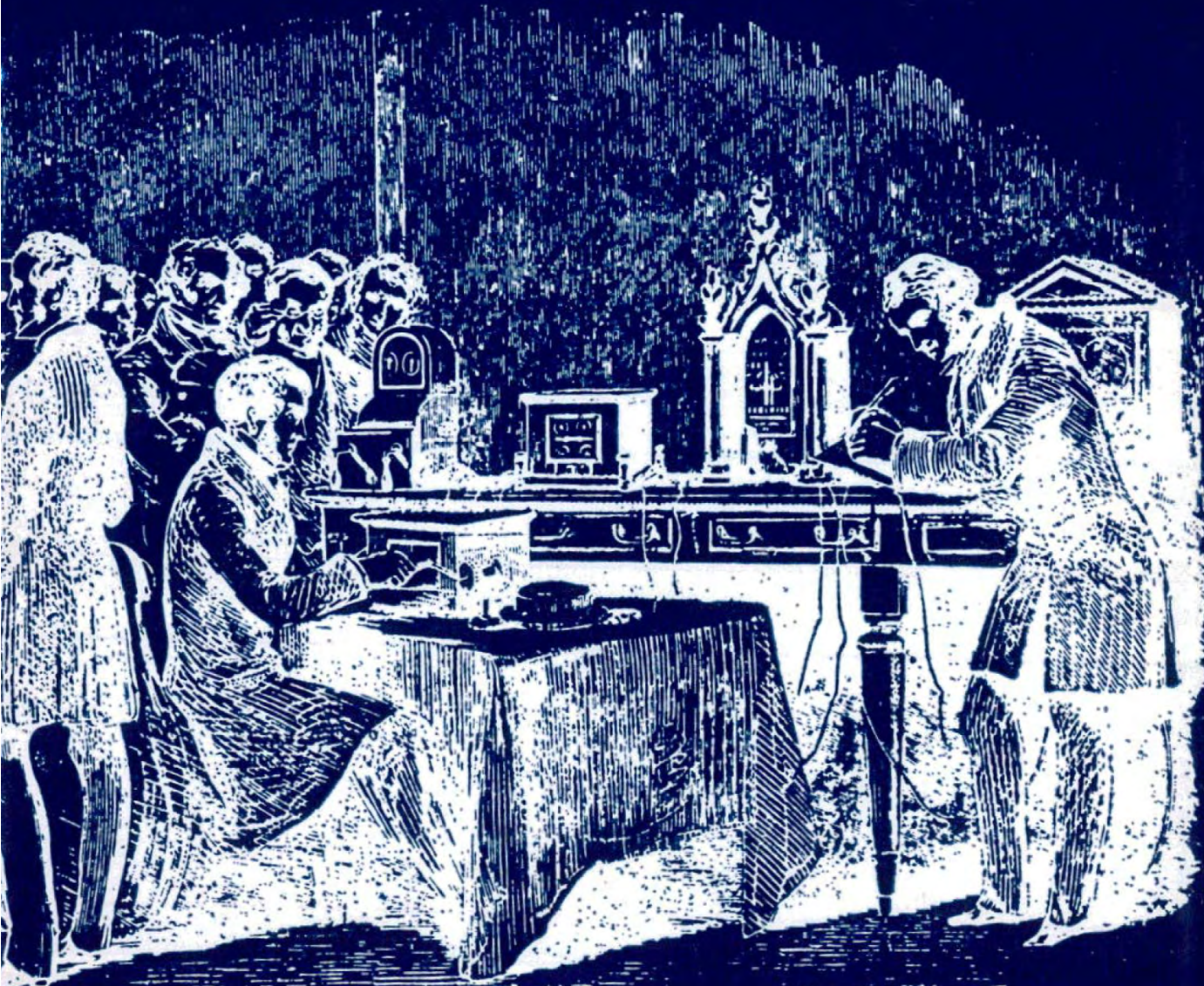


ELECTRIC TELEGRAPH

A Social and Economic History



J. L. Kieve

THE ELECTRIC TELEGRAPH

By J. L. KIEVE

Today, by reason of more recent developments such as the telephone, radio and telex, the electric telegraph has only a residual, though still important, role in high speed communication. But it was the telegraph which was the forerunner of them all—which in the middle of the nineteenth century first offered the possibility of transmitting information instantaneously over virtually any distance, thereby revolutionising communication and every organisation dependent upon it. Henceforth, imperial rulers in distant colonies, military commanders on remote battlefields, businessmen and commercial representatives far from their company headquarters, who had previously enjoyed considerable autonomy, were never again to be free from central control and direction. Railway working was made safe and efficient, and the dissemination of news to the press greatly accelerated. The telegraph became the nervous system of industry and commerce, and influenced every aspect of the life of the nation.

Here, based on original research, is the history of the telegraph down to the present day and an assessment of its social and economic effects. Its incorporation into the Post Office is thoroughly discussed in a chapter with a surprisingly modern ring—the telegraph was the first private industry to be nationalised and so the first to face the dilemma of providing a social service on a commercially viable basis.

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THE ELECTRIC TELEGRAPH
A Social and Economic History

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To Mark, Karen and Paul

CONTENTS

	<i>page</i>
1 ORIGINS AND DEVELOPMENTS TO 1837 Early experiments—Francis Ronalds—Cooke and Wheatstone—successful experiment on the London & Birmingham Railway	13
2 'THE CORDS THAT HUNG TAWELL' Use on the Great Western and Blackwall railways—the Tawell murder—incorporation of the Electric Telegraph Company—end of the pioneering stage	29
3 DEVELOPMENT UNDER THE COMPANIES Early difficulties—rivalry between the Electric and the Magnetic—the telegraph in London—the overhouse system—private telegraphs and the press	46
4 AN ANALYSIS OF THE TELEGRAPH INDUSTRY TO 1868 The inland network—sources of capital—the railway interest—analysis of shareholdings—instruments—working expenses—employment of women—risks of submarine telegraphy—investment rating	73
5 ACHIEVEMENT IN SUBMARINE TELEGRAPHY The first cross-Channel links—the Atlantic cable—links with India—submarine cable maintenance companies	101
6 THE CASE FOR PUBLIC ENTERPRISE Background to the nationalisation debate—public attitudes—the Edinburgh Chamber of Commerce—Frank Ives Scudamore reports—comparison with continental telegraph systems	119
7 NATIONALISATION 1868 Background to the Telegraph Bill 1868—tactics of the	138

	<i>page</i>
companies—attitudes of the press—the political situation—the Select Committee of 1868—agreement with the companies	
8 THE TELEGRAPH ACTS	154
Terms granted to the telegraph and railway companies under the 1868 Act—implications of the 1869 telegraph monopoly	
9 THE POST OFFICE TELEGRAPH	176
The period 1870–1914—reorganisation of the system—the first strike within the civil service—Scudamore misappropriates Savings Bank funds—the increasing financial loss	
10 TELEGRAPH MONOPOLY AND TELEPHONE DEVELOPMENT	199
The deliberate stunting of the development of the telephone following the 1880 lawsuit	
11 THE PRESS SUBSIDY	216
Relationship between Post Office and press 1870–1939—press subsidy stimulates provincial press and press associations	
12 USES AND MISUSES	230
Impact on various industries and markets—military applications—the police—firefighting—coastal safety—wireless telegraphy	
13 'BETWEEN UPPER AND NETHER MILLSTONES'	248
Decline of the inland telegram from 1918—the inter-war period—the greetings telegram—World War II—postwar decline—conclusion	
ABBREVIATIONS	269
NOTES AND REFERENCES	271

CONTENTS

9

page

APPENDICES

- 1 Details of the Post Office calculation of the loss on the
press telegram service, 1907 287
- 2 Telegraph tariffs and services, 1870-1971 289

BIBLIOGRAPHY 294

ACKNOWLEDGEMENTS 298

INDEX 299

LIST OF ILLUSTRATIONS

	<i>Plates</i>	<i>page</i>
1	Frank Ives Scudamore, architect of the nationalisation of the inland telegraph service in 1868	97
2	William Fothergill Cooke, primarily responsible for the early development of the electric telegraph in the United Kingdom	97
3	Charles Wheatstone, scientific genius	97
4	Charles Tilston Bright, knighted for his part in the laying of the first Atlantic cable, 1858	97
5	HMS <i>Agamemnon</i> laying the first Atlantic cable, 1858	98
6	The <i>Great Eastern</i> , laid the Atlantic cable of 1866	98
7	The India Rubber, Gutta Percha & Telegraph works, Silvertown, London, circa 1880	131
8	Telegraphists of the period circa 1865. The employment of women was a significant socio-economic result of telegraph development	132
9	Opening the first London–Paris telegraph circuit, November 1852	132
10	Some early telegraph instruments	197
11	Soemmering's water telegraph, 1809; Ronalds' Pithball and Dial Telegraph, 1816	197
12	St Martins-le-Grand, the Central Telegraph Office	197
13	William Cooke's 2-needle telegraph, 1842	198
14	Wheatstone's ABC instrument, patented 1858	198
15	The front page of the Telegraph Act 1868. The first case of the state taking over private commercial assets in the United Kingdom	231
16	Advertisements issued in 1845. One mentioning the arrest of the murderer John Tawell	232

Acknowledgement of Plates

Plates 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 by courtesy of the Post Office

Plate 2, by courtesy of the Institution of Electrical Engineers

	<i>page</i>
<i>Maps</i>	
The telegraph system in London. The London District Telegraph Company network, circa 1861	60
The telegraph network of the Electric & International company in the United Kingdom between 1852 and 1868	75
<i>Line Illustrations and Charts</i>	
House-Top Telegraphs. A cartoon circa 1862 by an unknown artist	57
The Derby Result 1860, by electric telegraph	70
The Telegraph Gallery at the Electric & International company's new offices at Bell Alley, Moorgate Street. Based on an illustration in the <i>Illustrated London News</i> , December 1859.	86
Chart comparing the dividend payments and yield received by investors 1852-68 from the Electric & International Telegraph Company, the London & North Western Railway, and 3½ per cent Consols	95
Chart showing the share prices of the Electric & International Telegraph Company and the London & North Western Railway, 1852-68	99
The result of a parliamentary division transmitted by electric telegraph, April 1859	123
Cartoon of Frank Ives Scudamore, artist unknown	188

CHAPTER ONE

ORIGINS AND DEVELOPMENTS TO 1837

The telegraph was the first invention to bring electricity to the service of man, by transforming the methods of communication. Its origins can be traced back long before 1837, when the first 'practical' telegraph was patented in England by William Fothergill Cooke and Professor Charles Wheatstone, but the stimulus necessary for its development was not provided until the expansion of the railway network in Britain and the United States in the 1830s; the electric telegraph and the railways were to expand together. The need for some means of communication faster, not merely than the horse but than the train itself, became clear.

During the eighteenth century many telegraphs were proposed using electricity. Although not wholly understood, attempts were made to utilise the remarkable qualities of this mysterious form of energy. The discovery in 1745 of the Leyden jar gave a great impetus to experimentation. In April 1746 Abbé Nollet transmitted the shock of a jar through a number of Carthusian monks joined together by iron wires in a circle 5,400ft in circumference. The contortions of the monks, when the circuit was closed, were accepted as sufficient evidence of the shock having been felt throughout the whole circuit. That these contortions took place simultaneously showed that the time occupied by electricity in traversing the circuit was too small to be perceptible.¹ Appreciating that electricity would travel almost instantaneously along a wire from one point to another, no matter how widely separated, several men attempted to use it for the transmission of information. In 1747 Sir William Watson, a member of the Royal Society, passed electricity through 9,000ft of earth and water on the Thames and through 10,000ft of wire suspended at Shooters Hill. In 1748 Franklin repeated similar experiments in Philadelphia. In 1749 Du Lac experimented across Lake Geneva.² However, the frictional or static electricity em-

ployed in all these early experiments was both fitful and difficult to insulate.

Some of these early systems used an alphabetical basis indicating every letter by a separate movement or light at the receiver. Such a suggestion was made in an anonymous letter signed 'C.M.' published in the *Scots Magazine* in February 1753.³ This 'expeditious method of conveying intelligence' was based on a separate wire for each letter of the alphabet and was 'otherwise somewhat intricate in its operations'. The author's reason for concealing his identity may have been his fear of being regarded as a magician by his neighbours. However, it seems probable that 'C.M.' was Charles Marshall of Paisley, 'a clever man . . . who could make lightning speak and write upon the wall'.⁴ Other methods used codes which employed combinations of single signals to distinguish letters. The first method was clear to the uninitiated; the second was more economical in wires and equipment.

Between 1750 and 1800 developments occurred which were to be decisive. As a result of the work of the Italian physicists, Luigi Galvani and Alessandro Volta, the battery was invented, supplying a gentle, steady and controllable flow of current at modest voltage. Its power was both in the strength of the current and its ability to flow continuously. This enabled certain of the effects of electricity to be clearly observed and applied to practical ends for the first time. Volta, professor of natural philosophy at Padua, communicated his discoveries to the Royal Society in 1800. He showed that the source of the electricity in Galvani's experiments was contact between two different metals. Within a matter of months, large electric batteries were being built on Volta's principle. In Munich S. T. Von Soemmering used an electrolytic battery to send signals which were indicated at the receiving end by the liberation of bubbles of hydrogen from the liquid in which the electrical impulse was discharged. In July 1809 he exhibited a telegraph through 2,000ft of cable. The discovery that an electric current flowing through a coil could cause a movement in a magnet suspended nearby, was a great step forward in the understanding of electromagnetism.

In Denmark, at the University of Copenhagen, Hans Oersted, experimenting with the current from a battery, discovered a de-

finite relationship between electricity and magnetism. In France, at the Polytechnic School in Paris, André Ampère, mathematician and physicist, heard in September 1810 of Oersted's discovery of a magnetic needle being deflected by a voltaic current. He developed the subject, published papers, and showed that magnetic deflection could be produced without magnets by the aid of electricity alone.

Meanwhile in Barcelona, out of the mainstream of European science, Francisco Salva employed a multiple-wire scheme. He probably established an experimental line between Madrid and Aranjuez, the spring residence of the royal family, as early as 1795. In this year he read a paper before the Academy of Sciences at Barcelona proposing a scheme by which letters would be indicated by various combinations of signals from a limited number of wires. The wires would be separately insulated and then rolled together into a single cable, a system later followed in cable construction.⁵

A number of other attempts were made to devise a practical system of telegraphic communication by means of frictionally generated currents of electricity. In 1816 Francis Ronalds, twenty-eight years old and intrigued by electricity, built what was probably the first electric telegraph capable of practical use. In his garden at Upper Mall, Hammersmith, he erected two wooden structures facing each other 20yd apart. With an elaborate arrangement of bars, hooks and silken cords he succeeded in stringing, in one continuous length, 8 miles of insulated iron wire backwards and forwards between the frames. He then succeeded in showing that, at least in dry weather, the transmission of electric signals was instantaneous. Developing his ideas, he built a second model using a shorter line of 525ft, which was threaded through glass tubes and placed in a trench 4ft deep and lined with pitch. At the end of the wire was an ingenious arrangement consisting of brass dials fixed on the seconds axis of a clock and marked with figures, letters and signs, which received the various signals.⁶ Ronalds' device depended upon static high-voltage electricity and as such would probably have failed over long distances. Nevertheless, it used certain principles of construction and maintenance which were subsequently followed. In

particular, his underground wire was not very different from those used later and he employed a more efficient means of insulation than hitherto adopted.

On 11 July 1816 Ronalds wrote to the Admiralty of the advantages and practical possibilities of his device, stressing its 'rapidity, accuracy and certainty'. He offered to demonstrate it. An initial reply gave encouragement but on 5 August 1816 a letter from Mr John Burrow, Secretary of the Admiralty, stated, 'Telegraphs of any kind are wholly unnecessary, no other than the one in use will be adopted.'

The admiralty rejection, although short-sighted, was because, for communications with the fleet at Portsmouth, a semaphore system based on the devices of Claude Chappe was employed. Chappe had connected a system between Paris and Lille in 1794, consisting of a succession of towers within sight of each other, 5 to 10 miles apart, on high ground. The basic apparatus consisted of wooden shutters which could be opened and shut in various combinations giving 63 distinct signals.⁸ Napoleon had made great use of the system in his conquest of Italy, linking Lyon to Turin and Milan, and later to Venice. The great defect of the system was when fog became sufficiently thick to prevent one station from seeing the next. The Admiralty seemed prepared to accept that at times it would be effectively cut off from the fleet, and this situation was still tolerated at a much later date. *The Times* of 4 April 1840 reported that in 1839 'the weather interrupted the system on only 29 days'.

This snubbing by government officials was not unusual and was testimony to the 'miserable parsimony' exhibited by the Crown to men of science as well as men of literature.⁹ As a result, Ronalds took out no patent, gave up telegraphy and turned to meteorology, becoming honorary director of the Royal Observatory at Kew between 1843 and 1852, and a Fellow of the Royal Society. In 1852 he received a grant from the Crown of an annuity of £75 per annum in consideration of 'important discoveries in electricity and magnetism' and devoted himself to the completion and cataloguing of his electric library—over 5,000 works in various languages, a unique collection of literature relating to electricity and magnetism.

Certainly, he had established a claim to be 'the father of English telegraphy'. He foresaw, before the railway age, the practical advantages of his device. 'Why', he asked, 'should not the government govern at Portsmouth almost as promptly as in Downing Street? Why should defaulters escape by the default of our foggy climate?' In 1823 he wrote *Descriptions of an Electric Telegraph and other electrical apparatus*, the first work on electric telegraphs ever published. In 1870, a year before he died, Ronalds received a belated knighthood for his services to telegraphy. He could 'thank a good constitution for not having been one among the many benefactors of mankind whose services are only appreciated after death'.¹⁰

By the 1830s two types of electromagnetic telegraphs had made their appearance—the needle system and the armature system. The needle system employed the deflections of small magnetic needles, placed at the receiving ends of the wires through which an electric current was sent, indicating the letters of the alphabet. The armature, or mechanical system, made use of the passage of an electric current through an electromagnet. By means of movements of the armature, signals could be recorded, in graphic form or by sound, to indicate the letters of the alphabet. It was Baron Pawel Schilling who made the greatest contribution. Schilling, a Russian diplomat acquainted with the work of Soemmering, whose telegraph he had seen in action in 1810 in Munich, developed what was the prototype of the needle telegraph. His first electrical experiments were directed to military applications. He attempted to provide telegraphic communication between fortified locations, and to explode powder mines at a distance, by means of electrical discharges through insulated wires underground or underwater. He then developed a coding system using five needles, which was demonstrated in 1832 to Czar Nicholas in Berlin. In the next few years Schilling simplified his telegraph and code, and by 1836 the final form used only one needle. He also developed an alarm system, in which a clockwork alarm was set in motion by an electrically actuated hammer. He died before he could develop his ideas further but a number of copies of his single needle instrument were made. It is possible that one reached England in 1835 to be demonstrated by Professor Wheatstone. Professor Muncke

of Heidelberg University certainly made one and used it in his lectures.

At one of the latter was William Fothergill Cooke, who was born in 1806 at Ealing in Middlesex, the son of Dr William Cooke, a surgeon and professor of anatomy at Durham University. By a strange twist of fate Dr Cooke, and possibly young William, had been among the people who went to view Ronalds' telegraph, as he was well acquainted with Ronalds' family. Ronalds and Dr Cooke transmitted many messages through the apparatus 'from over the coach house to the little tool house at the end of the garden'.¹¹ After a classical education at Durham and at Edinburgh University, Cooke joined the East India Company Army in 1825 at the age of nineteen, but resigned his commission in 1833. He then took up anatomical modelling, and for this reason visited Heidelberg and attended a lecture by Professor Muncke in which a copy of Schilling's needle telegraph was demonstrated—'one of the common applications of electricity to telegraphic experiments which had been repeated without practical results for half a century'.¹² Cooke was 'struck with the wonderful power of electricity and strongly impressed with its applicability to the practical transmission of telegraphic intelligence'.¹³ He was convinced that electricity might be employed for 'purposes of higher utility than a lecture' and, though with no scientific education and little experience of machinery, he applied himself to the 'practical realisation of the electric telegraph' with such energy that within three weeks he had constructed his apparatus. In April 1836 he returned to England and by June was 'finally satisfied with his machine'.¹⁴

Enthused by his device and confident of the future, Cooke wrote a pamphlet¹⁵ setting out a plan for establishing rapid telegraphic communication between the principal cities of the country, for political, commercial and private purposes; the lines of wires would run alongside existing railway lines, thus gaining some measure of protection. The government would be enabled 'in case of disturbance to transmit orders to the local authorities and if necessary to send troops to their support; whilst all dangerous excitement of the public might be avoided'. In commerce, the telegraph might be the means of transmitting vital

information of the daily state of important markets. It would assist the individual and the family at times of crisis. For the expanding railway system telegraphic warning of the approach of a train would avoid the expense of keeping an engine in continuous readiness at the foot of steep inclines to haul trains up. But however clearly Cooke saw the potential of the invention, there was the difficulty of developing its reliability to the stage where it was of practical use. There was also the need to show his invention to those 'who could bring it forward' for he was 'entirely unknown'.¹⁶

In November 1836 Cooke met Michael Faraday, chemist and philosopher, who had already carried out much great experimental research in electricity, and was heartened by the scientist's encouragement that 'the principle of the instrument was right'. Then in December 1836 Cooke wrote to his father asking for an introduction to a friend, Mr Walker, whose connections with the Liverpool & Manchester Railway could prove very useful in bringing the instrument before the public.

Through Walker, in January 1837, Cooke met the directors of the railway company. He discovered that they had a signalling problem with the Lime Street tunnel, one which was quite common in the early years of railways and which he was convinced could be solved by the electric telegraph. Either because the engines could not contend with steep ascents from a standing start, or because the residents objected to the noise and smoke of engines near their homes, the terminal stretches of railways were sometimes rope-hauled. At Liverpool the carriages ran downhill under gravity through a tunnel of 2,250yd to the station and were hauled up the incline by a rope attached to a winding engine at the summit.¹⁷ All remote power systems, whether using a winding engine or an atmospheric system with pumping stations, relied for their successful operation on communication between the train and the distant stationary engine. A similar need occurred when single-line working was adopted. It was then necessary to have reliable immediate warning at one end of the line, when a train was starting from the other, so as to prevent the possibility of a head-on collision between trains travelling in opposite directions on the same piece of track.

In fact the directors had already decided to use a pneumatic

telegraph—basically a whistle tube from one end of the tunnel to the other—and the order for the apparatus had been given before Cooke's interview. They were disinclined to give him financial backing but were sufficiently impressed to offer facilities for experiment.¹⁸ Cooke's instrument was still incomplete and based on a process which would be both intricate and slow, sending messages letter by letter; there was no certainty his signals would work over great distances. Even Faraday hesitated to give an opinion as to the 'galvanic fluid's action on a magnet at a great distance'.¹⁹ This latter problem was to bring Cooke to Wheatstone, who had for several years been interested in the transmission of information by electricity and had already made several important discoveries.

Charles Wheatstone was born in Gloucester in 1802, the son of a musician.²⁰ He went into partnership with his brother to manufacture and sell musical instruments and showed early promise of mechanical ingenuity. His work was directed towards the improvement of the instruments his firm made, and he systematically investigated the acoustic principles involved in the construction of violins, flutes and trombones. In 1823 he discovered that sound can be transmitted through solid wire and rods and so produced in distant places. A paper on this subject 'New Experiments in Sound', was read to the Academy of Sciences in Paris and was published in Thomson's *Annals of Philosophy*, a substantial achievement for a man who was not an established scientist. Subsequently Wheatstone published several other papers, including one on the nature of musical sounds. In 1829 he took out his first patent covering 'Mouth-blown instruments' and in 1831 wrote a paper on 'The transmission of sounds through solid rods', in which he examined the problems of communication over a long length of wire. In 1833 came a departure from his work on acoustics—'An account of some experiments to measure the velocity of electricity and the duration of the electric light.' Wheatstone believed that previous experiments using electricity as a communicating agent had failed because of imperfect knowledge of the velocity and other properties of electricity. He set up a four-mile insulated circuit of copper wire in his laboratory and determined that the speed of electricity was greater than that of light.

The paper so enhanced Wheatstone's scientific reputation that in 1834 he was appointed professor of experimental philosophy at Kings College, London; in 1836 he was elected a Fellow of the Royal Society. By this time he had ascertained that magnetic needles might be deflected, under properly arranged circumstances, through greater lengths of wire than had been tried previously and had determined many of the conditions necessary for the production of the various magnetic, chemical and mechanical effects in very long circuits. He had also devised, before he met Cooke, an instrument with a magnetic dial and letters upon it, later described as a 'permeating keyboard'; the indication of the characters was by convergence of the needle. This instrument, in which a few wires could be converted into a great number of circuits, was to become the first practical commercial telegraph in Britain and probably in the world, but its development was at first confined to the lecture room.

In February 1837 Cooke was introduced to Wheatstone by Dr Peter Mark Roget, secretary to the Royal Society, noted physician and scientific writer. Wheatstone was in the stronger position. Cooke saw the potential of a practical telegraph system and had his own instrument based on the mechanism of the musical box and a proposed application of electromagnetism to a clockwork alarm, but he was probably totally ignorant of electrical theory and of what others had done in the field; he also lacked finance for further development. Wheatstone had a clear grasp of electrical theory and was tolerably certain of the feasibility of making the telegraph work over long distances. He knew that the speed of transmission of electricity was so high as to make its operation instantaneous. He was also not blind to the practical implications of what he had achieved and was confident of overcoming all scientific and mechanical obstacles. He claimed later that, 'Some time before Mr Cooke introduced himself to me I considered my experiment to be sufficiently matured to enable me to undertake some important practical results.'²¹ He had informed Charles Fox, resident engineer of the London & Birmingham Railway, of his expectations and of his willingness to superintend the establishment of an electric telegraph on that railway. He also claimed to have made arrangements for an experiment across the Thames,

from his lecture room to the opposite shore; the firm of Enderby & Sons of Greenwich had undertaken to prepare the insulated rope. His experiments had been announced in the *Magazine of Popular Science* in March 1837, and Cooke wrote, 'imagine my dismay on hearing that Wheatstone had actually invented two or three [telegraphs]'.²²

Cooke experimented with his instrument on the four miles of wire in Wheatstone's laboratory and found that it was unsuitable; 'the electric fluid lost its magnetising quality in a lengthened course'.²³ Cooke clearly needed Wheatstone's scientific knowledge and ability for 'he has left the world behind in scientific researches on the subject'.²⁴ Thus, in May 1837 Cooke proposed a partnership, and that a joint patent be taken out. Wheatstone agreed, probably because he felt that commercial exploitation ill suited his role as a scientist; 'neither my occupation, nor my inclination, qualified me for the post'.²⁵ He was impressed by Cooke's 'zeal, ability and perseverance', which was necessary to ensure the project's success as a commercial enterprise, his single-mindedness and determination to 'make money'. Both men were to set about improving their instruments, and a patent was to be taken out, although neither of them then had a fully effective instrument, and although Wheatstone was anxious to secure the cooperation of an 'influential house in the city' before such a step. The patent, signed by William IV on 10 June 1837, was on 'Improvements in Giving Signals and Sounding Alarms in Distant places by means of electric currents transmitted through Metallic Circuits'. The patentees had six months, from the date of the sealing of the patents, in which to enrol their specification and, provided that the specification could be covered by the original title, they had a relatively free hand as to what was to be included in it. The intention was to patent both Wheatstone's needle instrument and Cooke's mechanical telegraph.

In some ways they were fortunate in obtaining their patent, and Cooke's anxieties over rivals are shown in many of his letters. For the boom in railway building during the 1830s—between 1831 and 1837 2,120 miles were sanctioned with authorised capital rising to £51.4 million—greatly stimulated the development of the telegraph, and several were produced in 1837 alone.²⁶ In the United

States Samuel Morse gave his first public exhibition and in France Steinheil operated a telegraph over seven miles of railway track. In particular, Edward Davy, a surgeon, had made experiments on the electric telegraph from 1835 without knowing what others in the same field had been doing. By the beginning of 1837 his ideas had developed well enough for him to carry out experiments in Regents Park, where he obtained permission to lay down a mile of copper wire around the inner circle of the park. In March he appears to have been alarmed by rumours of Wheatstone's work on an electric telegraph, and in order to secure priority for his invention he lodged a caveat and deposited with the Society of Art a sealed description of his invention, in its then state. Thus when Cooke and Wheatstone applied for patents, in May 1837, Davy opposed. A working model exhibiting all Davy's improvements was shown in London between November and December 1837 at the Belgrave Institute in London, and then for a further six months at Exeter Hall. In fact, it is likely that Davy had perfected his instrument before December 1837, the date of Cooke and Wheatstone's enrolment of their first specification.²⁷ Yet, in January 1838 Wheatstone wrote to Cooke of Davy's telegraph: 'Six wires are employed obtaining 200 simple and compound signals. I scarcely think he can effect either without infringing our patents.'²⁸

So Davy failed and in 1839 emigrated to Australia, probably for personal reasons.²⁹ He had perhaps shown a lack of foresight in exhibiting his machine before it was patented and possibly also he offered his potential backers too low a percentage of any proceeds.³⁰ He had however taken out a patent on 4 July 1838 for a chemical marking telegraph. A strip of calico, impregnated with iodine of potassium and chloride of lime, passed over a copper cylinder and was carried onwards when the cylinder revolved. When a signal was sent from the transmitting station, a metallic contact piece, forming one of the terminals of the line, was made to press against the calico, which completed the circuit through the latter and the metallic cylinder over which it passed. Every time a current was sent through the calico, a mark was made upon it by the chemical decomposition of the salts with which it was impregnated, thus giving a permanent record of the signal. This

patent was to form the basis of some of the chemical marking telegraphs used subsequently and was bitterly opposed by Cooke and Wheatstone who claimed that some parts of its mechanism infringed their patent. The matter was referred to Faraday whose opinion was that the two inventions were distinctive, and Davy's application was allowed.

Davy's unique contribution was probably the relay, or as Davy called it 'the electrical renewer', which made possible long-distance communication by telegraphy. The relay obviated the necessity of using large currents to compensate for the leakage inevitable in very long lines. The principle was to break up a long circuit between two distant stations into a series of shorter circuits, each complete in itself. Between each of these circuits was placed a relay, simply an apparatus which when a signal was sent from a transmitting station made connexion between the next circuit beyond it and a local battery, thus automatically carrying on the signal. To obtain the patent for the relay the Electric Telegraph Company paid Davy £600.

William Alexander, a Scottish inventor, also figured prominently at this time. He published his ideas in various journals including *The Times* of 8 July 1837, showing the practicability of his project and the estimated costs. Earlier, in June, he had written to Lord John Russell, the Home Secretary, about a plan for an electromagnetic telegraph between Edinburgh and London, but capable of being adopted all over the country. He experimented on a four-mile circuit at Edinburgh University, and in a letter to the Treasury suggested government aid and patronage. He opposed the application of Cooke and Wheatstone for a Scottish patent but eventually withdrew, apparently 'acknowledging the superiority of Cooke and Wheatstone's plans' and abandoning his own.³¹ However he still continued to 'make a great noise about his invention'. He took it to Kensington Palace for the inspection of the Duke of Sussex and in March 1838 he was at the Royal Society. However, 'The Committee of the Royal Society of Arts decided that Alexander's telegraph was not new and therefore unworthy of the attention of the Society.'³² Alexander, still undaunted, continued to advertise his invention, and placed it on exhibition at the Royal Gallery of Practical Science in the Strand, at the Poly-

technic Institute in London in 1839, and finally in 1851 at the Great Exhibition in Hyde Park.

In the six months before the specification, Cooke turned from experiment to the practical application of the telegraph, visiting Messrs Enderby to arrange a method of covering wires with rope yarn for a 'cross Thames' experiment,³³ while Wheatstone concentrated upon the development of his instrument. Cooke had already recognised the relevance of the railways, their advantages as the possessors of continuous ribbons of protected lands, and their needs, particularly where stationary engines were required. It is not surprising that he was aware that a tube for signal communication was to be installed at the Euston Square terminus of the London & Birmingham Railway. As at Liverpool, there was a terminal section operated by rope haulage, and preparations were being made for a pneumatic signal from the station to the winding engine, which was to be located at the head of the long ascent from Euston to Camden Town, a distance of about a mile and a half.

At the end of May 1837 Cooke again contacted Joshua Walker, who was closely connected with the London & Birmingham board.³⁴ He first tried to attract his interest by means of an application of the telegraph for fire warnings, by having a system of alarms in the streets of towns communicating telegraphically with fire stations. He intended to lay a brief statement of this before the government, envisaging a 'complete electro-galvanic civic, milito-police system'. Walker 'spoke handsomely of it but recommended my proving the practicability of the general principle before I attempted to introduce a project involving the disturbance of the pavements'. In fact, various similar systems were developed in Europe and in America well before they were accepted in England. Walker might well have been sceptical of the fire alarm scheme, but he introduced Cooke to Glyn, the chairman, Robert Creed, the secretary, and Robert Stephenson, the company engineer. Cooke expressed his wish to perform experiments on the railway; he was anxious to show his ability. To his delight the reply was: 'Let Mr Cooke have everything he may require.' Thus eighteen workmen laid out 8cwt of copper wire, giving a total length of 55 miles, in a vast carriage shed at Euston. Cooke could have his public trial.³⁵

On 4 July 1837 he gave a demonstration of his mechanical telegraph and alarm bell to some of the directors of the London & Birmingham railway and also to visiting directors of the Grand Junction Railway, which had just opened a connection from the Liverpool & Manchester to Birmingham.³⁶ Then on 9 July he demonstrated message-sending over a distance, to Stephenson and Creed. For this second experiment Wheatstone had arranged a 'hastily made telegraph' using four needles and four wires. The experiment obviously impressed the onlookers, who wished to see the effects over 'greater distances still'. By 24 July the extended line was ready, stretching through 19 miles of wire between Euston and Camden Town. With Wheatstone at Euston, in a dingy room near the booking office, lit by the light of a candle, and Cooke at Camden Town, a message was sent and a reply received. Stephenson was impressed, 'a convert to our system'; subject to the directors' approval he felt that the system could be utilised and the line extended.³⁷

Not until the end of August 1837 could a further demonstration be arranged, as new instruments had to be made and lines laid in accordance with Stephenson's request; moreover, railway officials were absent from London during August. Communication was then demonstrated through approximately 14-15 miles of wire. Stephenson was convinced of the telegraph's practicality and agreed to report to the directors immediately. He was prepared to recommend a more expensive method of protecting the wires to ensure their safety. Although the sum was large, approximately £400-500 per mile, about £100,000 to Liverpool, 'the telegraph was of great importance to the railroad'.³⁸ Charles Fox, resident engineer, wrote to Cooke, 'Nothing was more satisfying than these experiments to prove the practicality of transmitting signals, which have placed beyond a doubt that the principle may be applied with unerring certainty.'³⁹

The chairman and some of the directors saw a further experiment in late September 1837, and so the commercial practicability of the electric telegraph seemed proved, its future assured. Cooke went so far as to send to the chairman, Glyn, proposals for the establishment of an electric telegraph from London to Birmingham, Manchester, Liverpool and Holyhead. The telegraph would

be carried into several exchanges and would be opened to the public generally at a uniform charge to be agreed upon between Cooke and the company; an Act of Parliament was to be obtained, and Cooke was to have a royalty of £16 per mile and a share in the profits. This proposal was apparently submitted on the request of the company.⁴⁰ Then in October Cooke received an 'abrupt intimation' that the trial was to be limited to the Euston-Camden Town run; the railway 'did not intend to proceed further at present'; a bitter blow to Cooke, for whom 'the success and value of the invention had been incontrovertibly established.'⁴¹

Why the directors changed their minds is not clear but a clue might lie in the minutes of a meeting of the Railway Station Subcommittee on 3 October 1837.⁴² The chairman reported that Cooke would carry the electric telegraph into full effect between London and Birmingham, both by teaching the use of the instruments and a corresponding system of telegraphy to any necessary number of men, and also by superintending the laying down of wires for that distance. He was to be given two or more 'intelligent' clerks to follow his daily instruction, and power to spend up to £100 in further experiments. But, before any resolution was adopted, it was decided to obtain an estimate of the probable expense of laying down a line for telegraphic communication between Camden and Harrow stations. This estimate may have been so high as to deter the company. Possibly also, the Grand Junction directors, who had found Cooke's original mechanical telegraph, with its sixty signals, too complicated and cumbersome for the Lime Street tunnel, had not been over-impressed by his demonstration on 4 July and had not come back for demonstrations based on Wheatstone's instrument. Thus Stephenson was not able to convince his board, and the London & Birmingham went back to its original plan for a pneumatic system.

Cooke was left with negotiations to recover the two instruments built at the company's expense. He was willing to repay the £50-60 which the instruments had cost, 'to assist in bringing the invention forward in other quarters'. After a meeting of the London Committee of the company it was agreed that the instruments be returned at half the price of manufacture.⁴³

A description of the rope haulage of trains from Euston to

Camden Town, and of the pneumatic signal apparatus, appeared in Osborne's *Guide to the London and Birmingham Railway* 1840, which stated, 'Electricity was thought of as a quicker signal agent, and some successful experiments were tried with it, but experience has proved that the whistle is more advantageous and suitable at every respect.' An unkind epitaph to Cooke's endeavours.

Notes to this chapter are on pages 271-2

CHAPTER TWO

'THE CORDS THAT HUNG TAWELL'

The experiments had not proved entirely abortive, for many important contacts had been made, the most significant with Isambard Kingdom Brunel, engineer to the Great Western Railway, which although started in 1835 was not due to open any section of line until June 1838. Brunel had seen the telegraph demonstrated 'to perfection' and was convinced, like Stephenson, of its merits.¹ Cooke was optimistic about prospects on the GWR, although the railway had no demand for signalling to distant stationary engines; the trains were to be locomotive-hauled the whole distance.² Brunel arranged a meeting between Cooke and the GWR board. Cooke urged 'these sceptical gentlemen that with a telegraph the manager in his office at Paddington would live like a spider along the line'; Brunel applauded and the others were impressed by Cooke's enthusiasm.³ An agreement was drafted to cover the laying of the telegraph along the first section of the line, near London. There was no immediate railway working intended; it was merely a test of a communication system which, if successful, might be extended for the whole length of the line. The final agreement was not reached without some difficulty.⁴ Apparently the railway sub-committee made considerable and 'unreasonable' alterations in the original heads of agreement. Cooke determined to withdraw altogether and wrote to that effect—to the surprise of the GWR. The result was that the directors reconsidered Cooke's terms and accepted.⁵ There is no apparent record of discussion of the scheme in the minutes of the directors' and shareholders' meetings of the railway, the implication being that it was an unimportant matter to be attended to by the engineer and a few interested directors.

The agreement with the GWR was finalised in April 1838 and confirmed on 24 May. The essential features were that a line of six wires would be laid from Paddington to West Drayton, a distance of 13½ miles, and later extended to Maidenhead if it proved satis-

factory, that the company would employ Cooke as contractor for laying the lines, at its own expense, and that on 1 January 1839 it would decide whether to take a licence on defined terms for a wider area.

Brunel decided to run the wires, insulated with cotton and carefully varnished, through a hollow iron tube below ground at the side of the railway line, to protect them against accidental damage and vandalism.⁶ The connection to West Drayton took just over a year to complete and was opened in July 1839. Cooke's total costs for laying the telegraph was £2,817 10s.⁷ He wrote, 'I cannot fail to make a good thing of it, having contracted with very responsible parties to supply me at much less than estimated cost.'⁸ Five-needle instruments were installed at the two terminal stations, and at Hanwell for use in emergency.⁹ Apparently the apparatus worked effectively in notifying the passing of trains and in sending messages.¹² Cooke wrote: 'The telegraph on the Great Western Railway has given great confidence and satisfaction.'¹¹ It was the first working telegraph in daily use over a fairly long distance and its success brought in applications from foreign countries to put up telegraph systems.¹²

The practical application of the telegraph was next demonstrated on the Blackwall Railway which was opened in 1840. The line was built under the influence of George Parker Bidder, engineer, mathematician, and businessman, and the Stephensons, who had reported that rope haulage would be more economical than locomotives. They used a gauge of 5ft, which for years was standard in the Eastern Counties, 'a constant butt of criticism and source of amusement'.¹³ It was rope-hauled throughout its four-mile length, except for the upward gradient from Minories to Fenchurch Street, which the coaches climbed under their own momentum, and descended under gravity in the reverse direction, 'being started by a slight push from the porters in attendance'.¹⁴ Between Minories and Blackwall ran an endless rope driven by a stationary engine. There were intermediate stations at Shadwell, Stepney, Limehouse, West India Docks and Poplar.¹⁵ All carriages were moved by a rope wound by a drum at one terminus or the other by the alternate action of the stationary engine. The system was rather complicated, the rope often

broke, and in 1841 wire cable replaced it but also gave much trouble.

Both Bidder and Stephenson recommended the use of the electric telegraph to provide instantaneous transmission of information along the line. Arrangements at intermediate stations could be regulated so as to avoid inconvenience and delay, and when unexpected numbers of passengers arrived at the London terminal, additional carriages could be speedily supplied. The advantages of telegraphic signalling on lines operated by remote haulage were clear, and this time the distance was too great for the pneumatic signal. When the engine began pulling the rope, all the carriages moved simultaneously; if one of them became detached, the succeeding carriages would inevitably collide. Through the telegraph, information could be conveyed to the hauling engine.

Thus, when the line was opened in July 1840, a telegraphic system was installed. The carriages started every 15 minutes in each direction,¹⁶ and before the 'engine man' applied the power of his engine to the rope to move the train, he received specific instruction by electric telegraph from every other station that all was ready to start. Announcement of stoppages and accidents were transmitted by telegraph apparatus at all stations. In 1849 the Blackwell company replaced the continuous cable system by locomotives, but the electric telegraph had proved its worth. In 1841 alone the line had carried about 2 million people in safety in about $\frac{1}{2}$ million carriages, 'starting and stopping independently of each other, through the intervention of a system of telegraphs . . . worked by lads, porters, or breakmen performing regularly their ordinary duties'.¹⁷ The result of a single failure would have been 'fearful and fatal collision'. In July 1842, *The Railway Times*, commenting on an accident on the Blackwall Railway, praised the usefulness of the electric telegraph. News of the accident had been instantly conveyed to the engine house and the engine stopped. The consequences might otherwise have been very serious.

