--Reform Chapel
	18 Aug 1902	Hawke St--Reform Chapel
	26 Oct 1957	Closed (by then running to Sheffield Lane Top) (but cars continued running via Saville St and Newhall Rd until 28 Feb 1959)
MIDDLEWOOD	30 May 1903	Hoyle St--Parkside Rd
	8 Sep 1913	Parkside Rd--Catchbar Lane
	26 Nov 1913	Catchbar Lane--Middlewood
	27 Mar 1954	Closed
PETRE STREET	24 Sep 1903	Spital Hill--Canada St
	19 Apr 1925	Closed
MALIN BRIDGE	19 May 1908	Holme Lane Junction--Malin Bridge
	5 Jan 1952	Closed
ECCLESALL	1 Aug 1908	Rustlings Road Junction--Banner Cross
	14 Apr 1922	Banner Cross--Millhouses Lane
	27 Mar 1954	Closed
PRINCE OF WALES ROAD	24 Feb 1928	Elm Tree--Darnall
	12 Apr 1958	Closed
OTHER LINES (closure dates not given)	29 Sep 1901	Market Place siding
	19 May 1902	Moorhead siding
	25 Jan 1904	Sheaf St (from Commercial St), Paternoster Row & Furnival St
	30 May 1904	Cherry St siding
	4 Aug 1904	Snig Hill & Bridge St
	25 Dec 1904	Wolseley Rd
	31 Aug 1908	Leopold St
	21 Dec 1912	Rustlings Rd turning loop
	22 Sep 1924	Exchange St
	20 Sep 1927	Vulcan Rd siding
	23 Oct 1928	West Bar Green (to Tenter St depot)

SOURCE: S.T.D., Tramway Era, 29-31; note that opening dates refer to track sections and closing dates to routes, so in both cases other sections common to other routes may have opened or closed earlier or later.

These routes were later known as: a. SHEFFIELD LANE TOP
b. MEADOWHEAD

S9: THE DEVELOPMENT OF SHEFFIELD CORPORATION AND JOINT OMNIBUS COMMITTEE MOTOR BUS SERVICES 1913--1949

(1) Date Service Began	(2) Type	(3) Route	(4) Earlier Service	(5) Joint Service	(6) Ref.	(7) Notes
9 Feb 1913	T	Broomhill--Lodge Moor			122	
17 Mar 1913	T	Brightside--Wincobank			123	
31 May 1913	T	Malin Bridge--Rivelin			124	
7 Jul 1913	C	Fitzalan Square--Heeley Green			124	
27 Oct 1913	C	Fitzalan Square--Upperthorpe			124	a
7 Sep 1914	T	Millhouses--Totley	P		128	
21 Sep 1914	T	Middlewood--Stocksbridge			128	
14 Dec 1914	T	Brightside--Tinsley			142	b
26 Jul 1915	T	Handsworth--Aston			143	
29 Nov 1915	T	Intake--Mosborough	P		143	
14 Feb 1916	T	Firth Park--Ecclesfield	P		143	
23 Jun 1919	E	Mosborough--Eckington			155	
31 Jul 1919	T	Woodseats--Dronfield			155	
30 Sep 1919	E	Dronfield--Unstone			155	
24 Nov 1919	E	Ecclesfield--Chapeltown			155	
12 Jan 1920	E	Chapeltown--High Green			155	
19 Jan 1920	C	Midland Station--Brocco Bank			155	
24 Feb 1920	C	Above extended at both ends			155	c
19 Apr 1920	T	Intake--Woodhouse Mill			156	
26 Mar 1921	E	Aston--Kiveton Park via Dinnington			157	
? ? 1921	T	Intake--Killamarsh			157	
21 May 1921	T	Intake--Beighton			158	
26 Jun 1923	E	Unstone--Whittington Moor		M	161	e
28 Jan 1924	E	High Green--Penistone			161	
26 Apr 1924	E	Lodge Moor--Wyming Brook			161	f
7 Jun 1924	E	Totley--Owler Bar			161	f,g
16 Jun 1924	T/E	Wincobank--Shiregreen--Firth Park			163	
Summer 1924	E	Stocksbridge--Langsett			163	f
10 Oct 1924	T	Millhouses--Bakewell via Baslow	P		162	
27 Oct 1924	E	High Green--Howbrook			164	
1 Jan 1925	T	Ecclesall--Dore	P		163	
20 Apr 1925	C	Fitzalan Square--Petre Street	T		163	
6 Jul 1925	C	Moorhead--Bakewell via Calver	P		162-3	g
1 Aug 1925	C	Pond Street--Chesterfield		M	164	
26 Oct 1925	C	Pond Street--Dronfield via Abbey Lane			164	
10 Nov 1925	C	Exchange Street--Barnsley		Y	164	
11 Jan 1926	B	Tinsley--Gleadless			164	
13 Mar 1926	C	Sheffield--Barnsley		Y	165	
8 Apr 1928	C	Leopold Street--Rivelin Dams			167	
? Jun 1926	C	Exchange Street--Maltby	P		165	
or Jul 1926	C	Exchange Street--Holmsfield	P		165	
" 1926	C	Exchange Street--Worrall	P		165	h
" 1926	C	Exchange Street--Barnsley via Wadsley Bridge	P		165	i
? ? 1926	?	City?--Norwood			167	j
15 Nov 1926	T	Ecclesall--Bents Green			167	
25 Jul 1927	C	Sheffield--Rotherham--Doncaster		M	-	k
25 Sep 1927	C	Sheffield--Clowne	P		167-8	l
10 Oct 1927	C	Pond Street?--Cricket Inn Road			STD	g,m
13 Oct 1927	C	Moorhead--Castleton	P	N	158/69	n