The Blackwall line was profitable and its successful working brought Cooke further business.¹⁸ However on the GWR there was a rebuff. The wires had been damaged and the apparatus presumably had ceased to work.¹⁹ Cooke had hoped that the telegraph would eventually be extended to Bristol, since the original line had

hitherto been working efficiently. Brunel submitted the extension proposal to a general meeting of shareholders in 1842, but it met with opposition; a Mr Hayward of Manchester denounced the invention as 'new fangled' and managed to persuade the meeting to repudiate the agreement with the patentees.²⁰ A major factor may have been the cost. Cooke had been assured that any extension beyond Drayton did not 'in any degree depend upon the question of the practicality or efficient means of transmitting intelligence but only upon the cost and profitable return'.²¹ To prevent the removal of the wires Cooke proposed to the company that he would maintain the telegraph at his own expense. On 24 November 1842 the General Traffic Committee of the GWR agreed to this proposition, provided Cooke would send railway messages free of charge and would extend the line from West Drayton to Slough, a further 18 miles. Cooke was also required to replace the damaged section of line between Paddington and West Drayton.²² Until this time the telegraph had been confined to railway purposes, but now Cooke was to be allowed to transmit messages for the general public.

For the extension to Slough the five-needle instrument originally employed was discarded and replaced by a two-needle instrument requiring only two wires. Cooke also gave up the effective but expensive method of laying the line in iron tube, which Brunel had decided on for the line to West Drayton. Probably on financial grounds, he adopted a new system of suspending the wires by glass or pottery insulators from iron posts varying from 10 to 12ft in height and placed approximately 150yd apart. In September 1842 he had enrolled a patent specification describing such a system. Together with the saving in the number of wires, in changing over from five needles to two, this cut the cost considerably, according to Cooke's estimate by 60-70 per cent.

An immediate result of these changes was the emergence of a specialist class of operator. The old instrument could be worked by anyone who could read. In December 1839 *The Railway Times* had described how a deaf and dumb boy was able to work the telegraph and *The Times* of 2 September 1839 stated: 'The machinery and mode of working was so exceedingly simple that a

child who could read would be enabled to do so.' The two-needle instruments, with their more elaborate codes, now required a more specialist skill.

The telegraph installation of the Great Western Railway was opened for the public, who paid 1s (5p) for admission to see this 'marvel of science'. Thomas Home became the first licensee to work the electric telegraph between Paddington and Slough, paying a rental of £170 per annum for the privilege. The GWR had the use of the telegraph free of charge. The Slough line was unique in that it was the only occasion on which the charge was irrespective of the length of the message.

In 1842 Cooke published *Telegraphic Railways or the Single Way*, examining the advantages of the telegraph for railway communications as demonstrated in the successful working on the GWR and the London & Blackwall. The telegraph would answer objections to ancillary single lines where traffic did not justify double track, by enabling them to be operated safely and efficiently. 'The whole system of double way, timetables and signals was a vain effort to attain indirectly and very imperfectly, at great cost, safety from collision,' which could be ensured by electric telegraph, since it could maintain an adequate interval between trains. In the early days of the railway there was no way of knowing the relative positions of trains on the line. One of the functions of the signalman, or 'policeman', was to hold the train for a given period of time. Thus safety depended upon the punctual movement of the train; if the train in front was delayed, there was a strong possibility of collision. Cooke's 'block' system applied the electric telegraph to train control, imposing a space interval on the more dangerous time interval system. The principle was that the line was divided into 'blocks' or sections, and only one train at a time was allowed to be in a block. Each block had its own telegraph, the needle instrument employed having two signals—one to the left signifying 'line clear', and one to the right 'line blocked' or 'train on the line'. Whenever a train entered a section, say A-B, the signalman at A would signal 'train on line' to the man at B; this would be acknowledged by the latter and be maintained, or 'blocked over', until it arrived at B, when B would remove the block and signal 'line clear'. The man at A would keep his danger

signal on until 'line clear' was signalled, and no second train would be admitted until the first was out of the section. When 'line clear' was signalled, A would acknowledge that information and take down his danger signal.²³

In 1839 the system was probably applied at Clay Cross Tunnel on the North Midland Railway.²⁴ There was understandably a special danger, and dread of, tunnel collisions, and so the first crude installations of block working by electric telegraph came to be provided at tunnel sections. While engaged in the construction at Clay Cross, George Stephenson met Cooke and Wheatstone, and arranged that a telegraph be fitted through the tunnel, and the arrival and departure of each train reported; further that if a second train should arrive at either end before the previous one was telegraphed as 'arrived', it should be stopped by signals and detained until such message was received. In 1841 electric instruments or dials for controlling the trains were introduced to show at a glance if the line was 'clear' or 'blocked'.

In the same year the government appointed a select committee to inquire into the railways and to report upon the degree of supervision required in the public interest.²⁵ The setting up of the committee reflected public concern that maximum safety standards be attained on the railways, demanding ever more 'expensive and inconvenient precautions'. Among the witnesses called were representatives from all the leading railway companies, including Brunel and the Stephensons. The committee recommended that the enforcement of the timetable was the only means of obtaining knowledge of the relative position of different trains. Some railway companies disagreed because of the practical difficulties involved; on the Liverpool & Manchester railway the principle of punctuality had to be abandoned because of the great and varied traffic and the 'irregular intervention of trains from other lines'.²⁶ The company preferred to rely on the alertness and vigilance of their engine drivers. Brunel claimed he preferred illiterate engine drivers, in that they may be less distracted. He told the select committee, 'Our very best man on the Great Western Railway . . . can neither read nor write.'²⁷ Yet companies fully realised that the reduction of the possibility of collision would greatly increase public confidence, both from investment and travel considerations.

The financial loss caused by an accident in damage to the company's property, compensation, and in loss of traffic could be considerable. The select committee of 1841 was informed of one accident on the Eastern Counties railway which had resulted in a loss to the company of £10,000. Hence companies had a great interest in operating safely and 'were not disposed to stint their expenditure' on anything aimed at reducing the frequency and severity of accidents: brakes, 'the most important means of safety', new safety lamps and buffers.²⁸

The electric telegraph would be advantageous in that alertness would be enforced on staff by the 'instant and infallible detection at Head Quarters of individual remissness'.²⁹ A train could not arrive without notice; thus the staff had to be alert, as messages might be received and require an answer at any moment. Hitherto it had been accepted as axiomatic that any highway, whether it was a canal, a turnpike or a horse tramway, should be open to all on payment of tolls. Thus Cooke suggested that the use of the electric telegraph would enable the railway line to become a highway open to the public: 'agricultural produce might be carried in wagons along the railway in the intervals between trains'; warnings would be given, by telegraph, of the approach of a locomotive. The telegraph might result in a reduction in the stock of engines, carriages, and 'police' establishments, as well as providing greater security in working the railway. It could also be a source of income as a means of transmitting government despatches and commercial intelligence.

The telegraph stimulated the laying of single lines, thus reducing the cost of construction mainly of short country branches and of mixed systems—stretches of single line interspersed with double track. Many railway experts, notably W. H. Preece and G. P. Bidder, considered that, if properly worked, single lines would be sufficient to meet a great proportion of the requirements of the railways. The American railroads were nearly all single lines. 'Vast sums of money have been uselessly spent in the construction of the double lines in this country, where single lines would meet all the traffic.'³⁰ Nevertheless, largely because of the risks involved, single line working did not develop.

The strategic-political implications of the control of the tele-

graph were early realised. The Select Committee on Railway Communication 1840 commented: 'Circumstances may arise in which it may be very inconvenient to leave in the hands of a private company or an individual, the exclusive means of intelligence which the telegraph affords, it cannot fail to be of a paramount importance that the Government should be furnished with similar means of procuring and transmitting intelligence.'³¹ It believed that no railway company would object, provided fair terms were offered, to giving every facility to the government for establishing a line of electric communication over the whole length of its railway. The committee was anxious to fix the attention of the public on a discovery which was 'no less susceptible or useful than of dangerous application'.

However varied the arguments, and however Cooke may have felt about the telegraph, the public, though intrigued, appeared largely indifferent to the values of the new invention. It was still considered a novelty. In April 1845 the *Illustrated London News* described the use of the electric telegraph for a game of chess on the South Western. The railways themselves were lukewarm, some hostile, to what was called a 'dangerous experiment'. Many refused to be bothered with 'the wires'. Years were to pass before the natural affinity of wire and rail came to be recognised by the majority of the conservative railway managements even though the influential *Railway Times* was firmly in favour and argued 'it ought at once be adopted on all trunk lines'.³² The situation was similar in the USA. Telegraph companies were aware almost at once of the advantages of constructing their lines along the railways, but the latter were far from seeing any value in the telegraph. Cooke wrote: 'At the beginning of 1843 we were at our lowest point of depression. The patents remained almost unproductive, and we had incurred, in various ways, a considerable outlay.'³³

However, the Slough extension was a success, and the rate of growth of the telegraph system quickened. In 1843 Cooke had obtained permission from the GWR to extend the line from Slough to Windsor. The telegraph acquired considerable fame by its speedy announcement to the ministers of the Crown and London generally, of the birth of Queen Victoria's second son, Alfred

Ernest, at Windsor, on 6 August 1844. *The Times* declared itself 'indebted to the extraordinary power of the Electro-Magnetic Telegraph', for being the first to announce the birth. Three special trains carrying notables left London for a great banquet at Windsor. The telegraph was soon again in use—the Duke of Wellington's forgotten dress suit being obtained from Apsley House in time for the royal dinner party in the Windsor banquetting hall.³⁴

By 1844 Cooke's accounts on the electric telegraph were too heavy for him to keep in his private ledger and he employed a clerk.³⁵ Wheatstone's share of royalties for newly laid lines rose from £444 to £2,775 in 1845.³⁶ By 1845 the patentees were constructing or working with their patents about 550 miles of telegraph line upon metropolitan and country railway systems. They were also engaged on an installation for a French railway. Among lines completed was a single-line system from Norwich to Yarmouth, 20 miles long which was worked on the block system. Each station contained as many needles as there were stations on the line (five in all). Thus the position and the progress of every train could be perceived at any moment. In 1840, when the Norwich to Yarmouth bill was in Parliament, G. P. Bidder had recommended that the single line be worked by electric telegraph on Cooke's plan. This led to 'an intimate friendship between Cooke and Bidder'.³⁷ From 1844 the line worked efficiently and without mishap, the patentees receiving £2,500 worth of shares in the railway company in payment. The telegraph was also used on 15 miles of the Dover line, from Tonbridge to Maidstone, on a block system from Northampton to Peterborough, on part of the Edinburgh to Glasgow line, the Oldham branch incline, part of the Manchester to Leeds line, and the Ipswich incline.

In 1844 a telegraph line of 88 miles, by far the longest yet projected, had been started between Nine Elms and Gosport, on the London & South Western Railway, linking the Admiralty in London with Portsmouth. The Admiralty agreed to pay £1,500 a year for 20 years, and £1,000 a year for a further 20 years, for the maintenance of a double-needle telegraph for its own purposes.³⁸ In February 1845 the line was completed. *The Times* wrote that Wheatstone's 'new electromagnetic telegraph' worked 'to perfec-

tion'. Two wires were used by the Admiralty, and the other two by the LSWR both for its own and public purposes. The cost of the line, £24,000, was shared between the Admiralty and railway company.³⁹

So Cooke had succeeded where Ronalds had failed. Cooke was at Gosport when the line was opened and the Queen's Speech received. Two printers at his elbow set the type of alternate sentences, and Cooke, armed with copies of the speech, returned by the next train to London. The old semaphore system was, at last, nearly superseded.

Cooke was now prepared to accept a challenge to lay down a telegraph from London to Falmouth, Liverpool or Edinburgh, without any intermediate stops. The last practical difficulty regarding insulation 'the great difficulty we have had to contend with', had been overcome. He had obtained 'by simplest and cheapest means', presumably by pottery or porcelain cups attached to the posts, the insulation which rendered distance of no importance. This would be the base for the 'rapid extension' of the electric telegraph.⁴⁰

The success of the London to Gosport line meant more business. Negotiations were begun with the government to lay telegraphs on the Chester to Holyhead line. This was of great significance. The telegraph would stretch from London to Holyhead, some 300 miles, embracing in its route the commercial cities of Liverpool, Manchester and Birmingham. Adoption of the invention on a scale of this magnitude was likely to effect radical changes, especially in the commercial world. In particular, the establishment of telegraphic communication between Liverpool and Holyhead and Lloyds gave every facility for shipping purposes. In this respect the invention was already working most efficiently. Telegraphic notices were despatched daily on the arrival of important mails and merchantmen. *The Times* of 12 April 1845 reported that the arrival of the West Indian steamer *Tiviot* at Southampton had been announced at Lloyds by means of the electric telegraph on the LSWR. Cooke also considered the telegraph well suited for mines, coal pits and docks. One was certainly in use at the Poynton Colliery near Manchester in 1845.

The electric telegraph was also applied to atmospheric railways,

where reliable telegraphic communication between the engine houses was so vital. Without it, engines were overdriven, used excessive fuel, and thus pushed up working costs. The first atmospheric line, the Kingston & Dalkey in Ireland (part of the Dublin to Kingston railway) had only one engine-house; it opened without a telegraph in 1844, but one was put in within months. The next, the London & Croydon, opened in January 1846, with three telegraphs. Spelling out messages letter by letter, the telegraph was used from the start and 'judging by the absence of minuted complaints it worked well'. In 1847 the telegraph was installed by Brunel on the last of the atmospherics, in South Devon.⁴¹

The extent of quickening activity can be gauged from Cooke's outlay on telegraphs; from 1836 to 1844 he spent £31,279, in 1845 alone £71,719. According to his own notes, receipts throughout the period amounted to £96,974,⁴² excluding sums due on payment of works in hand.

In August 1844 came the first application of the telegraph to police work, on the GWR. The commissioners of police ordered that several detectives be stationed at Paddington to identify known criminals seen boarding the train to Eton, and to send details of them to Slough. Edwin Chadwick, the Poor Law Commissioner, a member of the commission reporting on the establishment of a general police force, had long advocated the use of the electric telegraph in police work. Its suitability was effectively shown on 3 January 1845 when John Tawell, dressed as a Quaker in a great brown coat reaching nearly down to his feet, was arrested at a lodging house in London after murdering his mistress at Slough. The transmission of his description by telegraph to Paddington was largely responsible for his rapid arrest. Although the letter 'q' was absent from the alphabet on the five-needle instrument, 'kwa' was transmitted from Slough. This was challenged, interrupted, repeated and queried again. Eventually Slough was allowed to finish the message when the word 'kwaker' then explained itself.⁴³ The Tawell arrest publicised the telegraph and alerted public opinion to the new device, 'the cords that hung John Tawell'.

The year 1845 was a significant one in the development of the

telegraph, for the transmission of news too was fundamentally changed. By its use *The Morning Chronicle* was able to report a political meeting at Portsmouth one day ahead of its contemporaries. Hitherto news had travelled slowly, newspapers resorting to carrier pigeons, semaphores and, once in the case of *The Times*, a fast channel steamer for news from the continent. The American Declaration of Independence on 4 July 1776 was not reported until 21 August, the victory at Trafalgar on 21 October 1805 until 2 November; political speeches were often not reported at all before the 1830s.

The autumn of 1845 saw Wheatstone in Brussels, to obtain the contract for the first telegraph in Belgium, between Brussels and Antwerp; Cooke hoping to conclude terms with the South Eastern Railway, for a line from Dover to London; and a letter from the Governor of Ceylon, desirous of establishing a telegraph between Port Gallis and Colombo, a distance of 62 miles.⁴⁴ The patentees had already established a telegraph at Aix-la-Chapelle, visited by the King of Prussia, and in 1842 from Paris to Versailles.

The partnership of Cooke and Wheatstone had never been an easy one. In 1837 Cooke had shown resentment at 'inaccurate' newspaper reports describing 'Professor Wheatstone's Telegraph' and the partners had needed a mediator before they could put their business relationship on a proper footing. Under an agreement of 18 November 1837⁴⁵ the proceeds of the patent were to be divided 55 per cent to Cooke and 45 per cent to Wheatstone, the extra 10 per cent being a fee to Cooke for acting as sole manager in the UK. Cooke also had the sole right to act as contractor for the laying of telegraphs, for which he could make terms separately. Wheatstone had most of the continental rights, Cooke having the privilege in Russia and Austria. Both partners pledged themselves to inform each other, for their mutual benefit, of all improvements they might achieve in the signalling or sounding of alarms by electricity. But they differed both in approach and character. Wheatstone wanted scientific glory with, if possible, substantial monetary reward as well. Cooke wanted commercial success with a fair proportion of scientific acclamation; he certainly attached considerable importance to the claim of originality in the method

of transmitting the electric circuit to the magnetic needle. In 1840, before the Select Committee on Railway Communications, the first question put to C. A. Saunders was phrased unintentionally to inflame Cooke, by implying that he was merely an assistant or sleeping partner: 'As secretary of the Great Western Railway Company, can you state to the committee whether they have adopted Wheatstone's Magnetic Telegraph?' Cooke was apparently waiting at the door of the committee to give evidence, but was not called. Articles in the press provoked Cooke into writing a strong letter to Wheatstone. There followed an exchange of letters, after which Cooke suggested arbitration, and Wheatstone agreed.

The arbitrators, Sir Marc Isambard Brunel, engineer of the Thames tunnel and father of I. K. Brunel, acting for Cooke, and J. F. Daniell, professor of chemistry at Kings College, for Wheatstone, faced a difficult task, as their terms of reference required them to consider far more than the priority of the inventions:

What shares, and with what practices and degrees of merit the parties are co-inventors of the Electric Telegraph; due regard being paid to the original projection of; to the development of its law and properties; to the practical introduction of it into the United Kingdom; to the improvements made upon it since its introduction . . . to all other matters which the arbitrators shall think . . .

In a detailed statement of his case Cooke claimed that he 'alone projected and originated the electric telegraph as a work of practical utility'. Wheatstone argued that, 'Cooke's instrument, which he called an electric telegraph, had never been practically applied and was incapable of being so', whereas the instruments which he had invented were all founded on principles previously proved by decisive researches, 'not merely theoretical but of a practical nature'. The arbitrators persuaded the disputants to agree to what was necessarily an ambiguous award. Their conclusion was that Cooke was entitled to stand alone, having practically introduced and carried out the electric telegraph as a useful undertaking, promising to be a 'work of national importance'; Wheatstone was acknowledged as a scientific man whose 'profound and successful researches had already prepared the public to receive it [the telegraph] as a project capable of practical application'. It was to their

united efforts that the progress of the invention could be attributed. The award was accepted, but the partners continued their uneasy and 'hollow truce'. The claims and refutations were a foretaste of what was to occur in the 1850s and 1860s when bitter controversy followed an article in the *Quarterly Review* of 1854. In 1866 the laying of the Atlantic cable reopened the controversy.

On 12 April 1843, the patentees agreed to Cooke becoming sole proprietor of the patents in the United Kingdom, and to Wheatstone receiving, in exchange for his share, a grant of royalty on all lines of telegraph which should be constructed under them, on a sliding scale depending on the length of the line.⁴⁶ Wheatstone had several times expressed a wish to withdraw from active participation on the commercial side of the business. In January Cooke had proposed that Wheatstone should either find half the capital required for the impending Windsor telegraph or cede the right of putting up the line to Cooke, who was convinced that 'further increased outlay was indispensable in order to construct a specimen telegraph on the suspension system'. Wheatstone was not prepared to co-operate.⁴⁷ In return Wheatstone was to have an exclusive licence to work patents on district telegraphs, when the communication did not extend beyond half a mile. This later proved to be a very valuable concession as private telegraphs developed. Wheatstone was also to retain the rights to employ the principles and mechanisms of the patents for purposes other than telegraphy.

Doubtless, Cooke had it in mind to offer 'an unfettered share in the patents to an influential capitalist', an objective since 1837.⁴⁸ In the summer of 1845 he was in contact with John Lewis Ricardo, since 1841 MP for Stoke, nephew of economist David Ricardo, and a prominent free trader and financier. Ricardo, born in 1812 and educated at Eton, was a colourful, dynamic personality. His daring feats of horsemanship have been well recorded. A patron of the fine arts and literature, an accomplished artist himself, he yet possessed the financial acumen of his family. The introduction was probably through George Bidder, who, guided by his experiences upon the Blackwall Railway, was one of the first to perceive the immense value of the electric telegraph for commercial and general purposes. The intention was

for Ricardo and Bidder to purchase part of the patent rights, with a view to the formation of a company to work the electric telegraph. In August 1845 Cooke's solicitors were instructed to arrange and schedule the numerous patents, specifications and drawings, together with copies of licences and contracts already completed. After considerable correspondence Wheatstone agreed to commute his royalty rights on all lines for £30,000.⁴⁹ Under a memorandum of agreement, 23 December 1845,⁵⁰ between Cooke, Ricardo and Bidder, 12/32nds of the patents were assigned to Ricardo at a price of £60,000, 11/32nds to Bidder at a price of £55,000, and the rest to Cooke, putting their value at £160,000. The apportioned consideration in each case was payable as follows:

	<i>1st Instalment</i> payable cash		<i>2nd Instalment</i> 1st April 1846	<i>3rd Instalment</i> payable out of first profits
	£	£	£	Total
J. L. Ricardo	24,000	18,000	18,000	60,000
G. P. Bidder	14,000	10,500	30,500	55,000

The only previous valuation of the English patents had been in January 1843,⁵¹ when 'friends of Wheatstone proposed to purchase a share'. Wheatstone then named, and Cooke approved, £5,000 as the value of a quarter share, a total valuation of £20,000. In 1845 the value of the English patents was £144,000, an indication of the rapid growth in 1844-5. Cooke received for his patents and business, as telegraphic engineer and contractor, £91,158, partly dependent on profits from the proposed company, and partly in shares.

In 1846 the Electric Telegraph Company, which had been provisionally registered in September 1845 by Cooke and R. Wilson, his solicitor, was incorporated to buy out the patents of Cooke and Wheatstone.⁵² The prospectus claimed that arrangements for the formation of the company had been in progress for a month in connection with some leading railway companies. Cooke wrote on 10 September 1845: 'two telegraph companies have sprung up within the week, the names of the promoters are not formidable but they pretend to be supported by some of the railway companies and influential individuals. I have advertised a counter company to ensure possession of the field.' There was some dis-

pute as to whether Wheatstone had been appointed scientific adviser to the new company. According to a supplementary agreement with Wheatstone, dated 3 October 1845, he was to be appointed scientific officer at a salary of £700 per annum.⁵³

When the bill for the incorporation of the company was brought into Parliament in 1846, it was opposed by Alexander Bain who had taken out patents in December 1841, 1843 and September 1845, related to wire suspension, improvements in printing telegraphs, and electric clocks. He asserted in his petition that he had invented both an electric clock and an electric printing telegraph, and had communicated his inventions confidentially to Wheatstone. The bill was carried through the House of Commons, but Bain's statement and evidence made such an impression in the House of Lords that the Lords' Committee was of the opinion that the company ought to make an arrangement with Bain and that the bill might be thrown out if it declined to do so. Thus Bain was bought off, subsequently being elected a director, although he soon resigned. He held 150 ordinary shares (£25 paid) on 1 July 1847, but he was not a shareholder by December 1848. In the event Wheatstone's relationship with the company was severed.

By 1846 the pioneering phase in the new industry was ended, and the foundations laid for a telegraph network. The telegraph had proved its worth for police purposes; it was essential for all remote-powered railway systems and atmospherics, and it had increased efficiency on the Paddington-Slough run, the only part of the system where non-railway messages could be sent by the general public; on single-line systems and through tunnels it was indispensable. The block system had been successfully introduced, although the system established on the Eastern Counties line between Norwich and Yarmouth was abandoned by the railway because of the maintenance cost of so many wires and instruments.

The commercial world was slowly realising the telegraph's significance, the government was aware of its strategic implications, and the press was awakening to its potential; indeed it was the publicity surrounding the Tawell murder, which probably aroused the financial interest of J. L. Ricardo. The greatest prospects lay, however, in the massive expenditure on railways,

which was to reach its peak in 1847-8. Here the market was immense. On the continent, in France, Belgium and Germany there was great interest, and in the USA, by 1846, the most distant sections of the union had been connected by telegraphs, with over 1,100 miles of line laid, the longest stretch being from New York to Buffalo, over 450 miles. This represented explosive development, as the first telegraph line had not been laid until 1844, on the Baltimore & Ohio Railway, when, by means of a Morse printing telegraph, the nomination of James K. Pack for president was made at Baltimore and announced in Washington two hours in advance of the mail.

Notes to this chapter are on pages 272-3

CHAPTER THREE

DEVELOPMENT UNDER THE COMPANIES

i

With the incorporation of the Electric Telegraph Company a new era in telegraph history had begun. For the next twenty-four years, until the Post Office took over the telegraph system in 1870, the development of inland telegraphic communications was left entirely to private enterprise, with the ETC the dominant concern; there was neither government financial assistance, parliamentary intervention, nor any central planning of a co-ordinated national network. The whole of the capital required was raised through the medium of joint-stock companies by public subscription. Not until the Telegraph Act 1863¹ was there any general Act relating to the telegraph system and the telegraph companies.

On the continent, almost from the beginning, the telegraph system was run as a state monopoly. It was considered of military and political importance, and no important lines were constructed by private enterprise.² In France the first electric telegraph line was constructed by the government for its own use in 1845, and not until November 1850 was public use allowed, with priority for official despatches. In July 1847 the Minister of the Interior, Lacave-Laplagne, declared in the Chamber of Deputies: 'La télégraphie doit être un instrument politique, et non un instrument commerciale.' Government service continued to be the prime purpose of the telegraph and until 1878 it remained under the administration of the minister of the interior, the head of the national police. In Prussia the military authorities displayed from the first a keen interest; the defects of the semaphore and the advantages of improving it were clearly recognised. In 1846 a military commission was appointed to investigate the possibilities and an experimental line was built between Berlin and Potsdam. Walter Siemens, later head of the great firm of Siemens

& Halske, then a young officer in the Prussian army, played an important part in this early experimental work. In 1847 he resigned his commission and founded a private telegraph construction works which in 1848-9 constructed major lines of telegraph communication with Berlin. Not until 1849 was the state system opened to the public. Austria had neglected the semaphore and ignored the electric telegraph until 1846, when experiments were begun along the government railway from Vienna to Brunn. Metternich declared the telegraph to be a monopoly of the state and it was not until June 1849 that it was opened to the public.

The ETC authorised capital was £600,000 in 6,000 £100 shares with liability unlimited for shareholders. There was still hostility in legal and mercantile circles towards general limited liability. Fears of speculative trading and the possibility of fraudulent promotion were voiced.³ *The Times* was consistently, over several decades, an outspoken foe of joint-stock enterprise and limited liability in general, because of the difficulty of fixing responsibility upon shareholders in the event of financial embarrassment. Thus the Joint-Stock Company Registration and Regulation Act 1844,⁴ while providing for the incorporation of new companies by simple registration, still left the liability of individual partners unlimited. However, the Act marked an epoch in the history of English company law by legally recognising a powerful instrument for the organisation and application of large amounts of capital. It was felt that general limited liability might be applicable in cases where very great capital was required, where the institutions were involved in long and continued risk, where the enterprises were to promote foreign trade or banking, or where the object was hazardous.

Prospects for the electric telegraph were still relatively hazy. The ETC had a limited amount of commercially workable line and a seemingly promising, though short-lived, future in signalling on remote-powered railways. It possessed the various systems devised by Cooke and Wheatstone and their patents. Yet there was a considerable risk involved in the investment by the initial eight shareholders in the 4,480 shares issued, with £25 per share called. The first directors were Cooke, John Lewis Ricardo and Samson

Ricardo, his uncle. George Parker Bidder was the largest single shareholder with 1,540 shares. Other shareholders were Albert and Frederick Ricardo, Thomas Boulton, and Benjamin Hawes, MP, the brother-in-law of I. K. Brunel, who had been introduced to Cooke in September 1837. John Lewis Ricardo became the first chairman of the company and his brother Albert became senior auditor. The original shareholdings were as follows:⁵

George P. Bidder	1,540 shares	£25 called	£38,500	paid up
W. F. Cooke	1,160	„	29,000	„
J. L. Ricardo	728	„	18,200	„
Samson Ricardo	616	„	15,400	„
Thomas Boulton	224	„	5,600	„
Benjamin Hawes	100	„	2,500	„
Albert Ricardo	56	„	1,400	„
Frederick Ricardo	56	„	1,400	„

It is probable that the ETC encountered considerable difficulties in these early years. In 1846 the company obtained a concession from the Belgian Government covering the whole of Belgium, and in September 1846 opened a line between Brussels and Antwerp. However, as there was little business outside stock exchange traffic, it could scarcely cover its operating expenses.⁶ In 1847 the company declined to build from Brussels to Quiévrain, where connection was to be made with the proposed French telegraph, and in 1850 sold back its original undertaking to the public authorities. In 1846 an abortive attempt was made by the ETC to interest the directors of the East India Company in the civil and military advantages of a telegraph system to connect the principal seats of government and commerce in India.⁷ Following a dispute with the GWR, in May 1848, over compensation for damage to an engine on the Paddington to Slough line, the telegraph was removed from the line by the ETC in June 1849. Apparently, 'it was not remunerative' to the ETC and 'had not covered its expenses for maintenance.'⁸ This was ironic for by November 1848, telegraphs covered over 1,800 miles of railway (about 50 per cent of those open) and the wires were being 'daily expanded'. The GWR continued to make use of the telegraph at the Box tunnel and in 1852 a telegraph was completed between London & Bristol. In 1853 the company created the post of telegraph superintendent,

appointing Charles Spagnoletti, later to make major contributions to block telegraphy.

Contracts with railway companies for the construction and maintenance of railway telegraphs were the chief sources of revenue. On 21 July 1849 contracts were sealed for five lines including the North Kent and the Crewe–Manchester. These contracts were in many cases highly advantageous to the ETC, enabling it to have exclusive wayleave rights for its telegraphs over the railway companies' lines in return for the use of the ETC's patents, clerks and other services. The agreement between the ETC and the Chester & Holyhead Railway on 13 March 1851 was typical. The ETC was to construct a line of two wires and maintain it for fourteen years; no other party was to be allowed to construct or use telegraphs on the line during this period, and the ETC was to erect lines for its own use along the railway.⁹ As a result of these substantial exclusive wayleave rights over the railways, later companies were obliged to use the roads and canals for their routes between the principal towns in the country.

Provincial newspapers were being increasingly supplied with parliamentary and general news, and contracts with the press and stock exchanges were becoming significant sources of revenue. In May 1849 a telegraph was established at the Central Post Office and correspondence was started with the Admiralty about a telegraph between Whitehall and Somerset House; a contract was signed in April 1850. The possibility of general commercial use still seemed to be little appreciated. F. E. Baines, then an employee of the ETC, later surveyor general of telegraphs and assistant postmaster-general, wrote of this period: 'Messages at the head office [of the company] were few. The charges were so high that it was for the most part only in an emergency that the telegraph was resorted to . . .' with 'perhaps not more than two to three messages spread over ten hours of daily attendance'.¹⁰ However, during the cholera epidemic of 1848, the General Board of Health sent instructions to its medical inspectors by telegraph, and so was able to use its establishment to the full.

The shares of the company in these years were 'almost valueless'. However, largely as a result of its contracts with the railways, the ETC was able to pay its first dividend, 2 per cent, on 30 June

1849. After this the company did not look back; the second half of 1849 saw profits reach £8,732, and the 2 per cent dividend was repeated. It is significant that among the twenty-three shareholders in 1849, when the issued capital had risen to £300,000, were railway contractors Samuel Morton Peto, elected a director in 1849, and Thomas Brassey, holding 175 and 333 shares respectively. Both were fellow directors of J. L. Ricardo in the Norwegian Trunk Railway Company. The railway influence among shareholders was emphasised by the presence of railway engineer and MP, Robert Stephenson, who had played an important part in the earliest development of the telegraph; he held 175 shares and for a brief period, 1857-8, was chairman of the company. Other important new shareholders were Joseph Paxton, later MP for Coventry and a director of various railway companies, and Richard Till, director of the Norfolk, Wells & Fakenham, the West End of London & Crystal Palace Railway, and other companies.

The possibilities of the new device in times of national emergency had been obviously appreciated from the outset. The ETC Act of 1846 had reserved to the home secretary the right to take possession of the company's telegraphs for one week when internal disturbance threatened, and for longer if necessary. These powers were exercised in April 1848, when, using the resources of the ETC, the government was able to obstruct the Chartist lines of communication.¹¹ The ETC was compelled to erect instruments additional to the ones normally in service and when the alarm was over sent in a bill for £500. The expense of requisition was of course sufficient to prevent the powers being used lightly. The assistance to the Home Office in 1848 gave the ETC an excuse for seeking indirectly—and unsuccessfully—a government subsidy, with veiled threats that the company would 'suppress all but the more profitable lines of telegraphy . . . or sell out to a less scrupulous concern which would vend information to the press in times of disturbance. . . .'¹²

In 1849 a rival company, the British Electric Telegraph Company, was promoted. It received its special Act in July 1850,¹³ although opposed by the ETC, to work the patents of the brothers Henry and Edward Highton, who had collaborated in devising 'improve-

ments in Electric Telegraphy', granted on 25 January 1848. The company was empowered to 'facilitate telegraphic communication with other countries' and make agreements outside the UK for working and constructing telegraphs abroad. The initial capital was to be £200,000 in 4,000 ordinary shares of £50 each. The shareholders were to have unlimited liability and the first directors were Edward Highton, William Davison and William Done Bushell, a director of the North British Railway. For the first time the ETC monopoly in inland telegraphy was being challenged. The prospects for another inland company were good. By April 1850 there were approximately 7,231 miles of railway open, or due for opening, with a further 4,795 miles pending. There were ETC wires over only 2,215 miles of railway, and so thousands of miles were still without the telegraph. In Ireland there were 500 miles of railway but no telegraph. This situation compared unfavourably with the USA, where by 1850 there were over 12,000 miles of telegraphs, the property of 20 telegraph companies. The implication was that competing companies might bring more facilities and lower charges.

The year 1851 was a significant one. Thirteen telegraph instruments were displayed at the Great Exhibition and, moreover, for the railways the heavy additional traffic resulting from the exhibition provided a severe test of the value of the telegraph. Mark Huish, engineer to the London & North Western Railway, wrote to the Road and Traffic Committee of the railway that the telegraph had proved its worth by extending the capacity of the railway 'in an incalculable degree'.¹⁴ In the first half of 1851 the ETC contracted with railway companies for the construction of 970 miles of line, including the Manchester, Sheffield & Lincolnshire, the Great Northern and the GWR, whose lines were to be extended from London to Exeter and Plymouth. On 13 November 1851 the first international submarine cable, between Dover and Calais, was opened to the public. For the first time the prices of securities in Paris were known to the London Stock Exchange on the same day and within business hours. On 21 November 1851 *The Times* reported the Paris political news so promptly as to demonstrate the efficiency of the telegraph. This was a great stimulus, as financial and trading interests became increasingly convinced of its

practical value. A boom in cable laying and submarine telegraphy followed, culminating in the attempts, eventually successful, to lay an Atlantic cable.

In August 1851 the English & Irish Magnetic Telegraph Company was incorporated to provide links between England and Ireland by submarine telegraph.¹⁵ It was authorised to work the patents of William Thomas Henley and David George Foster, granted 10 August 1848, for 'Certain improvements in telegraphic communication and in apparatus connected therewith. . . .' The wires were worked by magnetic electricity and required no galvanic batteries; on 25 June 1851 *The Times* had reported some remarkable experiments across the Serpentine with 'Henley's Magnetic Telegraph'. The liability of shareholders was unlimited and the original directors included Charles Kemp Dyer, later a director of the London & District Telegraph Company, and Henley. The initial capital was £100,000 in 2,000 shares of £50. For some time the EIM was the only English company in contact with Cork, Queenstown and other inland towns in Ireland.

The ETC was not to be left behind in the development of international communications by submarine telegraph. In 1852 a concession was obtained from the Dutch Government to lay wires from Orfordness, on the east coast of England, to Scheveningham in Holland, and from there to the Hague (120 miles across the North Sea). Two cables were laid in 1853 and 1854. The potential profitability of communications with the great commercial centres of Rotterdam and Amsterdam was clear. The Dutch Government had objections to the line in Holland being made by the ETC.¹⁶ Accordingly, a fresh company was formed, the International Telegraph Company, with a nominal capital of £150,000. One third of the shares was to be divided pro rata among shareholders of the ETC, one third was to be offered in London and one third in Amsterdam, Rotterdam and the Hague. The ETC directors managed the company, with ETC staff. By the end of 1852 London was in direct telegraphic communication with all the chief cities of the continent.

In 1852 arrangements were completed between the ETC, the astronomer royal and the South Eastern Railway Company for transmitting Greenwich Mean Time to London and the provinces.

An ingenious apparatus was designed by Edwin Clark, the company's chief engineer. On the top of its premises in the Strand the ETC erected a 'time-ball', which was linked electrically to the Greenwich 'time-ball' in such a way that both balls fell simultaneously at 1pm. Other 'time-balls' were established in Edinburgh, at the top of the Nelson monument, and in Glasgow, on the tower of the sailors' home. The Admiralty established one at Deal and there was another at Liverpool belonging to the ETC. The system was particularly useful to shipping. The ETC also erected an electric clock in the Strand; time signals sent by the hour from Greenwich were transmitted through the ETC wires to stations all over the UK.¹⁷

Between 1851 and 1855, the ETC system grew from 2,122 to 5,228 miles of line, and messages transmitted increased from 99,216 to 745,880. Its telegraphs embraced almost every town in England and were extended to Ireland by means of a submarine cable between Holyhead and Dublin, while the BETC system operated more in the north of England, Scotland and Ireland. Increased competition led to numerous tariff reductions between 1851 and 1855. The maximum charge for an inland telegram over 100 miles was reduced from 10s (50p) to 4s (20p). The Crimean War adversely affected business, although the cable companies probably benefited. This increased endeavours by the inland companies to reduce costs.

In July 1855 the Electric Telegraph Consolidation Act¹⁸ enabled the ETC and the IRC to merge into the Electric & International Telegraph Company, commonly known as the 'Electric'. The response of the Dutch public to the offer of shares in the IRC had been disappointing, even though in February 1855 agreement had been reached with the Holland Railway Company for an extension along its line to Amsterdam.¹⁹ The Dutch Government allowed the Electric to work the line, although generally major lines were to be built by the state. A significant feature of the Act was that dividend limitation was imposed for the first time on a telegraph company; 10 per cent was to be the maximum dividend payable, unless a larger dividend was necessary to make up a previous deficiency. This brought the Electric into line with other public utility companies such as the gas, water and railway

companies. Shareholders in the new company were granted limited liability.

The trend to rationalisation in the industry was emphasised in April 1857. The BETC and the EIM amalgamated to form the British & Irish Magnetic Telegraph Company (the 'Magnetic'), a company with limited liability under the Joint-Stock Act 1856. The amalgamation reduced duplication in offices, staff and overall working expenses, thus giving greater efficiency and economy over a united system. The Magnetic formed a powerful competitor to the Electric, with an authorised capital of £600,000 of which £581,150 was issued. There were strong provincial and commercial interests among the shareholders. The head office was in Liverpool, and of the original sixteen directors seven were from Liverpool, five from London, two from Dublin, and one each from Glasgow and Manchester. Among the directors were Sir Joseph Ewart, MP for New Brighton and a director of the North Union Railway Company and the Atlantic Telegraph Company, Edward Cropper, a director of several railway companies including the LNWR, V. O'B. O'Connor, a prominent figure in Irish railway development, John Pender, later a director of the Telegraph Construction & Maintenance Company and the British Indian Submarine Company, John Watkins Brett and Sir James Carmichael, both directors of the Submarine Telegraph Company, and Charles Kemp Dyer and Lightly Simpson, later to have connections with the London District Company. Approximately 60 per cent of all shareholders came from Liverpool, Glasgow and the North, approximately 26 per cent from London; 30 per cent of shareholders were merchants and brokers.²⁰

From the outset the Magnetic was particularly strong in Ireland, having a virtual monopoly of the use of the railways. The Electric was forced to use the roads and canals to expand its system, the very reverse of the situation in Britain. In certain cases it was forced to purchase existing lines to expand, which was more expensive. In 1858 the Magnetic made a contract with the Midland & Great Western Railway Company of Ireland, which not only resulted in a large expansion of the telegraph system but also led to a considerable business developing in the transmission of transatlantic messages via Newfoundland, by means of the Gal-

way steamers.²¹ Furthermore, the Magnetic had strong connections with the Submarine Telegraph Company. In July 1854 its forebear, the BETC, and the European & American Electric Printing Telegraph Company had agreed for the EAPT to assign to the BETC for £130,000, exclusive use of lines of telegraph constructed or in the course of construction by the EAPT, together with patents and the benefits of current contracts. The most significant of these lines was that between London and Dover, which connected with the STC cable between France and England.¹¹ Thus the purchase of the EAPT wires and concessions gave the BETC a powerful position in communication between London and the continent. These rights were automatically vested in the new joint company. The Electric was aware of the importance of the Magnetic connection with the STC. An entry in the private letter book of July 1856 stated: 'a connection with the Submarine Company is indispensable to our future prosperity'.