APPENDIX S9 continued

(1) Date Service Began	(2) Type	(3) Route	(4) Earlier Service	(5) Joint Service	(6) Ref.	(7) Notes
13 Oct 1927	C	Moorhead--Buxton	P	N	159/69	n
13 Oct 1927	C	Moorhead--Ashopton	P		169	
14 May 1928	L	Penistone--Huddersfield		Y	168	g
? ? 1928	L	Norwood--Southey Green			STD	o
1 Jan 1929	C	Sheffield--Gainsborough		J	172	p
? ? 1929	B	Norwood--Tinsley			STD	
22 Apr 1929	L	Heeley--Graves Park			STD	q
? Jul 1929	B	Inner Circle			219	
25 Sep 1929	C	Sheffield--Wombwell		J/Y	213	r
17 Oct 1929	C	Sheffield--Manchester		J	213	
27 Jan 1930	T	Dykes Hall Road--Worrall		J	214	
? ? 1930	C	Sheffield--Manchester via Snake		N	213	s
? ? 1930	T	Hillsborough--Wisewood			STD	t
27 Oct 1930	T	Malin Bridge--Stannington		J	216	
? Jan 1931	C	LMS Station--Wincobank			220	
1 Aug 1931	B	Outer Circle			220	
? ? 1931	L	Wombwell--Upton		J/Y	STD	u
? ? 1931	B	Darnall--Shiregreen			STD	v
? Apr 1932	T	Malin Bridge--Bradfield	P		216	
13 May 1932	C	Sheffield--Bradford		J/Y/W	-	g,w
4 Jun 1932	C	Sheffield--Ewden Valley			-	x
30 Jul 1932	E	Bents Green--Ringinglow			220	g,y
7 May 1933	C	Sheffield--Chesterfield via Ford		E	217	
25 Mar 1934	C	City--Nether Edge	T		195	
17 Apr 1934	C	Sheffield--Treeton	P		219	
17 Apr 1934	C	Sheffield--Thorpe Hesley	P	M	219	
? ? 1934	E	Stannington--Dungworth			STD	z
27 Jan 1935	C	Pond Street--Woodthorpe--Handsworth			222	
? ? 1935	C	Sheffield--Derwent			STD	
5 Jul 1936	L	Cricket Inn Road--Wybourn			STD	aa,g
26 Aug 1936	C	City--Fulwood via Broomhill	T		195	
29 Nov 1936	T	Beighton--Handsworth			STD	g
11 Jul 1937	C	City--Gleadless via Arbourthorne			196	g
17 Oct 1937	C	City--Shirecliffe			STD	bb,g
9 Jul 1938	L	Stocksbridge--Chapeltown via High Green			-	cc
14 Aug 1938	C	City--Southey Green via Owlerton			196	dd,g
3 Sep 1938	E	Stannington--Loadbrook			STD	g,z
5 Mar 1939	B	Attercliffe--Southey Green (peak)			222	
31 May 1939	L	Above & City--Southey Green extended to Buchanan Road			222	dd,g
29 Jul 1939	L	Extended again to Deerlands Ave (i.e. Parson Cross)			222	dd
? ? 1939	B	Shirecliffe--Vulcan Road (Attercliffe)			222	ee
? ? 1940	C	City--Blackburn		M	STD	ff
? ? 1941	B	Parson Cross--Norfolk Bridge			STD	
? ? 1948	C	City--Wordsworth Avenue			258	
? ? 1948	B	Hillsborough--Firth Park			258	
? ? 1949	C	Sheffield--Grenoside (circular)			258	

APPENDIX S9 continued

Abbreviations used in the Table

Column 2

B: Belt route making more or less incidental connections with radial tramways.

C: Route running into city centre without transferring passengers to/from a tramway.

E: Extension of an existing bus route already starting from a tramway.

L: Extension of an existing bus route not starting from a tramway.

T: Route running from an intermediate or terminal point on a tramway (most later being extended into the city, becoming routes of type C; see Appendix S12 for details).

Column 3

Minor alterations to or temporary suspension of routes not included; where the Sheffield terminus is not stated in the source, 'Sheffield' is used for longer distance services and 'City' for urban ones (akin to bus destination displays for many years).

Column 4

P: Service taken over from a private operator (details in Appendix S10).

T: Service replacing a tram route.

Column 5

A number of longer distance services were operated jointly with other operators, as follows:

E: East Midland Motor Services Ltd.

J: Joint Omnibus Committee (see text for details of JOC scheme).

M: Municipal operator (various).

N: North Western Road Car Co.

W: Yorkshire Woollen District.

Y: Yorkshire Traction or predecessor companies.

Column 6

This column gives a reference for the information preceding it.

Numbers: page number in Hall, Sheffield Transport.

STD: S.T.D., Brief History, 21.

- : None of these references, the source being given in the succeeding note.

APPENDIX S9 continued

Notes to the Table: column 7

These notes refer to the place cited in the preceding column except where otherwise stated. If a reference is given, a number on its own refers to a page in Hall, Sheffield Transport and 'STD' to S.T.D., Brief History, 21. Other references are given in full in the form used in the main text.

a. Never very successful and closed down in June 1918; 144.

b. An extension of the Wincobank service, turning it into rather more like a belt route.

c. Financially unsuccessful and withdrawn 3 Oct 1920.

d. The text does not make the date of opening clear, but buses were running to Killamarsh by the summer.

e. A joint service by Chesterfield and Sheffield Corporations between their respective tram termini.

f. Fine weekends only; according to STD the Wyming Brook service began in 1923.

g. Full or part date from Sheffield Reports for the appropriate year, always page 3 or 4.

h. Quickly abandonned and left to private enterprise; 167.

i. The B&DTC participated in the purchase of the operator of this and the preceding three routes, G. T. Glossop, and it seems this last route was also soon eliminated in favour of existing services by the Corporation and the Company; see Sykes, Yorkshire Traction, 17.