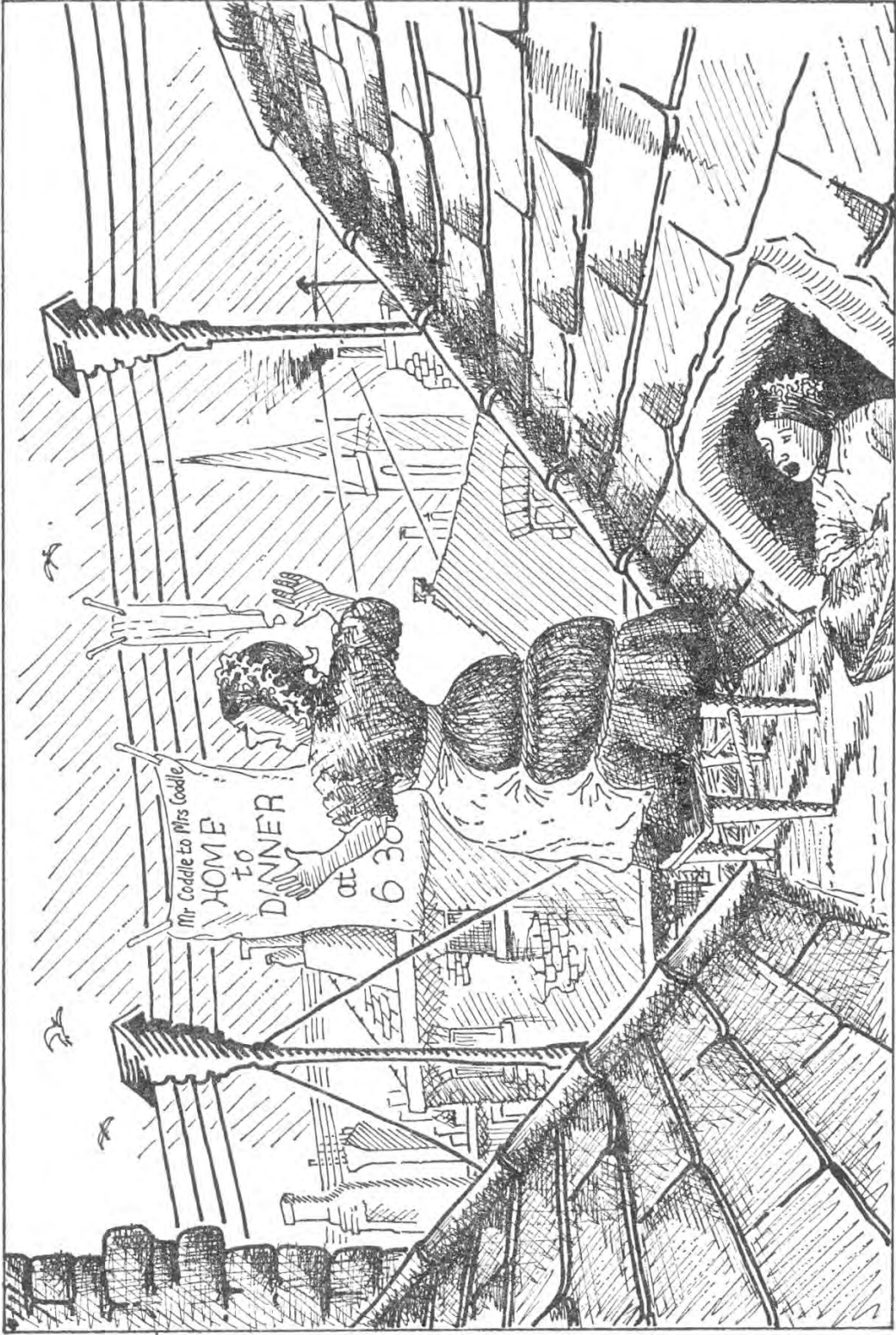
In April 1859 the Magnetic moved into new offices in Threadneedle Street, 'a noble edifice with front of Portland Stone'. The premises were erected as a central London station for the Magnetic and also for the STC. The building was constructed on the site of the Baltic Coffee House and adjacent premises. The ramifications of the telegraphs were becoming so developed that 'it appears probable that in a very short space of time these offices may be in immediate rapport with Hindostan, China and even Australia', commented the *Illustrated London News* of 2 April 1859. By 1857 the Electric had 430 inland stations open to the public and over 6,000 miles of line were in operation, stretching from Huntley, beyond Aberdeen, to Falmouth, and from Holyhead to Yarmouth.²³ In 1858 and 1859 independent companies were established to lay submarine cables between Weymouth and the Channel Islands, and from Cumberland to the Isle of Man, both exclusively connected with the Electric system. In 1860 lines were projected by an independent company to the Isle of Wight, to be worked by the Electric in connection with its general system. In the same year the telegraph was extended to the royal residence at Balmoral.

By this date, telegraphs were in common use at docks. From 1859 one was in use at London Docks and in 1860 a line was

established between Liverpool and Holyhead by the Manchester Dock & Harbour Board. Previously communication was by semaphore which in foggy weather was totally inadequate. News could now be transmitted to Birkenhead Docks of vessels homeward bound off Holyhead, which was of great value to ship-owners who were able to send out steamers to bring their ships into port without additional expense. A similar telegraph was established in January 1861 from Milford Haven to the royal dockyards at Pembroke.

Thus for a short period the telegraph system of the UK was controlled by the Electric and the Magnetic. In 1859 the London District Telegraph Company (the 'District') was formed with a nominal capital of £60,000 in £5 shares. The directors included Samuel Gurney, liberal MP for Penry & Falmouth, who was one of a Quaker family of philanthropists and bankers. He was partner in the banking firm of Overend, Gurney & Co, a director of the STC and Alliance Assurance. He supported proposals for a transatlantic cable and was a member of numerous radical societies, including that for the ending of slavery. Other respected names on the board were John Watkins Brett and Charles Kemp Dyer, both directors of the Magnetic. The link with the Magnetic was emphasised further by the fact that the secretary and general manager of the District was E. B. Bright, secretary of the Magnetic. The initial staff of forty-five ladies was trained at the newly built headquarters of the Magnetic. The District was to develop telegraphic communication within a radius of 4 miles from Charing Cross, with provision to extend to 20 miles, thus exploiting the potential of the London traffic without extending the system to unprofitable areas. The tariff was to be the low one of 4d for 10 words and 6d (2½p) for 15 words. The company hoped to employ the over-house method, cheaper than underground, and thus avoid damage to pavements. Wires were strung from telescopic iron masts, fixed on roof tops. Permission had to be sought from landlords and tenants, and wayleave payments had to be made.

The first over-house wire had been established between the two factories of Messrs Sydney & Alfred Waterlow, in July 1858, some quarter of a mile from London Wall to Birchin Lane in the



House Top Telegraphs. A cartoon circa 1862 by an unknown artist. The District Telegraph Company met many problems in finding resting places for its wires

City of London. They arranged their posts on house tops, stretching their wire high up across the street. A similar system existed in Paris, Brussels and New York, for local purposes.²⁴ Clearly the success of the system depended upon the consent of householders 'overtopped'.

In May 1859 the workmen of the District Telegraph Company were 'actively engaged in erecting poles and wires on housetops along the Kennington Road. . . .' A graphic account of the problems facing the company, in persuading householders to allow it use of their roofs, was given in November 1859 in *All the Year Round*, the magazine edited by Charles Dickens, in an article called 'House-Top Telegraphs':

160 miles of wire are now fixed along parapets, through trees, over garrets, round chimney pots across roads on the southern side of the river . . . the difficulty decreases as the work goes on and the sturdiest Englishmen is ready to give up the roof of his castle in the interests of science and the public good when he finds that hundreds of his neighbours have already led the way.

The District required at least six house-top resting places in a mile, and offered a nominal rent of a shilling a year, arguing that a low tariff might be based on a moderate outlay of capital on the permanent way. Some instances of difficulty were recorded:

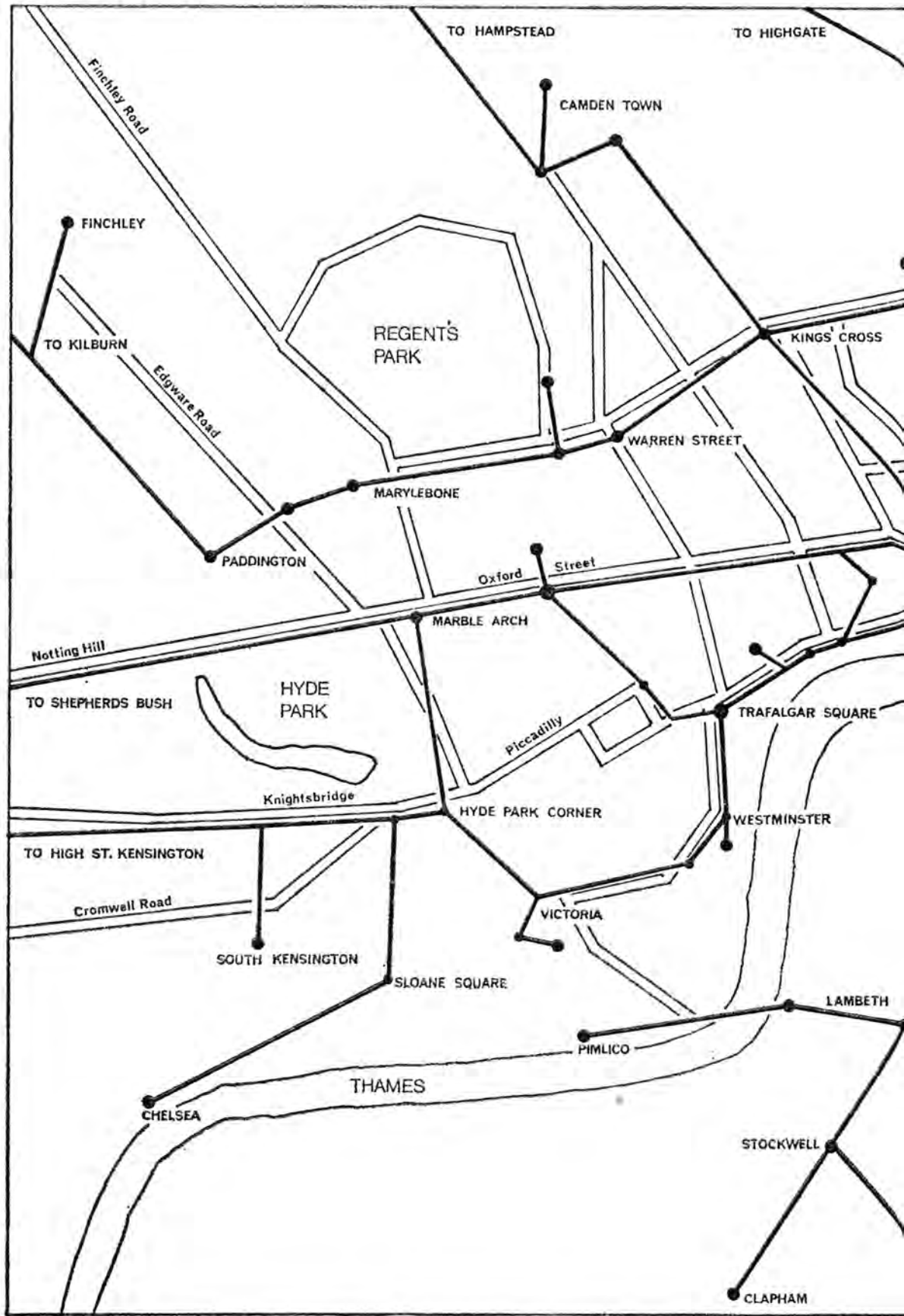
British householder (number 504) was an old lady subject to fits, and she only wondered what next would be proposed to hurry her into the grave. British householder (number 610) was another old lady who worshipped a clean passage; and she merely consented upon condition that the workpeople only passed through her house once, to get at the roof, carefully wiping their shoes on the mat in the attic. An agreement was made upon this peculiar basis and the carpenters were kept sixteen hours amongst the chimney pots; their food being drawn up by a rope from the street. The consent of British householder (number 810) was secured by a display of pocket models; but when the workmen arrived with a pole as long as a clothes-prop he stopped them on the ground that they were attempting an imposition. He had not allowed for the portable character of the mast; and the pole he had expected to see fixed to the house top was about the size of a tooth-pick. Finally British householder (number 92) was only too glad to be of service but unfortunately his house was so old and crumbling that not another nail could be driven in with safety.

Nearly 4,000 calls were made to get the consent of some 1,900 persons, and this for 160 miles of wire. The remaining 120 miles required 3,000 more visits. Landlords of all house property, as well as tenants, had to be consulted, doubling the work of the company's representatives. The chairman, reporting to shareholders in August 1860, commented: 'Residents in the suburbs have been unwilling to have wires carried over their homes. Indeed some persons had demanded compensation and others had required them to lease the space between the roofs of their house and the heavens.'

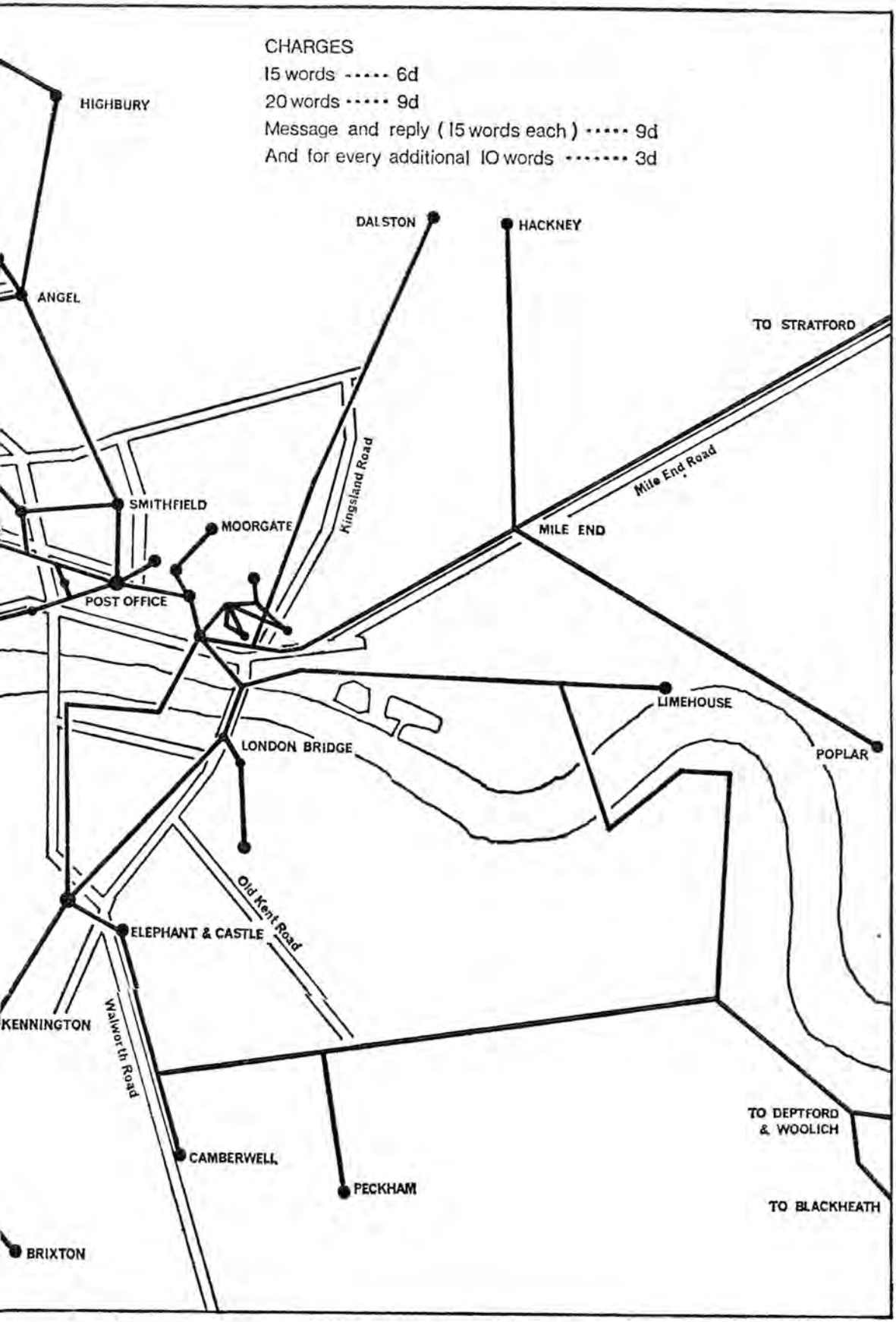
In June 1859 the District contracted for the Magnetic to erect and repair all telegraphs within the District area at the latter's expense, and to lease such telegrams at a peppercorn rent for 999 years. The District could use Magnetic offices, and would collect and deliver provincial messages within their limits for the older established company.

By 1860 the District had opened 52 stations of its intended 100, providing 335 miles of line. In 1860-1 messages transmitted increased by 93 per cent from 74,583 to 144,022, and there were 77 stations opened. By 1862 250,000 messages were transmitted, even though the company raised its tariff to 6d for 15 words in 1861. Telegraphic communication of a domestic character steadily increased. It became 'common to order places at the opera . . . and doctors when taken suddenly ill send round to their patients to know if they will be wanted'. Tradesmen in the suburbs, dealing with perishable articles of food, telegraphed to Billingsgate or Leadenhall for fish or poultry. Information of the great fire at Limehouse in October 1860 was conveyed from a branch office of the District in Commercial Road to the fire brigade in Watling Street in eight minutes. Thus the District made its impact, and a large increase in telegraphic business resulted in the metropolis.

The last of the major inland telegraph companies was the United Kingdom Telegraph Company²⁵ formed to develop telegraphic communications in Great Britain and Ireland over the public highways, by the 'purchasing and carrying out of the system of Thomas Allan in Electric Telegraphs'. Allan had provisionally registered the UKTC in December 1850 and the company



The telegraph system in London. The London District was to bring down



District network circa 1861. The impact of the tariffs in the metropolitan area

received its special Act in 1851. It issued a prospectus in 1853 but it was abortive until July 1860 when capital was raised. Authorised capital was £150,000 in 30,000 shares of £5 each. Directors included James Pilkington, MP for Blackburn, Alexander Croll, contractor, Lord Alfred Spencer Churchill, MP, James Nugent Daniell, chairman of the Blackwall Railway, and Admiral Sir Henry Leeke, MP for Dover and formerly Commander-in-Chief of the Indian navy. Banking interests were heavily represented on the board—George Braggington, William Elsey, Charles Joyce and Edward Barnard were directors of the Bank of London and Bank of Australasia. There were initially eighty-nine shareholders with limited liability under the 1856 and 1857 Joint-Stock Acts. The railway interest was certainly less evident in the UKTC than in any of the major companies.

The intention of the UKTC was to introduce a system of electrical communication based on the principle of the penny post to convey messages at an overall uniform rate of 1s per message of 20 words, irrespective of distance, over major trunk lines. Initially it proposed to place London in direct circuit with Birmingham, Manchester and Liverpool.

By 1860 the Electric and Magnetic were well established and it would have been impossible for any new company to compete with them at their rates. To establish a new telegraph company in 1860 it was vital that its plans should both encourage investors to take shares and induce the public to use its system. The plan of a uniform 1s rate was attractive. To investors it offered a chance of sharing in the successful development of telegraphy; by offering lower costs to the public it gave an advantage over the existing system. Thus the 1s rate was the key factor to the success and continuation of the UKTC, enabling it to raise capital in the first instance, to attract business and eventually to reach agreement with the Electric and the Magnetic. The UKTC was welcomed by the press, which felt that telegraphic charges were too high and was delighted that the 'palmy days' of the Electric and Magnetic monopoly were at an end.

Naturally enough the UKTC encountered strong opposition at the outset, as the existing companies opposed any project which might interfere with their powerful position on the railways and

the turnpike roads. The very validity of the Act of Parliament conferring rights to the UKTC to construct lines over the highroads was questioned. The Electric spent over £6,000 in legal and parliamentary expenses in opposing the UKTC bill, part of the costs being shared with the Magnetic. Not until the 1862 UKTC Act²⁶ did the situation alter.

The changing attitude of the government towards laissez-faire in the telegraph industry was evidenced by the enforcement on the company of maximum rates of tariff—1s for 20 words within 100 miles and 2s beyond.

The UKTC was forced to develop its system largely along the towing paths of canals, until the 1862 Act clarified the situation. Agreement was reached with the Grand Junction and other canal companies which appreciated the advantages of cheaper telegraphy. The aim of the other companies was to drive the UKTC off the highroads, as by the canals alone it could not extend its operations to many important towns in Scotland and Ireland. The UKTC Report of July 1861 described how, 'Men were employed to traverse the roads, suggesting opposition, making mis-representation; letters were posted to landed proprietors inviting them to oppose the company.' A letter of October 1861 from Robert Grimston, chairman of the Electric, to the secretary of the GWR included a list of locations where the UKTC had trespassed upon the property of the GWR. He would feel 'obliged on the GWR giving orders for the wires to be removed'. The Electric would hold itself responsible for 'all consequences'. The LNWR had already given orders for wires upon its property to be cut. The *Morning Post* on 14 August 1861 reported an 'extraordinary case' at Beaconsfield in Buckinghamshire where a solicitor, Mr Frederick Charseley, was charged with aiding and abetting several labouring men to cut down one of the posts recently erected by the UKTC:

Mr Charseley, who was at the White Hart Inn at Beaconsfield . . . offered to give anyone 2s 6d who would climb to the top of the telegraph post erected in the public highway opposite the White Hart Inn. As this offer appeared to be insufficient Mr Charseley said he would give 10s 6d to anyone who would fetch an axe and cut it down. This had the desired effect. The saw and axe were fetched and the post cut down by the defendants. Mr Charseley standing by and abetting them.

As a result of the post being cut down all communication was interrupted and damage of £20 was caused. A witness for the defence, Rev S. Major, curate of Beaconsfield, admitted he had been getting up affidavits against the UKTC and had been induced to do so through the firm of Wilson, Bristow, solicitors for the EITC.

In December 1861 the *Daily News* reported the committal of two employees of the LNWR at the Oxfordshire Quarter Sessions, for destroying telegraph wires belonging to the UKTC at the level crossing with the Banbury turnpike road. The LNWR had instructed the defendants to cut the wire and apparently had sent an engine with men and ladders to enable them to do so, as they maintained they had a right to prevent anything crossing their line. The UKTC claimed that the wires crossed the line at a height of 35ft and could not possibly interfere with traffic.

Notwithstanding these difficulties the UKTC began operations in November 1860, the first poles planted by Lord Alfred Churchill and William Elsey in Shepherd's Bush, on the Uxbridge Road, and its trunk line between London, Birmingham, Manchester, Liverpool and intermediate towns was completed in 1863. Before the UKTC opened its line to Liverpool and Manchester the charge to those places was 4s (20p). To make the uniform 1s rate successful it needed to be available to a large number of towns. Thus in 1864 a second trunk line was opened from London to Northampton, Leicester, Sheffield, Barnsley, Wakefield and Hull, and across Yorkshire to Manchester and Liverpool. This line was subsequently extended to Edinburgh and Glasgow, thus increasing to over 500 miles, distances over which messages could be transmitted for 1s. Westwards the company extended to Swansea and Plymouth, and by 1865 had erected 1,658 miles of line and 9,316 miles of wire with greater speed and at less cost than previous lines. The existing underground link between London and Liverpool had cost £180,000; the UKTC system cost £35,000. By 1866 its 125 offices were transmitting annually 743,870 messages.²⁷

The UKTC used a type-printing telegraph devised by Professor David Hughes of Kentucky. This was the first significant instrument in which the message was directly printed in ordinary type,

just as if it had been typewritten. The instruments at the transmitting and receiving stations were identical and synchronised exactly. Each letter was registered by a single current of short duration which brought a strip of paper, carried underneath the type-wheel, in contact with a key wheel; at the edge of this were placed the letters of the alphabet, so that the required letter was printed upon the strip as the type-wheel was made to revolve. The messages were sent by depressing a series of piano-like keys marked with the different letters and numerals. When a key was depressed it raised a pin which caught the key wheel, which in turn rotated the type-wheel, and sent a current to the distant station, causing the paper at both stations to be pressed up against the type-wheel at the same moment. Thus the instrument was mainly mechanical, the electrical action being confined to the sending of a short, single current when the type-wheel was in position. The Electric also tried the Hughes Type Printer in 1858 but did not use it. It was later widely used on the continent by the French, Italian, Austrian and Prussian governments, and also by journalists transmitting foreign news.

After 1866 the system expanded very slowly. The intention of the Post Office to purchase the companies' lines was known, and there was no obvious incentive to expand. Thus a policy of consolidation and development, rather than of expansion, was followed by the inland companies.

The vulnerable nature of the telegraph was forcibly impressed upon all by the great snowstorm of January 1866, which temporarily destroyed 450 miles of the Electric's main circuits including those on the GWR between London and Bristol and on the LNWR between London and Rugby. Damage amounted to £10,916.²⁸ The smaller companies were even harder hit; every above ground telegraph within 50 miles of London was damaged, and the over-house system of the District was completely destroyed.

The UKTC was adversely affected both by the increase in maintenance expenses and by a severe falling off in traffic. The financial crisis of 1866, and the consequent loss of confidence throughout the commercial world, resulted in a further falling off in business, thus contributing to the slackened growth after 1865. The un-

settled political state of Europe and the Austro-Prussian war also adversely affected trade and commercial confidence.

In 1862 the London & South of Ireland Telegraph Company was formed to improve telegraphic communication by providing a direct link between London and Queenstown via St David's Head, Pembrokeshire. The line effected a saving of 285 miles over the previous circuitous route of approximately 750 miles. The significance of the line was that transatlantic news could be transmitted more rapidly.

In 1866 the Atlantic cable was successfully laid after earlier abortive attempts. This was of great importance both to the Electric and to the Magnetic, since it promised a substantial increase in business. The telegraphic systems of both companies were connected to the cable via its Valentia terminus and thereby with the systems of the continent and Asia. British India was connected to England by February 1865. There was no telegraph station in the world with which it was not possible to communicate through the lines and cables of the two major companies, a considerable achievement by private enterprise in little more than twenty years.

ii

The particular impact of both the District and the UKTC was to lower tariffs, which in turn resulted in a large increase in the demand for telegraphic facilities. The relationship between increases in competition, lower charges, expansion in messages transmitted, and resultant increases in revenues, can be clearly traced. The ETC had initially charged 1d per mile for distances up to 50 miles, $\frac{1}{2}$ d per mile from 50 to 100 miles, $\frac{1}{4}$ d per mile for all distances beyond, words in the addresses being charged for.²⁹ In 1850 and 1851, as the ETC faced competition for the first time, charges were substantially reduced. The result was that messages transmitted increased from 99,216 to 211,137 in 1851-2, the average cost of a message fell to about 2s 4d, and profits increased from £19,124, to £24,032. In 1854 and 1855 substantial reductions were made; the charge for addresses was discontinued, effectively increasing the length of a message—20 words could now be sent

100 miles for 2s. The results were similar: increasing business, higher net profits which soared from £30,554 in 1854 to £60,072 in 1857, and lower average charges for telegrams.

Between 1861 and 1865 there were several reductions, largely prompted by the UKTC 1s uniform rate. Both the Magnetic and Electric claimed that the rate was unremunerative on the longer circuits but were compelled to adopt it between all points reached by the UKTC. In July 1865, after four years, the experiment of a uniform rate was discontinued, and the Electric, Magnetic and UKTC agreed to a new scale of charges:

For distances of up to 100 miles, a message of 20 words 1s

For distances of up to 200 miles, a message of 20 words 1s 6d

For distances of up to 300 miles, a message of 20 words 2s

For messages within London and other large towns the rate was reduced to 6d. The proposal to abandon the 1s rate appears to have come from the UKTC. In September 1864, H. Weaver, secretary of the Electric, wrote to E. B. Bright, secretary of the Magnetic: 'We are asked to give an assurance that in the event of the UKTC finding the 1s rate unremunerative, and upon their making this fact known, we [Electric and Magnetic] agree with them upon a rate and adopt it simultaneously. The UKTC on their part agree to make no further reductions.'³⁰ In February 1866, the UKTC stated that the uniform 1s rate for 20 words had been unremunerative to the company 'after four years persistent trial'; consequently the tariff had been increased. However, between 1861 and 1865 the number of inland messages rose from 2,123,589 to 5,781,989, while the average cost of a telegram to the consumer fell from approximately 3s 9d to just over 2s. Gross receipts of the Electric and Magnetic combined, rose from £307,062 in 1861 to £473,702 in 1866, while net profits rose from a combined figure of £99,393 to £178,160. Clearly the public were responsive to price changes and were making more use of a facility which at the initial higher prices was within the reach of comparatively few. That net profits increased as business expanded, also implied economies of scale being increasingly derived; seemingly working costs did not increase in the same proportion as business or as the increased length and number of wires. In particular, the number of messages, and therefore gross receipts, per mile of wire increased.

As demand increased so it was necessary to provide more and better facilities. From 1846 to 1868 extensions were made in the network of lines and additional stations opened. The number of messages transmitted by the Electric increased by an average of approximately 28 per cent per annum. The expansion of its system can be seen in the following table, based on company reports.

THE DEVELOPMENT OF THE SYSTEM OF THE
ELECTRIC & INTERNATIONAL TELEGRAPH COMPANY

Year Ending	Messages Transmitted	Mileage		Wires % increase per annum	Number of Instruments
		Line	Wire		
1851	99,216	2,122	10,650		Figures not available
1852	211,137	3,709	18,650	80%	
1853	245,793	4,409	21,315	15%	
1854	572,116	4,954	24,304	13%	
1855	745,280	5,228	27,989	12%	2,603
1856	812,323	5,348	28,627	4%	2,774
1857	881,271	5,637	29,498	3%	2,938
1858	870,143	6,103	30,733	3%	3,024
1859	1,025,269	6,272	31,346	2%	3,194
1860	1,117,364	6,541	32,787	2%	3,352
1861	1,201,515	6,727	32,787	2%	3,529
1862	1,534,590	7,597	35,006	8%	4,003
1863	1,825,427	8,230	39,042	10%	4,489
1864	2,356,406	8,659	41,592	7%	5,136
1865	2,971,084	9,306	45,044	8%	5,778
1866	3,150,149	9,740	47,572	6%	6,491
1867	3,351,910	10,007	49,619	4½%	7,245
1868	3,755,340	10,160	50,067	0·8%	7,655

Telegraphic communications received an important stimulus in the provision of private telegraphs for public institutions, offices, warehouses and factories. There was initially only limited extension of the needle telegraph as a means of private communication, because instruments required great skill and proficiency on the part of the operator, both in manipulation and translation—‘the language was as difficult to acquire as shorthand’. This difficulty was overcome by a series of inventions by Wheatstone, culminating in his patent of June 1858 for ‘Improvements in Electro-

Magnetic Telegraphs and Apparatus', which became known as Wheatstone's universal or ABC telegraph. The instrument was so simple that anyone who could read could work it. All that was required was to press a knob opposite the letter required to form the word. An early use of the apparatus was to link the House of Commons and the Queen's printer in Shoe Lane in the City of London.

On the ABC the signals were recorded by means of a pointer moving round a dial on which the letters of the alphabet were marked. The instrument was very suitable for use on private wires where great speed was not essential and where skill in operation was not required, although speeds of 20-30 words a minute were easily achieved by experienced operators. It consisted of two dials, an upper receiver and lower transmitter, each with pointer and with the letters of the alphabet marked. When a handle at the front of the machine was rotated the current was generated. An iron projection or armature was made to spin in front of a pair of coils surrounding the poles of a horse-shoe magnet, thereby generating at each revolution four currents in alternate directions through the coils. By a mechanism each current was made to move the pointer through one space. In order to indicate a letter, the key opposite to the required letter on the lower dial was depressed and the handle turned until the pointer came opposite to that letter. The pointer was prevented from turning further and the currents cut off so that the pointer on the lower dial and on the receiving dial at the receiving station remained pointing to the same letter. A bell in circuit with the communicator called attention to a message being sent.

The Universal Private Telegraph Company was incorporated in June 1861, to work these patents. The authorised capital of the company was £190,000; initially 4,000 £25 shares were issued and offered privately to subscribers who were asked to take up 100 shares each. The first directors included Wheatstone, Edward Franklin, FRS, William Fairbairn, FRS, civil and mechanical engineer, and Alderman David Salomons, MP for Greenwich, a founder of the London & Westminster Bank and a former Lord Mayor of London.

The company undertook to construct and maintain, for a fixed

annual rental of £4 per mile, a line of private wire between places of business, or between residence and business. Early lines included those for Thomas de la Rue, Negretti and Zambra and the Westminster Bank. Cables containing thirty or more wires were carried over house tops. The commissioner of police at Scotland Yard 'spider-like sat in a web of co-extension with the metropolis'. In Glasgow and other large cities business expanded and the company was a profitable concern from its inception. Receipts rose from £2,469 in 1862 to £16,545 in 1868; 4 per cent dividends were paid on ordinary shares each year from 1864 to 1867, and 6 per cent in 1868, as profits rose to over £7,000 per annum.²⁹ The great peculiarity of the UPRC was that it placed means of communication in the hands of the public without making any public appearance itself. The business required few employees and no public offices; thus its overheads were less than the other companies.

The popularity of private wires, and their evident usefulness in all types of commerce and government, resulted in 732 contracts being in operation by 1868, representing a total of 2,525 miles of wire, and 1,773 instruments, of which 1,196 were maintained by

The Electric and International Telegraph Company.

(INCORPORATED 1846.)

EPSOM RACES.

MAY 23rd, 1860.

THE DERBY.

THORMANBY	.	.	.	.	.	.	1st.
WIZARD	.	.	.	.	.	.	2nd.
HORROR	.	.	.	.	.	.	3rd.

30 Ran.

The Derby Result 1860. Racing results were transmitted by telegraph from the early 1850s

the UPTC. The total annual income accruing to the telegraph companies from private wires was £25,027, excluding government offices. Members of the royal family paid £2,730 to have their own private wires.³²

An additional facility developed by the telegraph companies was a press service, particularly geared to the needs of provincial newspapers. The Electric had an Intelligence Department with a staff of editors and reporters, whose function was the collecting and distribution of home and foreign news. By 1854 more than 120 provincial newspapers received columns of parliamentary news, the Stock Exchange prices, other market movements, the day's horse racing and the most important sporting news.

In 1860 the Electric erected a telegraph office on the racecourse at Newmarket and linked it with the existing telegraph office at the station. Previously meeting information had been conveyed into the town by 'hard riding', which frequently placed in jeopardy the lives and limbs of women and children; alternatively results were posted on the course and observed by a powerful telescope from the telegraph station, which worked well in clear weather but failed in mist.

For an annual charge of approximately £200 the *Glasgow Herald*, the *Manchester Guardian* and the *Belfast Newsletter* could buy a news ration averaging 6,000 words a day when Parliament was in session and 4,000 words daily at other times of the year. In January 1859 the Electric and Magnetic contracted with Reuter's, who received £800 per annum, for the exclusive rights to supply foreign telegrams to all towns in the UK. Reuter's retained the exclusive right of supplying commercial and shipping news to private subscribers within 15 miles of London (the latter were prohibited from passing it on to newspapers or public rooms). Julius de Reuter, a German Jew by birth, an Englishman by adoption, was probably the first man to see the immense advantages of the use of the telegraph for newspapers and had established an office in London in 1851. The Magnetic paid the Electric £350 per annum as their share of the message agreement. In February 1865 the Electric, Magnetic and UKTC agreed to form a combined news and intelligence department under the direction of a joint-committee and managed by Charles Boys of the Electric.

Revenue was divided in the proportions of 44 per cent to the Electric, 32 per cent to the Magnetic and 24 per cent to the UKTC.

Subscribers to the companies' press bureau were allowed a reduced rate between 7pm and 7am of 50 per cent of the public rate; the rate was 25 per cent cheaper during the day. Where the same message was sent to several newspapers in the same town the charge for each address after the first was 25 per cent of the initial charge. By co-operation, therefore, the newspapers in the larger towns were able to obtain considerable reductions. Newspapers were also able to rent private lines for their exclusive night-time use at a charge according to distance, for instance, £675 to Manchester and £750 to Scotland.

The impact of the telegraph on the provincial press was substantial, since it was now better able to compete with the London newspapers. Within newspaper offices editors now had to make up their minds quickly and be ready to rethink in the course of a single night, as news no longer came all at one time, when the coach or train arrived, but continuously.³³ Total revenue received by the telegraph companies from press services was £31,882 in 1868; £25,197 from collecting, editing and transmitting news, £3,953 from letting special wires, and £2,732 from conveying special messages.³⁴ As the companies had a monopoly of the telegraphic communications of the UK, newspapers requiring news by telegraph were compelled to resort to them for it, and take what they were willing to supply. The smaller newspapers were possibly satisfied, but clearly the larger were not, for they continually attacked the companies. This dissatisfaction was to be a major factor in the nationalisation of the telegraph system.

Notes to this chapter are on pages 273-4

CHAPTER FOUR

AN ANALYSIS OF THE TELEGRAPH INDUSTRY TO 1868

By 1868 the public telegraph network of the UK consisted of over 91,000 miles of wire and 21,751 miles of line, operated by railway and telegraph companies. There were 3,381 stations open to the public, transmitting annually over 6 million inland messages. The telegraph companies owned the greater part of the wires and lines and provided the bulk of facilities. Public facilities were provided by railway companies at 1,226 stations, and additionally at 738 stations facilities were used exclusively for railway purposes. Thus the railways operated approximately 36 per cent of all telegraph stations open for public use and owned about 12 per cent of the total wire and about 22 per cent of total telegraph line. They transmitted a mere 5 per cent of total messages, emphasising the peripheral position of most railway stations. In all, approximately 55,000 miles of telegraph company wire ran along the railways, under agreements for various periods of years. At the expiration of the agreements the railways could legally refuse to renew them. Thus they were in the position, at least in theory, of being able to extend their own systems or demand better terms from the telegraph companies.

Public telegraphic facilities and messages transmitted in the UK in 1868 are summarised in the following table.¹

<i>Telegraph Companies</i>	<i>Miles of Line</i>	<i>Miles of Wire</i>	<i>Messages Inland</i>	<i>Including Atlantic and Continental Cables</i>
Electric	10,007	50,065	3,137,478	3,676,666
Magnetic	4,696	19,235	1,530,961	1,743,725
UKTC	1,692	10,001	776,714	807,155
District	345	345	183,304	183,304
UPTC	139	400	27,542	27,542
Total	16,879	80,046	5,655,999	6,438,392

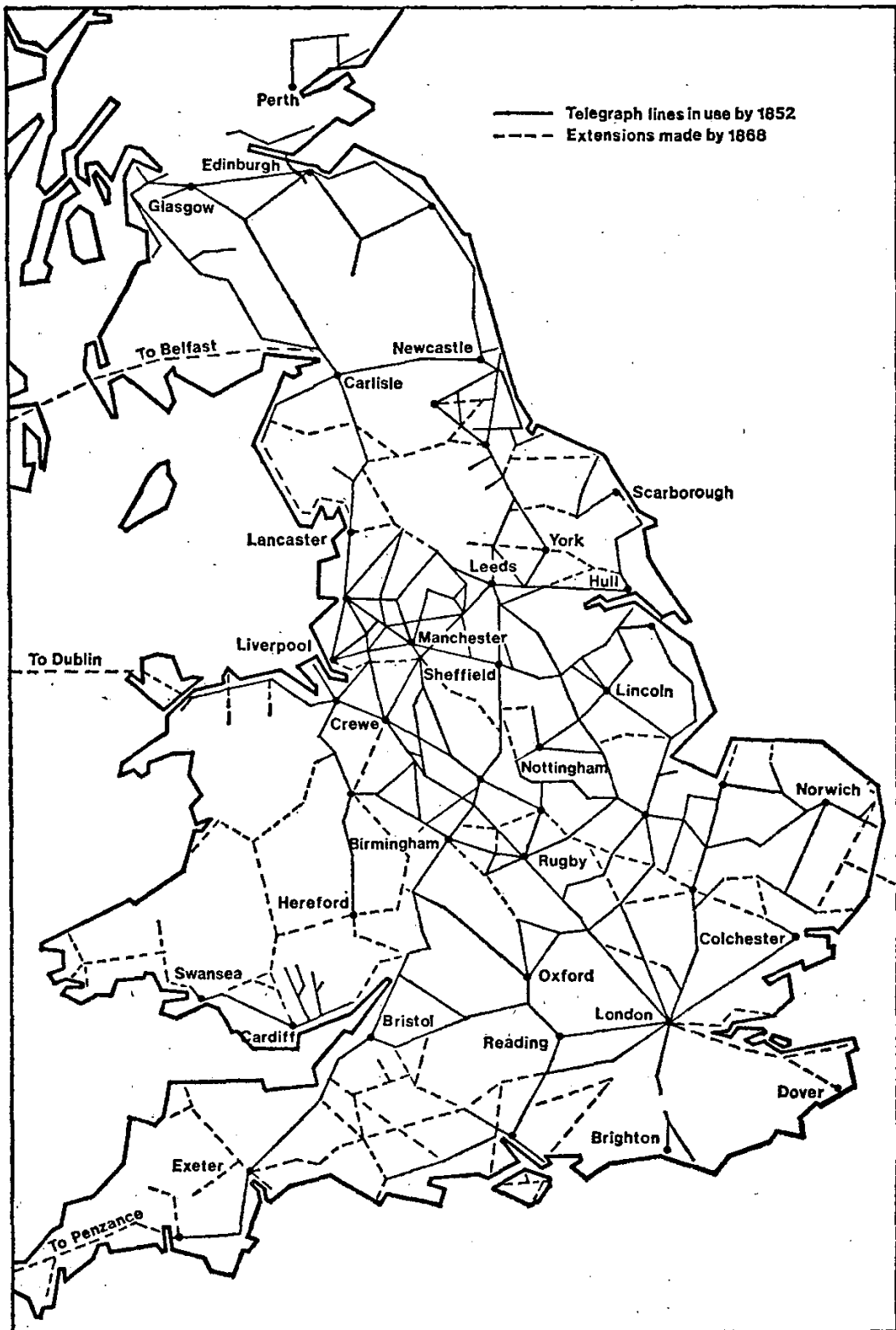
Railway Companies

Lancashire & Yorkshire Railway	432	Figures not avail- able	123,283
South Eastern	351		
London, Brighton & South Coast	284		86,937
London, Chatham & Dover	140		83,410
Other Railways	3,664		
Totals	4,871	11,022	360,924
Combined	21,750	91,068	6,016,913

Stations for public use

Telegraph Companies		2,155
Railway Companies:		
In England & Wales	904	
In Scotland	270	
In Ireland	52	1,226
		<u>3,381</u>

This continuous expansion from 1846 constantly required new capital, which was not always put to profitable use immediately. The telegraph system had no 'prescribed or ascertainable terminus'. Robert Grimston, in his youth a noted boxer, swimmer and cricketer, chairman of the Electric from July 1859, claimed that the policy of the company was 'to leave no place unoccupied where there was the slightest prospect of conveying wires with advantage, at no time has the company ever considered its work complete'. The Electric was prepared to increase and establish telegraphic offices 'without respect to the numerical population', provided working expenses were at least met, an important caveat. It was of course true, as Weaver, secretary of the Electric, admitted in evidence before the select committee of 1868, that the company would look first to profitability and then to the public interest. He testified that extensions would not be made unless the line was certain to pay; there were cases of the company opening offices where there appeared 'no great probability of obtaining



The telegraph network of the Electric & International telegraph company in the UK between 1852 and 1868. The poor service to the peripheral areas is clearly seen. The system expanded from 3,709 miles of line 1852 to 10,160 by 1868

business', and often they had to be closed as there were 'in some cases only one or two messages a week'.