j. Introduction of this service is not specifically mentioned by Hall, but he does reproduce a list of bus routes as in August 1926 with it on (167) and it also appears in STD.

k. A. Hilton, The Development of Rotherham Bus Services (Sheffield, 1980), 7.

l. Given up again by December as part of the long-running dispute with the East Midlands Company, as were two other routes running from Cresswell in the East Midlands (and whose fate is irrelevant here).

m. Hall, 222, dates this service to 1934, but this is contradicted by both Sheffield Reports, 1927-8 and STD.

n. The Corporation operated on its own for nearly a year, joint service beginning on 3 Sep 1928.

o. This seems to be an extension of the existing Norwood service to Southey Green; see Sheffield Minutes, T&MC, 16 Oct 1928, 850.

p. Actually an extension under the auspices of the new JOC an existing LNER route to Retford; see Cummings, Railway Buses 1, 97.

q. Confirmation that this was an extension of the Heeley service and of the full date comes from Sheffield Minutes, T&MC, 16 Apr 1929, 456.

r. Actually wholly operated by the YTC, but regarded as a JOC route for part of its length; 213.

s. Year from STD.

t. This appears to have been a service from Hillsborough, on the tramway, to Wisewood, although STD gives no details apart from the outer terminus; see Sheffield Reports, 1930-1, 3.

APPENDIX S9 continued

u. Obviously a JOC route operated, or at least shared financially with the YTC, and an extension of the earlier route to Wombwell. One can often glean details of earlier services from later timetables, in which services are often recognisably the same. In this case, see Sheffield Transport and Joint Omnibus Committee, Tramways and Omnibus Timetable (3 Apr 1955), 139.

v. This was a belt line, being an extension of an existing Darnall--Firth Park service; see Sheffield Reports, 1931-2, 3. Doubtless this was a remnant of the Tinsley--Gleadless route, which must have been cut back to Darnall once the Prince of Wales Road tramway opened in 1928. However the new route was itself cut back to Brightside from 6 Nov 1932 and Shiregreen was served from Wincobank; see Sheffield Reports, 1932-3.

w. Sykes, Yorkshire Traction, 24 gives the details to add to the destination given in STD.

x. Tuesdays and Saturdays only to Ewden Valley Waterworks Village; full details from Sheffield Reports, 1932-2, 4.

y. Saturdays and Sundays only; as above.

z. Reference to the Timetable (cited above) makes it clear that these were both rural extensions beyond Stannington, the two being largely duplicate services.

aa. The minutes supplement STD to show that this was an extension of the existing Pond Street--Cricket Inn Road service to the Wybourn estate; see Sheffield Minutes, TC, 21 Apr 1936, 517-8.

bb. It is assumed that this was a through service from City, which was almost a certainty by this time, even though not specified in STD.

cc. Route as well as date from Sheffield Reports, 1938-9, 4.

dd. The exact course of events relating to bus services to Parson Cross is most unclear. It was resolved in 1937 to serve the new estate by two routes; see Sheffield Minutes, TC, 21 Dec 1937, 169. It appears that one of these, via Owlerton, was established on 14 Aug 1938, but although Hall quotes this as serving Parson Cross, it appears only to have run as far as Southey Green at that time. Both this all-day service and a works service to Vulcan Road were extended twice in 1939, so bringing them into Parson Cross proper; for which see Sheffield Reports, 1939-40. STD also gives 1939 as the year buses reached Parson Cross.

ee. Not mentioned in STD, but presumably this formed the basis for service 194, which by 1955 was running to Templeborough via Tinsley; see the Timetable cited above, 221.

ff. Not mentioned in Hall, but this must have become works service 29, operated jointly with Rotherham Corporation; see the Timetable, 88.

S10: INDEPENDENT AND AREA OPERATORS' MOTOR BUS SERVICES IN AND AROUND SHEFFIELD 1914--1933

(1) Date	(2) Type	(3) Route	(4) Firm	(5) Taken Over	(6) Ref.	(7) Notes
Feb?1914	T	Intake--Mosborough	MS	29 Nov 1915	125/43	a
7 Mar 1914	T	Intake--Mosboro'--Eckington	SD	29 Nov 1915	125/43	a
May?1914	T	Millhouses--Totley	DA	7 Sep 1915	125/8	
20 Jun 1914	T	Firth Park--Mortomley	E	14 Feb 1916	126/43	b
4 Oct 1914	T	Owlerton--Chapeltown	E	?1916	126/8	c
17 Jan 1921	T	Intake--Eckington	UD	-	157	d
? Jan 1921	T	Handsworth--Kiveton Park	UD	1 Oct 1930	157/215	d
4 Mar 1921	T	Intake--Killamarsh	UD	-	157	d
2 May 1921	C	Staveley Road--Baslow	NW	-	158	f,h
May?1921	C	Moorhead--Castleton	HN	13 Oct 1927	158/69	
11 Aug 1921	T	Handsworth--Worksop	UD	-	157	
3 Sep 1921	T	Intake (Elm Tree)--Ford	C	?	158	e
2 Oct 1921	T	Ecclesall--Dore	DN	1 Jan 1925	158/63	
24 Apr 1922	C	Moorhead--Buxton	HN	13 Oct 1927	159/69	
1 Jul 1922	C	Moorhead--Eyam	GD	?	159	e,g
28 Sep 1922	T	Millhouses--Holmsfield	NW	29 Jun 1927	159/67	h
? Sep 1922	T	Intake (Elm Tree)--Ford	BF	7 May 1933	159/217	i
1922?	T	Malin Bridge--Bradfield	T	? Apr 1932	159/216	i,j
1922?	T	Malin Bridge--Stannington	T	? Apr 1932	159/216	i,j
? ? 1922	T	Malin Bridge--Stannington	SK	? Jul 1933	159/219	i
9 Oct 1922	T	Millhouses--Bakewell	BT	10 Oct 1924	159/62	
? May 1923	C	Moorhead--Chesterfield	MA	[1923-4]	160	k
? ? 1924	T	Tinsley--Maltby	UD	-	161	
? Jun 1924	C	Moorhead--Bakewell	Mc	Jul?1925	161/2	
1 Aug 1924	T	Intake--Harthill	UD	[1 Apr 1925]	162	1
1 Jan 1926	C	Exchange St--Barnsley	GL	? ? 1926	164	
13 Feb 1926	C	Exchange St--Maltby	GL	? ? 1926	164	
17 Mar 1926	C	Exchange St--Worrall	GL	? ? 1926	164-6	
17 Mar 1926	C	Exchange St--Holmsfield	GL	? ? 1926	164-6	
? ? 1926	T	Hillsborough--Worrall	SK	?1926	167	m
4 Jun 1927	C	Sheffield--Clowne	UN	25 Sep 1927	168	
? Jul 1927	C	Sheffield--Gainsborough	NP	13 Feb 1929	170/2	i
6 Oct 1927	C	Sheffield--Ashopton	HN	13 Oct 1927	169	
25 Jun 1928	C	Sheffield--Manchester	UE	24 Feb 1930	170/214	i
? Aug 1928	C	Sheffield--Treeton via Tinsley	T	[1932]	170/217	n
24 Sep 1928	C	Sheffield--Treeton via Intake	K	17 Apr 1934	170/219	i
15 Oct 1928	C	Sheffield--Dinnington via Tinsley	W	-	170	
21 Nov 1928	C	Sheffield--Retford	L	-	172	o
1 Jan 1929	C	Above extended to Gainsborough	J	-	172	
? ? 1929	C	Ellin St (Moor)--Killamarsh	BO	-	213	
24 May 1930	C	Pond St--Holmfirth (two routes)	BD	[1932]	214/18	n
13 Sep 1930	C	Sheffield--Retford	P	[1931]	215/18	n
Nov?1930	C	Sheffield--Retford	BB	[1932]	215/18	n
14 Nov 1932	C	Exchange St--Thorpe Hesley	K	17 Apr 1934	217/19	i
3 Mar 1933	C	Sheffield--Ollerton	HG	-	219	

Note: the table is taken up to 1933 only because after that there were no more new entrants to the local bus scene for over thirty years; see Hall, Sheffield Transport, 219.

APPENDIX S10 continued

Abbreviations used in the Table

Column 2

C: Route running into the city centre without transferring passengers to/from the tramway.

T: Route running from an intermediate or terminal point on the tramway.

Column 4

BB: Blue Bus
BD: Baddeley
BF: Barlow & Fisher
BO: Booth
BT: Battey
C: Coggan
DA: Dart Motor Transport Co.
DN: Dungworth
E: Ecclesfield & District Motor Bus Co.
GD: Goddard
GL: Glossop
HG: Hogg
HN: Hancock
J: Joint Omnibus Committee
K: Kitson
L: London & North Eastern Railway
MA: Machin
Mc: McKay
MS: Mosborough & District Motor Co.
NP: Ne Plus Ultra
NW: Newsome
P: Pioneer Motors
SD: A. Sedgewick & Co.
SF: Skinner & Woodhouse
T: Thrale
UE: Underwood Express
UD: W. T. Underwood Ltd., later East Midland Motor Services Ltd.
UN: Unity Motor Services
W: Wigmore

Column 5

Dates are those on which the Corporation or later the JOC took over the operation of a former private service. Dates in parentheses [ ] refer

APPENDIX S10 continued

to services withdrawn without direct Corporation/JOC replacement. Blank entries indicate similar services but without date or services which were not taken over but remained in private hands.

Notes to Table: column 7

Notes from page previously cited in Hall, Sheffield Transport, except for note (h), from ibid., 166.

a. Service ceased during World War II and was replaced by the Corporation after an interval.

b. Initially only replaced by Corporation buses between Firth Park and Ecclesfield.

c. This service must have stopped about the same time as the previous one.

d. These were the inner sections of services which ran further to areas well outside Sheffield.

e. The takeover of this service is not specifically mentioned, but it was eliminated or taken over at a later date.

f. Ran to Matlock for a few months; Staveley Road is just off London Road and relatively close to the city centre.

g. Goddard had already been running from a garage in Ecclesall Road, but for how long is not specified.

h. Newsome gave up his Baslow service when he started running to Holmsfield. There were at least two other owners on this route, Evans and Johnson, who were forced off the road in 1926.

i. Actually taken over after the formation of the JOC.

j. Thrale's services may well have started earlier than this.

k. Withdrawn at the turn of 1923-4 after prosecution for licence evasion.

l. Route withdrawn by the operator by agreement rather than actually being taken over by the Corporation.

m. May well never have operated.

n. Eventually eliminated or cut back to avoid competition through decisions of the Traffic Commissioners.

o. Shortly came into the orbit of the JOC.

S11: SHEFFIELD TRANSPORT, CHANGES IN TRAFFIC RECEIPTS AND IN REVENUE PER CAR MILE FOR SELECTED TRAM ROUTES AFFECTED BY MOTOR BUS EXTENSIONS