Thus the natural tendency was for competing offices to grow up densely where business was good and sparsely elsewhere. Approximately 75 per cent of the total receipts of the telegraph companies came in from fifteen towns and approximately 50 per cent came in from London alone. In 1867 the Electric claimed that of its total receipts of over £320,000, only 3 per cent was received at 1,100 stations. Thus there was a conflict between the need to maintain profitability and the need to provide facilities. Total share capital employed by the major companies in 1868 was £2,245,977, loans and debentures totalled at least £250,767, producing a total minimum capital employed of £2,496,744.

TOTAL CAPITAL EMPLOYED BY THE MAJOR INLAND
TELEGRAPH COMPANIES

	<i>Share Capital Issued</i>		
	<i>Ordinary</i>	<i>Preference</i>	<i>Loans & Debentures</i>
	£	£	£
Electric	1,169,875		7,550
Magnetic	515,170	124,484	139,605
UKTC	137,480	112,955	101,812
District	54,550	10,000	1,800
UPTC	121,463		
	£1,998,538	£247,439	£250,767

By railway standards, capital employed was small. The GWR alone employed capital of £36,902,044 in 1868, while by the end of 1865 the massive sum of £456 million had been raised by the railways.² The telegraph companies were less capital intensive, as they owned and constructed fewer tangible assets than the railways. The ratio of fixed to variable costs was less than on the railways. This possibly emphasised the risk of investment in the telegraph industry, and the stock market rating of the telegraph enterprises reflected scepticism of their continued profitability. For the unproved smaller companies it was a difficult and expensive business to raise new capital, especially as their shares were usually quoted below par on the Stock Exchange. Both the UKTC and the District were forced to issue 10 per cent preference shares.

The District, after failing to raise £5,000 by debentures on the open market, was able to obtain a £1,000 loan at 7 per cent from the Magnetic on a six-monthly basis. The UKTC raised capital by the issue of bonds carrying $7\frac{1}{2}$ per cent interest, payable half-yearly in advance by the company in UKTC frank message stamps. The UKTC reported in July 1863 that the number of subscribers in leading cities had reached 734, and the total amount subscribed by bonds of this type was £33,265. The stamps were used very much like postage stamps with the object of expanding telegraphic business in excess of the stamps paid as interest. Both the Magnetic and the District issued stamps from 1860. A discount was allowed to purchasers and sellers of the stamps in order to encourage wider use.

The UKTC held public meetings in the major commercial towns, inviting each town to subscribe the capital required by the company to extend its wires. 'Influential committees' of tradesmen were constituted to assist the company in raising money. The UKTC's self-appointed role as a 'consumer's company' was reflected in their shareholders' lists. By August 1865 there were 784 shareholders of 27,585 issued shares of £5 each, compared with 89 holders of the 20,320 shares initially issued.³ Nine directors held more than 50 per cent of the shares, while a very large proportion of the country-wide shareholders held very small amounts, usually under ten shares. In this respect the pattern of shareholdings was similar to that of the railway and banking companies. There were many shareholders in Stockton, Burslem and other major towns of the Potteries, Newton Abbot, Newcastle and Glasgow. The UKTC issued debentures, at 6 per cent and $7\frac{1}{2}$ per cent, and in 1866 was forced to take up temporary loans and issue preference shares on which it paid 10 per cent.

The Electric and the Magnetic, longer established and profitable enterprises, were in a stronger position. However, even the Electric had to turn down business because of pressure upon available capital. In certain cases this was overcome by local subscription to Electric debenture stock. In 1854 inhabitants of Whitby subscribed £1,500 at 4 per cent. Several bills were introduced into Parliament to facilitate increases in authorised capital. In November 1859 the Electric was able to raise a loan of £53,180

at 4½ per cent, repayable in seven years, from the Rock Life Office.⁴ Here, interlocking directorships probably helped—George Parker Bidder, a member of the Rock board for more than 30 years, Samuel Peto and Richard Till being directors of both companies. The National Bank of Scotland had taken up debenture stock in 1855. Shares in the larger companies were not widely held; to encourage wider ownership there were share splits. For example, under the Electric Telegraph Company (Amendment Act) 1851, shares nominal £100, £50 paid, were divided into 4 shares, each of £25. The chairman, John Lewis Ricardo, reported: ‘The extraordinary nature of the enterprise for a long time retained the shares of the company in the hands of the original shareholders; now, however . . . the stability of the enterprise is assured.’⁵ However, even by 1856, ten years after incorporation, and with seven years of payments of dividends, the company had only 442 shareholders with share capital of £707,600, an average holding of approximately £1,600. The largest holder was Thomas Brassey with £38,850 of stock; W. F. Cooke held £25,575, Thomas Critchley £25,000, E. R. Langworthy £28,575, J. L. Ricardo £19,025, Albert Ricardo £18,075 and Robert Stephenson £14,275. Approximately 2½ per cent of shareholders held over 30 per cent of stock. Each of the original shareholders maintained their interest.⁶ The Magnetic raised its capital largely from the major commercial centres of Liverpool, Glasgow, London and Manchester. It too would provide telegraph facilities but in certain cases ‘only if local gentlemen of position took up stock’. By 1868 there were approximately 520 shareholders of the consolidated £515,170 stock, an average holding of less than £1,000. The largest holders were J. C. Ewart, MP, £15,850, and Edward Cropper, also on the Atlantic Telegraph Company board, with £20,000, both directors since 1857. Various members of the Brett family held £7,500 of stock, while T. D. Hornby and H. F. Hornby held £8,290.

Contractors were among the leading shareholders of the telegraph companies: Thomas Brassey and Samuel Morton Peto in the Electric; W. T. Henley, 415 shares, W. D. Passmore, 622 shares, and Alexander Croll, over 3,000 shares, in the UKTC; and Jacob and John Watkins Brett in the Magnetic and Submarine

Telegraph Company. Patentees were often given opportunities to take up shares as payment for the use of their inventions. Thus W. F. Cooke and Alexander Bain had shares in the Electric and Edward and Henry Highton in the Magnetic, as did Sir Charles Tilston Bright; Wheatstone was a major shareholder in the UPRC as was Professor David Hughes in the UKTC.

The close relationship between telegraph and railway companies was emphasised by the list of shareholders and directors of the two largest companies. In 1868, according to Bradshaws Railway Directory, of the seventeen directors of the Magnetic no fewer than ten were directors of railway companies. Of the thirteen Electric directors, six were on the board of railway companies. This latter figure excludes J. L. Ricardo, Richard Till, Robert Stephenson and Sir Joseph Paxton, all of whom had sat on the Electric board and had strong railway affiliations. 'Railway' MPs amongst shareholders included Brassey, Peto, James Pilkington (UKTC), the Earl of Caithness (Electric), Sir J. C. Ewart and Samuel Gurney. Railway managers, such as Mark Huish and George Parker Bidder, had substantial shareholdings.

There is little evidence of cross-shareholdings, one company in another, although in 1868 the Magnetic held 400 shares in the District. Charles Kemp Dyer and Lightly Simpson were on the board of both the Magnetic and District while E. R. Langworthy, on the board of the Electric, also held £2,500 stock in the Magnetic. Sir James R. Carmichael, director of the Sovereign Life Assurance Company, and J. W. Brett were on the boards of both the Magnetic and the Submarine Telegraph Company. Robert Grimston and George Bidder of the Electric were on the board of the Atlantic Telegraph Company. John Pender of the Magnetic was on the board of the Telegraph Construction & Maintenance Company, as well as being chairman of the British Indian Submarine Telegraph Company and the Atlantic Telegraph Company. Other significant shareholders included W. H. Smith, MP for Westminster, Lord Alfred Spencer Churchill, who held 1,350 shares in the UKTC, Lord Alfred Paget, also a director of the Edinburgh Life Assurance Company, the North British Railway Company and the South Staffordshire, and George Peel of Soho Works, Manchester. Bankers and manufacturers held overall a

substantial percentage of shares. There were relatively few institutional shareholders; the British & Foreign Marine Insurance Company held £1,250 and the Maritime Insurance Company £6,700 stock in the Magnetic in 1868; the National Bank of Scotland held 255 shares of £5 each in the UKTC. Foreseeably there were few female shareholders although holding 5 shares in the District was Emma Novello, of Cannonbury, daughter of Vincent Novello, composer, and sister of Clara Novello, the famous soprano.⁷

The major capital outlay was the erection of the telegraph lines which were generally supported on wooden poles fixed in the ground; usually native larch, or pine imported from Sweden or Norway, was used. The poles were originally coated with tar to prevent the absorption of moisture and lasted approximately seven years; the application of creosote or sulphate of copper lengthened life. Weather conditions, the quality of wire used, and the skill and efficiency of the workmen affected costs. It was more expensive to construct a telegraph in a remote area far from a railway. To construct a 10-mile telegraph on railways, using stores and materials of the best description and carrying a minimum of one wire, cost £25 per mile. Using cheaper materials it was possible to erect a two-wire line for £18.⁸

The estimated cost of Electric instruments in use in 1868 was £52,150 and of Magnetic £19,498.⁹ The companies were prepared to experiment and adopt new inventions whenever they were clearly improvements. In the early days double-needle instruments were used on the principal circuits of the Electric. On every needle instrument, set in a mahogany case, was a dial on which was inscribed the names of the six or eight stations the instrument usually communicated with. When the superintendent brought a message to be transmitted, the attendant, usually an 'intelligent looking' boy of about fifteen, would sound a bell by means of an electric current, which would simultaneously alarm all stations on the line. Although the attention of all operators on the line was alerted, the bell would then subside in all stations except that to which the boy caused his index needle to point—a signal by which the clerk at that station knew the message was intended solely for him. He, by a corresponding signal, indicated that he was ready to

receive it. With both hands on the brass handles fixed to the dial, the message-sender would rapidly spell off the information by twists of his wrists, each of which imparted to the needle of his dials as well as the dials of the distant station, a convulsive movement designating a particular letter of the telegraphic alphabet. Two little stops of ivory were placed about half an inch apart on either side of the needle, to prevent it deflecting too much and causing too much vibration. He was able to transmit at approximately 20 words a minute, while under very favourable conditions 40 words a minute could be attained. In emergency it was possible to transmit by a series of movements of the single-needle, at the reduced rate of 10 words a minute. At the receiving end the attendant read the quivering movements of his dial, repeating aloud to an assistant seated at his side. As soon as the message ended it would be taken to the 'Booking Office' and there despatched to its destination. Later the ringing of the alarm was discontinued because the 'horrid din it occasioned became insupportable to persons in constant attendance'.¹⁰ The clicking of the needle, caused by the sound of the iron tongue hitting against the stop, was found quite sufficient to be noticed. When business was heavy one boy was necessary for each instrument; generally he could manage about three in a watch of approximately eight hours. The story goes that one somnolent station clerk, in order to enjoy his nap, trained his terrier to scratch and wake him at the first sound of the clicking needles.¹¹ Basically the earliest needle instruments were ill-adapted for working long distances, and their use became confined to train signalling over short sections of line.

By the early 1850s the Bain 'pointer', a chemically printing telegraph, was in use. Chemically prepared paper in a long narrow strip was unwound from a roller, driven by clockwork and a weight. A needle or pen, generally a piece of thin steel wire, was so adjusted as to press on the paper in a slanting direction. As currents of electricity were sent from a distant station by depressing a key or lever in connection with the battery, blue marks of long or short duration were produced on the strip of paper. There was no mechanical action as in the needle instrument, or indeed in later forms of printing and acoustic telegraphs. By the mid-1850s

the Morse recorder was in use, with its system of dots and dashes—the first international alphabet. The original form of Morse instrument embossed the marks or signs on a strip of paper by means of a pointer or stylus. Later forms had ink writing, which was superior to the needle telegraph in that it gave a permanent record.

Between 1863 and 1868 the Electric experimented with the 'Caselli facsimile telegraph', which proved slow and difficult to operate, and two other type-printing instruments. From 1867 it experimented with the Wheatstone automatic apparatus, which was successfully tested between London and Manchester, Newcastle, Glasgow and Edinburgh. In 1869 it was tried with 'perfect' success between London and Amsterdam. The great advantage of the automatic was its greatly increased speed. It transmitted at 120 words or 600 letters a minute compared with the 30–40 words per minute of other instruments, and had great potential on very busy lines. It consisted basically of three distinct parts: a perforator, which prepared the message by punching holes in a paper ribbon, a transmitter, which sent the message by automatic machinery controlled by the holes in the paper pressing through it, and a receiver, which was basically a delicate Morse ink-writer, to record the message. On the front of the perforator were three keys which, as they were struck by the operator, punched a series of dots and dashes on the paper ribbon.

The Electric introduced the 'pneumatic despatch' in 1854, between its central office and the Stock Exchange; messages were transmitted through pipes under the street by means of atmospheric pressure. Later the system was extended to the principal city offices of the company, and installed also in Liverpool in 1864 and in Birmingham and Manchester in 1865. Despite major advantages the tubes required additional expenditure. The Magnetic worked the 'Bell' telegraph of Sir Charles Bright.

Great difficulty was encountered in maintaining communication in wet weather, even over short distances. In 1851 improved insulation, making the wires less vulnerable to the weather, was adopted on all long-distance lines, for example between London and Liverpool, thus doubling the distance over which the company could transmit direct, without messages having to be re-

peated by intermediate stations, and increasing speed and accuracy. In December 1853 the Electric laid eight underground wires from London to Manchester and Liverpool, and from Manchester to Leeds. Eventually the gutta percha decayed and the wires had to be taken up. Further improvements in 1857 enabled the company to telegraph direct between places previously requiring three separate transmissions. By 1862 it was possible to communicate in any weather, direct between London and Glasgow, Edinburgh and Dublin. By 1868 wires were generally insulated by being fixed to porcelain, glass or earthenware cups, attached to poles. The cups were so made as to expose the upper portion to the cleansing action of the rain while the lower portions were shielded. The wires were attached to the insulators by being wound round them and firmly soldered together. Thus if a breakage took place at any point, the wires between neighbouring poles were not dragged from their supports.

The Post Office later claimed that the companies would not make use of improvements or introduce new instruments but continued to use equipment on which shareholders' capital had already been expended. However, the companies were prepared to adopt improvements if they offered economies. By 1868 the total cost of construction of the Electric's telegraph system was £1,036,046, of the Magnetic's £719,579, and of the UKTC's £347,184.¹²

Payments to patentees were an important fixed cost. The ETC capital account of 30 June 1851 disclosed payments of £168,826, including £141,106 to Cooke and £20,486 to Alexander Bain (who sadly died in near poverty in 1877). The Electric also paid inventors for the use of their patents, thus securing its position against possible opposition; amounts were paid to Edward Davy, Barlow & Foster, Cromwell Varley, J. L. Clark and J. Fuller.¹³ The English & Irish Magnetic capital account of 1856 showed £51,581 under this heading.

On occasion companies paid for an invention by the issue of shares. By a contract of 10 October 1862 the UKTC bought Professor David Hughes' patent for 'improved telegraphic apparatus', dated 27 April 1858, for £12,000 in the form of 2,400 paid up £5 shares, 1,800 to be paid at once and 600 when the company in-

creased its capital to £200,000, which occurred in September 1864. For exclusive rights to his ABC telegraph the UPTC had allotted Wheatstone £27,000 in shares in 1861.¹⁴

'Legal and Parliamentary charges' and 'Preliminary Expenses' were significant items particularly before 1856-7. Bills had to be brought before Parliament for share capital to be increased and for share splits to be authorised. In 1862 over £6,000 costs were incurred by the Electric and £1,957 by the Magnetic, during their struggles to maintain their monopoly against the UKTC. The charges of the UKTC between 1862 and 1863 amounted to £11,709. General charges, including a special Act of Parliament, cost the UPTC £4,013 in 1864; preliminary expenses of the EIM were £5,374. In the early years there was much 'piracy of inventions', which involved legal expense in prosecutions. In 1851 the Electric obtained three verdicts in its favour.

Maintenance of the system was a major item involving expenditure upon materials and additional staff, particularly engineers and linesmen. Unless the lines were kept in good order traffic would fall off at once. Renewals were necessary within quite short periods in towns, where there was relatively rapid deterioration. Wires needed to be renewed within 4 to 5 years; posts were considered likely to last 7-12 years, before clear symptoms of decay occurred. Sulphur from smoky atmospheres converted the oxide in the iron into a sulphate of zinc, which was soluble and was consequently washed off the wire by rain. Maintenance costs varied between the companies but were approximately 25-30 per cent of total working costs, as shown in the figures for 1869:

	<i>Miles of Wire</i>	<i>Gross Working Expenses</i> £	<i>Main- tenance</i> £	<i>Maintenance as per cent of Gross Working Expenses</i>
Electric	50,065	192,050	50,007	26%
Magnetic	19,275	87,626	24,351	27%
UKTC	10,001	43,350	10,193	23%

The UKTC had the lowest percentage of maintenance charges to total working expenses (£1 os 4d per mile of wire) because their system, based on the roads, had on average six wires to every mile

of line. The Electric had on average five and the Magnetic four wires to a mile.

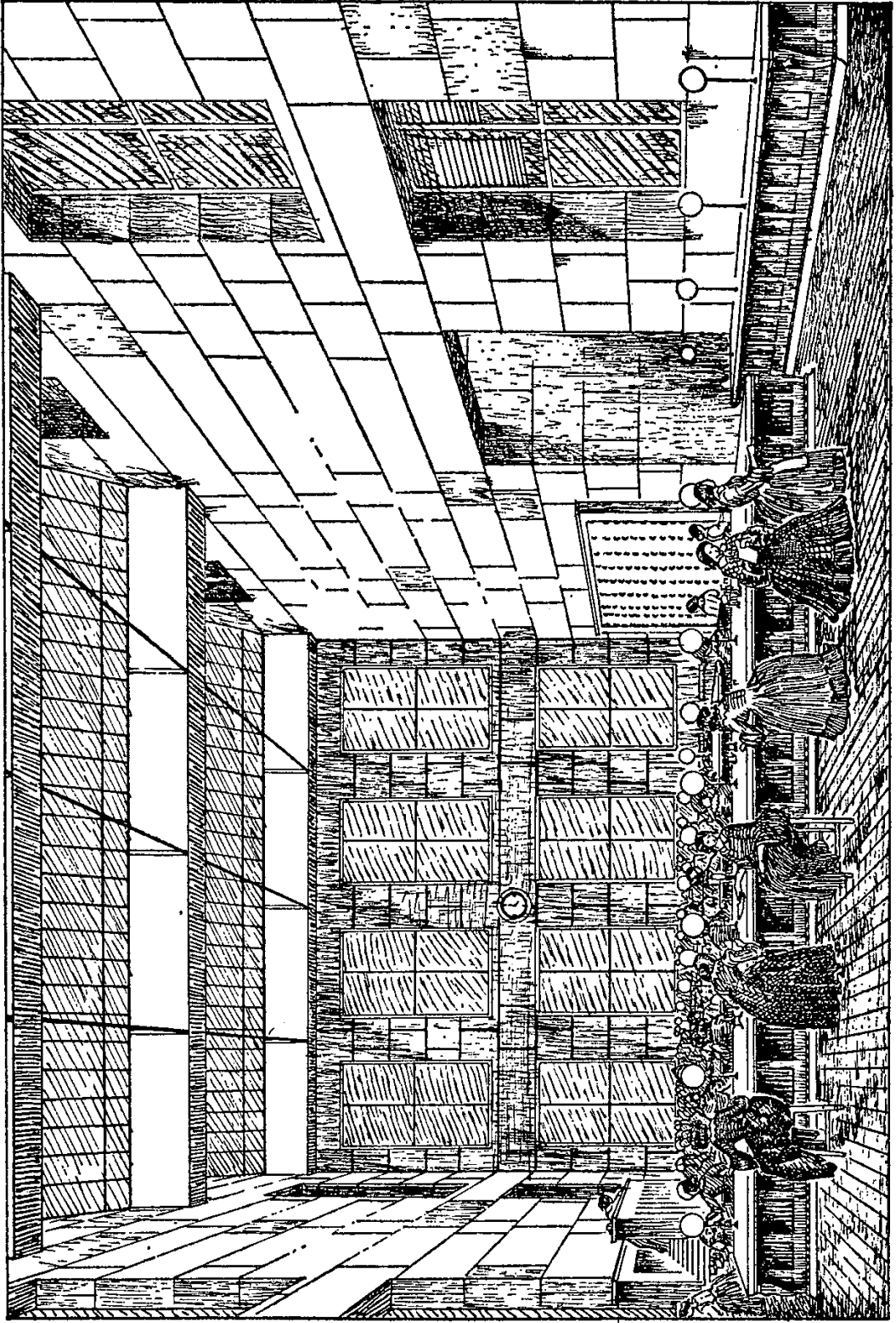
Wages and salaries were the largest item of working costs. In 1868 the companies employed 5,339 staff at an annual cost of over £215,000. An analysis of the type of labour and costs, based on the Report of the Treasury Committee on the Telegraph Service, 1875, is given in the following tables:

	<i>Number Clerks</i>	<i>Employed Messengers</i>	<i>Costs</i>	
			<i>Commercial</i>	<i>Engineering</i>
			£	£
Electric	1,465	759	95,721	35,435
Magnetic	647	433	39,122	11,195
UKTC	270	207	19,259	5,011
District	114	66	4,600	850
UPTC	18	6	1,732	3,155
	<hr/>	<hr/>	<hr/>	<hr/>
	2,514	1,471	£160,434	£55,646
	<hr/>	<hr/>	<hr/>	<hr/>

Engineering staff, all companies, totalled 677. Commercial staff represented almost 50 per cent of the Electric's total working expenses and 46 per cent of the Magnetic's.

The telegraph industry was a new area of female employment. The Electric employed women from 1855 and by 1868 there were 200 employed at the central office of the company in Telegraph Street, Moorgate. They were often the daughters of clergymen, tradesmen and government clerks, and were mostly between 18 and 30 years old and unmarried. Under the careful supervision of a 'matron', Mrs Craig, they were employed to transmit and receive messages, and earned between 10s (50p) and 30s (£1.50) weekly. All the companies employed women; they were 'admirable manipulators of instruments', had less inducement to change jobs, and not being organised in any combination for higher wages, could be paid less than men. The work was light although the hours were long, generally a nine or ten-hour day, six days a week.

At the offices of the District the girls worked in a 'lofty room, admirably lighted and ventilated', with three large counters stretching the whole length of it and bearing the instruments. While waiting for the click of an incoming message, they read or



The Telegraph Gallery at the Electric & International Telegraph Company new offices at Bell Alley, Moorgate Street. Approximately 100 young women were employed under the watchful eyes of a matron, Mrs Craig

did crochet or needlework. There was an air of 'comfort, cleanliness and content about the whole room that contrasted favourably with other occupations for females'. The company provided a cook who prepared the food the girls brought in for their dinner and tea. There was also 'a lavatory embellished by a fountain' and all arrangements indicated 'a very gallant appreciation by the company of the people it employed'.¹⁵

Employment in the telegraph offices was eagerly sought and there were many more candidates than vacancies. The *Shipping Gazette* of 7 February 1862 reported a 'disgraceful hoax'; about 400 'respectably dressed females were drawn to the offices of the Electric' in response to an advertisement for vacant posts in one of the morning papers and the police had to be called to clear the place. The *Morning Chronicle* of 24 August 1859 commenting on the difficulties of female employment wrote of 'a notorious and cancerous evil in our social system' that could induce 'so large a number of respectable and well-to-do young women to apply for a not very tempting employment'. Yet 30s weekly, earned by an experienced telegraphist in a large town, working Morse at 27 words a minute, was very attractive, when a needlewoman working at home earned no more than 3d (1p) per day and the top wage for a male was 35s (£1.75)—for a 63-hour week by a print compositor. The same issue of the *Morning Chronicle* reported that a young seamstress had committed suicide because her earnings 'were not enough to enable her to live honestly'.

All the companies stressed the need to 'educate' their staff who were given a 'thorough drilling'. Typically a training period of six weeks was allowed during which no payment was made and if the required standard of eight words per minute was not reached the young lady was dismissed. Young boys aged 14 to 15 years were also employed. At busy times during the day one boy or girl was necessary for each instrument; at other times, one employee could manage three or four. Night work was exclusively carried out by men.

Offices and stations for public use were often rented from the railway or canal companies or turnpike trusts; expenses so incurred were analysed by G. W. Chetwynd, Accountant General for the Post Office, in June 1869:

	<i>Rent & Rates</i>	<i>Fuel, Lighting & Fittings</i>	<i>Stationery</i>
	£	£	£
Electric	14,485	10,575	9,125
Magnetic	7,793	3,854	4,269
UKTC	6,458	1,342	2,538
District	2,012	860	361
UPTC	689	401	
	<hr/>	<hr/>	<hr/>
	£31,437	£17,032	£16,293
	<hr/>	<hr/>	<hr/>

When wires were strung across private property, the companies often undertook to remove them in a given time and guaranteed an annual rent for the use of roof tops. They were often accused of 'defacing the streets' and causing permanent injury to amenities. Wayleave payments were made to railways, canals and turnpike trusts for right of way for telegraph lines. This was a relatively insignificant cost, particularly for the Electric. The Magnetic had one major wayleave payment, £1,391 per annum for rights of way on the South Eastern Railway, on which it had 1,355 miles of wire. The Electric paid £200 as right of way to the Great Eastern Railway for continental wires. The UKTC faced the heaviest burdens, as it had had to build along the turnpike roads and canals, which forced harder bargains than the railways had done on the Electric and Magnetic. The UKTC had to pay approximately £2,000 to canal companies in 1861.¹⁶ In 1868 total wayleave payments were as follows:

	£
Electric	734
Magnetic	1,810
UKTC	2,509
District	177
UPTC	550
	<hr/>
	5,780
	<hr/>

The various running expenses, approximately 57 per cent of total revenue, are summarised in the following table based on an analysis of the Electric accounts for the year ending 30 June 1868, when gross receipts were £352,107, and net profits £147,976.

<i>Working Expenses Analysed</i>	£	% of Expenses
Salaries and wages	97,357	47.9
Maintenance labour		
materials	55,444	27.3
Rent, rates, gas, insurance	17,599	8.7
Books, stationery, printing	9,125	4.5
Station expenses	7,914	3.9
Costs of repairing submarine cable	5,437	2.7
Direction and audit	2,500	1.3
Interest on debentures	2,460	1.3
Law charges	1,279	.6
Postage	528	.25
Contribution to sickness fund	291	.15
	<hr/>	
	199,934	
	<hr/>	

The entry for repairs to submarine cables is indicative of the additional expense of submarine telegraphy. The combined prime cost of all submarine cables owned by the inland companies was estimated at £316,052 in 1868.¹⁷ By 1868 the Electric possessed eleven such cables, valued at approximately £164,000; three were continental ones, the two largest to Holland. From its incorporation the Magnetic was much concerned with submarine cables, laying two to Ireland, between Portpatrick and Donaghadee, near Belfast, in 1853, and between Whitehaven and Portpatrick in 1854. It also had a close relationship with the STC through a holding of £22,960 stock and interlocking directorships, and enjoyed exclusive rights to carry messages. The STC had exclusive concessions from both the French and Belgian governments, and when a cable to Emden, on the coast of Hanover, was successfully laid in 1858, the Magnetic line between London and Weyborne on the Norfolk coast was worked in conjunction with it, effectively giving a monopoly of Scandinavian business to the Magnetic.

In April 1859 a further agreement was signed between the Magnetic and the STC covering a combined traffic arrangement. The STC was not to send any messages, or connect itself, to any other inland telegraph line in Great Britain and Ireland; the Magnetic was not to lay down wires or send messages to the

continent by any other submarine line. The Magnetic was also to endeavour to raise a further £30,000 towards the cost of an SRC cable between Cromer and Tønning in Denmark.

The UKTC entered submarine telegraphy when a cable was laid between Newbiggin in Northumberland and Jutland in Denmark, in 1868. This line was extended through to Russia, affording direct communication with Scandinavia, Russia and Northern Europe. In the year ending 30 June 1868 the gross earnings of the telegraph companies from continental trade were £199,613. Electric continental receipts were £82,107, approximately 22 per cent of total revenue.

The likelihood of damage to a cable was high. The Electric's Dutch cables were constantly broken by ships' anchors, especially during stormy weather when ships tended to drag anchor. It was therefore important to lay lines so as to avoid as far as possible shallow water or rough coasts at the shore-end of the cable. The latter needed to be extremely strong, as it was exposed to strong currents, accidental damage from anchors and rough sea beds. The deep-sea section of the cable was safer, but water too deep needed to be avoided, by detour if necessary, because of the great difficulty of effecting a repair. Stronger insulation was needed than for land cables and corrosion was a great problem. The life of a cable was probably no more than fifteen years; no cable to 1868 had lasted so long and most had failed well before. The Electric cables to the Isle of Wight were quite frequently broken by ships' anchors in stormy weather. In 1855 the Electric purchased *The Monarch* for £10,000, the first ship specifically fitted for cable operations and repairs.

On the advice of Robert Stephenson, then chairman, who saw that, with submarine cables, charges would inevitably have to be met which would impose an undue burden on the revenue of a single year, the Electric established a trust fund in December 1858 to ensure that there was an adequate reserve available for renewals and repairs. Up to 1868 any balance of profits, after providing for dividends, was regularly transferred to the fund, while out of it the Electric paid £82,106 for the renewal of cables, as well as £48,835 from current revenue for repairs. Its concern to maintain an adequate reserve can be well seen in many company reports

between 1859 and 1866; submarine cables continued to give the board 'much anxiety', since 'rapid deterioration cannot be guarded against, or met, as it arises from day-to-day as on land'. Casualties of a 'baffling and unexpected nature' might be expected to occur more frequently as the cables became older. By December 1862 the trust fund was almost exhausted after the payment for the new four-wire cable between Lowestoft and Zandfoort to replace the four single-wire cables between Orfordness and Scheveningham. It was described in February 1863 as 'the sheet anchor of this company'.

In 1866 the character of the Electric fund altered when the great snowstorm revealed the necessity of providing for exceptional damage to land lines. From January 1866 to June 1868 the Electric consistently transferred to the fund the whole of its surplus earnings after paying a maximum dividend of 10 per cent,¹⁸ instead of making up past dividends to the 10 per cent maximum.

The great cost of submarine telegraphy was an additional burden to the profitability of an industry which was already unbearable to the elements on land. The net profits of the Electric, available for dividends and transfer to reserve funds, showed a steady upward trend, as the following table shows:

ELECTRIC NET PROFITS AND DIVIDEND PAYMENTS 1851-67

Year	<i>(biennial figures)</i>		
	<i>Gross Receipts</i> £	<i>Net Profits</i> £	<i>Dividend per cent</i> (paid 31 December)
1851	49,865	19,124	6
1853	104,184	31,672	6½
1855	144,928	43,800	6
1857	180,734	60,072	8
1859	201,674	68,822	7
1861	213,584	71,510	7
1863	254,360	89,631	7
1865	314,026	127,076	10
1867	346,740	145,725	10

Thus the Electric did not fail to pay a dividend between 1849 and 1868, the year of nationalisation. The amounts paid in dividends rose from £5,500 in June 1849 to £117,987 in 1868. By 1868 the company was earning about 12½ per cent on capital

employed, compared to 7 per cent in 1858 and 6 per cent in 1851.

It is probable that once the company had reached a position of paying a certain dividend, it tried to maintain that position, and refrained from making extensions which might cause a reduction. However, it did not confine itself merely to risk-free developments and the return on capital employed was only moderate throughout.

The Magnetic's net profits also showed a steady rather than a spectacular upward trend. They were affected by the general depression of trade which took place in 1857-9, but between 1861 and 1865 they rose from £27,883 to £37,840 and from 1866 to 1868 from £44,658 to £62,824. By 1868 the company was earning 9.6 per cent net on capital employed, compared with 4.4 per cent in 1858. Dividends were paid each year from incorporation in April 1857 to 1868; the rate did not fall below 4 per cent and reached an exceptional 9½ per cent in 1868. The latter resulted from knowledge of the impending Post Office take-over. The amounts paid in dividends rose from £16,739 in 1857 to £62,284 in 1868.

Neither the UKTC nor the District was able to establish itself as a profitable concern. Though trading from 1861, the UKTC did not publish revenue accounts until June 1865; presumably no profits were made before then. Between 1865 and 1868 there was a small balance of profits on the ordinary share capital as the following table shows:

UKTC PROFITS FOR THE YEARS 1866-8		
	<i>Profits</i>	<i>Percentage of</i>
	£	<i>Profits to Capital</i>
1866 to June 30th.....	8,909	3.09
1867 to June 30th.....	14,078	4.3
1868 to June 30th.....	16,497	4.8
	<hr/>	
Total Profits	£39,484	
	<hr/>	

Total profits of £39,484 in 1866-8 failed however to keep up with the liabilities of the company in interest payable on debentures, loans, bonds and preference shares, as can be shown in the following table:

INTEREST PAID BY UKTC UPON PREFERENCE
& BORROWED CAPITAL

	<i>Total amount of Preference & Borrowed Capital</i>	<i>Interest Paid</i>	<i>Rate per cent</i>
	£	£	
Year ended 30.6.1866	151,176	9,933	6.55
„ „ 30.7.1867	188,897	15,710	8.31
„ „ 30.8.1868	202,734	17,132	8.44

The total interest paid between 1866 and 1868 was £42,766. Thus, the increasing liabilities of the company were more than absorbing any increases in profits. There were, in fact, no profits available for the ordinary shareholder, as the aggregate of loan interest moved beyond the paying powers of the net revenue. It is also most significant that the preference capital and loans were obtained at very high rates of interest. In 1866 the financial world had been shaken by the collapse of Overend Gurney & Co, reputed to be as safe as the Bank of England. Speculative lending had left it with uncovered liabilities of £5 million and many smaller firms were dragged down with it. Bank rate was increased to 10 per cent in May, yet between 1867 and 1868 it was at no time higher than 3 per cent and for a time was as low as 2 per cent. Thus, any dividends which were paid by the UKTC to ordinary shareholders were short-earned: the 4 per cent paid on 31 December 1865 and the 2 per cent on 30 June 1868.

The District was in deficit from its first accounts in June 1860 until June 1865 when it showed a surplus of £242. Profits reached their peak in 1865, the year of the new tariff intended to boost profits. However, in 1868 the company ran at a loss of £1,068. The District thus fought an unsuccessful battle to become viable, and an appropriate comment on its affairs can be taken from the final report, presented to shareholders in February 1870. 'The Directors . . . and in many ways shareholders are relieved from much anxiety,' by the impending Post Office take-over. The report then stated that the company was in a fair way to becoming a successful commercial undertaking. But more realistically, the company would have found it increasingly difficult to raise additional capital on any terms. For the year ending 30 June 1868

profits were not enough to pay the 10 per cent preference shareholders. The District had spent over £10,000 in preliminary charges and had, in addition, made a loss of £15,214 12s in ten years' trading. It seems reasonable to conclude that the company might have been wound up.

The uneven profitability and high-risk factor were reflected in the investment rating of the telegraph companies. Even when the Electric was an established company, paying a well covered dividend, the investment rating was comparatively low. A high yield on an investment reflects an amalgam of either poor prospects for future growth in profits, an unstable and erratic record, or a large risk factor. In March 1856, when the Electric had a record of dividend payments for seven years and had been paying 6-6½ per cent since 1851 on its ordinary shares, the stock of the company (£100 paid) was selling at 80—yielding 7.5 per cent—reflecting uncertainty about future prospects and a high level of risk. Even in 1865, when prospects appeared excellent as a result of the new tariff agreement, the stock was selling at 120-30, indicating a yield of between 6.9 per cent and 7.5 per cent, or on the basis of approximately 14 years' purchase of profits. The average price in 1867 was 143, yielding 7 per cent. Only in 1868 and 1869, when speculative buying occurred on the strength of the Post Office paying a big price for the company, did the shares sell at anything like the level accorded to the top railway companies, prices ranging from 239 to 261 for £100 stock. Similarly, not until the speculative flurry of 1868, when the stock of the company soared to around 160, did the Magnetic's shares reach par.

Not unexpectedly, the shares of the UKTC and the District never reached par. The latter never covered costs and in November 1867 its shares (nominal value £5) were quoted between 18s (90p) and 30s (£1.50). Speculation on likely Post Office terms pushed the price to £3 15s (£3.75) in July 1868. UKTC shares (£5 nominal) also reached their peak in the same period, £3 7s 6d (£3.37½).

The very nature of the telegraph system, exposed to the elements—snow, gales, floods, even hot sun following on a wet spell might cause damage—meant that there was always the possibility of large expenses being incurred. If the company had submarine

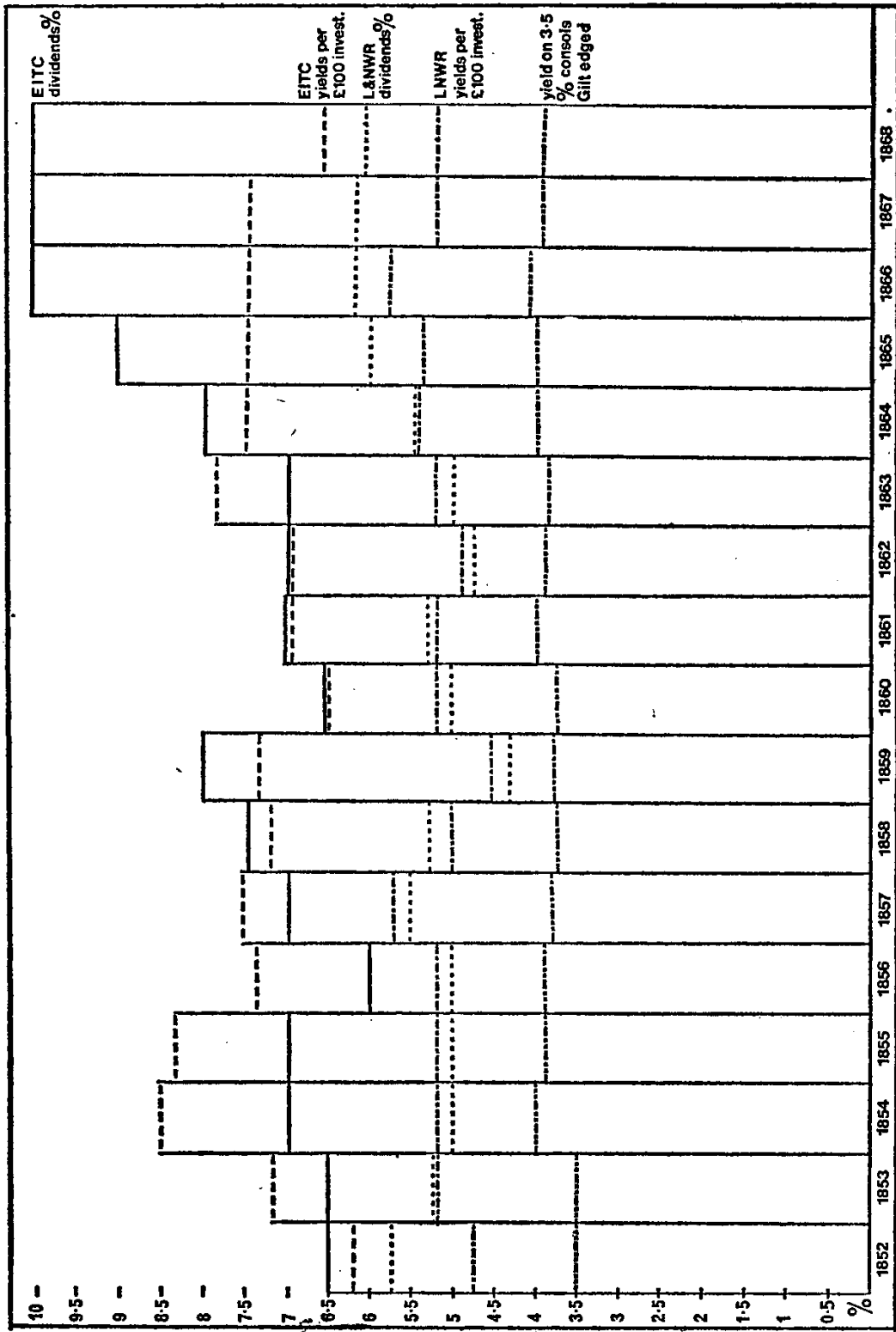


Chart comparing the dividend payments, yield received by investors 1852-68, from the EITC and the LNWR, and 3 1/4 per cent consols. Consistently the investment rating of telegraph companies was low

cables the position was more vulnerable. Conceivably, a reason for the Post Office not developing the telegraph in the first instance was the high risk factor.

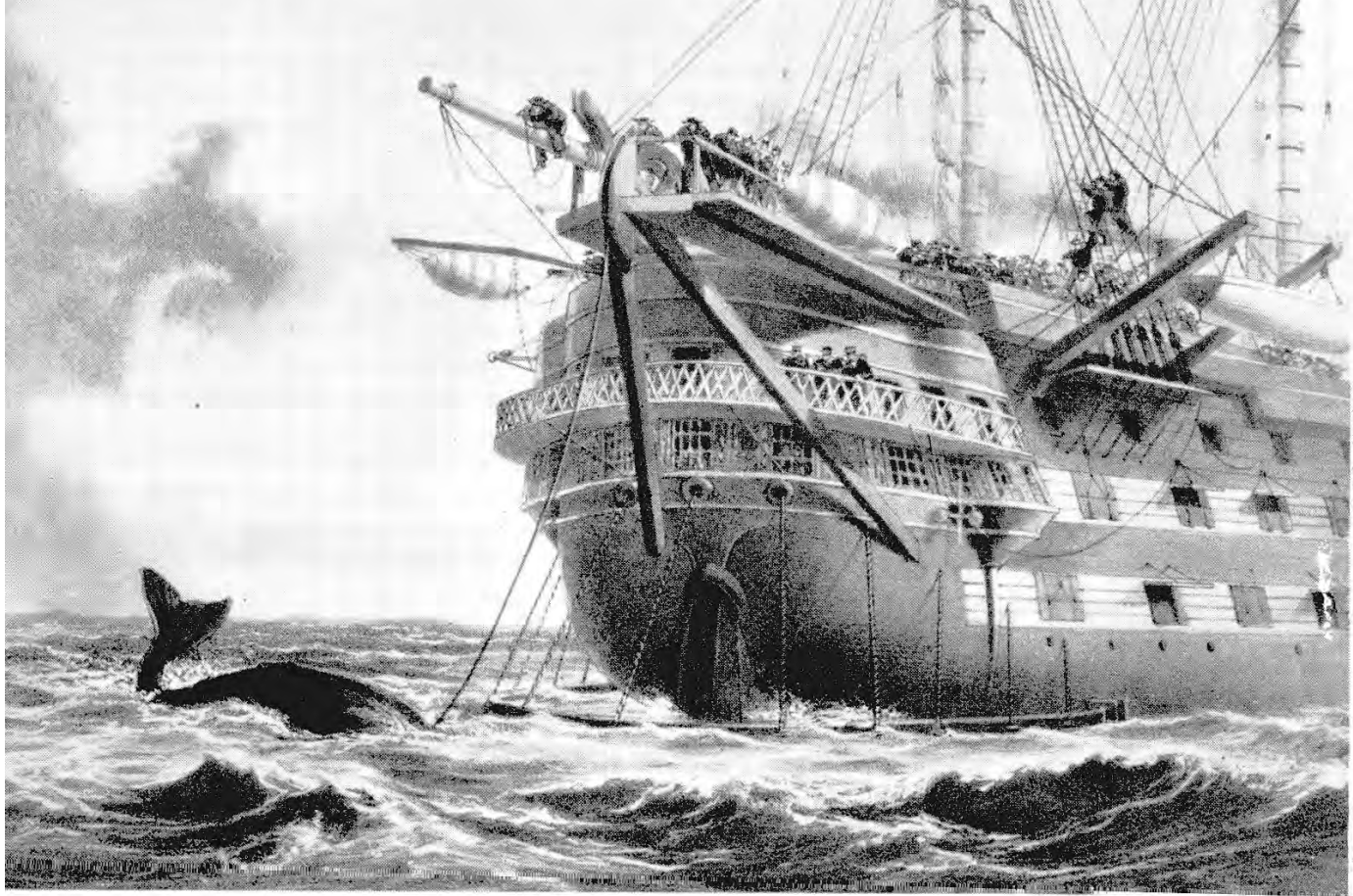
As an example of the investment rating of telegraph companies the price movements, dividends and yields of the Electric between 1852 and 1868 can be compared with those of the LNWR. The Electric consistently had a superior dividend record, with growing profits, yet it was selling on a higher yield and more generous price/earnings ratio; its investment rating was substantially lower. The tables which follow include also the yield on $3\frac{1}{2}$ per cent Consols, which varied only slightly throughout the period. The figures are derived from *The Course of the Exchanges 1852-68*. The same conclusion can be reached by considering leading canal stocks. Regents Canal was selling throughout the period on a yield basis of about 3 per cent.

The conclusion must be that the investing public considered that high present profits (in certain cases) were not enough to compensate for future uncertainties unless tied to a high present yield. The telegraph companies' major assets were their lines, worked often along railway tracks on leases due to expire, and on patent rights also due to expire, some in fourteen years.¹⁹ Railway and canal companies owned much land and property, whereas telegraph companies had no real tangible property except for their lines, which needed efficient management to be profitable. This lack of tangible assets was reflected in both stock market prices and the high rate of interest which had to be paid for loan capital. J. L. Ricardo commented at the Special General Meeting of the Electric in October 1857: 'This company labours under considerable difficulty in respect to debentures which can only be renewed at a price we do not want to pay.'

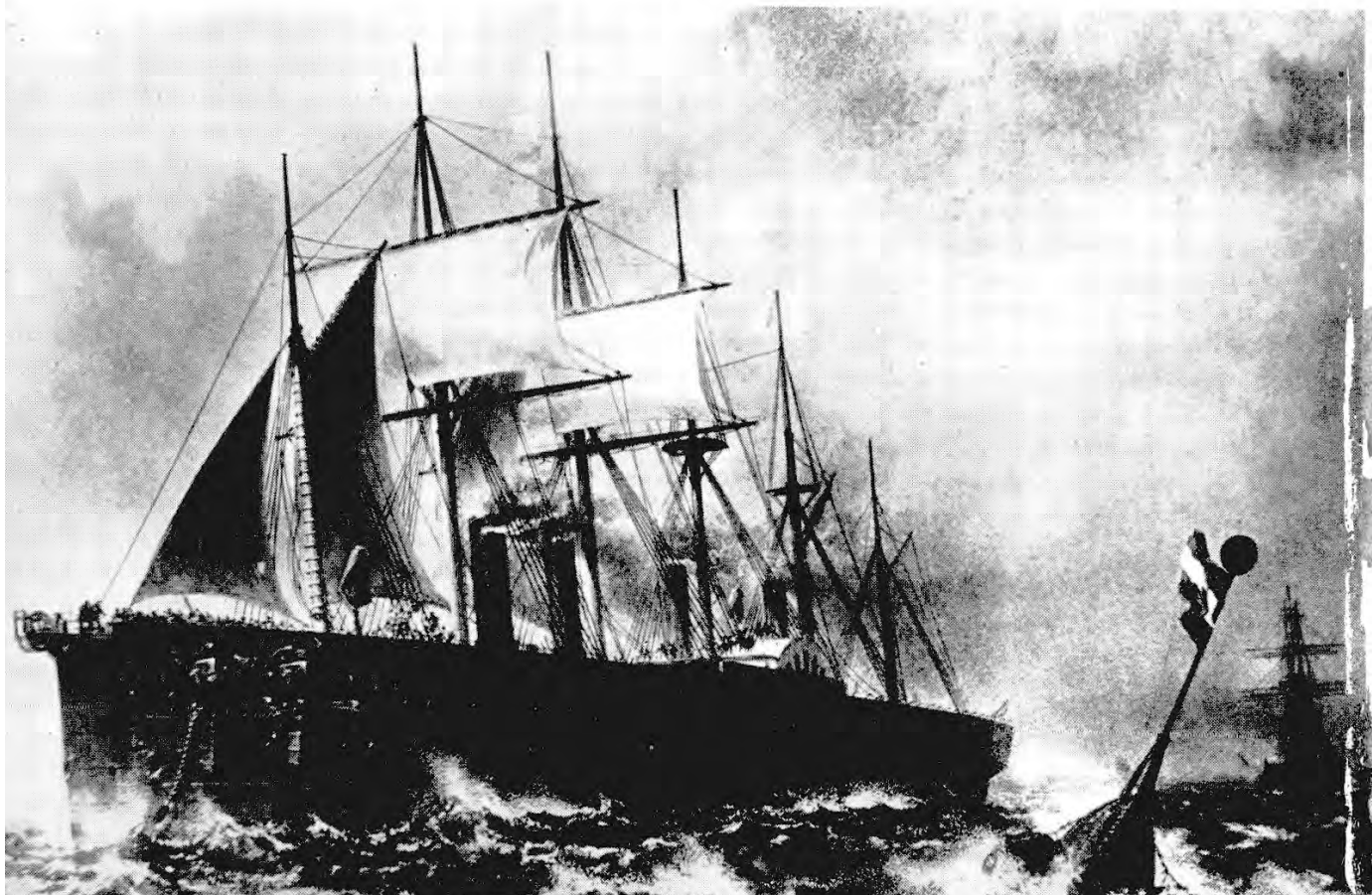
Even after nationalisation, independent companies were selling on the stock market at round thirteen years' purchase, or a yield of 7-8 per cent; in 1876 both the Anglo-American Telegraph Company and the SRC were selling on approximately this basis. Possibly the risk factor was overdiscounted in the market. However, of the 64 telegraph companies formed between 1846 and 1868, 68 per cent failed; the failure rate of railway companies was 59 per cent. The figures for telegraph companies were better than for mining,



Page 97 (top right) Frank Ives Scudamore, assistant secretary of the Post Office, the architect of the nationalisation of the inland telegraph service in 1868; (top left) William Fothergill Cooke, a man of ambition and determination, primarily responsible for the early development of the electric telegraph in the United Kingdom; (bottom left) Charles Wheatstone, a scientific genius not blind to the practical implications of what he achieved; (bottom right) Charles Tilston Bright, knighted for his part in the laying of the first Atlantic cable in 1858. The first honour bestowed directly on the telegraph industry



Page 98 (above) HMS *Agamemnon*. A drawing by R. Dudley of the laying of the first Atlantic cable in July 1858. A very large whale was seen approaching 'at a great speed'. It appeared to be making straight for the cable and it was a great relief when it was seen to pass astern, just grazing the cable where it entered the water; (below) the *Great Eastern*, Isambard Kingdom Brunel's great vessel. Laying the Atlantic cable of 1866 was the first piece of work worthy of her



G

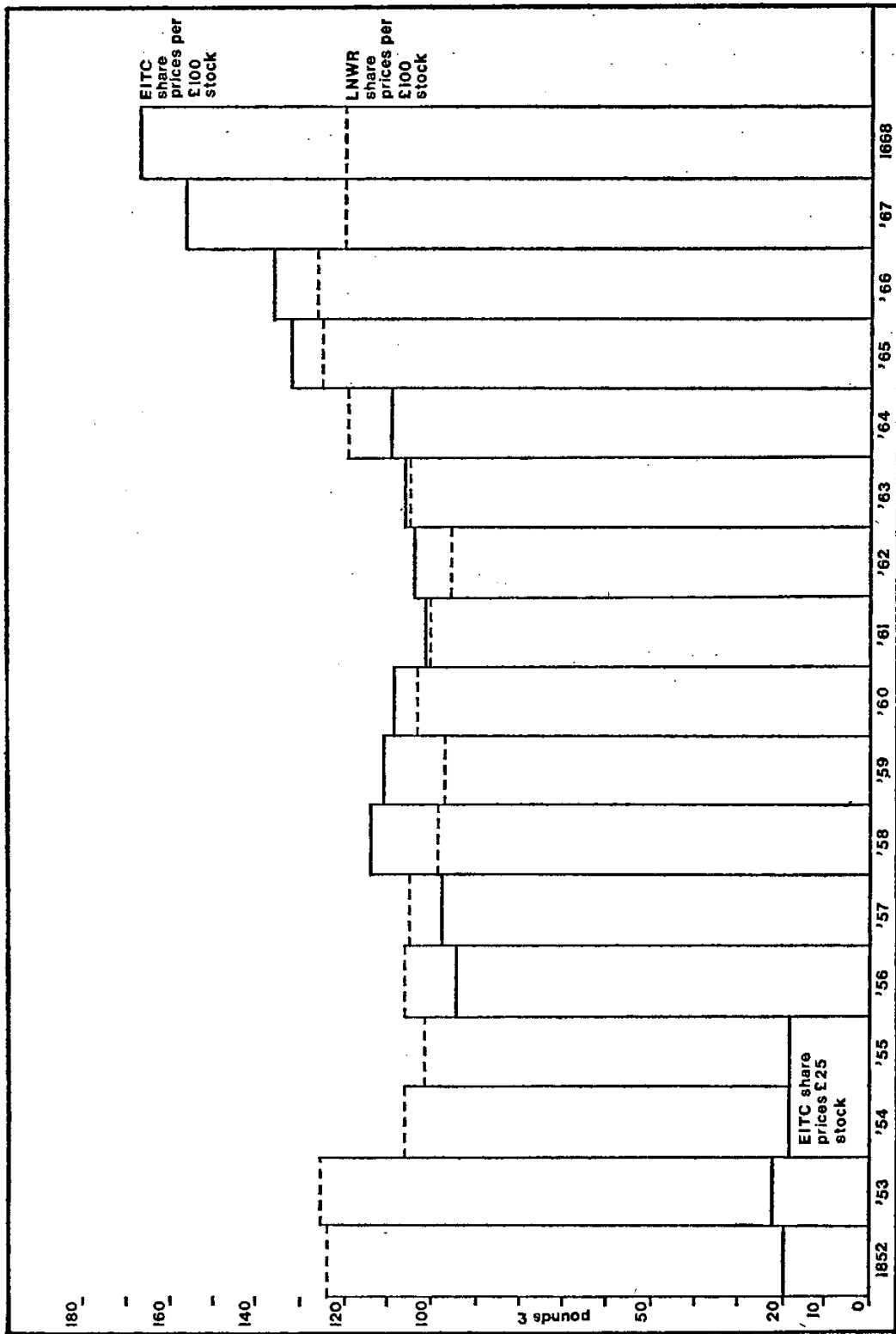


Chart showing share prices of the EITC and the LNWR between 1852 and 1868

shipbuilding, banking and finance groups, but significantly worse than the overall average.²⁰

Nevertheless, in spite of the risks involved and the very real cost of being the pioneers, private enterprise had by 1868 developed a system of communication within the British Isles which brought every town of any importance in contact with any other part of the country and with all parts of the world. The contribution of the telegraph industry during the period 1846-68 cannot be measured solely in terms of the relatively small capital employed compared with the railway industry, nor in terms of the numbers of employees. Its contribution was a vital one in the development of an international economy; in the intricate network of both internal and international communications, in the growth of commercial and financial organisations and in the rapid economic growth which occurred in the first twenty years of the second half of the nineteenth century.

Notes to this chapter are on pages 274-5

CHAPTER FIVE

ACHIEVEMENT IN SUBMARINE TELEGRAPHY

i

After the successful development of inland telegraphic communication, and in particular the line from London to Dover, it was logical that engineers should consider communications overseas. The feasibility of submarine telegraphy had been suggested by Salva in a paper at the Barcelona Academy of Sciences in 1795.¹ However, before it could be achieved it was essential to overcome the difficult problem of providing adequate insulation for the conducting wire. In the case of overhead land lines, it was necessary only to insulate the various supports suspending the conductor in mid-air, whereas insulation of a submarine cable had everywhere to be proof against penetration of water at great pressure and biological attack. The earliest experiments in submarine telegraphy were unsuccessful because of the lack of a suitable insulating material.

At one time rubber was thought to be suitable but it was found to break down when submerged for any length of time in sea water and in consequence little progress was made. Then the introduction of gutta percha, the coagulated latex of certain trees from the Malay Peninsula, enabled work to proceed with greater promise. Gutta percha resembles rubber in its chemical composition but is different in its physical properties, being inelastic at ordinary temperatures and becoming plastic on immersion in hot water. Although first known in Europe as early as the 1650s, it had found no special use until the mid-1840s when demand became keen enough to produce reckless tree-felling in Malaya.² In 1843 its properties were brought to the notice of the Royal Society of Arts, and it was examined by Michael Faraday who recognised its excellent insulating qualities under water. Dr Weiner Siemens used it as a coating for cables across the Rhine in 1847 and at Kiel Harbour in 1848.

Although various experiments were made in sending electric currents through wires immersed in water, the first serious proposals were put forward by Wheatstone. In February 1840 he exhibited plans before a committee at the House of Commons, describing in detail a proposed method of communication between England and France across the Straits of Dover. During 1844 and 1845 he made several trials in Swansea Bay and succeeded in exchanging signals with a neighbouring lighthouse from a boat.³ There is no record of the length of the cable, nor of its life. As soon as gutta percha made its appearance in England, Wheatstone used it for his cable, proposing to enclose the wire so insulated in a leaden pipe. However, he failed to discover a method of coating his conducting wires with the insulating substance. The problem was eventually solved by Charles Hancock in 1848, who at his rubber works at Stratford-le-Bow adapted a machine originally designed for making gutta percha tubing.

The first full-scale experiment of real promise was conducted in January 1849 by C. V. Walker, telegraphic superintendent and electrical engineer to the South Eastern Railway Company. From the deck of a small ship, *Princess Clementine*, in the English Channel near Folkestone, he paid out some 2 miles of wire covered with gutta percha. The shore-end was connected to the overhead line of the South Eastern Railway, and Walker, on board the ship, was able to transmit direct to London, a distance of about 85 miles.⁴

The achievement of laying the first submarine cable of practical significance was due to the enterprise of two brothers, Jacob and John Watkins Brett. It was Jacob who was first inspired with the idea of submarine telegraphy but his interest attracted his elder brother John to take an active part in the enterprise. The latter, originally an antique dealer and a comparatively wealthy man, was able to supply much of the finance to enable the project to go forward. His was the stronger personality, and he had the ability to negotiate with governments and officials.

In June 1845 Jacob Brett registered the General Oceanic Telegraph Company, but this was soon to be superseded. In July the brothers wrote to Sir Robert Peel, PM, about their proposal for a general system of telegraphic communication, both oceanic and

otherwise. They were referred to the Admiralty, which proved more receptive and helpful than in 1816 when Ronalds had made his approach. Then in 1846 they registered the General Oceanic & Subterranean Electric Printing Telegraph Company 'to establish a telegraphic communication from the British Isles across the Atlantic to Nova Scotia and Canada. . .'. The company would adapt Professor Royal House's printing telegraph, later widely used in America, for cable telegraphy. In November 1845 a patent was taken out.⁵

In 1847, after considerable negotiations, Messrs Brett obtained a concession from the French Government to establish a submarine telegraph between France and England. The agreement was subsequently cancelled but was renewed again on 10 August 1849 for a period of ten years, on the understanding that communication was established by 1 September 1850 at the latest. In 1850 the English Channel Submarine Telegraph Company was incorporated by John Watkins Brett who subscribed £500, as did railway engineer Charles Fox, Charlton J. Wollaston, engineer and a former pupil of Brunel, and Francis Edwards. It was felt that £2,000 would be sufficient. A cable 25 nautical miles long, having a central copper conductor covered in $\frac{1}{2}$ in gutta percha, was manufactured at the works of the Gutta Percha Company, City Road, London. The drum, revolving on a horizontal axis, was placed on the deck of the *Goliath*, a small steam-tug, and taken to Dover. The shore-ends were laid first, extending on the English side from a horse-box in the yard of the South Eastern Railway terminus to a structure of piles, laid for the new Admiralty pier in Dover harbour; and from the French side to just beyond the rocky ledge which stretches out a considerable distance from Cape Gris Nez, a headland near Calais. The shore-end was encased in a very thick lead tube.⁶

At 10am on 23 August 1850 the *Goliath* left Dover escorted by the *Widgeon*, a government surveying vessel; the route had been marked out previously with buoys. The seaward part of the shore-end was picked up and joined to the main portion of the line, which was then paid out. Engineer in command was Charlton Wollaston, aided by contractor, William Reid, who had undertaken to equip the *Goliath* with the necessary gear. The cable was

successfully laid and signals were exchanged, one being sent to Louis Napoleon. However, a few hours later communication failed entirely—it was apparent that the cable had broken. One rumour was that a fisherman had raised the cable to the surface with his trawl, later exhibiting it in Boulogne as a specimen of rare seaweed with its centre filled with gold. Attempts were made to pick the cable up but the weight of the lead pipe prevented this and the line had to be abandoned.

The labours of Brett, Wollaston and Reid were not entirely in vain. The feasibility of laying a cable and of transmitting electric signals across the Channel for a distance of over 20 miles was proved. The line had also served to maintain the concession granted to Brett, as signals had been conveyed. The problem was to find a satisfactory method of protecting the insulated conductor from damage during and after laying.

On 19 December 1850 the Bretts obtained a new concession from the French Government, to be in force for ten years from 1 October 1851 and to hold good only if the submarine line was in working order on that date. Seven weeks before the time limit the necessary funds had still not been subscribed. The undertaking was saved by T. R. Crampton, railway engineer and inventor, who helped raise the necessary capital of £15,000 by taking up £7,500 himself. He was joined on the board by Sir James Carmichael and Lord de Mauley. The new cable, constructed by Messrs Newall & Co, was of much heavier construction, formed of four copper wires, each covered with a double layer of gutta percha. These were twisted together, filled with tarred hemp and then wound over with tarred cord encased in iron wires. On 25 September 1851 it was successfully laid across the Channel. Crampton was able to announce the feat to scientists at the Great Exhibition just as Queen Victoria was leaving the platform after formally declaring the exhibition closed. On 23 October 1851 the Submarine Telegraph Company obtained a further ten-year concession, and on 13 November 1851 the cable was opened to the public. The first direct communication between London and Paris by electric telegraph was in November 1852 through the lines of the STC and the European & American Telegraph Company.⁷

The success of Crampton's cable gave considerable impetus to

submarine telegraphy. Many enterprises were started, although there were many failures. In 1852 three unsuccessful attempts were made by the Magnetic to establish communication between England and Ireland, firstly, between Holyhead and Howth, near Dublin, and then twice between Portpatrick and Donaghadee. However, a third attempt at the latter in 1853 succeeded in laying a heavy cable weighing 7 tons per mile, with six conductors. In the same year an additional heavy multiple cable was laid across the Channel between Dover and Ostend. Anglo-Dutch and Anglo-German cables were laid, and by 1857 the Electric was in direct communication with Holland, Germany, Austria and St Petersburg. A further submarine cable was laid in 1858 between the Suffolk coast and Zandfort in Holland which extended communication to Hamburg. By 1860 the STC was working six cables, ranging from 25 to 117 miles long, connecting England with the continent. The charge for a message from Paris to London, originally 19s (95p), was down to 7s 3d (36p) by 1859. In other parts of Europe, by 1860 telegraphic communication had been achieved between Denmark and Sweden; Italy, Corsica and Sardinia; and Sardinia and Africa. Between 1854 and 1861 the firm of Glass, Elliott & Co of London, which was in the forefront of the great expansion in submarine telegraphy, laid twenty-four cables with a total length of 3,677 miles, the longest being 1,565 miles from Malta to Alexandria.

The feasibility of uniting the two vast systems of Europe and North America began to excite entrepreneurs and scientists. It had been proved that cables could be laid in comparatively deep water but between Ireland and Newfoundland were nearly 2,000 miles of ocean up to 3 miles deep. In addition to these difficulties it was still not known whether electric currents could be conveyed through so long an unbroken circuit, and at such a speed that messages could be passed quickly enough in succession to be remunerative. Doubts were modified in October 1856 by a series of experiments by Charles Tilston Bright and Edward Whitehouse, who linked up submarine cables with the underground wires between London and Manchester, a total distance of over 2,000 miles, and found transmission satisfactory.⁸

In 1852 F. N. Gisborne, a very able English engineer, and an

American syndicate obtained an exclusive concession for connecting St John's, Newfoundland, with Cape Roy, in the Gulf of St Lawrence, by an overhead line. A company was formed, the Electric Telegraph Company of Newfoundland. The idea was to 'tap' steamers from London at St John's and pass messages from there to Cape Breton, on the other side of the gulf, by carrier pigeons. A few miles of cable were made in England, and laid between Prince Edward Island and New Brunswick. Gisborne then surveyed a route for a Newfoundland land line, erecting 40 miles before being stopped by lack of funds. In New York, in 1854, Gisborne met Cyrus West Field, a wealthy businessman and dominating personality, and sold his company's concession to him. Field succeeded in obtaining from the Newfoundland Government very favourable terms, covering exclusive rights to land cables at Newfoundland for fifty years, and then extended this monopoly to New Brunswick, Cape Breton Island, and the shores of the state of Maine in anticipation of an Atlantic cable.

J. W. Brett joined Field's syndicate. In 1855 a single-conductor cable was made in England by Messrs Glass, Elliott & Co to be laid between Cape Breton and Newfoundland. This was probably the first occasion on which a cable was properly coiled in specially constructed tanks at the factory, previous to shipment. Hitherto, coiling had been done on the factory floor and was somewhat rough and ready, leading at times to entanglements between the turns. Forty miles were laid in August 1855, but rough weather forced the captain to cut the cable to save the ship. A fresh instalment was sent out in 1856 and laid successfully across the gulf, thus connecting St John's with Canada and the American lines. In July 1856 Cyrus Field came to England and in September a contract was agreed between J. W. Brett, Charles Bright and Field to form the Atlantic Telegraph Company for the establishment of telegraphic communications between Newfoundland and Ireland. The company was registered on 20 October 1856.⁹

The nature of the ocean bed had by this time been ascertained by a series of soundings taken by Lt O. H. Berryman USN in USS *Arctic* and also by Commander Joseph Dayman RN in HMS *Cyclops*. There was, it seemed, a gently undulating plateau of great breadth, at a depth varying from 1,700 to 2,400 fathoms,

which extended nearly the whole distance between Ireland and British North America. These depths compared favourably with soundings of 6,000–7,000 fathoms further south. Trinity Bay, Newfoundland, was considered suitable for the starting place at the western end and Valentia Bay was chosen in Ireland.¹⁰

The £350,000 necessary for the enterprise was obtained largely through meetings at Liverpool, Manchester and Glasgow. The campaign was opened on 12 November 1856 in Liverpool, the headquarters of the Magnetic, many of whose shareholders were merchants and shipowners who could see the value of the United States being connected telegraphically with the United Kingdom and Europe through the company's Irish lines. Field and Brett gave inspiring addresses, and a scientific explanation was given by Charles Bright. A similar pattern followed at Glasgow and Manchester. The £350,000 was raised by the issue of 350 ordinary shares of £1,000 each—the majority taken up by shareholders of the Magnetic. The largest individual subscribers were John Watkins Brett and Cyrus Field, who each took up 25 shares although both reduced their personal interest before final allotment. Nine of the board elected were directors or shareholders of the Magnetic, including John Watkins Brett and Sir John Pender. The latter was later to take a leading part in the vast extensions that were to follow, including cables across the Mediterranean, the Red Sea and several other Atlantic cables. At the peak of his career the 'cable king' was chairman of nine telegraph companies which together controlled £15 million. Other directors included Professor William Thomson of Glasgow University (later Lord Kelvin), an ardent believer in an Atlantic cable, and George Peabody. Charles Bright was appointed chief engineer and Wildman Whitehouse electrical engineer.

Manufacture of the cable was begun in February 1857. The Gutta Percha Company made the core, while the contract for the outer sheathing was divided between Glass, Elliott & Co and Messrs R. S. Newall & Co of Birkenhead. The cable was due to be delivered in June 1857, allowing only four months for manufacture—of a cable 2,500 nautical miles long. This race against time was the outcome of an unfortunate commitment insisted upon by Field in connection with his American interests. Both

Bright and Whitehouse urged, in vain, for more time to ensure greater care in the manufacture and Bright urged a different type of cable, with a conductor three times as large, and a much greater thickness of insulation. The contract price for the entire cable was £225,000—the core cost £40 and the armour £50 per mile. There was not time to provide proper buildings or tanks on shore and the cable was consequently laid dry and exposed to the sun which injured some upper layers that had to be subsequently cut out.¹¹

The British Government agreed to a guarantee of £14,000 per annum during the working of the cable,¹² a major and significant concession, and also provided HMS *Agamemnon*, a 91-gun battleship, which had been Admiral Lyon's flagship at the bombardment of Sebastopol, and was well suited to cable-laying. In the main hold, 45ft square and 20ft deep, was stored half the cable from the works at Greenwich, the balance being divided into other small coils. The other half of the cable, made at Birkenhead, was coiled on board the steam frigate *Niagara*, one of the finest ships in the US Navy.

Originally Bright had urged that laying should start in mid-ocean from both ships, one towards Ireland and the other towards Newfoundland. However, Whitehouse urged starting from Ireland and his views prevailed with the board. The expedition started from Valentia on 6 August 1857, headed by *Niagara*, from which the first half was to be laid. The greater part of the heavy shore-end cable had been laid previously by a small steamer. The laying proceeded well until 11 August 1857 when 274 nautical miles had been covered. Then in a heavy sea the ship pitched, and the cable parted 20 fathoms below the surface in over 2,000 fathoms. The expedition returned to Plymouth, where the cable was taken ashore at Keyham, well tarred and left dry to prevent rusting of the iron sheathing wires. Faulty parts were cut out and a new length of 700 nautical miles manufactured by Glass, Elliott & Co, which together with the 39 miles recovered brought the total amount available to over 2,900 miles.

In the spring of 1858 a second attempt was made. This time HMS *Agamemnon* and USN *Niagara* proceeded into mid-ocean,

experiencing en route a tremendous storm in which the ships recorded 45° rolls and waves over 40ft high. The splice between the two portions of cable was made and on 16 June 1858 the ships separated, *Agamemnon* laying towards Valentia and *Niagara* towards Newfoundland. Three times, while paying out, the cable parted, and each time the operation had to be begun again, 540 miles of cable being lost. Nevertheless, on 5 August 1858 the cable was successfully landed at Trinity Bay, and on the same day the *Agamemnon*, despite very rough weather and strong headwinds nearly all the way, entered Valentia Bay. Trinity Bay reported 'very strong currents of electricity throughout the whole of the cable from the other side of the Atlantic'.¹³ *The Times* commented 'since the discovery of Columbus, nothing has been done in any degree comparable to the vast enlargement which has thus been given to the sphere of human activity'.

A knighthood honoured Charles Bright, at the age of only twenty-six the youngest man to receive the distinction for many years; it was the first honour bestowed directly on the telegraph industry. In the United States there was great jubilation; torch-light processions in New York set the town hall on fire, and congratulatory messages were exchanged between Queen Victoria and the President of the United States, James Buchanan. But then, owing to a serious insulation fault about 300 miles from Valentia, signals became confused and on 1 September unintelligible. A few more words were transmitted at intervals up to 20 October, when a total of 732 messages had been conveyed by the cable including news, on 17 August, of the collision of two Cunard Line steamers, the *Europa* and the *Arabia*, with assurances that no lives had been lost. The line was never opened for public traffic at the Newfoundland end, but the English Government had time to countermand the order for two regiments to leave Canada for England, resulting in a saving of approximately £50,000 and again demonstrating the advantages of rapid communication. In 1860 attempts were made to repair the cable but were soon abandoned, owing to the bad conditions of the sheathing wires, the shore-end only being recovered. The immediate cause of the failure could not, therefore, be precisely ascertained.

Despite the final failure of the undertaking three facts were

conclusively demonstrated: that it was possible to lay over 2,000 nautical miles of cable in ocean depths of 2-3 miles; that distinct and regular signals could be transmitted and received beneath the sea across a vast distance; and that cable-laying ships could be hove to in deep water without parting the cable. Thus the feasibility of the project was proved. The faults were on the electrical side, and also the core, especially the conductor, was too small. Yet immense progress had been made since the first submarine cable in 1851.

ii

In 1857 Lionel Gisborne, having obtained powers from the Turkish Government to carry a telegraph line across Egypt and to lay a cable in the Red Sea, promoted the Red Sea & India Telegraph Company, to establish communications between England and her East Indian possessions. The importance of this link, particularly after the Indian Mutiny and the reverses of the Atlantic Telegraph Company, decided the British Government under Lord Derby to give assistance in the form of what was essentially an annual subsidy of £36,000—a guarantee of 4½ per cent on its capital for 50 years.¹⁴

The proposed line was 3,043 miles long, between Suez and Karachi, and was divided into two parts. The first part, from Suez to Aden, 1,358 nautical miles, was laid in 1859, but various sections of it frequently broke down. Probably, it was laid too tautly and the type of cable was too fragile for some of the rough ground it traversed. The second section of the line, from Aden to Karachi, 1,685 nautical miles, was laid in 1860, and the company reported its line was complete; but once again faults quickly developed in all sections and the company was obliged to abandon the line before any commercial use was made of it.¹⁵ It was claimed that a complete message never got through the entire length, but only through each section separately.

Aroused by the successive failures of the Atlantic Company and the Red Sea & India, the joint losses of which amounted to more than £1 million, as well as the continuous Treasury guarantee, the government in 1859 decided to appoint a committee to consider

the whole question of the construction, laying and maintenance of submarine cables.¹⁶ Eight members were appointed, half by the Board of Trade and half by the A.T.C. The impressive representatives of the Board of Trade were Robert Stephenson, Douglas Galton, Charles Wheatstone, William Fairbairn, president of the British Association in 1860, and George Bidder, while the A.T.C. representatives were Edwin Clark, Cromwell F. Varley, Latimer Clark and George Saward. Stephenson died soon after the committee began work.

The committee sat from 1 December 1859 to 4 September 1860, questioning engineers, scientists, electrical engineers, manufacturers, anyone who had experience of submarine work and could throw light on the subject. Investigations were made into the structure of all cables previously made or in the course of manufacture, the quality of the different materials used, the routes taken, the electrical testing, the sending and receiving instruments, and the speed of signalling. The effects of temperature and pressure on insulating substances were ascertained, as was the breaking strain of copper wires, iron, steel and tarred hemp.

The committee reported, in April 1861, that the failure of the cables submitted for investigation might have been avoided had conditions been sufficiently understood beforehand. It felt that submarine telegraphy might be as sure and remunerative in the future as it had been speculative in the past, provided that the specification, manufacture, laying and maintenance of cables were proceeded with on the lines laid down in its report, 'the most valuable collection of facts, warnings and evidence ever completed concerning submarine cables'.¹⁷

Partly as a result of the committee's findings, a successful link with India was achieved in 1864.¹⁸ As the cables of the Red Sea & India Company lay unrepaired and abandoned, the Indian Government determined to establish telegraphic communication with Europe on its own account. In order to make the submarine portion as short as possible, and to avoid deep water, it was decided to lay a cable in the Persian Gulf, along the coast of Beloochistan, thus guarding the line of communication from pirates and natives. The landing places selected were Karachi and Fao, at the mouth of the Shattel-Arab river. The cable, with a total length of 1,450

miles, was manufactured by W. T. Henley in four sections, and the conductor was constructed by the Gutta Percha Company. Loaded on board five ships, and taken round the Cape to India by Sir Charles Bright, it was successfully laid. The greatest obstacle was when the flotilla was anchored at the mouth of the river Shattel-Arab, with 6 to 8 miles of mudbanks between the ships and the shore. This was the first cable expedition to use Morse flag and lamp signalling—by day and night respectively. It was also the first instance of any great length of cable being a complete and lasting success—thanks to the many improved methods introduced in its manufacture and to thorough electrical and mechanical testing.

iii

The promoters of the Atlantic telegraph, headed by Cyrus Field, never relinquished hope of establishing a successful line, and several schemes using new routes were brought forward by competitors. One in 1860, The Grand North Atlantic Telegraph, aimed to reduce the continuous length of cable by laying in four sections through Iceland and Greenland and so to Labrador, but after detailed surveys the scheme was abandoned. The Atlantic Company persuaded the British Government to despatch two vessels to further examine the ocean floor, 300 miles out from the coasts of both Ireland and Newfoundland, and in 1862 HMS *Porcupine* explored the western end of the Atlantic. The Civil War in America stimulated attempts to raise fresh capital. Field crossed the Atlantic incessantly; he is said to have crossed sixty-four times and been sea-sick every time.¹⁹ In 1863 the Electric was induced to contribute £1,000 to the project.

The directors of the Atlantic Company established an impressive scientific consultative committee to advise upon electrical and mechanical problems, with special reference to the type of cable to be adopted. This committee was composed of Galton, Fairbairn, Thomson, Wheatstone and Joseph Whitworth, FRS.

In April 1864 the Gutta Percha Company was amalgamated with Messrs Glass, Elliott & Co, to form the Telegraph Construction & Maintenance Company. John Pender was the first chair-

man and Richard Glass managing director, while other directors were Thomas Brassey, Samuel Gurney and Alexander Findley, MP. The company gained the contract for the manufacture of the cable, and payment was made partly by £250,000 in cash, partly by £250,000 in 8 per cent preference shares, and partly by £100,000 in mortgage debentures. Thus the contractors, essentially John Pender, were staking a large amount of money on the success of the enterprise. If it were successful, a further sum of £137,140 in unguaranteed stock of the Atlantic Company was to be paid by instalments as long as the cable continued to work. The capital of the newly formed ATC was £600,000, of which the TCM had found more than half. Field was able to raise only £70,000 in America; Thomas Brassey was again a major shareholder.²⁰

The core was made at the Wharf Road works of the Gutta Percha Company, in 4,500yd lengths. Experience of earlier expeditions had shown the inconvenience of two vessels laying cable simultaneously. The only ship that could take on board the entire length of cable was the *Great Eastern*, an enormous vessel for its day, of 22,500 tons. Originally christened the *Leviathan* because of her size, she was the conception of Isambard Kingdom Brunel, and had been lying idle for some time; laying the Atlantic cable was to be the first piece of work which was worthy of her. In 1864 the Great Eastern Steamship Company, under the chairmanship of Daniel Gooch, MP, previously locomotive superintendent of the GWR, who became an ardent supporter of the enterprise and was later chairman of the TCM, arranged for her charter. As she could not be moored off the works at East Greenwich, the cable had to be cut into lengths and coiled on two pontoons from where it was transferred into three large watertight iron tanks in the hold of the vessel. The shore-end cable, manufactured by W. T. Henley at North Woolwich and some 30 miles in length, was put on board the SS *Caroline* which was fitted for the purpose.²¹

On 23 July 1865 the *Great Eastern* joined up her cable to the shore-end and started paying out towards America at a speed of 6 knots. She was escorted by two British warships, HMS *Terrible* and HMS *Sphinx*. Trouble soon occurred, on 24 and 29 July, when iron wire pierced the cable and the ship had to stop for the damaged portions to be cut out. Then on 2 August an accident

happened to the picking-up machine, which was used for hauling in the cable if a fault was discovered. Forced to stop, the *Great Eastern* was at the mercy of the winds and swell, and the heavy strain on the cable damaged it badly in two places. Before the damaged portions could be secured on board, the cable parted and sank. Several attempts were made to recover it but the work had to be given up, and on 11 August the fleet of ships parted company with hopes shattered.

The results of this second expedition were financially disastrous. Yet, although the picking-up gear had failed, the paying-out machinery had proved itself. The feasibility of grappling in mid-Atlantic had been demonstrated, for the cable had almost been recovered. To overcome the financial difficulties, the ATC was amalgamated with a new company, the Anglo-American Telegraph Company, to raise £600,000 of fresh capital for new ventures. In raising this, Field secured support from Daniel Gooch, who promised to subscribe £200,000, and Thomas Brassey, who promised to bear one-tenth of the total cost of the undertaking. The TCM subscribed £100,000 and each of ten directors subscribed £10,000 each. Other subscriptions came principally from firms participating as sub-contractors. The Electric was approached for £100,000; Cooke proposed that this be carried but the board disagreed.²² The TCM was to receive £500,000 for the new cable and if the project succeeded, an extra £100,000. If both cables were successful the TCM stood to receive £737,140.

It was proposed not only to lay a new cable between Ireland and Newfoundland but also to repair and complete the one lying at the bottom of the sea. A length of 1,600 miles of cable was ordered from the TCM; with the unexpended cable from the last expedition this gave a total of 2,770 miles of cable—1,960 miles for the new cable and 697 to complete the old one, with 113 miles in reserve.

On 30 June 1866 the *Great Eastern* arrived at Valentia. The principal members of staff acting on behalf of the contractors were as in 1865. Samuel Canning was in charge, Willoughby Smith was the chief electrician; also on board were Professor Thomson, consulting electrical adviser to the Atlantic Company, Daniel Gooch and Cyrus Field. Also travelling was J. C. Deane, the secretary of the Anglo-American Telegraph Company, whose

diary in *The Times* and other newspapers roused great interest. On 13 July 1866 the *Great Eastern* began paying out and on 27 July arrived off Trinity Bay, the cable successfully laid. New York and the rest of the USA and Canada were now in telegraphic communication with Europe. To complete the triumph, between 31 August and 2 September 1866, the *Great Eastern* successfully hooked the 1865 cable, spliced it on to the cable on board and thus provided a second cable link across the Atlantic. Never before had a cable been recovered from such a depth of water.²³ Richard Glass, Samuel Canning and Professor Thomson were knighted, and Charles Wheatstone, William Fothergill Cooke and belatedly Francis Ronalds, were also honoured.

With this great achievement a new era of submarine telegraphy began. The period of first attempts was virtually over. It had been demonstrated that not only in narrow and shallow areas, but also across great oceans could telegraphic lines be laid and maintained. Improvements in detail might still be made but it seemed that a suitable type of cable had been discovered, whilst efficient methods had been devised for recovering and repairing in very deep water. Improved instruments for transmitting signals with increased rapidity had been constructed, and more precise methods developed for testing cables, as well as for locating faults during manufacture and laying. Thus the few years after 1866 saw major developments.

In 1868 the Anglo-Mediterranean Telegraph Company was formed to establish fresh communication between Malta and Alexandria by means of a direct deep-water cable of about 900 miles across the Mediterranean. The old line had constantly failed between these points, being laid on an uneven sea bed in shallow water, with the constant danger of damage from fishing vessels. The new cable was laid with complete success, by the TCM as contractors, with Sir Samuel Canning and Willoughby Smith as chief engineer and chief electrician. In 1869 the TCM manufactured and laid, using the *Great Eastern*, a cable between Egypt and India, for the British-Indian Submarine Telegraph Company. The cable passed down the Red Sea via Aden and then crossed the Arabian Sea. A previous company, the Anglo-Indian Telegraph Company, had been formed to establish direct telegraphic communication to

India by submarine cable, instead of relying on the land lines to the Persian Gulf and subsequent cable. The company had obtained the Egyptian landing rights, previously granted to the Red Sea Company, but had failed to raise the necessary capital.²⁴

Other long distance submarine cables then followed. The TCM carried out major work for the British Indian Extension & China Submarine Telegraph Company, linking Tonking, Hong Kong, Singapore and Madras, and in 1872 a cable was laid from Madras to Australia, for the British-Australian Telegraph Company, via the Straits Settlement. Thus the United Kingdom was in telegraphic contact with Australia. Also in 1872 was formed the Falmouth, Gibraltar & Malta Telegraph Company to provide a direct link between the UK and her eastern empire. As a result of pressure from the Portuguese Government this cable was ultimately taken into Lisbon on the way to Gibraltar. The starting point was Porthcurno, a quiet spot about 10 miles from Land's End, the company leasing a land line between there and London. The cable between Porthcurno and Lisbon passed through very deep water and lay for some distance at nearly 2,700 fathoms, one of the greatest depths in which any cable had been laid. Moreover, it was later repaired in those waters.