Bus Route[a]	Tram Route[b]	Revenue			Revenue			Change in Revenue		
		Four Weeks[c] Ending	£	pcm d.	Four Weeks[c] Ending	£	pcm d.	£	pcm d.	p.a.[d] £
Bakewell	Millhouses	22 Nov 1924 (41)	4,555	22.52	21 Nov 1925 (72)	4,563	21.30	8	1.22	106
Penistone	Wadsley	"	2,306	15.99	"	2,303	15.19	3	0.80	39.75
Eckington	Intake	"	2,844	19.07	"	3,381	20.14	537	1.07	7,115.25
Chesterfield	Woodseats	"	8,642	19.18	"	8,551	17.66	91	1.52	
Dronfield	Millhouses	"	4,555	22.52	"	4,563	21.30	8	1.22	1,099.75
Wincobank	Brightside	18 Oct 1930 (967)	1,587	13.73	17 Oct 1931 (860)	1,231	11.00	356	2.73	4,717
Handsworth	Prince of Wales	15 Dec 1934 (147)	5,452	16.79	14 Dec 1935 (141)	6,019	17.31	567	0.52	
	Intake	"	1,920	17.51	9 Feb 1935 (351)[e]	1,886	16.15	34	1.36	509
	Handsworth	"	3,624	11.69	14 Dec 1935 (141)	3,600	12.20	24	0.51	
Lodge Moor	Fulwood	17 Oct 1936 (1087)	2,664	13.95	16 Oct 1937 (1083)	2,612	13.73	52	0.22	689
Bents Green	Ecclesall	"	5,199	17.74	"	4,809	16.49	390	1.25	5,167.50
Gleadless	Intake	"	3,286	16.91	"	3,093	14.84	193	2.07	2,557.25
Shirecliffe	Firth Park	16 Oct 1937 (1083)	6,875	15.66	15 Oct 1938 (1130)	6,332	15.52	543	0.14	7,194.75
Shiregreen	Firth Park	16 Jul 1938 (798)	6,198	13.94	15 Jul 1939 (869)	5,949	15.27	249	1.33	3,299.25

Note: 'pcm' in the captions equals 'per car mile'.

APPENDIX S11 continued

Notes and Sources

a. Details of bus routes projected into the city centre are found in Appendix S12. By no means all have been included here either because the precise date on which the bus service began is not known or because of complications caused by extension of the tram route at about the same time, which would obviously distort any results.

b. This is either the tram route at which the bus service formerly ended or the one(s) along which the buses started to run into the city.

c. Figures taken from the financial statements presented to the Committee at monthly intervals; the number in brackets is a page reference to Sheffield Minutes.

d. The annual effect is calculated for the purpose of this Table by taking the four-weekly change in revenue and multiplying it by 13.25 to achieve a result for 53 weeks.

e. In this case it is not possible to take the results a year later, because they would have been affected by the opening of an extension to the Intake tramway on 8 Feb 1935. So the revenue figure used as a basis here is actually for the two weeks ending 9th February; this is doubled to produce a comparable four-weekly figure.

S12: SHEFFIELD CORPORATION OR JOINT OMNIBUS COMMITTEE MOTOR BUS SERVICES PROJECTED INTO THE CITY CENTRE

Date	Bus Route	Tram Route(s) Affected	Notes
19 Feb 1925	Bakewell via Baslow	Millhouses	a
18 Mar 1925	Penistone	Wadsley Bridge	b
21 Mar 1925	High Green	Wadsley Bridge	c
1 Apr 1925	Mosborough etc.	Intake	a
I Aug 1925	Chesterfield	Woodseats	d
26 Oct 1925	Dronfield	Woodseats & Millhouses	d
(late) 1925	Dinnington via Kiveton	Handsworth & Intake	e
25 Jul 1927	Rotherham & Doncaster	Tinsley & Brightside	f
1927-8	Stocksbridge	Middlewood	g
1927-8	Totley	Millhouses	g
1927-8	Woodhouse	Intake	g,h
1928-9	Beighton via Gleadless	Intake	i
30 Sep 1929	Dinnington via Todwick	Handsworth	j
1 Aug 1931	Wincobank	Brightside	k
6 Nov 1932	Shiregreen	Firth Park	l
?1935	Wisewood	Malin Bridge	m
27 Jan 1935	Handsworth via Woodthorpe	Intake, Handsworth & Prince of Wales Road	n
25 Oct 1936	Lodge Moor	Fulwood	o
6 Jan 1937	Bents Green & Ringinglow	Ecclesall	o
11 Jul 1937	Gleadless via Arbourthorne	Intake	o
17 Oct 1937	Shirecliffe	Firth Park	p
14 Aug 1938	Southey Green via Owlerton	Wadsley Bridge	q
2 Oct 1938	Shiregreen	Firth Park	r

Note: this list includes only services formerly terminating at a tramway or else new services projected into the city and does not include routes taken over from private operators (which were usually, though not always, running into the city anyway); the aim is thus to pick out changes which might adversely affect the tramways.

Other Notes and Sources

a. Hall, Sheffield Transport, 162.

b. Ibid., 163.

c. Ibid., 163-4.

d. Ibid., 164.

e. This change was agreed in May and probably implemented in the autumn; see Sheffield Minutes, T&MC, 26 May 1925, 499 and 22 Sep 1925, 770.

f. Sheffield Reports, 1927-8, 3.

APPENDIX S12 continued

g. These three routes were extended into the city during this financial year, but a more precise date is not stated; see Sheffield Reports, 1927-8, 3.

h. This change was agreed in February 1928 and must have been implemented shortly afterwards; see Sheffield Minutes, T&MC, 21 Feb 1928, 264.

i. Extended during this financial year; see Sheffield Reports, 1928-9, 3.

j. Hall, Sheffield Transport, 213.

k. Ibid., 220.

l. In 1931 the Darnall--Brightside service was described as being extended to Shiregreen via Firth Park, but on 6 Nov 1932 this section, then described as to Firth Park, was transferred to the Wincobank--City service, so providing a direct Shiregreen--City service for the first time; see Sheffield Reports, 1931-2, 3 and 1932-3, 4.

m. The extension of the Wisewood service to City was agreed in March 1934, and later ten six-axle Leyland buses were ordered for the route. If no service could be offered until these particular vehicles arrived, then the date must have been 1935, for they were not delivered until then; see Minutes, T&MC, 20 Mar 1934, 384 and 10 Apr 1934, 454 and also Hall, Sheffield Transport, 305.

n. Hall, Sheffield Transport, 222.

o. Sheffield Reports, 1936-7, 4.

p. Ibid., 1937-8, 4.

q. Ibid., 1938-9, 4.

r. The area rather confusingly described as 'Shiregreen' since at least 1924 when a bus route was first extended there was further developed in the mid-1930s when it was served by a circular bus route from Firth Park (see Hall, Sheffield Transport, 195-6), but in 1938 was given a direct service to the city (see Sheffield Reports, 1938-9, 4). Presumably this was a different part of the area to that served as described above in note (1).