By 1880 nine cables crossed the Atlantic, representing an investment of over £14 million, and a total of 97,568 miles of cable traversed the oceans.²⁵ The TCM emerged as the giant from this great expansion of cable enterprise, as can be gauged by the increase in number of shareholders—from 300 in 1867 to 1,360 in 1877.²⁶ Owing to great pressure of work at the firm's premises much work was sub-contracted to W. T. Henley at Woolwich. The latter had set up works at the Minories in 1837, for the manufacture of electrical apparatus, and had built submarine cables for the Electric. But by 1873 its North Woolwich works covered over 16½ acres, and comprised factories producing cable, insulators, and electric and magnetic apparatus, galvanising and rolling mills, and steel and wire works. Between 1868 and 1873 the company produced more than 12,000 miles of submarine cable, including work for South American and Asian telegraph companies, and in 1880 went public.²⁷ Also at Woolwich, the Siemens Telegraph Cable Works employed over 2,000 men and

carried on all branches of telegraph work, including laying cables and designing cable ships. The firm built the direct cable across the Atlantic and also the Indo-European cable.²⁸

By 1880 the production of gutta percha was virtually monopolised by the India Rubber, Gutta Percha & Telegraph Works Company, part of RCM, whose principal works were at Silvertown, covering an area of about 15 acres and employing 2,800 people. The company also had works in France where about 300 people were employed, and its annual wage bill was over £110,000.²⁹ Its principal business was the construction and laying of submarine cables, and it employed four purpose-built steamers with a total carrying capacity of 12,000 tons, of which the *Silvertown* was the largest telegraph ship afloat. In addition to submarine cable works there were instrument shops where various types of telegraph apparatus were manufactured for foreign and HM governments. Part of the works manufactured india rubber, ebonite and gutta percha goods. The company also manufactured apparatus for torpedoes and submarine work, possessing a complete system for harbour defence. The works were lit by electric light, the installation being the finest private one in England.

All these companies manufactured galvanised wire for telegraph lines and exported telegraphic wire and apparatus to all parts of the world, providing any service in connection with submarine telegraphy. The value of exports averaged £296,397 per annum from 1858 to 1867, and after 1870 expansion was rapid. By 1873 the total value of telegraphic wires and apparatus exported was £2,359,223, about 1 per cent of total manufactured exports.³⁰

None of the companies which effected this rapid expansion of submarine telegraphy, to the great benefit of world commerce, was assisted by any government monopolies, subsidies or guarantees. The government had been bitten by its mistake on the original Red Sea cable, and so the vast benefits derived from submarine telegraphs were largely due to the enterprise of British capitalists, risking their money in undertakings which at the time appeared to many of their countrymen to be the maddest of speculations. The cables were laid along principal trade routes, which had the advantage that, even under hostile conditions, the navy would be able to afford some protection since these areas would be most

carefully patrolled. Not until 1901-2 with the laying of a 3,458 mile cable across the Pacific Ocean from British Columbia to Australia and New Zealand was there any departure from the policy of leaving cable laying to private enterprise. The Pacific cable of 1902 was the first occasion in which countries of the Commonwealth worked together on a project, and it was the first instance of direct government intervention. The cable was jointly owned by the governments of the USA, Australia, Canada, New Zealand and the UK.³¹

A very significant point is that many submarine cable companies were floated just after the Telegraph Act 1868, which nationalised the inland companies. The promoters rightly calculated that this was an opportunity to secure for reinvestment in new telegraphic ventures, a good deal of the capital so released. Moreover, the publicity which the proceedings of the select committee of 1868 (appointed in connection with the government purchase) gave to the lucrative nature of telegraph enterprise, together with the success of the Atlantic cable, persuaded financiers to promote and support new submarine telegraph enterprises.

Notes to this chapter are on pages 275-6

CHAPTER SIX

THE CASE FOR PUBLIC ENTERPRISE

i

In 1854 public control of the telegraph system was debated in general terms. The *Quarterly Review*, the journal of intellectual non-conformity,¹ asked why the Electric Telegraph Company should virtually possess a monopoly of telegraphic communication in the United Kingdom? Would it not be wise for the legislature to consider the question before it was too late? The *Review* contended that the conveyance of news could not safely and conveniently be left in the hands of even one company without strict government supervision. The situation would grow worse if new companies were to spring up and a great public service be thrown into the arena of competition.² The dangers of such a situation had been seen on the railways where laissez-faire was the prevailing attitude of ministers. 'Is not telegraphic communication as much a function of Government as the conveyance of letters?' the writer asked. If the 'do nothing' principle was to be allowed to take its course, Great Britain would suffer, as had the United States, where, 'Even with perfect accord between companies, dissimilarity of instruments used . . . [was] as great an evil as the break of gauge in the railway system. Messages could not be passed from one line to another and delays as vexatious as those which occur on Continental lines, could take away much of the value of the invention.'

Also in 1854, Thomas Allan, electrical engineer and inventor, later a promoter of the UKTC, advocated that the Post Office should work the telegraphs at a uniform rate of 1s (5p) for 20 words, irrespective of distance. He argued that a more extensive use of the electric telegraph would follow a reduction in charge. In 1854, 50 per cent of telegraph messages related to the Stock Exchange and 31 per cent were commercial; only 13 per cent concerned 'family affairs'. Allan contended that with reduced prices,

business would increase in a geometric progression, similar to the effect of the penny post on the letter service, according to the extent of the reduction and the availability of facilities. The main cost of the telegraph lay in constructing the lines of communication; thus, if a wire could be used more intensively or laid more cheaply, fixed costs per message would fall. This would enable rates to be reduced. This would only be possible, he contended, if the Post Office took over the telegraphic communications of the country and worked them as a unified and co-ordinated system.³ In 1860 Allan submitted the same views to Lord Stanley of Alderley, Postmaster-General, and to J. L. Ricardo.

In 1856 F. E. Baines, a clerk in the home mails branch of the Post Office, later assistant postmaster-general, submitted to the Treasury a plan for the 'establishment in connection with the Post Office' of a 'comprehensive system of electric telegraphs'.⁴ The main features of Baines' plan were threefold: existing companies were to be purchased, a uniform rate of 6d (2½p) for 20 words, inclusive of delivery, was to be established, and the proposed system was to be incorporated in the Post Office. In 1857 a copy of this proposal was sent to Lord Stanley, then president of the Board of Trade.

A more remarkable advocate of public enterprise was John Lewis Ricardo, founder member, director and chairman until 1858 of the Electric, MP for Stoke, director of the North Staffordshire Railway Company, one-time chairman of the Metropolitan Railway, and for many years a director of the London & Westminster Bank. In 1861 he forwarded to Gladstone, Chancellor of the Exchequer, a memorandum, 'In support of the expediency of the telegraphic communications of the United Kingdom being in the hands of HM Government and administered by the Post Office.'⁵ It is difficult to account for the stand which Ricardo, a prominent free-trader, who had played an important part both in the repeal of the Corn Laws and the Navigation Acts, took on this issue. Conceivably, he might have been influenced by the growing competition in the industry. By 1861 he had severed all financial ties with the Electric and so was not directly affected, although Scudamore later claimed that the

memorandum was drawn up in 1858, at the time Ricardo was still chairman.

Ricardo argued that 'it was imperative to transfer the telegraphs to a public department'. He estimated that the cost would be no more than £2 million and if the capital could be raised at $3\frac{1}{4}$ per cent there would be a clear profit of approximately £60,000 per annum, more than adequate to establish a sinking fund for the redemption of the purchase money. The employees and premises of the telegraph companies might either be reduced or made available for other Post Office use. Ricardo compared the position in Great Britain with that on the continent where the telegraph was 'at once seen and understood as so powerful an engine of diplomacy, so important an aid to civil and military administration, so efficient a service to trade and commerce' that all continental states immediately established a state telegraphic system, 'an experience of advantage to all'. He conceded that in Great Britain nationalisation was not practicable until the success of the telegraph 'was sufficiently pronounced as not to render it a speculation into which it might have been imprudent for any government to enter'. Coming from a leading member of the commercial world this memorandum probably had more effect than was immediately realised. It was referred by Gladstone to Sir Alexander Spearman, Comptroller General of the National Debt, and F. I. Scudamore, Receiver and Accountant General of the Post Office.

In 1862 there were further proposals that the Post Office should take over the telegraphs. The departmental attitude appeared to be that it was now too late to do so and to set up a Post Office monopoly. The Postmaster-General, Lord Stanley, was not prepared to act at that time, although he had always considered 'the conveyance of messages by the electric telegraph might have been advantageously incorporated in the postal system'.⁶ In 1862 neither the department nor indeed the government was convinced that public opinion would support such intervention by a government department against private enterprise. The state was still disinclined to formulate long-term plans and policies and waited to be jogged into action. It was aware that the public generally was suspicious of the state and centralisation. Moreover, be-

tween 1840 and 1864 the Post Office had experienced an era of reorganisation and rapid expansion of functions.⁷ The introduction of the penny post in 1840 was followed by internal reforms under Rowland Hill. London was divided into postal districts, and important changes occurred in postal procedure. In 1860 the packet service was transferred from the Admiralty, and in September 1861 the new system of Post Office Savings Banks came into operation and expanded rapidly. By March 1862 there were 2,522 places of deposit open, and savings totalled over £730,000; government staff and premises were being used to encourage a habit by which the state set much store. In 1864 the Government Insurance and Annuity scheme was introduced, by which persons could insure their lives and purchase annuities through the Post Office. Scudamore stated in 1868: 'I was at the time [of the Ricardo memo] prevented by the duties devolving on me in connection with the Post Office Savings Bank and more recently by my duties in connection with the Government Insurance and Annuity Office from giving it proper consideration.'⁸

ii

The government did not appear to give a definite lead in policy. In 1851 the Belgian Government suggested regulating transmission of international telegraphic communications by treaty between Great Britain, France, Belgium and Prussia—on the assumption that telegraphic communication should be under the control of governments. A confidential memorandum was prepared for the President of the Board of Trade, Henry Labouchere.⁹ It asked if the government was prepared to recommend assumption of control of the telegraphs. Hitherto, it had only been thought necessary, in the Acts constituting telegraph companies, to secure priority of service for official despatches and to give the government the right, in emergency, to take exclusive possession of any telegraphic establishment for a limited period of time, compensation to be settled by arbitration in case of dispute. 'The time seems to have arrived for the Government to determine whether it will exercise any more systematic control over the telegraphic communication of the country than it has hitherto

April 1st

THE
REFORM BILL.

By Electric Telegraph :

“Advertiser Office,” Friday, 10 a.m.

Messrs. Thew & Son beg to publish the result of
the Division upon the Reform Bill.

For Lord Jno. Russell's	
Resolution	330
Against	291
Majority against Govern-	
ment	39

The result of a parliamentary division transmitted by electric
telegraph 1859. News flashes of this type were common

done.' The importance of the electric telegraph as a means of communicating intelligence could hardly be overestimated. The only solution was that 'the various electric telegraph companies should be placed under a uniform system of management'. It was argued that many of the reasons for the Post Office being made a government department seemed equally applicable to the telegraph. In 1844 Parliament had recognised the general usefulness and significance of the invention by inserting provisions in the Railway Act ensuring the use of the wires for the general public.¹⁰

The late forties were relatively prolific of legislation of a regulatory character, especially towards public utilities. Gasworks, waterworks and railway companies all had imposed upon them maximum dividends of 10 per cent. Under the Gasworks Clauses Act 1847,¹¹ undertakers were obliged to invest excess profits in government stocks as a reserve fund and a statement of account had to be sent annually to the clerk of the peace. However, regarding the telegraph companies the government did relatively little. Influential opinion 'objected to the government interfering with enterprises which ought to be left to the action of private enterprise'.¹² However, in 1855 the Electric and International Consolidation Act prohibited the distribution in any one year of a dividend above 10 per cent. In 1862 the UKTC Act restricted tariffs within a limited framework, and contained a clause reflecting government concern at the monopolistic structure developing in the industry. The company could not sell or transfer any portion of its undertaking without the direct authority of Parliament; it was prohibited from leasing any one of its wires to another company without the consent of the Board of Trade.

There had been increasing disquiet about the 'extraordinary powers' sanctioned by private bill committees to the electric telegraph companies, enabling them to erect their posts and wires along public highways. Petitions from landholders and trustees of turnpikes and district roads, complaining that companies had interfered with public and private rights, were presented at the House of Commons. It was claimed that they were placing posts and wires in front of houses and generally interfering with public amenities, and it was contended that it was 'desirable to have a general measure, laying down some principles which would not

deprive the public of the advantage arising from the competition of the various companies but at the same time would protect the public property'. A peculiarity of the electric telegraph companies was that, unlike the docks, harbours and railways, they were not under the control of the Board of Trade; thus telegraph bills, if unopposed, were passed without the attention of Parliament being called to the 'extraordinary provisions contained in them'.¹³ The matter was brought to a head by the UKTC bill, which asked for 'powers of a most extensive nature which if granted would enable it to use all public highways with imperfect protection to the rights and interest of property'.

In 1863 the Telegraph Act¹⁴ was passed, applying to all future as well as existing telegraphic companies. It regulated powers under special Acts, and specified generally the works which a telegraph company might execute subject to the restrictions of the Act. There were general provisions as to arbitration by the Board of Trade but the latter was also empowered to proceed against a company which did not comply with the Act's provisions. A significant clause restricted the sale of any telegraph company except with the consent of the Board of Trade. Thus the state assumed its prerogative of intervention in the name of competition and the public interest.

In July 1865 the British telegraph companies, acting together, withdrew the uniform low rate of 1s for 20 words, addresses free, that had been in force since 1861 between certain large cities, in particular where the UKTC had its lines. Implicitly this development underlined the previous ineffectiveness of state intervention. Without doubt, stimulated by this action, that 'authoritative exponent of commercial opinion', the Edinburgh Chamber of Commerce, appointed a committee to 'consider the present conditions of telegraphic communication in the United Kingdom with a view to its improvement'.¹⁵ The committee reported in October 1865 with a stinging indictment of the telegraph system and a recommendation in favour of state ownership. The Edinburgh Chamber of Commerce approved the report, which was to precipitate agitation for the take-over. The Scottish towns had been instrumental in pressing for a low and uniform postage in the 1830s¹⁶ and now their views regarding the telegraph system were

to be adopted by almost all the chambers of commerce in the United Kingdom.

The chief grounds of complaint against the companies were their high charges, which thus tended to check the growth of telegraphic correspondence; the frequent and 'vexatious delays' in the delivery of messages, together with their 'inaccurate rendering', of which many had reason to complain; and that many important towns and even whole districts were without telegraphic communication. It was claimed that in the great majority of places which had telegraphic facilities the office was remote from the business centre and population, and open daily for too short a period. In addition, the press had alleged to the committee that in the transmission of news they not only suffered from all these defects, but also from the 'inexperience . . . or carelessness of the staff of the telegraph companies'. Material provided for the newspapers was inaccurate and often unintelligible, so that 'in every newspaper office much valuable time was wasted in the irritating and wearisome occupation of deciphering and reducing to intelligible order' the news received. The press was dissatisfied also with the scale of charges.¹⁷

The committee believed that much lower charges would yield ample revenue to cover all the necessary costs of an excellent system of communication. In the United States in 1859, before the Civil War, 5 million messages were sent, at an average cost of 1s 8d (8p) each, producing a revenue, exclusive of newspaper receipts, of £400,000, whereas the figures for Great Britain were 1,575,437 messages at an average cost of 3s 6d (17½), with gross receipts of £275,704. On the basis of population the USA used three times the number of telegrams per head. In France, Switzerland and Belgium the state telegraph systems provided lower rates and wider facilities than in Great Britain, and the number of telegrams sent was proportionately much greater. All of these countries had been behind Great Britain in postal communications, but they were more cheaply and better supplied with telegraphic facilities. The committee further contended that the British railway system might be the means of extending and cheapening telegraphic communications; it would cost little to add wires to those already being used for railway purposes. In

fact the railway companies were an obstacle to improvement, because of exclusive wayleave agreements granted to the Electric.

Three possible schemes were proposed. First, the companies should be amalgamated under an Act of Parliament, which might fix the maximum remuneration of the directors and the maximum tariffs, and might further provide that all profits beyond what was necessary for a maximum dividend were to be applied either to reduce rates or to provide capital for extending services. The system might be supervised by the Board of Trade. The Edinburgh Water Company was an example of a regulated monopoly, constituted by Act of Parliament, with a maximum dividend and scale of charges and with increases in income applied to expanding facilities. This structure would reduce expense, especially in cutting out superfluous offices and staff; there were about 300 places where all the three telegraph companies had offices, often, as in Edinburgh, within yards of each other. The second proposal envisaged completely free trade. A general Act should be passed authorising any association to erect telegraph poles along any public way. The advantages would be great increases in facilities and thus a cheapening of the system. The third proposal was for the government to manage the system through the Post Office. Lines could be extended to all places where money order offices were located; the great success of the penny post pointed the way. Although some loss might at first be incurred, the adoption of a low uniform rate, say 6d for 20 words, would within a few years produce a surplus revenue and greatly benefit the community. Moreover, there were few obstacles to the scheme. There was no powerful opposing interest like that of the railway companies nor was there any enormous capital to be dealt with—the subscribed capital and borrowings of the leading companies were less than £2,500,000. No interest should be allowed to stand in the way of a 'great national improvement' although the companies ought to receive fair compensation. Finally, it suggested that the government be petitioned to appoint a royal commission to investigate the 'present system of the telegraph companies, with a view to the improvement of the system'.

The Edinburgh Chamber of Commerce under the energetic

leadership of George Harrison, who had been a fervent advocate of public ownership, adopted the recommendations, and other chambers of commerce were circularised. The great majority adopted the views of Edinburgh, and opinion crystallised in support of a plan for combining the postal and telegraphic systems under the Post Office, to which end petitions were presented to the House of Commons in 1867-8. The purchase of the telegraph companies by the state was 'essential to the progress of the mercantile and manufacturing interests of the country'. The agitation resulting from the companies' abolition of the 1s rate encouraged the Post Office to take positive action.

In September 1865 the Postmaster-General, Lord Stanley, who 'for many years had taken a great interest in the question and had long been of the opinion that the Telegraph Systems of the country ought to be under the control of the Government and worked by the Post Office',¹⁸ directed F. I. Scudamore:

To enquire, and report, whether in his opinion, the Electric Telegraph service might be beneficially worked by the Post Office, and whether it would then possess any advantage over a system worked by the private companies, and whether it would entail a very large expenditure beyond the purchase of existing rights.

This was the first official intimation that the government was considering buying the telegraphs; the terms of reference were wide and somewhat ambiguous.

Frank Ives Scudamore, born 1823, was the son of John Scudamore, solicitor, of an old Hertfordshire family. He was educated at Christ's Hospital and entered the Post Office in 1841. A man of drive and ambition, 'small, bright-eyed, eager and alert', he achieved the office of receiver and accountant general in 1856 and was mainly instrumental in the elaboration of the scheme for a government savings bank. It was he who introduced the post-card, publishing several tracts to explain and popularise it, and in 1863, in recognition of his ability and energy, he had been promoted assistant secretary of the Post Office.

His report was made to the postmaster-general in July 1866.¹⁹ He favoured the Post Office purchase and the establishment of a uniform 1s rate, and emphasised the deficiencies of the system as stressed by the Edinburgh Chamber of Commerce. Existing faci-

lities were insufficient, and in many places the telegraph office was inconveniently located and open for too short a period. The great majority of offices were, of course, at railway stations, with the additional disadvantage that the staff had dual loyalty and responsibility. Scudamore contended that little improvement could be expected so long as the telegraph was worked by commercial establishments geared to earning dividends and engaged in wasteful competition. Thus development of the telegraph had been retarded, whereas the growth of the telegraphic services of continental states had been greatly stimulated, particularly in Belgium and Switzerland, by annexation to the Post Office and the consequent adoption of low charges. Scudamore did not include statistics from the USA, alleging that there was no true comparison because of the extent of distances involved, an omission later queried by opponents of nationalisation.²⁰

On the continent correspondence by telegraph was more general and more popular than in the UK, where its use was 'practically confined to stockbrokers, mining agents . . . racing and betting men, and others who were engaged in business of a speculative character or who dealt in articles of a perishable nature'. Thus, the use by 'general merchants' was comparatively little compared to those engaged 'in the more speculative branches of commerce', while the general public used the telegraphs only in grave emergency and a message was received with consternation. Their annexation to the Post Office would bring great advantage to the public and ultimately large revenue to the state.

The Belgian telegraphs, under state control since 1850, had made successive tariff reductions—to the equivalent of 5d (2p) for an ordinary message of 20 words. This had so stimulated the system that between 1860 and 1865 the use of inland telegrams had expanded by over 400 per cent whereas letter post had grown by only 45 per cent. In Switzerland too, the efforts of the state administration had resulted in rapid growth. The evidence showed that reduction of the rates immediately created a large number of additional users.

Scudamore contended that because of the greater distances in the UK the telegraph had a greater advantage over the post than in Belgium and Switzerland. However, the telegram was used

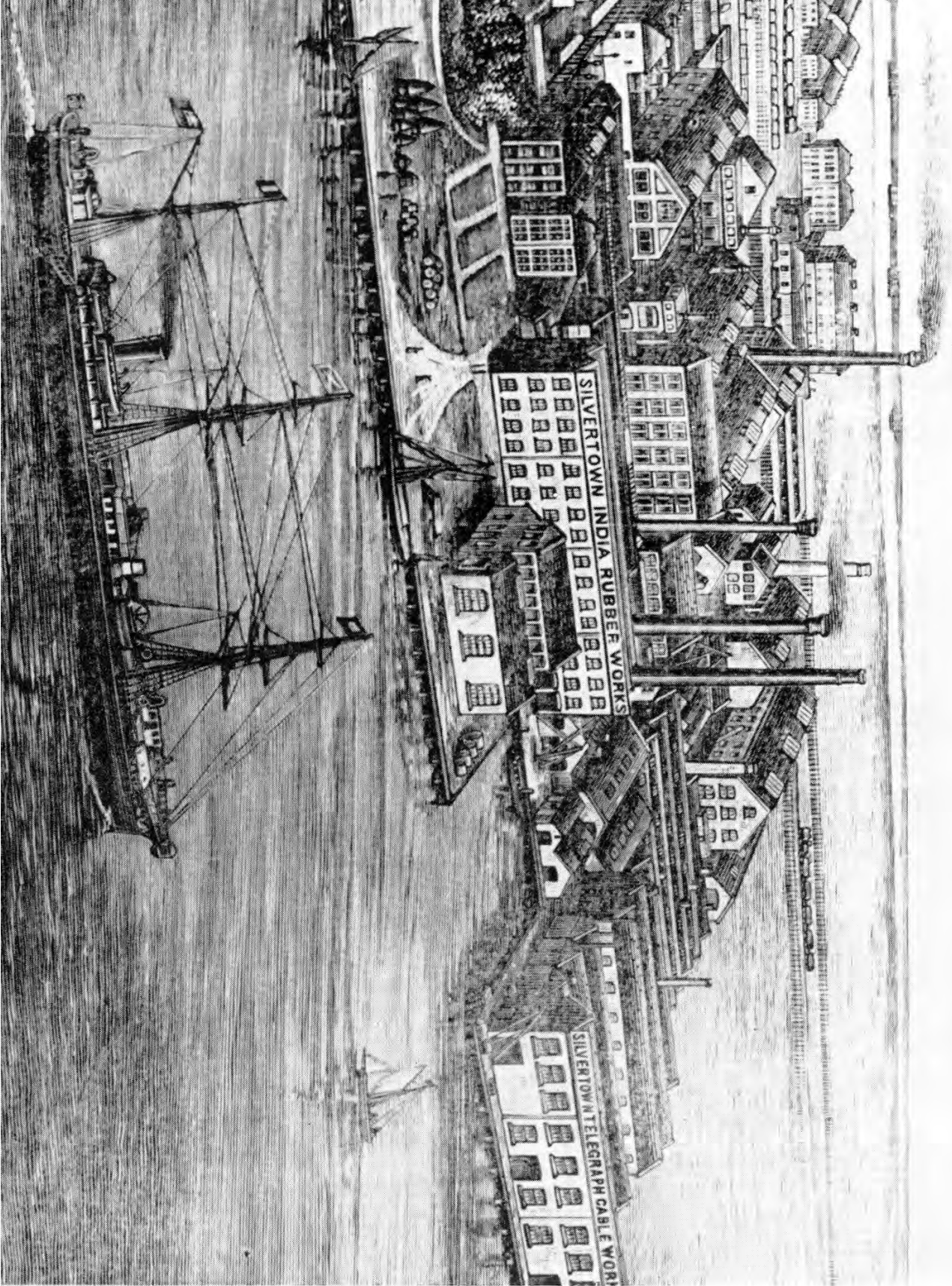
much less by comparison with the letter in the UK than in the other two countries.²¹ Number of letters sent per telegram:

<i>Year</i>	<i>Belgium</i>	<i>Switzerland</i>	<i>UK</i>
1860	218	84	296
1861	195	87	273
1862	187	80	221
1863	114	74	197
1864	88	70	169
1865	73	69	151

It might be argued that these figures were testimony to the efficiency of the penny post rather than to the deficiencies of the telegraph companies. Yet Scudamore contended that the statistics were positively favourable to the companies; probably included in 'messages transmitted' were messages handed over by another company, which therefore had been counted twice. However, even with this possible bias the percentage of telegrams to letters was no higher in England in 1865 than it had been in Switzerland in 1853, or Belgium in 1862. The slower growth and higher charges of the UK system were attributed to the divided management of the companies, motivated by the interests of shareholders rather than of the whole community.

Telegraph facilities were allegedly inferior to those of Belgium and Switzerland. In 1865 the UK system of 16,066 miles of telegraph line and 2,040 telegraph offices included many facilities worked by different companies but taking much the same course and serving precisely the same area. Thus business was divided without facilities being widely spread. Scudamore contended that a minimum of 2,000 miles of line and 300 offices were duplicated. He conceded that there was a more liberal allotment of wires to lines in the UK compared to Belgium and Switzerland but he claimed that this did not compensate for the more restricted distribution of the lines and telegraphic offices. The number of messages transacted by each Belgian or Swiss office was about the same as by each telegraph office in the UK; messages respectively per office being UK 2,285, Belgium 2,195, Switzerland 2,346. Yet while in Switzerland there were 9.9 telegraph offices per 100,000 people, in Belgium there were 6.6, and in the UK 5.6.

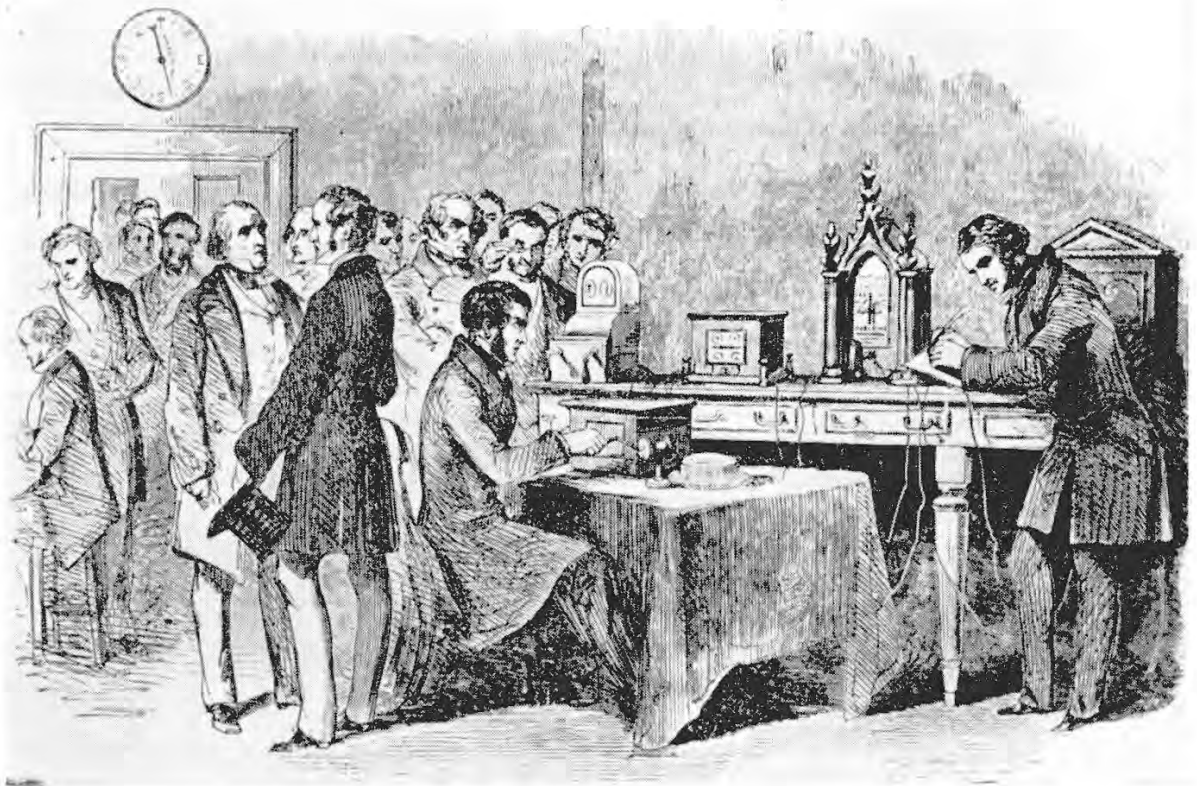
A further defect of the system in the UK was the position of the



Page 131 The India Rubber, Gutta Percha and Telegraph Works of the Telegraph Construction and Maintenance Company, Silvertown, London. One of the great complexes which had developed by the 1880s employing over 2,000 people



Page 132 (*above*) Telegraphists of the period. Women employed at the Central Telegraph Station, Telegraph Street, the head offices of the Electric & International Telegraph Company. The employment of women was a significant socio-economic contribution of the development of the telegraph; (*below*) opening the first London–Paris telegraph circuit, November 1852. The first cross-Channel cable was successfully laid in September 1851 by the Submarine Telegraph Company



telegraph office. Scudamore stated that many towns of a population of 2,000 or more did not possess a convenient telegraph office, which was commonly at the railway station. His assessment, based on an examination of 486 English and Welsh towns, was that of these towns 30 per cent were 'well served', 40 per cent were 'indifferently served', 12 per cent were 'badly served' and 18 per cent, with an aggregate population of half a million, were not served at all.²² This inconvenience would tend to deter potential users, as the cost of transmission would depend on distance and on how far the addressee lived from the nearest terminal office. Thus the absence of facilities must check correspondence by telegraph. 'Good service' was defined as the presence of a telegraph within the town limits. A town was 'indifferently served' if the telegraph was approximately $\frac{1}{2}$ mile from the Post Office. A town was defined as 'not served at all' whenever the distance of the telegraph office from the Post Office exceeded 1 mile; the report listed 96 such towns, but it was stated in a footnote in the appendix that by 1868 25 of these had been given a railway telegraph office.

Thus, Scudamore contended, the telegraph system was analogous to the postal service of pre-1840, when letter boxes were few in number, rates were excessive, and the limits of free delivery so narrow that very many letters were charged extra. Yet the cost of providing facilities was lower in the UK, £4 9s (£4.45), average per mile of wire for the four principal companies than in either Belgium, £5 1s (£5.05), or Switzerland, £4 19s (£4.95), and certainly did not necessitate restricted provision or high charges. Even with higher costs, both the Belgian and Swiss systems had apparently more than covered expenditure at their lower tariffs. In the UK, the companies had made gross profits of £16 per mile, or more than 33 per cent of gross receipts. However, Scudamore contended, the UK companies would rather not increase their business by reducing rates because this might increase working expenses and might in the short run have an adverse affect upon net profits and thus on dividends.

Scudamore was quite certain that the companies could bring the existing costs of a message below 1s by adopting either of two courses. First, the telegraph companies might amalgamate and so greatly reduce their working expenses without losing any of their

business. Scudamore did not at this time give any specific figures—in evidence before the select committee of 1868 he quoted £55,000 as the probable figure to be saved by amalgamation;²³ he then considered that the companies could reduce wages and salaries by one fifth, saving £30,000, station expenses by one quarter, £3,000, rents by one third, £13,500. They could also save £7,000 on news collection. The companies were aware of the advantages of amalgamation in reducing costs but it was not likely that the public would benefit. The necessity for maintaining and increasing dividends, would, it was argued, still operate against any reduction of rates. Second, the companies might bring about a growth of business by extending telegraph lines to the 'wealthy suburbs' of Liverpool and Manchester, thus bringing the telegraph closer to densely populated areas at relatively small cost. If this were done, the extensions to the main line would act as feeders, rather as the lines of the District company rendered valuable aid to lines outside London. However, this action was unlikely to be taken because of the sacrifice of immediate revenue which would be incurred.

Thus the only real chance of a great increase in facilities was through the Post Office. Two general objections had been made against proposals for extension of the duties of the Post Office: that the department was already hard worked; additions to its responsibilities would make it less efficient for its original duties, and that the sub-postmasters in smaller towns would be incompetent to perform their new duties. Scudamore refuted both arguments. Throughout the great expansion of functions undertaken by the Post Office in recent years, there had been, he alleged, no fall in efficiency. Increased duties for sub-postmasters would enable the Post Office to pay higher salaries which would attract even better people. Fundamentally, the Post Office possessed unique facilities for such expansion, in its 12,000 offices throughout the country, open for 10 to 12 hours daily. It would be able to provide a better service than any other public department or private company. At the great majority of offices additional work might be undertaken without any additional cost or labour. The department would bring the telegraph closer to the population, extend opening hours, reduce charges for messages and give a money

order service by telegraph. No private firm could bring about such an extension of facilities to districts which would otherwise be neglected, and permit the establishment of a low and uniform tariff. The crucial question was whether the Post Office could achieve this reorganisation without loss to the state.

Scudamore estimated that the whole of 'the property and rights of every description' of the four principal companies might be purchased for £2,400,000, based on the market price of the shares and allowing for some depreciation of stock. A further sum of £100,000 would be required for extensions, construction of additional lines, instruments and office fittings, and for training staff. This original estimate suffered from serious omissions. It did not consider the possible need to purchase railway property and way-leaves, although Scudamore envisaged the need to leave the railway companies what equipment they required for their own purposes. The estimate included nothing for goodwill, compulsory sale, or prospective profits. It did not include payments to the UPTC or to Reuter's and allowed nothing for compensation to displaced officers of the companies.

As the annual revenue of the Post Office was estimated at £1,500,000, the cost of the scheme would be, it appeared, less than two years' revenue. When the programme was fully matured and the public was familiar with the improved facilities, and if the proportion of telegrams to letters was increased to the Belgian and Swiss figures, Scudamore estimated that 11,200,000 telegrams would be transmitted annually at an average charge of 1s 2½d (6p), producing annually £676,000 but allowing nothing for foreign messages, private lines or press news. After interest on capital at 3½ per cent, £81,250, had been met, there would initially be a net profit of £138,750.

The report was duly submitted by the postmaster-general to the Treasury. The financial crisis of 1866 together with the unstable political position, no doubt delayed any positive action. There was a change of government as Russell was defeated and the conservatives came into office with the Duke of Montrose as postmaster-general. However, it appears there was a clear determination to go through with Scudamore's proposals. In January 1867 a confidential draft of a bill, 'To extend the facilities

facilities to territory and population was still greater in both Belgium and Switzerland, while the proportion of inland telegrams to letters was far less in the UK. Clearly, Scudamore contended, one system was framed and maintained solely for public benefit, the other with a view to the interests of shareholders and only indirectly for public gain. Costs were not greater than on the continent; thus there was no reason to restrict the provision of facilities more than elsewhere or make higher charges for their use.

There was one very significant change from the original report. In the interim period, with the intention to purchase proclaimed, the market price of the shares had risen to nearly £3 million, and £100,000 was again added for extensions and additions. The probable purchase price was thus increased to £3,100,000. However, even allowing for heavier interest charges, Scudamore submitted calculations showing there would still be an estimated surplus of £77,750.

Scudamore's calculations, allowing 5 per cent for unforeseen contingencies, were as follows:

	£		£
Estimated revenue	640,000	Estimated working expenses	405,000
Less 5 per cent for possible over-estimation	32,000	Add 5 per cent for possible deficiency	20,250
	<hr/> 608,000		<hr/> 425,250
Less estimated charge for capital	105,000	Estimated surplus	77,750
	<hr/> £503,000		<hr/> £503,000

Thus Scudamore confidently asserted that the proposed transfer could be effected without loss to the government, although the actual terms could only be arranged after a full examination of the plant of the companies, allowing for depreciation, and a full inspection of the books, which should show the true value of their trade.

Notes to this chapter are on pages 276-7.

CHAPTER SEVEN

NATIONALISATION 1868

In February 1868 a reconstruction of the conservative government took place on the resignation of Lord Derby, Disraeli succeeding to the leadership. On 1 April the new Chancellor, Ward Hunt, introduced the Telegraph Bill 'to enable the Postmaster-General to acquire, maintain and work the Electric Telegraph in the United Kingdom'.¹ For the first time in history the government proposed to enter upon a strictly private enterprise. Hitherto, it had acted as a controlling and checking power only; now it was overthrowing 'preconceived notions, as well as the cherished views of our best political economists'.² The bill was described in the covering letter to the Treasury as merely 'permissive'. It did not contemplate the acquisition of any monopoly by the postmaster-general, but placed him, if the bill became law, in the position of a newly formed telegraph company, leaving him to negotiate terms with existing companies. It was not proposed to confer on him any rights which the companies themselves did not have, or to give him any greater powers over private property. It authorised him to acquire the whole or part of the business of any telegraph company for an agreed sum. If he acquired any one undertaking he had, at the request of any other company, to purchase it also on terms to be settled. Failing agreement between the parties an arbitrator was to be appointed by the Board of Trade. The bill provided for a uniform 1s rate, irrespective of distance, for a 20 word message. There was still no provision for the purchase of the telegraph rights of the railway companies, and no mention had been made of this in Scudamore's two reports. As the greater number of offices were at railway stations, and the greater number of lines ran along the railways, this was an important and surprising omission. In many cases the lines were originally erected for railway purposes and although many additional wires had been put up for commercial use, the poles remained the property of the railway companies. In the Supplementary Report of February 1868 Scudamore stressed it

was necessary to deal only with the telegraph companies and not 'with the few railway companies which are at present engaged in transmitting telegraph messages for the public'.³ However, the bill provided that where railway companies gave a public telegraph service they would be able to compel the postmaster-general to purchase these rights from them. There was, however, no obvious understanding of the full importance and nature of the railway interest, and of the agreements between telegraph and railway companies—that the purchase of the telegraph companies would lead to the purchase of the reversionary rights of the railways in the telegraphs.

It was, however, already clear that the railways' interests were opposed to the principle of the bill. In February 1868 a meeting was held by the principal railway companies, including the LNWR, the GWR and the Midland, to discuss how their opposition should be organised.⁴ In March railway representatives met Ward Hunt, the Chancellor, and impressed upon him that they were 'entirely opposed' to the transfer of the telegraphs to the Post Office, and that the passing of the bill would be resisted with all their power. Hunt was apparently 'staggered with the prospect of such opposition'.

A letter written in April by W. H. Preece, eminent telegraphic engineer and later engineer-in-charge to the Post Office, gives some insight into the attitude of the railways.⁵ The railway companies, 'whose interest in the telegraph services of this country, both pecuniary and intrinsically, is second only to that of the telegraph companies themselves', had been omitted from the bill. Only the South Eastern and the Taff Vale railways completely owned a telegraph for the use of the public, but there were many others worked under agreements with the telegraph companies, and in the majority of cases these agreements were 'of the most diverse and complicated character'. The Electric had 158 working agreements with different railway companies; each of these had a certain and expanding interest in the telegraph on its line, 'whether it be opened for the use of the public or not'. The bill should be withdrawn to compel the Post Office to compensate the railways for the extra expenses they would incur in maintaining and managing their own lines; and they would also lose their bene-

ficial interest in the application of their telegraphs to public business. Preece doubted if the government could become 'contractors and engineers as the telegraph companies were'. It could not undertake such beneficial working arrangements at small stations where a telegraph company clerk could book trains and assist generally—to all intents and purposes the servant of the railway company, which a government employee could not be. 'The Bill must acquire all the rights and obligations of the telegraph companies and then deal with the railway companies separately and independently'. Railway companies should be compensated for the loss of their partnerships with telegraph companies. 'The Government have evidently not considered the magnitude of this transaction nor can they be aware of the enormously involved and complicated arrangements existing between the companies.' The railway companies should strenuously resist the undisputed right of way, bound to be claimed for the erection of telegraphs, and the possible interference by the Post Office in the internal management of telegraphic and other business. The inconvenience of having two distinct staffs, under different managements, on railways which already maintained their own lines, was very great and would become infinitely more so when every line had its own telegraphic staff, as well as that of the Post Office. If the government were to be permitted to use railway telegraph lines, it must be on the same basis as the telegraph companies, to all intents and purposes 'the servants of the railway companies'.

On 18 April 1868 *The Railway Times* commented that the reduced rates were the only practical boon offered by the bill, and that this would be paid for, perhaps much too heavily, by the whole nation, not merely by users of the telegraph. It would further be paid for in the . . .

abandonment of further telegraph enterprise; in the stagnation and dreary routine inseparable from official regulations; in the interference by the Government with commercial business . . . ; it would be paid for by the rejection of all improvements . . . by the absence of all desire or inducement to improve; and . . . by the dependence of the press on the whim or favour, or perhaps prejudice, of a Government official.⁶

It warned that the railway companies, which had always been ready to expand, might find themselves subjected to powers which they knew by experience would be exercised with 'no unsparing or considerate hand'.