S13: SHEFFIELD CORPORATION MOTOR BUS FLEET 1920-1961

Year	Buses	Year	Buses
1920	37	1940	377
1921	40	1941-4 (not known)	
1922	43	1945	448
1923	42	1946	461
1924	51	1947	456
1925	64	1948	466
1926	91	1949	540
1927	109	1950	559
1928	126	1951	537
1929[a]	142	1952	553
1930	162	1953	590
1931	177	1954	619
1932	191	1955	641
1933	186	1956	666
1934	200	1957	710
1935	231	1958	777
1936	247	1959	776
1937	284	1960	856
1938	308	1961	861
1939	351		

SOURCE: Annual Reports, passim.

a. Joint Omnibus Committee buses would be included in the totals from 1929 onwards.

S14: SHEFFIELD TRANSPORT, FINANCIAL RESULTS OF TRAM AND MOTOR BUS OPERATION 1939--1955

Year ending 31 Mar	Balance after Deductions		Renewals		Balance after Renewals		Departmental Balance	Notes
	Tram £	Bus £	Tram £	Bus £	Tram £	Bus £	Both £	
1939	102,435	95,243	63,111	54,635	39,324	40,608	79,932	a
1940	87,104	103,204	61,300	60,114	25,804	43,090	68,894	a
1941							59,253	b
1942							5,169	b
1943							176,178	b
1944	108,488	68,624	60,000	53,989	48,488	14,435	63,124	
1945	70,088	66,327	60,000	47,653	10,088	18,674	28,762	
1946	356	65,724	60,000	41,884	59,644	23,840	35,804	
1947	67,769	44,169	60,000	62,817	127,769	18,648	146,416	
1948	134,043	99,533	120,000	74,419	14,043	25,114	39,157	
1949	50,329	88,894	120,000	66,454	69,671	22,440	47,231	
1950	22,985	103,306	120,000	61,962	97,015	41,344	55,671	
1951	78,904	3,577	120,000	57,523	41,096	53,946	95,042	
1952	132,609	10,388	120,000	56,401	12,609	66,789	54,180	c
1953	160,765	89,141	116,240	59,134	44,525	30,007	74,533	
1954	80,269	86,703	106,065	16,534	25,796	70,169	44,372	
1955	21,245	164,719	93,294	83,451	72,049	81,268	9,219	

SOURCE: Sheffield Reports and Accounts, passim, Summary, 1-2.

a. Each Annual Report has a Table summarising past results. The Net Surplus for 1939 and 1940 is given there as £83,043 and £70,662, not the figures in the final column of this Table. The latter are, however, the amounts in the full accounts for those years. There is no obvious explanation for this discrepancy.

b. Wartime details not available; totals from the Table mentioned in note (a).

c. This same Table shows the balance for 1952 as £74,180; this is probably just a printing error which was carried forward from year to year without being checked.

S15: SHEFFIELD CORPORATION TRAMWAYS WORKING COSTS 1938-9--1939-40 AND 1943-4--1949-50
IN PENCE PER CAR MILE

Working Expenditure	1938-9	1939-40	1943-4	1944-5	1945-6	1946-7	1947-8	1949-9	1949-50
Traffic									
Wages of Motormen and Conductors	4.906	5.114	6.665	7.084	7.638	8.087	8.783	9.479	9.628
Other	1.476	1.603	2.216	2.254	2.442	2.981	2.961	3.325	3.215
Total	6.382	6.717	8.881	9.338	10.080	11.068	11.744	12.714	12.843
General	1.031	1.110	1.223	1.277	1.342	1.599	1.737	1.850	1.983
Repairs									
Permanent Way	0.630	0.638	0.844	0.853	0.910	1.221	1.442	1.379	1.427
Electrical	0.259	0.243	0.273	0.277	0.313	0.325	0.413	0.416	0.430
Buildings	0.046	0.041	0.069	0.085	0.088	0.090	0.112	0.177	0.308
Workshops, Tools etc	0.012	0.015	0.015	0.015	0.027	0.026	0.030	0.035	0.029
Cars	1.511	1.574	2.207	2.320	2.578	2.912	3.438	3.846	4.128
Other Rolling Stock	0.011	0.004	0.008	0.011	0.004	0.004	-	-	-
Total	2.459	2.515	3.416	3.561	3.920	4.578	5.455	5.853	6.322
Power									
For Cars	1.958	1.972	1.914	1.966	2.164	2.400	2.540	2.574	2.596
Other than cars	0.071	0.068	0.063	0.067	0.075	0.101	-	-	-
Total	2.029	2.040	1.977	2.033	2.239	2.501	2.540	2.574	2.596
Superannuation	0.056	0.069	0.096	0.115	0.120	0.142	0.182	0.172	0.183
Sickness Payments	-	-	-	0.381	0.434	0.452	0.314	0.459	0.449
Sub-Total	11.957	12.451	15.593	16.705	18.135	20.340	21.972	23.622	24.376

Working Expenditure	1938-9	1939-40	1943-4	1944-5	1945-6	1946-7	1947-8	1948-9	1949-50
War related Expenses[c]									
Air Raid Precautions	0.036	0.201	0.113	0.078	0.035	-	-	-	-
National Service Allowances	-	0.160	0.293	0.209	0.106	0.017	-	-	-
War Damage Act 1943 Insurance	-	-	0.061	0.071	0.040	-	-	-	-
Total	0.036	0.361	0.467	0.358	0.181	0.017			
Total Working Expenditure	11.993	12.812	16.060	17.063	18.316	20.357	21.972	23.622	24.376
Balance	2.966	2.750	3.786	3.023	1.424	0.101	2.945	1.357	0.860

SOURCE: Annual Reports and Accounts, Tramways Revenue a/c, passim.

a. The years 1940-1--1942-3 are omitted because of lack of published data.

b. Costs after 1949-50 are not given because the presentation of the figures changes slightly after that year.

c. These wartime items of expenditure were always treated as exceptional and displayed after the normal items making the Sub-total the sum which was taken as comparable to peace-time years.