The leading opponents of the measure were, of course, the telegraph companies themselves. In December 1867 the secretary of the Electric, Henry Weaver, circulated MPs, particularly those with railway interests, urging them to oppose the bill.⁷ The strong railway interest in Parliament was the telegraph companies' best chance of preventing the bill going through. Accordingly, it was emphasised that government powers to acquire rights and easements over land and property particularly affected railways. Were the railways desirous of substituting for the telegraph companies, 'over which they had a very obvious control', the Post Office authorities who 'already deal with a high hand'? The very nature of the scheme ensured that all arrangements would have to be made at the very lowest figure possible. The Post Office would abolish competition and the railways would thus not be allowed to use their telegraphs for commercial purposes. On 3 December Robert Grimston, chairman of the Electric, wrote to Disraeli that the Post Office take-over, and the extension of facilities to remote districts, could only be achieved at a very heavy annual cost to the state. The making and working of unprofitable branch lines had been a great burden to many railway companies; they had proved suckers rather than feeders. On 5 March 1868 Grimston gained a personal interview with the chancellor, at which Scudamore and the postmaster-general were also present. It was apparent, however, that the government was determined to proceed with the bill.

The public statement of the case for the telegraph companies was given in a pamphlet, *Government and Telegraphs*, published in May 1868.⁸ It contended that the proposed plan of purchase was scarcely distinguishable from partial confiscation, and disputed the arguments of Scudamore and the chambers of commerce regarding the number of districts unserved and the lack of facilities. The bill's proposal that the postmaster-general might 'purchase the whole, or parts of the undertaking of any company' was unjust. If the bill was to permit the purchase of telegraph rights, it

ought to compel the government to take over all those rights without distinction. It gave no compulsory power of purchase but only empowered any company 'with the authority of two-thirds of the votes of shareholders' at a special general meeting, to sell any portion of its undertaking. The postmaster-general might acquire, for a small sum of money, powers and privileges of a company, 'or such part' of them as might suit his purpose. If the company was doing badly, the shareholders might be inclined to sell. Thus the postmaster-general would be able to set up a government telegraph competing with those privately established. It could fix a low tariff, so as to render it impossible for the private company to even cover working expenses. Thus competition would be impossible, and the other companies would be compelled to sell out on disadvantageous terms. Objection was raised to the proposal that if terms were not settled between the parties, an arbitrator appointed by the Board of Trade should fix a price. 'A Government Officer appointed by one department to fix a price for another' was 'scarcely different to confiscation'. The purchase was to be paid for out of the public purse, not out of Post Office revenue; yet the full amount had not been indicated. Worse, there was 'not the slightest prospect that, in the hands of the Government, the Electric Telegraph would ever pay its expenses'. In seeking to take over the 'inland telegraph' the promoters of the bill had failed to see the difficulties and expense which would follow in interfering with railway communications, foreign telegraphs and the press. The bill ought to provide for full compensation to all officers of the telegraph companies who became redundant or whose status and pay were reduced; 'every door will be closed to telegraph employees when the telegraph was purchased by the Government.'

The fallacious character of Scudamore's arguments, based on a comparison of UK tariffs and telegraphs with those of Belgium and Switzerland, was exposed. It was argued that the 'letters' of the UK were swollen by the many 'circulars, samples and patterns'—a profitable trade encouraged by the Post Office but comparatively unknown on the continent. If these were omitted it was probable that telegrams in the UK would be much higher in proportion to letters than in either Belgium or Switzerland.

Scudamore claimed that the elimination of circulars from his estimates would have little effect. Grimston further argued that the Belgian system differed essentially, its principal business being messages from one country to another, whilst that of the English telegraph was the internal message. In fact, the internal telegraphs of Belgium had never paid at the low uniform charge, receipts covering only 66 per cent of expenditure; it was the transit messages which had enabled the whole system to cover costs. Delays and inaccuracies were frequent and lines were often blocked by comparatively unimportant messages. The Belgian state system was thus both unsatisfactory and running at a heavy loss. Comparison with the Swiss system was equally illusive; what was certain was that Swiss telegraphs were worked at a loss under the cheap uniform half-franc rate introduced in 1867.

The general conclusion drawn by the pamphlet was that whilst the British telegraphs were almost exclusively internal, the Belgian and Swiss were essentially international. Thus they could make up deficiencies arising from losses on internal communications by the surplus derived from their transit trade. However, if the Post Office lost money on its internal communications with rates as low as in Belgium and Switzerland, there would be no transit traffic to remedy the deficiency. The telegraph companies had an excellent record in terms of rate reduction, yet a cheap uniform rate had not, would not, pay.

It was further contended that the Post Office take-over was an interference with private enterprise and if allowed would lead to further encroachment. Parliament had until 1867 dealt with telegraphic communication on the basis that the best interests of the nation would be served by competition. Thus, federation had been prohibited, dividends limited, and tariffs fixed. The chancellor had stated: 'If the Post Office had a monopoly . . . it could easily lower tariffs and at the same time be profitable.' But why a government monopoly? This would not necessarily lower charges. Amalgamation and consolidation of the companies would be just as effective. There were implicit dangers in the state controlling the telegraph. Under the Telegraph Acts it could at any time take them under its authority, in the event of crisis, without the need for constant control. The government might give advantage in telegraphic

information to newspapers supporting it, with detrimental consequences to opposition papers; at parliamentary divisions there might be disadvantages to the opposition; there would be a danger of state 'espionage' and censorship as practised in Europe, and danger too in the additional powers of patronage given to a government department. Finally, the pamphlet contended, the Post Office already had more duties than it could properly perform and the government had never shown any special aptitude for telegraphic work, either in construction or working. The history of its arrangements with the Mediterranean Extension Company, which involved the Consolidated Fund in an annual expenditure of £36,000, for a cable lying at the bottom of the Red Sea that had never carried a message, was a warning of government incompetence in this respect.

Scudamore replied to several of these points in May 1868, asserting that one of the chief merits of the scheme was that it had no novel features and that the amalgamation of telegraphic and postal administrations had been tried successfully not only on the continent but also in the British colonies of Victoria and New South Wales.⁹ Uniformity of charges and lower tariffs were working successfully in Belgium, Switzerland and Denmark. He rejected the telegraph company case regarding the unprofitability of inland messages in Belgium and the unprofitability of the low uniform rate in the UK.

The press, on balance, was clearly in favour of the Post Office move. The *Manchester Guardian*, representing the views of many provincial newspapers, had for some years advocated placing the telegraph system under the control of the Post Office.¹⁰ In particular there was dissatisfaction with the system under which the telegraph companies had a monopoly of news collection. The press wished to collect its own news, independent of any party which might convey it for them, and to this end the Press Association had been formed in 1865.¹¹ Under the Post Office there would be no monopoly and every newspaper would be able to obtain news as it desired. The rates charged by the companies were considered low, but much of the news paid for was of little value. For special wires the rate was high, 'practically prohibitive'.¹² The newspapers objected to the fact that the telegraph companies were not com-

pelled to supply all the press on equal terms; they might supply particular papers or not, as they pleased, and on what terms they pleased. Thus the action of the telegraph companies sometimes appeared 'despotic and arbitrary'.¹³ If a newspaper had a contract with one company it could not be supplied with news from any other agency even though it was dissatisfied. Certain newspapers opposed the bill, *The Sheffield Independent* and *The Yorkshire Gazette* among provincial sheets, and *The Money Market Review* and *The Bullionist* in the City of London, which were distrustful of putting the telegraph into government hands. 'It was difficult to find the press unanimous on anything.'¹⁴ However, essentially the interests of the press seemed to be with the promoters of the bill and 297 petitions in favour were sent in by the press, many not confined to one paper. *The Economist* of 4 April 1868 wrote: 'Even if the Companies resist, they will not be very powerful opponents—firstly because the leaders of both political parties have already sanctioned the scheme, secondly because they are exceptionally unpopular. There is probably no interest in the Kingdom, which is so cordially disliked by the press, which when united is stronger than any interest, and which has suffered for years under the shortcomings of the private companies.'¹⁵

However, the crucial point was how far had the current of opinion about state interference in private enterprise, really ebbed since the 1850s. Then 'it would have been useless for any Chancellor to propose such an operation, nor would it have been acceptable to the Treasury itself'.¹⁶ Then public attitudes were inconsistent with state control of profitable operations. It was believed that state interference was wrong because it interfered with the freedom and natural rewards of private enterprise. There was also doubt as to whether the government could perform any remunerative work well. 'By 1868, public opinion is not quite prepared to take over the railways in England, because there are too many of them; but it is prepared to buy the Electric Telegraphs . . . the distrust in State competence to do profitable work is greatly diminished. The Post Office is admitted to do its work very much better and more cheaply than any company.'¹⁷ Public opinion was tending to believe that state intervention would be beneficial in nearly all great enterprises; the public was looking to

the state to defend their interests (for example, in the demand for the auditing of railway accounts). The internal communications of a great state were not matters for private enterprise at all; they were of national importance and involved a national obligation. 'A system of wires now partial will be made universal; a system of charges now proportional to distance will become uniform; a system of deliveries now uncertain will be made definite.' Parliament should transfer a means of communication which was a monopoly in the hands of a few, using it for their own profit rather than the public advantage, to the hands of a department which was only 'a very efficient servant of the whole community'.¹⁸

Against this adverse comment and pressure from the Post Office, the companies became 'reluctantly' more interested in the terms of the sale. They proposed that they be bought out on the basis of twenty-five years' net profits, using the precedent of the 1844 Railway Act. The government offered the highest price on the Stock Exchange of the companies' shares up to 25 May 1868, plus an allowance for loss of prospective profits; this the companies rejected. The question was to be referred to arbitrators, one nominated by each party, and an umpire chosen from men of high standing. By June *The Economist* was lamenting that 'a Bill which might have been passed with acclamation may in consequence be indefinitely postponed'.¹⁹

The debate on the second reading of the bill began on 9 June. The House of Commons then sitting was the last to be elected under the provisions of the Reform Act of 1832. The conservatives held office but were in a minority, and the government was in fact defeated on the Irish Church Question on 4 April 1868, a few days after the bill's introduction. Disraeli tendered his resignation but agreed to retain office until the ensuing general election, the first to be held under the 1867 Reform Act. Parliament was due to be prorogued in August, and the government was naturally anxious for popularity and probably wished to go to the country having achieved nationalisation, particularly as the opposition had already committed itself to state purchase. The chancellor described the great manifestation of opinion from 'disinterested parties in favour of the Bill'. Seventy-seven petitions

in favour had been received from chambers of commerce, public bodies, merchants, traders and the general public, and 177 from the press.²⁰ Only one petition against had been received from persons not shareholders in the telegraph companies. Ten petitions had been received from the telegraph and railway companies, and 319 from individuals, all shareholders. It was highly desirable that an early decision should be reached in the interests both of the public and the companies, which would be unable to plan ahead if the measure was postponed for another year. The government anticipated a surplus revenue of £210,000 per annum, which would enable it to pay interest at 3½ per cent and clear the debt in twenty-nine years. The amount required for purchase and necessary extensions had now risen to nearly £4,000,000 because of an increase in the companies' share prices. The Electric, quoted 144-148 in November 1867, had risen to 164-169 in early May 1868. This rise in share values gave support to the belief in government circles that the value of the telegrams was increasing so rapidly that the state would lose money by any delay. This was certainly the view taken by Scudamore. In a confidential memo of July 1869 he stated: 'It was obvious that if we did not satisfy the telegraph companies and the railway companies they could beat us by the mere effluence of time. We knew the trade which we wanted to buy was growing largely. We believed that if we did not succeed one and possibly two years might elapse before we again had the chance of settling the question.'²¹

The major opposition to the bill was led by George Leeman, MP for York and 'a railway man'. He questioned whether it was the duty of the government to conduct business hitherto left solely to private enterprise. Only now that the undertakings were profitable was the government stepping in to buy them up. The petitions in favour of the bill were of 'common paternity'. Would the Post Office do more for the press than was being done? He stressed the large beneficial interest of the railways in the telegraph companies and argued that the wires belonging to the railway companies could not be properly worked if the telegraphs were transferred to a staff of government clerks. He contended that the scheme would be financially disastrous; the revenue of the Post Office from the letter post had fallen from £1,659,510 to £578,000

between 1839 to 1841 as a direct result of the introduction of the penny post. It had taken twenty-four years for the Post Office to bring revenue up to what it was before the new system came into operation.²²

Largely as a result of this opposition it was agreed that the bill should be referred to a select committee of the House, under the chairmanship of Hunt. The members of the committee were nominated on 23 June and included Leeman and George Goschen, member for the City of London. The latter was a distinguished member of the commercial world, being head of the banking firm of Frühling and Goschen as well as a director of the Bank of England. The committee was to inquire as to:

Whether it is desirable that the transmission of messages should become a legal monopoly of the Post Office; whether it should be left to the discretion of the Postmaster-General to make special agreement for the transmission of messages or news at reduced rates; what securities should be taken for insuring the secrecy of messages transmitted through the Post Office; what arrangements should be made for the working of submarine cables to foreign countries.

It was now late in the session and in view of the strength of the threatened interests it seemed probable that the bill would eventually have to be withdrawn or deferred; thus there was great pressure on the government to act quickly. The relationship between the railway and telegraph companies was now clearer to the Post Office, and it was realised that compensation would have to be paid for their vested and contingent rights. Intensive negotiations were begun with the companies, and finally at the end of June agreement was reached on the basis of twenty years' purchase of net profits. The two younger telegraph companies, the UKTC and the District, which were, it was contended, still building up their business, were given special provisions on the basis of the purchase of their ordinary shares at stock exchange valuation. Terms were also agreed with the railways covering the purchase of net annual receipts, prospective receipts on public telegraph work, compensation for loss of granting way-leaves and for loss of reversionary rights.

As a result of this settlement the opposition had largely with-

drawn before the meeting on 1 July of the select committee, which thus had to examine witnesses itself. In the debate Goschen said: 'Before the Committee there appeared Counsel representing the promoters [the government] and, at first, Counsel representing the original opposition to the bill [the companies] but in consequence of the change in views of the opposition, who during the proceedings became friendly to the bill, there was no counsel present to cross-examine witnesses.'²³ Thus the inquiry was carried out under a great disadvantage. In the public interest and to bring the full facts to light, members of the committee, chiefly Leeman and Goschen, had to cross-examine witnesses who were largely on one side. Subject to arbitration and the approval of the committee, the Post Office had, except for the UPTC and Reuter's, bought up or contracted to buy up every interest which had been represented by the petitioners against the bill.

Complications with the UPTC had not been foreseen in either of Scudamore's reports. The original intention of the Post Office had been to work only public inland telegraphs and not to interfere with companies working private wires. However, the UPTC had contended before the 1868 select committee that when the system came under Post Office control private lines would be run down and its business seriously harmed by the low uniform rate. As a result, the Post Office decided to take over private as well as public lines, the UPTC being offered the same terms as the two leading companies. The second complication arose in connection with Reuter's Nordeney cable; if the postmaster-general purchased both the Electric and the Magnetic he would take upon himself conflicting obligations. The Electric had an agreement with Reuter's under which it was bound to send a definite class and number of messages by the Nordeney cable. The Magnetic had an agreement with the STC, through which it forwarded all continental messages. The Post Office would also be acquiring the Electric's Zandvoort Anglo-Dutch cables, which it would be unable to use if it fulfilled the obligations of the Magnetic. Thus the Post Office could purchase the property of the STC, or it could sell or lease to it the Electric's cables. It was decided to lease them, but there still remained the obligation to Reuter's. It was judged necessary, therefore, to purchase the Nordeney cable and lease it

also to the STC. Reuter's contended that the value of this cable had been increased by its acquisition, on 31 March 1868, of a prospective interest in the Euro-India Company, formed to work a new line between England and India, across part of Prussia, Russia and Persia. This provided an alternative to the Turkish state land lines via Baghdad and was eventually opened in January 1870. The terms agreed with Reuter's were similar to those with the public inland companies. 'It may be', said Scudamore in 1869, 'that if longer time for consideration had been afforded me some other course than that which was followed might have been found, but at that late period of the session and harassed as we were not merely by our opponents, but by severe pressure of work, we could find no other course and were forced to purchase the property of Reuter's upon such terms as we could arrange.'²⁴ In fact, the prices paid for the UPTC and Reuter's absorbed the margin upon which Scudamore and the government had counted for the purchase of the reversionary rights of the railways.

The select committee reported on 16 July, recommending that the transmission of messages for the public should not become the legal monopoly of the Post Office. The submarine cables should be worked by leasing them to the companies, although ultimately it might be found expedient that the Post Office should itself work them. On 21 July the House of Commons went into committee on the bill. The chancellor now stated that the estimated cost of purchase made by Scudamore and approved by M. H. Foster, the principal financial officer of the Treasury, was £6 million. The average net annual revenue also approved by the Treasury, was estimated at £280,000, equivalent to the interest of 3½ per cent on £8 million.²⁵

This calculation was based on a paper handed in by Scudamore to the select committee on 9 July. He projected forward from 1 July 1869, the date of the take-over, an annual rate of increase of 10 per cent in the number of inland messages (estimated to be 6 million in 1866) and allowed for effects of the proposed uniform rate and the extension of facilities. Maximum estimated messages (11,650,000) would produce a gross revenue of £680,000 (assuming 1s 2d per message), while minimum estimated messages (7,500,000) would produce a gross revenue of £437,000; in both

cases revenue from press work (£12,000) and continental messages (£45,000) were added. The combined annual expenditure of the telegraph companies was £330,000. Estimated savings on amalgamation (£55,000), and savings because the Post Office was not to work submarine cables (£10,000), were deducted. Additional costs of working and maintaining Post Office extensions, and meeting additional business, were added. £358,000 was estimated as the maximum net revenue, £203,000 as the minimum net revenue, giving an average net profit for the Post Office of £280,000.²⁶

In the debate Goschen thought that 'the Chancellor should admit that the Select Committee on the Bill had curtailed their inquiry as much as possible considering the magnitude of the interests concerned'.²⁷ He was anxious about the financial results of the measure, since he considered Scudamore's estimate of revenue too high, by anything from £80,000 to £100,000 annually, and his estimate of expenditure too low. Because the companies might save £55,000 by amalgamation, it did not follow that the government could conduct the business so economically. Even if it could, the Post Office would undertake business which the telegraph companies would have considered unremunerative. The companies would not carry their wires into districts where the charges were heavier than the receipts, whilst the Post Office might be obliged to. Scudamore had also made no allowance for any reserve fund to meet unexpected contingencies. Goschen contended that the minimum profits might well be no more than £150,000, which would be enough to meet interest at $3\frac{1}{2}$ per cent only on £4½ million. Leeman argued that with the imperfect information on cost as well as on revenue, the bill ought to be delayed. He contended strongly that £6 million would not be enough. The lack of consideration of the railway interest in Scudamore's estimates, had placed the government in a position where the railway companies were demanding terms, in respect of their reversionary powers, which it was the duty of the government to resist. The analogy with the Belgian and Swiss systems was inappropriate. While the charge for a telegram in Belgium was approximately 5d (2p) and the charge for a letter was 2d (1p) it was far more likely that a person might prefer to pay the extra

for the telegram, but in Britain, if the cost of a telegram was 1s (5p), it would be preferable to use a letter at 1d. Moreover, the greatest distance a telegram could be sent in Belgium was 120 miles; in Britain the maximum was 700–800 miles. He questioned the ability of the Post Office to deal with the telegraph which 'it did not understand'.²⁸

However, there was little serious concerted opposition in the Commons. The majority believed that it was in the public interest for the bill to be passed, whilst the terms to the companies should be advantageous because of the element of compulsory purchase and their rising profit record. Gladstone asked why the established practice of arbitration was not followed, for which he could see no reason; he was concerned that the Post Office was not to have a legal monopoly, and also that the bill should not be delayed.

With the support of both sides the bill passed through its final stages and became law on 31 July 1868. Thus government control and intervention in the business world took a major step forward. The telegraph was added to insurance, annuities, postal orders, parcel and letter post, as state enterprises. The changing attitude of the public towards *laissez-faire* and state action, revealed in the awakening of the public conscience to moral aspects of many industrial and social problems, was now applied to the telegraph industry. The principle of natural liberty, sound as it might have been as a system for producing wealth, stood condemned as causing abuses and deficiencies in service. The implication was that it did not bring about a just distribution of wealth or profit to the community. In its place were established the administrators of a public department, 'inspired with a natural desire to extend their sphere of acknowledged usefulness'.²⁹ 'The desire of the Post Office authorities for the acquisition of the telegraphs almost developed into a passion.' Possibly also, there was in 1868 a greater trust in the action of the state, developed by the legislative reforms of 1832 and 1867. Changes in the distribution of political power no doubt produced changes in the way in which the actions of the state were regarded. Although the country at large was governed by the upper and not by the middle classes, the commercial classes were prepared to use the state to forward their

own interests. This control would have been repugnant before 1832. Thus, in 1868 the state was invoked as the agent of the people's will, although few appreciated the full implications of the step being taken.

Notes to this chapter are on pages 277-8

CHAPTER EIGHT

THE TELEGRAPH ACTS

i

The Telegraph Act 1868¹ authorised the Post Office to purchase the telegraph companies and the telegraphic business of the railway companies, on terms to be agreed. But because the whole matter had been left so late in the 1867-8 session, the implementation of the Act remained contingent upon Parliament voting the necessary funds in the following session. The last clause of the 1868 Act stated:

In case no Act shall be passed during this, or the next session of Parliament, putting at the disposal of the Postmaster-General such moneys as shall be requisite for carrying into effect the objects and purposes of this Act, the provisions contained . . . shall be void.

In effect, the matter was to be left open for further discussion; more advantageous terms might be obtained for the Post Office.

Under the 1868 Act the telegraph companies were to be paid a sum equal to twenty years' net profits for the year ending 30 June 1868, and provision was also made for the price of companies which had developed new business or had not been formed long enough to show profits. There were also complicated arrangements for the railway companies involved in the industry, both as message carriers, or indirectly, as granters of wayleaves.

The first step was to ascertain the precise amount of net profits for the year ended 30 June 1868. A committee under the chairmanship of G. Chetwynd, receiver and auditor general of the Post Office, was appointed in August 1868 to investigate the accounts of the companies to ensure that profits had not been over-stated. All ten members of the committee were drawn from the Post Office Accounts Department. It was suggested that with so large a sum involved the Exchequer and Audit Department should have been brought in;² but Scudamore argued that his men could carry out a more searching investigation than professional accountants who would have no loyalty to the department. The amount of work to be done was very large and the time limited; it was easier

to put pressure upon a team made up from the Post Office than from members of another department.

Great care was taken to ensure that the work proceeded on a uniform principle.³ The committee was instructed to investigate allowances for depreciation as well as expenditure on maintenance in proportion to that on construction. It was to assess net profits, defined by the Post Office as the balance left from gross receipts after allowing for working expenses and maintenance of plant. Therefore, as well as a searching examination of the accounts, it was vital to examine the plant and equipment to ensure that the stock taken over was in normal working order. The major part of this work was carried out by C. V. Walker, electrical engineer of the South Eastern Railway, who examined the plant of the EIRC, Magnetic and UKTC. Bartholomew, electrical engineer, scrutinised the plant of the District and the UPRC, while the submarine cables of the companies were examined by Messrs Fleeming, Forde and Jenkin. The partnership of H. C. Forde, engineer to the Malta-Alexandria cable, and Henry Fleeming Jenkin, engineer to R. S. Newall of Gateshead, and professor of engineering at Edinburgh University, had begun in 1861. The firm had designed the Nordeney-Lowestoft cable for Reuter's in 1866.

From an examination of representative line the consultants were to ascertain whether any maintenance expenditure which should have been charged to revenue, had been charged to capital account, and whether sums spent on maintenance had been sufficient; they were also to establish the expenditure on laying, maintaining and replacing submarine cables. They were informed that every diminution of the apparent net profits of the companies 'will not only reduce the sum to be paid by the Postmaster-General for such net profits by 20 times the amount of such diminution, it will also tend to reduce the sum for prospective profits'.⁴

The result of these investigations was that the claims of the principal companies were reduced from £7,036,037 to £5,715,047. The sum deducted from the purchase money because of real and possible dilapidations and depreciation exceeded £500,000. The work of Messrs Fleeming, Forde & Jenkin was 'instrumental in reducing the purchase money of the undertakings of the Electric and the Magnetic by more than £200,000 and of Reuter's by

possibly £100,000'.⁵ The revised claims were then submitted to arbitration and finally agreed.

It was July 1869, before Parliament again considered the question; a bill was introduced authorising the Post Office to spend £7 million on carrying out the Telegraph Act 1868. With the change of government, the new postmaster-general was the Marquis of Hartington. The total expenditure to be incurred before the transfer would be £6,750,000, a figure based on Scudamore's confidential memorandum of 3 July 1869. He estimated £6.7 million for purchases and £300,000 for extensions and rearrangements of lines; to provide the facilities promised by the 1868 Act. This estimate was reached by a detailed costing of all likely expenditure, using information derived from the companies, and by a careful survey of all post offices. The government expected net annual profit of £314,354 to meet interest charges and the repayment of debt. Details of the calculation were as follows:

<i>Revenue</i>	£
From inland messages	514,234
„ Atlantic and continental messages	109,577
„ private wires and instruments	25,027
„ transmission of news	25,000
	<hr/>
	£673,838
<i>Expenditure</i>	
For Maintenance of land lines	89,371
„ „ of cables	2,267
„ „ of instruments	11,357
„ salaries, wages, all expenses incidental to commercial side of business	181,405
„ wayleaves, rents, rates, petty expenses	49,500
„ renewal of all cables	15,784
„ compensation to redundant officers of telegraph companies	9,800
	<hr/>
	£359,484
Balance of profit	£314,354
	<hr/>

Interest charges upon £6,750,000 were £270,000, if the money was borrowed at 4 per cent, or £236,250 at 3½ per cent. Thus the

estimated surplus, after allowance for interest, would be, according to Hartington on 5 July 1869, either £44,000 or £78,000. The proportion of expenditure to revenue estimated was approximately the proportion achieved by the Electric, the largest of the private companies. Hartington could see 'no reason why the Government should not be able to keep their expenditure in as favourable a proportion as a private company had succeeded in doing'.⁶ One major policy change was proposed, namely that Parliament should now grant the Post Office a legal monopoly over all telegraphic business. Consequently, the estimates put forward by the postmaster-general now included amounts for the purchase of companies not dealt with under the 1868 Act when a monopoly was not contemplated.

In 1868 it was argued that the department had nothing to fear if it did its work well.⁷ The telegraph, unlike the letter post, required a major capital outlay, and once the system was established there would be no private capital forthcoming to support rival schemes because the risks of failure would be too great. In practice, therefore, the Post Office would have a monopoly; but if a private company was able to compete and transmit messages at a lower rate, or adopt improvements in methods which the Post Office had refused, this would be to the benefit of the public and investors.

Goschen contended that with a uniform rate of 1s irrespective of distance, there was nothing to stop a private company taking away some of the best business from the Post Office without going into unprofitable outlying districts. Leeman argued: 'Where would be the difficulty of the railways or other persons starting a telegraph at 6d, and running the Post Office off the roads?'⁸ However, in practice it appeared virtually impossible to set up in opposition to the Post Office, in view of the settlements made by the department with the railway companies, and the need for potential rivals to obtain permission from Parliament to run lines along the roads. The view of the majority in 1868 was that a monopoly would stop progress, stop improvement, and induce the monopolists to be content with matters as they found them. There was no need for a 'law to preclude parties picking out the plums'.⁹

It was the realisation that private companies were likely to take

advantage of a uniform rate by undercutting the Post Office on the remunerative routes, thus causing financial loss to the department, that changed opinion. That the Post Office had not abused the letter post monopoly, which many felt to be similar in principle to the telegraphs, was an important element in the argument. However, there were still those who opposed a monopoly, arguing that it was merely compensation for 'a bad bargain'. The *Investors Guardian* of 10 July 1869 stated: 'The principle of non-monopoly . . . is one of utmost consequence to the well-being of the community.' There was no good reason to saddle the country with all the disadvantages of a monopoly; any title which the Post Office had to monopoly should depend upon the cheapness and efficiency of its service, not on legal power.

In support of the monopoly clause, the government argued that while it was not anticipated that its scheme would be unremunerative, some profits were necessary to finance extensions to remote areas. Probable losses on these lines would need to be recouped on more remunerative lines, between large towns. The Post Office should therefore be protected from competition on these lucrative lines. It would not be difficult for any company to operate lines between the largest towns or stock exchanges at a lower rate than 1s. It had been estimated that 66 per cent of the purchase price was made up of payment for goodwill, a cost which new companies would not need to pay; they could therefore construct their lines more cheaply.¹⁰ Thus, unless the Post Office had a monopoly, 'the purchase of the telegraphs was a waste of money at the immense price the Government was called upon to pay'.¹¹ The country was buying not merely the plant but the whole of the business. Those engaged in the industry ought not to be allowed at any future time to resume operations. There was always a danger that if the Post Office did not get its monopoly, it would be continually buying off companies threatening competition. Public opinion expressed through Parliament would be at least as effective as competition in maintaining the efficiency of the system under public ownership and offering protection against the abuse of economic power.

An amendment that the monopoly granted to the Post Office should be limited to seven years, renewal conditional upon satis-

factory performance, was defeated, largely on the grounds that it was unreasonable to ask the government to give twenty years' purchase for a seven year monopoly. There was also a general feeling that a public monopoly was not comparable to a private one. Many were prepared to see the former, who would not have supported a private monopoly or even amalgamation between the companies. Essentially a public monopoly need only be self-supporting; a private one would be concerned to exploit its position for the benefits of shareholders and was 'a grievance which should not be borne'.¹² This was in line with classical political economy and a school of thought epitomised by Walter Bagehot and *The Economist*.

The monopoly clause did not apply to private telegraphs and the Post Office was prepared to carry on the work of the private companies in hiring out apparatus to private subscribers, but an important implication of the clause was that the Post Office now had to come to terms with companies with which it had not been intended to deal under the 1868 Act. Some of these had little or no business, but all had obtained Acts and were in possession of certain patents. They were able, therefore, to put in claims to the Post Office to compel a purchase under the monopoly clause. The two most important were Bonelli's, a telegraph company, and the Economic Telegraph Company, which were purchased for £23,000 and £15,000 respectively. Both amounts were vastly larger than had been anticipated by Scudamore. In 1868 he believed both companies 'altogether extinct' and their claims of 'trifling amounts'.¹³ Bonelli's might have been purchased in 1868 for £5,000.

In the major debate of 26 July 1868, when the Telegraph Bill was re-committed, few members of the Commons queried the principle of a measure quite new to the government of the United Kingdom, namely the purchase of large commercial concerns to be carried on by a government department. Few opposed a measure directly contrary to the principle of private enterprise, upon which Parliament had hitherto acted. More criticism was levelled at the terms upon which the take-over was to be effected and the Chancellor Robert Lowe 'washed his hands' of the price which was to be paid.¹⁴ But by this time it was too late to with-

draw. The Act received the Royal Assent on 9 August 1869, and provided a state monopoly. The money was to be raised by the creation of 3 per cent Consols and charged to a Telegraph Capital Account. The reforms within the civil service, initiated by the Northcote-Trevelyan Report of 1854, silenced those who might have questioned the implications of greatly increasing the number of civil servants. The establishment of a permanent career service, working loyally and impartially for changing political masters, meant that there was no danger of undue patronage in the hands of the government.

The purchase followed of the Channel Islands and the Isle of Man companies (the latter by the Telegraph Acts Extension Act 1870),¹⁵ and of many small companies. The acquisition of the Orkneys & Shetland Telegraph Company, in 1876-7, and of the Scilly Islands Telegraph Company, in 1879-80, completed the purchases made out of telegraph capital. These purchases, together with sums spent on extensions and improvements, greatly increased the sums originally budgeted for. By 1873 this figure had risen to £5,811,967, as follows:

	£
For Electric & International Telegraph Company	2,938,826
„ British & Irish Magnetic Telegraph Company	1,243,536
„ Reuter's Telegraph Company	726,000
„ United Kingdom (including £11,000 as the price paid for the patent of the Hughes Type-Printing Telegraph	526,264
„ Universal Private Telegraph Company	184,421
„ London & Provincial Telegraph Company (District)	60,000
	<hr/>
Total paid for the principal companies	5,679,047
„ Jersey & Guernsey Telegraph	54,920
„ Bonelli's	23,000
„ Economic	15,000
„ miscellaneous small companies	40,000
	<hr/>
	£5,811,967
	<hr/>

The Orkneys & Shetland cost £37,550, and Sir Charles Wheatstone was paid £9,200 for the patent rights of his ABC apparatus,

so the eventual purchase price, excluding payments to railways, was over £5,900,000. Scudamore's original estimate, based, it is true, on the purchase of only the four main inland companies, had been £2½ million: £2.4 million for the plant and goodwill of the companies and £100,000 for extensions; he had, however, 'to yield much' before the purchase was completed.

ii

In considering the acquisition of the telegraphs by the Post Office two broad questions arise. First, was the transfer desirable from the point of view of public policy and of overall benefit to the community? Secondly, were the terms appropriate or were they too generous, becoming ultimately both a burden to the department and the public purse?

The first was considered both by Parliament and by the select committee of 1868, and was discussed by newspapers, periodicals and chambers of commerce. The overall conclusion was that, although companies had achieved a great deal by developing the telegraph, adopting new inventions and providing a service for the public, their first loyalty was to their shareholders and their first concern to earn sufficient profit to provide a reasonable return on capital. Thus, the companies could not push ahead with unremunerative extensions and therefore tended to confine their lines to the larger towns. The Post Office, not needing to make a profit, but only to cover costs, could extend the telegraph to remote areas, unserved under the old system. This opinion was given further force by the comparison with systems on the continent, already organised and controlled by a department of state.

The Post Office system would not be so dependent upon the railways as the private system. Instead of telegraph offices being on the outskirts of many towns, they would be brought into the centre, there would be an extension of wires through large cities into suburbs, and in rural districts the telegraph would be brought to every money order office. The public would benefit from the saving of time and cost. The Post Office would provide 3,776 offices compared to 1,882 maintained by the companies.¹⁶ Whereas

in 1869 there was only one office to every 13,000 of the population, the Post Office system would give one to every 6,000. Any loss on the extensions into unremunerative areas would be more than made good by the profit from the growth of business resulting from better facilities and lower prices. The complete separation of the commercial from the railway telegraph would speed up the service to the public and add to railway safety. The press would benefit from the ending of the telegraph company monopoly of news collection and distribution, and the rates for news were to be low, no matter by what agency or by how many it might be collected.

Uniformity of rate irrespective of distance was an integral part of the Post Office scheme. This system operated in Denmark, Netherlands, Belgium and Switzerland and also in the UK postal service, and it enabled the use of prestamped paper, which was especially attractive to the Post Office. This simplification, in the views of the officials, would make the telegraph more popular. Under the old system it was difficult for the public to know what the cost would be because the system of charges was so complicated. The basic charges of the companies related only to their own systems but not beyond them. So extra charges were the rule rather than the exception, and apparently this extra charge was always high in proportion to the ordinary tariff.

It was contended that the 1s uniform rate meant that certain large towns came off worse because under the companies the rate had been reduced to 6d, for example in London. However, of 5,988,821 inland messages transmitted by the companies in 1868 only 163,177 were at the 6d rate, whereas there were 2½ million at 1s 6d or above.¹⁷ In practice, because the offices were generally situated some distance from senders and receivers, the 6d rate hardly existed. The Post Office was not prepared to sacrifice the principle of the uniform rate in order to aid the very small minority who now had to pay more.

There was some support for a 6d rate for 15 words. Chancellor Hunt was a 'great believer in the 6d rate'; Scudamore also felt 'it would eventually pay well', and the Liverpool Chamber of Commerce had petitioned for a 6d rate in December 1866. However, the Post Office considered it would take time to educate the public

to make more use of the telegraph. The staff would be under pressure and at the start 'would be at the lowest point of efficiency'. It would be more prudent to begin with a 1s rate. 'As soon as the tariff can be reduced, with safety to the revenue and convenience to the Post Office, it will be.'¹⁸ In the light of later experience, the immediate introduction of a 6d uniform rate would have resulted in a heavy loss to the Post Office.

The private companies had not found the 1s rate irrespective of distance remunerative. The competition of the UKTC uniform rate of 1s for 20 words between 1861 and 1865 forced the major companies to reduce their tariffs over most of the main centres of business throughout the country. The UKTC did not pay a regular dividend on its ordinary shares and this theme of the unprofitability of the uniform rate, except on very short distances, is repeated in the company reports of both the Electric and Magnetic. Some argued that the unprofitability of the UKTC was due not to the fixed rate of 1s but to the unfair competition of the other companies, which reduced their rates to 1s for places the UKTC served, but kept them up elsewhere. The District had failed to be profitable on the basis of a 6d uniform rate, though it traded in the most densely populated area of the country and served the part of the community most likely to make maximum use of the telegraph. 'If the shopkeepers and artizans of London had shown such indifference, how can it be anticipated that their provincial brethren will avail themselves more largely of the telegraphic system?' asked opponents of the measure.¹⁹

In 1868 there was some concern that the 1s rate might not immediately be remunerative, but it was considered that the Post Office would ultimately succeed where the private companies, under divided management and a divided system, failed. A united system would derive economies of scale, and a lower rate, 'imprudent when only part of the system was in your hands', could be afforded. 'A cheap telegram in order to be successful must go everywhere.'²⁰ That the system should be self-supporting ultimately, was an opinion widely voiced, although a temporary loss 'perhaps ought not to be condemned as leading to the development of a very important system which must pay before long'.²¹ In other words, if the 1s rate was unremunerative then the commer-

cial community would consider the government justified in raising charges.

As for the second question, the suitability of the government terms, the principal telegraph companies, the Electric and the Magnetic, were purchased on the basis of twenty years' net profits. The two younger companies, the UKTC and the District, both had indifferent profit records, and indeed the District never traded at a profit or paid a dividend. The UKTC was paid twenty years' profits, plus the price it had paid for the Hughes Printing Telegraph, and the highest market valuation of its shares between 16 and 25 June 1868, even though 'swollen by the intended purchase of the government'. Compensation was also paid for the loss of profits resulting from its efforts to establish the low uniform rate. These latter two items were decided upon by an arbitrator. The purchase price of the District was based upon the highest market valuation of its ordinary shares from 1 June to 8 July 1868, plus an allowance for prospective profits determined by an arbitrator. The UPTC was paid twenty years' profits, and also for the purchase of Wheatstone's ABC patent. The Reuter's Company was paid twenty years' net profits based on the month of March 1868 and derived from the Nordeney cable, as well as twenty years' profits from its contract with the Indo-European Telegraph Company. The smaller companies, purchased as a result of the 1869 monopoly clause, were generally bought on the basis of a valuation of plant, goodwill, compensation for compulsory purchase and, where appropriate net profits.

Was the basic principle of twenty years' profits too generous? Certainly the major part of the telegraph company system, in particular that of the Electric, ran along the railways under agreements for various terms of years. Some of the agreements were to terminate in three years, while others had more than twenty years to run. The average term was $26\frac{2}{3}$ years per mile of line before the renewal of the agreements. Most of the big railway companies, in the relatively near future, would be in a position to strike a hard bargain with the telegraphs for the renewal of rights of way. For example, the LNWR had over 9,394 miles of wire and 1,346 miles of lines, about 12 per cent of the whole telegraph system, running alongside its tracks, on agreements which had an average of only

7½ years to run.²² The 3,793 miles of wire and 761 miles of line on the Midland had 8 years to run; the 2,834 miles of wire and 704 miles of line on the Great Northern 5 years, and the 1,126 miles of wire on the North Eastern 11 years. The notable exceptions were the GWR with 1,365 miles of line and 5,435 miles of wire, approximately 6.5 per cent of the system and 9.7 per cent of the mileage on the railways, and the London & South Western with 503 miles of line; both had 99-year agreements. The agreements could be analysed as follows:

Agreements to end between 1 and 5 years affected 1,280 miles of line.

Agreements to end between 6 and 10 years affected 3,988 miles of line.

Agreements to end between 10 and 20 years affected 3,211 miles of line.

Agreements to end between 20 and perpetuity affected 4,990 miles of line.

Agreements covered a total mileage of 13,470 miles of line and 54,744 miles of wire, approximately 66 per cent of the telegraph system of the country.²³ It is arguable whether the figure of 26½ years, for the average unexpired agreement, was of great significance, as the agreements were of differing importance and some having only a few years to run affected virtually the whole system.

That the government had offered twenty years' purchase for less than twenty years' wasting leasehold assets was used as a forceful argument by Reuter's to obtain terms of twenty years' purchase for its ten-year contract with the Electric and its thirty year exclusive concession from the Prussian Government. The Post Office had initially offered to buy these rights for ten years' net profits. However, Vernon Harcourt, counsel for Reuter's, one of the ablest lawyers of the day, argued that having paid twenty years' profits for railway company leases, the Post Office should not be surprised 'that other people should wish to be treated on equal footing'. Harcourt agreed £726,000 for an enterprise costing £153,000; it was ironical that the man who was to be Gladstone's great supporter, and ten years later his home secretary, should have been Reuter's chief counsel in a case which cost Gladstone's chancellor of the exchequer such a considerable sum of money.