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Borough (later County Borough) of Doncaster

Abstract of Accounts for the years ending 31st March, 1901--1936.

Minutes of the Proceedings of the Committees of the Council as a Municipal Authority and as an Urban District Council, municipal years, 1904-5--1935-6.

City of Sheffield

Minutes of the Council and Minutes and Reports of Committees, municipal years, 1895-6--1960-1.

Tramways (later Transport) Annual Reports, 1898-9--1960-1.

TRANSPORT UNDERTAKINGS' RECORDS

South Yorkshire Transport
(as successors to Doncaster Corporation Transport)

Letter Books 1920--1932 (not a continuous series).

Tramways Department, Employees Register and Record.

Yorkshire Traction Company
(and predecessor companies)

Company Minutes, 1924--1930.

Dearne District [Feb 1951?]: statement of the cost to the Company of the DDLR Agreement.

Dearne District Operation [Nov 1951?]: financial statement of payments made under the Agreement.

Dearne District Light Railways: historical summary of relationship with the DDLR.

Letter from BET Head Office to R. W. Birch Esq. [Manager] (27 Oct 1944) and giving details of purchase prices of pre-war buses.

Report of the Directors and Statement of Accounts for the years ended 31st Dec 1923--1932.

Reports of Mr. Robinson [Manager] to the Board December 1929 to November 1937.

Report (24 Apr 1934) on new vehicles delivered in 1933.

Reports of Revenue and Expenditure for the quarters ending 30 Jun 1930 to 31 Mar 1933.

Standing Joint Committee [with the railway companies], Minutes, 16 Nov 1931.

Statement in respect of services operating in Bolton-on-Dearne Area and affected by the D. D. L. R. Agreement (1949).

ARCHIVE COLLECTIONS

Doncaster Archives Department
The material is listed below in accordance with the department's classification system. Each letter/number code often covers more than one item, and in some cases quite a large number of documents. In such cases, the items of present interest are listed below the code in alphabetical order.

AB2/2/1/11

Town Council Minutes 1 Jan 1895--4 Apr 1912.

AB2/2/2/6

Council-in-Committee Minutes 18 Jun 1897--20 Jun 1901.

AB2/2/16/2

Tramways Committee Minutes 7 May 1901--13 Nov 1905.

AB9/TC3/A44

Estimate of Proposed Light Railways.

AB9/TC3/A45
(unless otherwise stated, items refer to the Doncaster Corporation Light Railways, 1899)

Mr. Crabtree's Evidence.

Estimate of Proposed Light Railways.

Form of tender for rail (blank).

Light Railways (Extensions), November 1902.

Memorial of the Mayor, Aldermen and Burgesses of Doncaster in the County of York, November 1901.

Minutes of the Proceedings of the Inquiry into the Doncaster and District Light Railways, 15 Jan 1899.

Notice of Application for a new Order, November 1901.

Order, Doncaster Corporation Light Railways, 1899.

Table of Population of Boroughs in the West Riding of Yorks. at the Census of 1881 and 1891.

AB9/TC3/A46

The Barnsley and Doncaster Light Railways Order, 1902.

AB9/TC3/A47

Doncaster Corporation Light Railways Order, 1902.

Evidence to be given . . . in support of the Barnsley & District Scheme.

AB9/TC3/A49

Doncaster Corporation Light Railways, Proposed Extension, Estimates.

AB9/TC3/A50

Contracts for Construction of Tramways, for Cars (with Dick, Kerr Ltd), for Points and Crossings (with Hadfields) and for Rail (with a Belgian firm).

AB9/TC3/A52

Mr. Crabtree's Evidence, Doncaster Corporation Light Railways, 1902.

Estimates, Doncaster Corporation Light Railways, Proposed Deviation and Extension, 1901.

Memorial of the Mayor etc of the Borough of Doncaster, November 1902.

Order, Doncaster and District Light Railways, 1899 (draft of BET scheme).

Order, Doncaster Corporation Light Railways, 1903.

Mr. Wyld's Evidence, Doncaster Corporation Light Railways, 1902.

AB9/TC3/A54

County Borough of Croydon, Tramways, Information obtained from other

Towns, December 1905.

AB9/TC3/519

Doncaster Corporation (Trolley Vehicles) Order, 1929.

Plan of tram lines in depot area (1925).

AB9/TC5/78-81

Light Railways Committee, Letters, 1899--1903 (series continues beyond these dates).

Goldthorpe Branch Library

Dearne District Light Railways (hereafter, DDLR) Joint Committee Minute Book, 1 Sep 1913--13 Jul 1922.

South Yorkshire Record Office

This archive lost its independent existence with local government reorganisation in 1985 and is now administered by Sheffield City Archives Department (based in the Central Library). SYRO items are only available by prior request, however. Since the SYRO collection is still separately stored and indexed, items from it are still classified as such. Usually each document is assigned a separate reference code, and so the list below is in numerical order of code; multi-document files are noted accordingly. All items have the prefix 8/UD.

1/10-18. Wombwell UDC, Minutes of Council and Committees, 1917-18--1925-6 (series extends beyond these dates, but only these were consulted).

2/3-4. Wombwell UDC Committee Minutes, 5 Nov 1912--27 Jul 1915 (also a longer series).

28/1. Brief for Applicants, 26 Feb 1914.

28/3. Minutes of Proceedings of the Light Railway Commissioners' Inquiry, 26 Feb--10 Mar 1914.

28/4. Light Railway Commission, Proceedings, 21 Jul 1914.

28/8. Proof of Evidence to 1914 Inquiry: J. A. Yardley.

28/9. Ibid.: J. L. Hawksworth.

28/10. Ibid.: Miscellaneous.

28/12. Ibid.

28/14. DDLR Order, 1915.

28/15. Analysis of Messrs. Bury & Walker's Payments, Sep 1913--Feb 1916.

28/345. DDLR (Extension and Abandonment) Order, 1916.

28/346. Estimate of Expenses for Railways 14 and 15, 26 Nov 1915.

28/353. Objections to the 1915 Inquiry.

28/357. Copy Order of Board of Trade, 21 Nov 1918.

28/359-63. Estimate of Expense, Nov 1913, amended (by hand) to Aug 1919.

28/461. DDLR (Amendment) Order [draft].

28/463. Objections to the 1919 Order.

28/465. Brief for Applicants at the Light Railway Commissioners' Inquiry, 21 Jan 1920 (includes the Evidence of various witnesses, principally A. R. Hoare and H. England, with separate pagaination).

28/467. Minutes of Proceedings, Light Railway Commissioners, DDLR (Amendment) Order, 21-22 Jan 1920.

28/471. Table shewing Collieries and Works, Aug 1919.

28/474. DDLR (Amendment) Order, 1920.

28/476. Objections of the Motor Legislation Committee to the Confirmation of the Order, 6 Jul 1920.

28/478. Objections of the Railway Companies to the Confirmation of the Order.

28/482. Notes on the Speech of Mr. Stanley of the Ministry of Transport; Joint Committee, 15 Dec 1920.

28/484. Statement by Mr. Hoare to the Joint Committee, 3 Jan 1921.

28/487. Sheffield Daily Telegraph, 14 Mar 1921; Letter from the General Secretary of the Motor Legislation Committee (cutting).

28/488. Brief for the Applicants at the Inquiry into the Confirmation of the DDLR (Amendment) Order, 16 Mar 1921.

28/495. DDLR (Amendment) Order 1921.

28/496. DDLR (Amendment) Order 1924.

28/498-9. Two versions of a Bill proposed in 1929.

28/500. Letter from the Secretary of the Yorkshire Traction Company (at BET Head Office).

28/501. Short Statement of Facts and Evidence (in support of the 1933 Bill to abandon the line).

28/503,9-10. Draft versions of Agreement as to the Abandonment of Light Railways and Substitution of Omnibus Services (1932).

28/534. Brief for the Yorkshire Traction Company.

28/539. The Dearne District Traction Act, 1933.

28/541. Copy Agreement for Electricity Supply, 31 Dec 1923.

28/544. Minutes of the Joint Committee, 30 Aug 1922--15 Dec 1932.

28/545. Reports of the Clerk to the Joint Committee, 16 Nov 1923--21 Jul 1932.

28/546. DDLR Works Committee Minutes, 1924--1933.

28/547. DDLR Finance Committee Minutes, 1925--1933.

28/548. Ledger.

28/558-82. Financial Statements, years ending 31st March, 1925-1949.

28/593. Joint Committee, 10 Jun 1948 (one of a few scattered minutes surviving from the post-closure period).

28/604. Miscellaneous Papers, post-closure period.

28/605. Dearne UDC Treasurer's Report to Finance Committee, 29 Dec 1950.

28/607. The Yorkshire Traction Company Valuation of Plant, 1 Oct 1933.

28/608. List of Apparatus and Material for Disposal, 18 Aug 1933.

28/609. Miscellaneous Papers re. Abandonment (includes various meetings, reports etc., some of which are cited in the footnotes above).

28/644. Plan of route (c.1920).

28/484/Z1. File of items donated by A. S. Denton.

PERSONAL PAPERS

C. T. Humpidge

Birmingham: Comparative Running Costs of Trolleybuses, Trams and Motor Buses (1933).

Birmingham: Current Consumption of Cars 842 and 843 (experimental lightweight cars).

Portsmouth: Comparative Expenses per Mile for Buses and Trolleybuses, 24 Jun 1939.

Sheffield: Economics of PSV Operation, 1939 compared with 1966.

(the file also included notes for various lectures, cited below)

LECTURES

Hallpike, A. W. The Development of Transport and Commercial Vehicles in Bristol (Institution of Mechanical Engineers, 18 Jun 1952; published by the Institution).

Humpidge, C. T. 'Birmingham Corporation Tramways' (Light Railway Transport League, Manchester, 30 Mar 1967: author's notes).

_____. 'Buses' (Omnibus Society, 18 Jun 1967: author's notes).

_____. 'The Development of the Public Service Vehicle as the Complete Vehicle Concept' (Crompton-Lanchester Lecture of the Institution of Mechanical Engineers, 21 Oct 1966: author's draft, but later published by the Institution in Commercial Vehicles--Engineering and Operation [1968]).

_____. 'Problems of Municipal Transport' (Institute of Transport One Day Course: author's notes).

Marshall, Edward. 'The Llandudno and Colwyn Bay Electric Railway' (Light Rail Transit Association, Sheffield Area, 16 Jan 1978: notes).

Yearsley, Ian. '"Bus and Coach" and the Anti-tram Campaign' (Light Rail Transit Association, Sheffield Area, 23 Feb 1981: notes).

Young, Dr. Tony. 'Manchester Light Rail Scheme' (Light Rail Transit Association AGM, Manchester, 1986: notes).