Certainly, as the leases expired the railway companies were able to obtain better terms or even to order the companies to remove their plant, and replace it with their own. Possibly this potential pressure was another reason for the low investment rating of the telegraph companies. On the other hand, because the leases did not expire together, the railways would obviously have been handicapped in building up a telegraph system, which by necessity would have to have been piecemeal. The likelihood of the railways building a competing system was thus, in practice, remote. However, it was feasible that if one route was free, especially a lucrative one, such as London to Liverpool, a railway company might not merely insist on much harder terms, but also consider starting a new company. Certain railway companies had shown themselves quite competent in operating public telegraph services, notably the South Eastern (under a working arrangement with the Magnetic), the Lancashire & Yorkshire, the London, Brighton & South Coast, the London, Chatham & Dover, and latterly the North British and the Caledonian.²⁴

The telegraph companies were essentially trading companies and their prosperity and business was based on goodwill rather than estate. They owned comparatively little real property, although Scudamore anticipated disposing of 'valuable freehold properties' obtained on the transfer as an important abatement of the price which the Post Office was paying. However, twenty years' net profit seemed a very high figure to pay largely for goodwill, the magnitude of which had hardly been realised. It was alleged that it would cost the government only £2 million to start a completely new system.²⁵ The whole of the continental system of telegraphy had been constructed for £4 million, the French Government had put up 66,000 miles of wire for £950,000, and the Belgian system had cost £83,000.²⁶ The Post Office was about to pay £4 million for goodwill . . . 'for the eagerness to do the thing in a hurry'.²⁷ It was conceivable, though in practice doubtful, that the state could compete against the companies without purchasing them. If the railways were ever nationalised, the government could use their land, and would therefore not need to purchase the telegraph companies.²⁸

The upward movement of telegraph share prices in 1867-9

indicated to some that the government was paying too high a price. It was a movement 'unprecedented in the history of ordinary speculation',²⁹ when generally share prices were drifting downwards under the economic and financial uncertainty of the time. The shares of the Electric in January 1867 were quoted at 132 for £100 of stock, in January 1868 at 153, but by July 1869 stood at 255, having risen £30 in one week in July 1868; at nationalisation in February 1870 the price was 270. Magnetic shares standing at 90 (£) per £100 of stock in January 1867, were quoted at 165-170 by the end of 1868. The UKTC, quoted 1½ per £5 of stock in January 1867, was selling at 6½ to 7 in July 1869. The most meteoric rise was shown by Reuter's. In April 1868, before the intention to purchase part of the business was known, the £25 shares were quoted at 9 to 7 discount. In July 1868, at the time of the agreement between the companies and the Post Office but before the arbitration awards, Reuter's was quoted at 5-6 premium, but after the agreements were signed at 31 premium and in July 1869 at 45 premium. The £25 shares had risen from £16 to £70 each, an enormous appreciation. Finally, the District quoted at ¾ to 1¼ per £5 shares, ¾ discount, in January 1867, had risen to 3½, an increase of more than 100 per cent, by July 1869 when the final terms were known.³⁰ It was not surprising that officials of both telegraph and railway companies were 'jubilant about the terms'.

Those supporting the terms argued that the share rise occurred because the Post Office investigation had revealed the true potential of the business and made shareholders determined not to sell. At the same time the attention of investors generally had been drawn to the soundness of telegraph companies, at a time when it was 'difficult to find a sound investment'. 'The rise in value of shares was no proof that the terms offered to the companies were too liberal.'³¹ Speculation was bound to occur so long as there was any uncertainty about the terms.

The case for twenty years' profits was that the telegraph network was growing and the average annual growth of profits was not less than 10 per cent. The trade of the Electric was growing at 18 per cent and that of the Magnetic at 32 per cent per annum. The longer the transfer was delayed the more expensive would the

take-over become. The terms might well seem generous in 1868 and 1869; they would not appear so ten years after, assuming that growth rates were maintained. *The Economist* of 4 July 1868 felt that the price was a 'fair one' and that the government 'must make the best bargain it can'. In the Commons debate of 26 July 1869 Hunt, the former chancellor, reiterated that not until very late in the previous session had the government agreed to purchase the telegraphs, and it had had to consider whether to compromise on the terms proposed or drop the bill. Its conclusion was that if the bill was postponed, it would have to pay in 1869 far more than twenty years' profits. In fact, it was really buying only 17½ years, because of the increase in profits during 1868-9.³² Hartington said that if they were to begin afresh they could not 'get the property on better terms'; the business that the government was going to buy was not up to June 1868 but to January 1869.³³ Upon this calculation the purchase price was considerably under seventeen years! Scudamore, 'the author' of the measure, was concerned that delay would increase the purchase price. Agreement with the companies was necessary, to avoid paying 'more next session, or more the session after'.³⁴ The absolute consent of the companies 'in this particular session' was vital before the bill could be proceeded with.

It was of paramount importance to avoid shaking investors' confidence in private enterprise, and to assure them that they would be exposed to nothing more than the normal vicissitudes of trade. 'The possibility of competition by the State, by means of money taken . . . by taxation, was never included in the ordinary vicissitudes of trade.'³⁵ Parliament was jealous of public money being employed against private enterprise. The true interests of the country required that the government should deal fairly, and even liberally, with the parties whose rights it was acquiring. The transaction was in the nature of a compulsory purchase. 'The sellers are entitled to receive full value and the transactions ought to be beneficial to them,' although, 'the companies had no right to demand more than a fair price.'³⁶ The problem was what was a fair price. Good terms were necessary in a compulsory purchase. The government was prepared to pay the full value of the business plus a bonus 'so as not to discourage private enterprise on similar

occasions'. It was purchasing a 'ready-made' industry after it had been developed by private enterprise. The companies did not want to sell, while 'the government and the public very much desired to buy'.

It was contended that the Electric, the largest company, could not pay more than 10 per cent without reducing its charges. How could a concern be entitled to twenty years' profits when it was limited to a 10 per cent dividend? In fact, there was nothing to prevent the Electric from making up back dividends to 10 per cent over the twenty-two years of its existence, nor was there anything to prevent the company getting the full benefit of its earnings by creating new shares. Further, it was contended that a telegraphic business was peculiarly hazardous and speculative and not worth more than ten years' profits. Even allowing for an additional 25 per cent for compulsory purchase, this would amount only to 12½ years.³⁷

Fundamentally, therefore, the terms reflected the need to assuage a society geared to private enterprise yet realising the advantage of a public department running a service vital to the community, provided the service were self-supporting. The terms granted to the UKTC appeared particularly generous—'buying the company four times over'. Consequently even though their capital was £350,000 they received £562,264. Reuter's with a capital of £266,000 received £726,000; the Magnetic with a capital of £534,000 received £1,243,536; the Electric received £2,938,826, although the whole capital and debenture debt of the company was £1,240,000. Only the 'unfortunate' District received £60,000 on its £65,000 capital. It was contended that the Post Office was in such a haste to conclude a bargain that it had succumbed to all the demands of the companies, thus creating a precedent for further government take-overs in the private sector.

A minor criticism of the terms was that the twenty years' profits were based on the year ending 30 June 1868, for the current year, when the company accounts had not yet been published. Thus there was an opportunity to swell profits; it would have been better to have taken the average over a period of several years when profits were known. However, offsetting this the investigat-

ing committee was able to reveal any irregularities in the accounts for 1867-8, by comparing previous years' figures.

The case for the companies rested on a variety of grounds. They had a virtual monopoly, likely to be retained for years; there was harmonious working, agreement on rates, command of roads, canals and railways. In practice there was 'hardly any possibility of capital being put into any undertaking to compete with them'. The major companies had developed a profitable business, and the telegraph was bound to be increasingly used by commerce and the general public. The measure involved a major shift of public policy; the government needed to tread warily and give private enterprise the benefits of any doubts. Hence the companies were able to gain generous terms. The basis of twenty years' profits was liberal even though the stock market valuation is not always a true measure (the price of a share does not necessarily reflect the true value of the whole share capital). Only 3 per cent of telegraph company stock changed hands in a year, usually a forced sale by an executor.³⁸

In the terms to the railways there was even greater diversity, and the estimate of expenditure by the government differed even more from what was actually paid. The railways' case for compensation rested on their loss of the rights to grant wayleaves, to increase rates and put pressure upon the telegraphs when leases expired. They were also losing the chance to run their own public telegraph business.

Most of the railway companies received twenty years' net profits, derived from transmitting public messages over their wires. In the case of the GWR, London, Chatham & Dover, and several other companies, this figure was based on profits so derived for the year ended 30 June 1868. In some instances, the annual amount of these profits were fixed, at specific amounts. The Caledonian Railway Company was limited to £1,200.³⁹ The North British Company was paid twenty years' current net revenue on the basis of receipts for the week ended 5 June 1868.

All railway companies, except the London & South Western and the North Eastern, received the estimated annual increase of receipts over twenty years. Generally this was based upon the average increase of the preceding three years, although in the case

of certain companies, for example the London, Chatham & Dover, the basis was the increase of gross receipts for the year ending 30 June 1868. The railways received this annual increase, and not the telegraph companies, because 'it was possible for the railway companies at any time to turn the telegraph companies off the road'.⁴⁰

Some railways, such as the GWR, London, Chatham & Dover, Bristol & Exeter and Caledonian, stipulated that the government should make good the rents and any other payments due to them from telegraph companies during the unexpired periods of their agreements. Compensation was also paid where services previously provided by the telegraphs now had to be undertaken by the railways, such as operating their own telegraphs and construction work on telegraphs beside their tracks. Thus, the principles on which compensation was paid showed considerable variation. This implied, no doubt, that some companies were able to drive harder bargains than others, although possibly the variations implied 'little beyond the diversity of contracts' existing between the companies. Provision for arbitration, if necessary, was made in most cases.

Other stipulations showed equal diversity. All railways except the Caledonian, were authorised to move equipment and wires belonging to the postmaster-general at his expense, whenever their business required it; the Caledonian was bound to give notice to the postmaster-general, who would move them at the company's expense. In general the companies were to receive, additionally, rents for the poles and wires on their land. The government was to hand over to them, 'free of charge and in efficient working order', the plant of the telegraph companies hitherto used for railway purposes, so that they might carry on their own telegraphic work immediately. All railways were allowed to retain the privilege granted by the telegraph companies concerning the transmission of 'all messages of the railway company in any way relating to the business of the company' to and from any 'foreign stations' free of charge. The term 'foreign station' was not defined by the Act but was understood to mean stations not on the company's line. The significance of this concession was not fully appreciated by the Post Office in 1868.

Critics contended that it would be impossible to distinguish whether or not a message was on the business of a company, and so would lead to endless disputes if not to fraud. That such a concession was allowed showed with what 'reckless haste' the business had been managed. By 1891 the number of 'free messages' had risen to 1,600,000, at great cost to the Post Office.

In return, the Post Office mostly obtained unlimited way-leaves, though in some cases a fixed time was stipulated; the GWR agreement was for twenty-one years. The GWR was paid £33,000 and an annual rent of £5,500. Rents were paid either annually, or per mile of wire. For example, the LNWR received an annual rent of £6,000 and a payment of £1 per mile per annum for all wires over 6,000 miles, and the Taff Vale Company also received £1 per mile of wire per annum. Thus, the Post Office acquired all railway-owned public telegraphs.

What the total amount of compensation would be, it appears, no one knew. In the Commons debate of 21 July 1868 Leeman commented acidly on these 'imprudent financial arrangements' which he hoped 'would never be followed by any other Government'. Certainly, Scudamore had not known up to June 1868 what arrangements existed between the telegraph and railway companies, and was unaware of the likely magnitude of claims. Leeman warned that the railways had reversionary interests which would come into operation when the existing arrangements with the telegraphs expired. Then several of the railway companies would be able to compete with the Post Office in the transmission of telegraphs: At what price would an arbitrator value this power to compete and combine? Dire warnings were given by W. F. Fowler: 'For what the House knew there might be contingent liabilities for hundreds of thousands or millions more.'⁴¹ Goschen contended: 'After the Government had paid twenty years' purchase to the telegraph companies they will probably have to pay half as much again to the railways.' Ward Hunt said it was 'impossible to form any accurate opinion of the sum that would be required for the purpose of compensating the railway companies and the telegraph companies'.⁴² The government was not prepared to give an estimate because it could be used against it during arbitration. 'But Mr Scudamore, whose ability . . . had been of

great service to the Government, had given considerable attention to the matter and believed £6 million would be the outside figure to be paid to both the telegraph and railway companies.'

M. H. Foster, of the finance division of the Treasury, had been requested by the select committee of 1868, to examine Scudamore's estimates of the revenue to be derived by the postmaster-general from the telegraphs, and the likely expenditure. Foster admitted in evidence that he had given only two or three days to consideration of the issue, that the 'railway compensation is a small part of the whole', and that 'the interest between the telegraph and railway companies is not a large one either way'. However, he agreed that it was largely guesswork, what the amount of railway company compensation would be. He was ignorant of the significance of relationships between railway and telegraph companies. He had not considered the question of future wayleave rights, which would arise on expiry of the present leaseholds. He had not calculated the value to the railways of the power of reversion, to work their telegraphs for the public, but he did not think it large. He had not considered the extra cost to the railways of having to employ their own telegraph clerks, but he thought it 'extremely small'. Even though these points were fully exposed by Leeman, Foster still persisted that £6 million would be 'an outside figure' for the purchase of all telegraph interests together with expansions.⁴³

Thus the terms of compensation, as well as the method of determining them, could be criticised. In the case of the telegraph companies, there was hasty negotiation, on the belief that the longer the transfer was delayed the more the government would have to pay. This haste meant that the companies were in a strong bargaining position, which they exploited fully. In the case of the railways, the Post Office entered into agreements which effectively left it with an open-ended liability. Clearly the importance of the link between the railways and telegraphs was not appreciated.

The press and chambers of commerce were in the main favourable to the measure, which they knew would benefit them and argued would benefit the general public. Until January 1869, when there was a critical article in the *Edinburgh Review*, contending that the Post Office was under-estimating the cost, no in-

fluent voice criticised the terms.⁴⁴ By then, had the Liberal Government wished to withdraw, the matter was in 'so complicated a state that it would be impossible to recede'.

The direct negotiation between the Post Office and the companies, by-passing Parliament, and, in fact, presenting it with a virtual *fait accompli*, was damaging to the control it had over the spending of public money. Had the matter gone direct to Parliament, 'sums obviously in excess of what was reasonable could not have been allowed to pass'. Alternatively, if the whole question had gone to arbitration, the pros and cons might have been more rationally considered, in greater detail and with less haste. If the companies had gone to arbitration, they might have obtained liberal terms; they 'could not well have been bound down to much lower terms' because of the element of compulsory purchase.⁴⁵ Because of the 'extraordinary provision that the arbiter was to be appointed by the Board of Trade', the companies had strenuously opposed it, and once it was rejected, their shares rose 50 per cent. This is not surprising; the Board of Trade was not so likely to 'over-value a scarcely visible property like a telegraph line, with its heavy outlays for maintenance and management', even though the Treasury was 'certainly not in a mood to drive a hard bargain'.⁴⁶ Scudamore felt it was better to 'hold to the present bargain' than go to arbitration about how many years' profits the price should be based on. Certainly, it would have meant delay in the transfer; railway claims were still being considered by arbitrators ten years later.

Ostensibly the telegraph companies had compromised. They had accepted twenty years, when they might have held out for twenty-five, on the precedent of the Railway Act. Scudamore had intimated he was not prepared to pay this; if a reasonable bargain could not be made with the telegraphs, Parliament could authorise the Post Office to build a system to compete with them. He made it clear that this would be very much a last resort, but it was a veiled threat.

Finally, since the Post Office was eager to effect the transfer as rapidly as possible, the timing was a vital element in the calculation. Negotiations with the companies did not begin until the end of the session. The select committee was deeply conscious that if

it dissented from any of the arrangements, the whole scheme would be dropped for another session. So great was the committee's fear, that Goschen was unable to substitute 31 December 1868 for 30 June 1868 as the end of the term for calculating profits. The government of 1868 was no doubt keen to quit office with the take-over of the telegraphs to its credit, and the select committee necessarily relied almost entirely on government officials and supporters for its evidence.

The whole inquiry was conducted with a haste not commensurate with the important interests and large sums of public money involved. Whatever the pros and cons the terms 'entailed upon the nation extravagant costs' far beyond the 'few pounds . . . which were not a matter of national importance',⁴⁷ originally envisaged. By 1876 the cost of total acquisition and extensions had risen to £10,071,536, while up to £2 million in railway claims were still unsettled. The cautious estimate of *The Economist* of 4 July 1868, that backed by their parliamentary power the railways 'are quite sure to make . . . a bargain only too favourable to themselves', had been proved too well.

Notes to this chapter are on pages 278-9

CHAPTER NINE

THE POST OFFICE TELEGRAPH

The Telegraph Act, August 1869,¹ authorised the expenditure of £7 million for the purchase of the telegraphs. The Post Office was able to begin implementing the proposals of the 1868 Act, although the final transfer was not scheduled until 1 January 1870, and it started to improve facilities, rearranging wires wherever competition had caused duplication. It extended wires from railway stations on the outskirts of towns to post offices in the centre, and from towns into rural and other districts lacking facilities. The systems in large cities were expanded and improved as the following table shows.²

	1869	1870
London	95	334
Birmingham	10	14
Manchester	21	32
Leeds	10	18
Glasgow	13	19
Edinburgh	9	15

Under the companies, 'town offices' had been opened only in large towns. These tended to be in the business centre, with the offices of the three major companies close together, often only a few yards apart—in Edinburgh all telegraph offices were within about half a mile of each other, the rest of the city having none. The object of the Post Office was to build lines to all places which had a money-order issuing office, and to meet the anticipated growth in traffic new lines had to be erected. There was additional pressure because 6,000 miles of wire were to be released for exclusive railway use, to achieve the separation of the commercial and railway systems, provided by the 1868 Act. Thus it was necessary to recruit, train and re-allocate staff. Uniform codes and regulations had to be prepared as quickly as possible to co-ordinate systems. The Morse system was to be developed and staff instructed in its use. By 31 March 1875 sixteen instructors were employed at an annual cost of £911. A payment was also being made to the Queens Institute in Dublin for 'the education of young women in telegraphy'.³

By 5 February 1870, the actual date of transfer, the Post Office had opened 1,007 postal telegraphic offices, each serving a distinct locality. By the end of 1870 a further 900 were opened, and telegraph business was also carried out for the department at 1,820 railway stations, which thus lost none of their usefulness. In the first year of Post Office administration 91 per cent of messages were transmitted from post offices, showing clearly their convenience for telegraph users.

By the end of 1870 the simple uniform tariff of the 1868 Act applied throughout the UK, the Channel Islands and the Isle of Man. Exceptions initially were the lines to the Scilly Isles, and to the Orkney and Shetlands, because of the extra risk and difficulty, and these were worked by private companies under licence from the postmaster-general, with authority to charge an additional rate, until they were taken over in 1876-7 and 1879-80 respectively. The benefits to users were already clear—the average cost of an inland message was down by nearly 33 per cent.

This early progress was not achieved without considerable difficulties which tended both to delay work and increase costs. They arose partly out of the natural reluctance of the companies to extend their systems once the take-over was mooted, and partly from the reorganisation of the whole telegraph system. Problems became more acute when the passing of the Telegraph Act was delayed—until August 1869.

Very few extensions were made by the telegraph companies in 1865-7 and none at all in 1868-70, though all the time there was great public demand for expansion. Thus the Post Office started with very heavy arrears of work, and 'heavily in debt to public expectations'.⁴ Those districts which the companies had most neglected tended to press hardest for improvements. Yet at the outset the Post Office was forced to concentrate on its main routes, as it was vital to ensure that these could cope with the expansion of business; otherwise regular users of the telegraph would have suffered inferior service.

The Post Office had been handicapped because not until the passing of the 1869 Act could it incur expenditure on telegraphs or invite tenders for materials. Nor could it obtain the indispensable advice or assistance of company officials. In addition, the

Franco-Prussian war cut off supplies from German instrument makers at a time when they were least replaceable. Mechanics capable of making instruments were few in number, and eventually the difficulties in obtaining sufficient printing and recording instruments proved insurmountable. The Post Office was compelled to use a wide variety of instruments acquired from the companies, including single-needle instruments, Wheatstone's ABC, Bright's Bell and the Morse sounder. The approach of winter increased difficulties while the higher price of iron after 1870 pushed up costs.

However, despite the difficulties and local disappointments the new regime appeared to work well, with only 'a few hitches unavoidable in the carrying out of so great an undertaking'. In November 1871 *The Graphic* claimed: 'Loud would be the lamentations . . . to return to the old system of telegraph offices few and far between, high charges, and a hundred other annoyances which not having experienced better things we patiently suffered.'⁵ By 1872 the system comprised more than 5,000 offices (including 1,900 at railway stations), 22,000 miles of line, 83,000 miles of wire and more than 6,000 instruments. Conveniently situated telegraph offices, at the cost of 1s, 'transmitted to every part of the UK . . . with speed and regularity'.⁶ Total messages rose to over 12 million, 50 per cent more than before nationalisation.

However, from a financial point of view, it began to appear that the take-over was 'a blunder brought before Parliament and the country upon representations which in many cases have proved contrary to the fact'.⁷ Scudamore had claimed that it would cost £200,000 to rearrange the telegraphs and give a 'perfect' service to 2,950 places.⁸ His initial estimate of the cost of reorganisation had been £100,000. In 1869 Hartington stated that £300,000 would be enough to give 'perfect accommodation' to 3,776 places.⁹ However, in 1867 W. S. Jevons had estimated £2,500,000 as the cost of improvements and extensions to places not then connected to the system.¹⁰ By September 1873 the Post Office had spent £2,130,000 on such work. Over £500,000 went to make good the depreciation of plant during 1868-9, for which allowance had been made in the purchase price. The balance of over £1,500,000 represented new capital outlay. Scudamore, an

enthusiast but not a businessman, had seriously underestimated the cost, in particular of extensions to 841 new locations. He had calculated that each would require, on average, the erection of three-quarters of a mile of telegraph line, whereas about 3 miles proved necessary.

In 1871 Scudamore convinced the chancellor that a further loan of £1 million was necessary, thus raising to £8 million the capital authorised. It was in 1873, against a background of increasing expenditure and the probable 'parsimony of the House of Commons',¹¹ that 'grave financial irregularities were disclosed' before the Committee on Public Accounts. Scudamore had misappropriated Savings Bank and other Post Office funds of £812,000, for the use of the telegraph department, anticipating that Parliament would not grant any further funds on capital account. He was severely censured for his 'excess of zeal'. The significance of the affair was not lost on contemporaries. That the misappropriation was made in what Scudamore conceived to be the interests of the public did not affect the case; no public servant had the power of anticipating or over-riding the will of Parliament. The very essence of an incorrupt public service was that no misappropriation of public funds could take place without being revealed to independent officers. In theory, this safeguard should have operated, yet in practice it had failed. The affair spotlighted the growing financial difficulties of the department. Parliament needed to authorise a further loan of £1,250,000, but there was concern that the small saver might be deterred from entrusting his money to the Post Office Savings Bank. In practice, however, in 1873-4 the savings bank movement continued its rapid expansion—a further 250 branches were opened, bringing the total to more than 4,800, while depositors increased by 120,000. The affair was significant in that it settled the relations between the revenue departments and the Treasury, and defined the duties of accounting officers. Power was conferred upon the comptroller and auditor general to audit the telegraph capital account. A report was presented for the period 1868-73, and subsequently annual reports were submitted until the account was closed in 1891.

The episode effectively marked the end of Scudamore's career at the Post Office, the government voting him £20,000 for his

services. About this time the Ottoman government required an experienced official to reorganise the postal and telegraphic services of the Turkish Empire and it was suggested he should take up the job. He projected several useful reforms, and in 1877 received from the Sultan the order of the Medjideh, but when he found that his projects were not seriously entertained, he resigned. He continued to live in Turkey and found relaxation in literary work. He had been an intimate friend of many of the literary giants of the nineteenth century, including Dickens, Trollope, Thackeray and Edmund Yates, and now contributed to *Punch*, *The Scotsman* and other magazines. He died in 1884 and was buried at the English cemetery at Scutari.

Various committees between 1871 and 1876 attempted without success to explain the great discrepancy between the estimated and the actual cost of rearranging and extending the telegraphs. The representatives of the Post Office and the Treasury blamed the purchase of businesses not contemplated in 1868 and unforeseen expenses for extensions. In fact, the state made no purchases beyond those contemplated in 1869, except for the Jersey and Guernsey cable at a cost of £57,350, and the Isle of Man cable at a cost of £16,136 in 1889. As for unforeseen extensions, in 1869 3,776 telegraph locations were promised; by 1875 there were 3,791 offices, including 300 in London.

Scudamore's initial estimate had been £2.5 million. In 1869 £7 million was voted, but by 1891 the figure had reached £10,948,173, more than four times the estimate. This greatly increased capital expenditure, and the consequent burden of interest charges, was, it was argued, the major reason for the failure of the Post Office telegraph to pay its way. The 1876 Select Committee on the Post Office stated that there probably would have been no loss 'if the Telegraph Capital had not been so largely inflated'. In 1895 the postmaster-general wrote: 'The large price paid as purchase money . . . is one of the factors which have contributed to the unfavourable financial results of the telegraph system.'¹²

The main reason, however, was the serious under-estimation by Scudamore of working expenses. He had promised that initial net profits would cover interest charges at 3½ per cent on £10 million capital, being between £200,000 and £360,000, with

prospects of growth later, but in fact, as the following table for 1870 to 1895 shows, only in 1870-1, 1875-7 and 1878-85 were the minimum figures reached; the maximum was exceeded only twice, in 1880-1 and 1882-3.¹³

TABLE SHOWING NET REVENUE OF THE TELEGRAPH DEPARTMENT
OF THE POST OFFICE 1870 TO 1895 BEFORE PAYMENT
OF INTEREST ON STOCK

	£		£		£
1870-1	342,618	1879-80	333,504	1888-9	212,263
1871-2	158,914	1880-1	451,465	1889-90	290,264
1872-3	113,795	1881-2	357,859	1890-1	251,806
1873-4	161,629	1882-3	363,028	1891-2	184,476
1874-5	87,075	1883-4	330,835	1892-3	18,927
1875-6	211,882	1884-5	274,271	1893-4	27,770
1876-7	202,431	1885-6	167,915	1894-5	88,204
1877-8	196,072	1886-7	88,484		
1878-9	267,722	1887-8	122,842		

The situation grew steadily worse up to 1914. Net profits covered interest on stock created for the purchase, only in 1870-1 and 1880-3. Annual interest charges increased from £214,500 in 1870-1 to £326,417 in 1879-80. By 31 March 1894 the cumulative deficiency amounted to £5,406,584, including a provision for the redemption of the capital. A more favourable interpretation of the figures showed that by 31 March 1906 the government had paid a total of £4.5 million in interest which had not been earned by the telegraphs, or approximately 26.5 per cent of the total capital invested. The latter was estimated by this date to have reached £16,945,400, made up as follows:

	£
Railways	2,000,000
Extensions 1870-3	2,208,000
Extensions 1873-1906	6,890,000
Telegraph companies	5,847,400 ¹⁴

In 1866 Scudamore estimated a net profit on capital employed of 8.8 per cent; by 1869 this had been adjusted to 5.13 per cent, still more than enough to pay the interest and redeem the capital. In practice, by 1877 when loans totalling £10,943,173 had been authorised, a net expenditure of £10,131,000 yielded a net revenue of £119,913 and the return on capital employed had fallen

to 1·4 per cent. The government had sold 3 per cent stock at an average price of 92·3 per cent.

Working expenses had first been estimated at approximately 67 per cent of total revenue; after examining the more detailed accounts of the companies, Scudamore adjusted this downwards to 51·6 per cent. He predicted that this figure would apply in the first year and would then tend to diminish. However, between 1870 and 1875 working expenses progressively increased and profit margins diminished. Even on the most favourable interpretation, taking into account expenses properly chargeable to capital, such as wayleaves, extensions and pensions, expenses greatly exceeded the original estimate, as revealed in the following table:¹⁵

PERCENTAGE OF WORKING EXPENSES TO TOTAL EXPENSES

1870-5			
1870-1	57·75	1873-4	89·74
1871-2	79·63	1874-5	97·54
1872-3	88·96		

The committee of 1875, appointed by the Treasury to investigate the causes of the increased costs, concluded that because of the numerous extensions since 1870 it would be difficult for the government to operate the service as cheaply as had the companies. However, expenses might reasonably be kept within 70-5 per cent of gross revenue, leaving a margin sufficient to pay the interest on the capital.

It was not perhaps surprising that Scudamore was so wide of the mark, as it was difficult to prepare accurate estimates for the early years, before experience had been gained. Even stationery was consistently underestimated between 1870 and 1875, when it cost over £60,000 compared with an estimate of £25,000. However, even in succeeding years operating expenses failed to come within the limits suggested by the 1875 committee. Even after 1881, when the telephone companies began to pay 10 per cent of their revenue to the Post Office, amounting by 1890 to £40,676 and over the period 1881-1911 to £201,964, the situation failed to improve, and after 1890 the total expenses were considerably in excess of total revenue.

The accounts were not kept on commercial principles until

after 1876. Work freely undertaken for other public departments, which ought to have appeared as a set-off against working expenses, was not included. Sums which ought to have been charged to the capital account, were charged to revenue. The telegraph account was charged with one-third of the expenses of all sites purchased by the Post Office. Thus the situation was made to appear even worse; if the Post Office wished to make it appear that the state had made a bad bargain it certainly went the right way to work. *The Saturday Review* argued that it was 'by no means certain there is a loss on the Telegraph Service'.¹⁶ The signs were ominous. The 1875 committee stated: 'There will be nothing left to pay the interest upon the capital . . . or for the gradual reduction of the debt.' In 1876 the select committee of the House of Commons, presided over by Dr Lyon Playfair, reported that unless vigorous attempts be made to decrease working expenses the condition of the department would remain unsatisfactory. In December 1875 the economist W. S. Jevons, writing in the *Fortnightly Review*, contended that while traffic had increased 81 per cent from 1870 to 1874, operating expenses had increased 110 per cent. He argued that the position was even worse, as working expenses had risen, 'even since the introduction of the wonderful invention of the duplex telegraph by which the carrying power of many wires had been doubled at a stroke and with very little extra cost'.¹⁷ Taking into account various contingent charges, including pensions, annuities to officers of the companies, railway claims and the ultimate redemption of the debt, he estimated a loss of £500,000 annually—a far cry from Scudamore's assurance that revenue would cover capital costs in twenty-five years.

Certainly, Scudamore's predictions of the probable growth of traffic, resulting from the increase in facilities and from the reduction and uniformity of charges, were accurate. Messages transmitted increased rapidly; in no other European country was a similar expansion seen.

TABLE SHOWING MESSAGES TRANSMITTED 1869-1800¹⁸

1869	6,500,000 estimated	1873-4	17,821,530
1870-1	9,850,177	1874-5	19,253,120
1871-2	12,473,796	1879-80	26,500,000
1872-3	15,535,780		

Scudamore had used the analogy of the penny post to support a uniform rate. However, there was little affinity between the services. He had counted on substantial economies, as business expanded, from the amalgamation of company staff and offices into one department, and from the use of facilities already provided by the Post Office. These economies, however, were exaggerated. Telegrams had still to be individually received and transmitted; every increase of traffic involved increased expense in nearly the same ratio for many items. It had been wrong to argue from the example of the penny post, where a great increase in traffic could be carried without any great advance in expense. Indeed, he should have been warned by Rowland Hill's earlier miscalculations on letter post profits. By 1875 this had become clear. Whereas postal net profits increased each year after 1840 (although not until 1863 did they reach the level of 1839) telegraph profits were diminishing in the years after 1871.

TABLE SHOWING NET PROFITS FROM LETTERS AND TELEGRAMS¹⁹

	<i>Letters</i>	<i>Telegrams</i>
	£	£
First year before reform	1,659,087	
First year after reform	500,789	342,618
Third year after reform	600,641	113,795
Fifth year after reform	719,959	87,075

Thus as telegrams transmitted increased, net revenue fell, implying that working expenses were rising faster than revenue. Unless some check was put on expenditure or receipts augmented, the management of the telegraphs would clearly become a permanent charge on the country.

The preamble of the 1868 Act stressed the intention to provide a 'cheaper, more widely extended and more expeditious system of telegraphy to the public'. Initially, the Post Office doctrine was that every location with a money order issuing office, was entitled to a telegraph service. By 1872 it was estimated that there were 728 offices, approximately 18 per cent of the total, to which extensions had been made but which were not paying expenses.²⁰ In 1873 the government adopted a new policy; no extension would be made unless it was likely to pay, and a guarantee was demanded before a station was established in any outlying district.²¹ The

guarantees demanded, including the recouplement of outlay by the Post Office within seven years, and a margin of a certain percentage for contingencies, proved an effective check to expansion. From 1874 to 1880 the number of offices increased only from 3,692 to 3,924, although by 1884 the figure had reached 5,858. But the new policy did not provide for the withdrawal of an established service, as this would have led to much public inconvenience and agitation, which the government could not resist. Thus, even with the introduction of the guarantee, there remained uneconomic offices, though they declined in number—to 449 by 1874, out of a total of 3,692, approximately 12.3 per cent. The Treasury committee of 1875 suggested closing offices which were not covering expenses but the Post Office was opposed to this, as much money had been spent in the erection of the lines to them and there would be further cost in removing them. It was argued that the system would be made profitable by developing it to its full capacity, not by trimming facilities. Indeed, expenditure on extensions, which had averaged approximately £26,000 annually between 1873 and 1879, increased to over £70,000 between 1880 and 1885.²²

The most significant increase in working expenses was in salaries and wages. The companies had, where possible, frozen wages and salaries because of the impending transfer, against a background of generally rising real and money wages. Real wages moved from base 100 in 1850 to 137 in 1876, although there was a setback between 1865 and 1868 when the index fell from 117 to 109.²³ The companies had not increased their labour force, meeting increased demands with overtime working. The average annual wage in the seven largest cities of the country in 1868 was approximately £53 10s for male staff, including supervisors, and £38 10s for women. The companies highest rates were in London—£91 per annum for men, £46 16s for women. This compared to the average manual wage in 1870 of £43 4s for men.²⁴

There was latent discontent among the staff, which found expression in the formation of staff associations in many big cities. The Electric had been particularly concerned at the development of a 'Telegraph Clerks Association'; Weaver, the company secretary, wrote in November 1866 to J. M. Clark, secretary of the

STC: 'If the organisers are discovered I shall at once discharge them and shall communicate their names in order that they may not obtain employment in any telegraph company.'²⁵ Nationalisation brought no immediate improvement in salary but a far more rigorous discipline. Under the companies employees could earn considerably more than the basic wage, though this extra was precarious, but the Post Office withdrew chances of extra payments. A strike was only narrowly averted after the transfer, and a partial strike occurred in December 1871, an event of significance in the development of organised labour within the public service. In October 1871 the telegraph clerks at Manchester formed themselves into a trade union, the 'Telegraphists' Association, to protect their interests against the government, their employer. Almost every town in England afterwards claimed to have taken the initiative and produced the arch agitator.²⁶

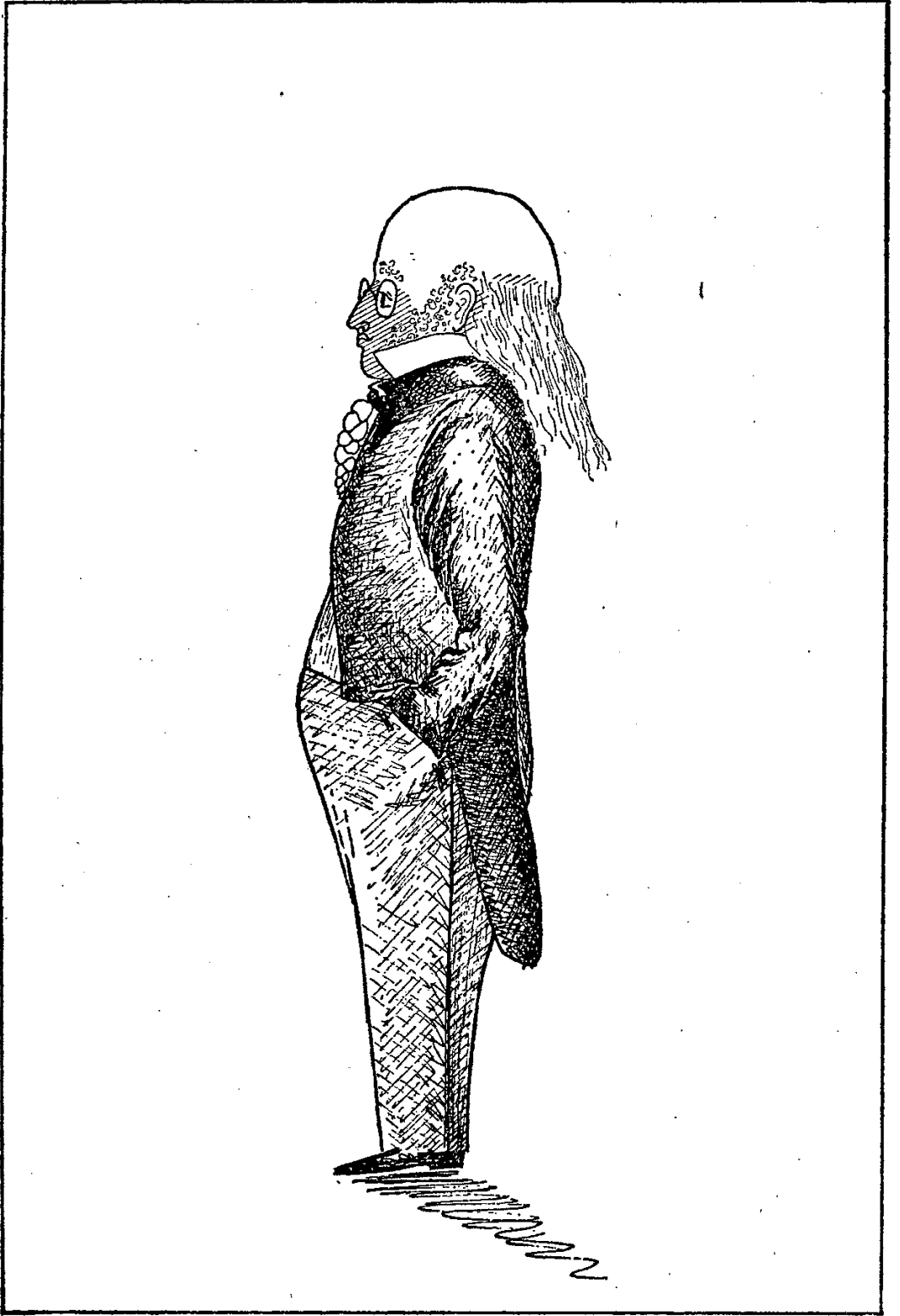
For the first time the machinery of organised labour was active within the civil service. Scudamore, who soon after the agitation started promised a new scale of classification, considered the organisation a breach of discipline and issued notices to the effect that unless the clerks retired from the association, they would be dismissed. Some refused to comply and were suspended from duty; their colleagues then struck to force the withdrawal of the order.

A telegraphic report of the strike, addressed to the *Daily News* and *The Times*, was delayed by the Post Office authorities, on the grounds that its immediate publication might be injurious to the public service. This brought a great storm of protest from the press, against Scudamore's assumption of discretionary power and the implications it might have for censorship in a wider form, an issue debated in 1868 by opponents of the transfer. In the Commons the Postmaster-General, Monsell, stated that Scudamore was to be officially censured for his action. The *Saturday Review* commented: 'It is well Scudamore be reminded that it is not the business of the department to think but to forward messages with despatch.' In a confidential letter of 30 December 1871 to the postmaster-general, Scudamore accepted complete responsibility for the action. He claimed: 'The public may rest assured that no

one in my position could secretly censor a telegram.' He had been 'powerless to prevent disclosure' although he had not aimed at concealment of his action.²⁷

The effect of the strike was to hasten a wage increase. In August 1872 the telegraph branch was put on a definite establishment basis and a scheme of classification introduced. The 5,233 telegraph staff were divided into four categories with wages ranging from £160 to £45 per annum. Certain staff received immediate increases in wages, together with back pay, at a cost to the Post Office of £64,000. The average annual wage of a male telegraphist in London increased to £68, while the female average increased to £46. Outside London the annual average wage was £57 for men and £42 for women. These figures covered a scale which ranged from £160 annually for principal clerks to £31 for male probationary clerks. For women the lowest rate was 8s (40p) a week for probationary clerk rising to 12s (60p) on being certified as capable of transmitting public messages. The highest rates of pay were out of reach of the great majority of employees.²⁸ Despite the increase, the level of wages was still below that of the cable and maintenance companies, and between 1872 and 1880 2,341 out of 6,000 clerks left for other employment. Educational standards were reduced to get people in the Post Office telegraph schools; yet private telegraph schools flourished. *The Railway News* commented: 'It is well known that the demand for clerks is in excess of the supply.' Skilled telegraphists at stations in the Mediterranean, Egypt and the colonies commanded salaries of £480-500 per annum.²⁹

The improvement in the wage structure may not have satisfied the staff but it placed greater pressure on the finances of the department. The percentage of wages and salaries to total expenditure rose from 39 per cent in 1870 to 57.4 per cent in 1872-3; it fell to 44 per cent by 1881 but increased rapidly after 1884 reaching 72 per cent by 1895. It was widely contended, for example by the 1875 committee, that the government had always tended to pay its employees more than the open market rate for relatively routine, unskilled and subordinate work, compared with work requiring initiative and high skill. The Post Office was bound to extend this policy to its new employees, as it was im-



Cartoon of Frank Scudamore, artist unknown, an administrator, 'inspired with a natural desire to extend his sphere of acknowledged usefulness'

possible to distinguish between various groups of public servants. Thus salaries would be largely raised to the levels prevailing in the Post Office. In fact the wages of subordinate grades in the department were not significantly higher than those of the companies. For the year ending 31 March 1868, the average wage paid to 6,717 employees in subordinate grades—letter carriers, sorters, stampers and messengers—was £42 per annum. The salary of the average postmaster was £108.³⁰ Therefore, although wages rose beyond Scudamore's predictions, this might have been anticipated. However, possibly more surprisingly, the numbers employed rose. It was not unreasonable to suppose that one centralised staff of officers and engineers would be less numerous and costly than four separate staffs. It was expected that the Post Office would employ 1,528 clerks and 1,283 messengers less than the combined companies' staff of 2,514 clerks and 1,471 messengers. But by August 1870, 4,913 clerks (1,535 female) and 3,116 messengers were employed, nearly three times the estimated staff and more than double the total staff of the companies. By December 1872, the number had risen to 9,591, 5,915 clerks and 3,657 messengers, which accounted for most of the excess of expenditure from 1870 onwards. Uniforms alone cost over £12,800 by March 1875. Each unit of labour employed by the Post Office represented about £9 of annual net profits—in 1868 the Electric had been earning about £59 per annum for each unit of labour employed.

Not only routine but also supervisory staff increased. Scudamore had contended that the companies' average expenses were swollen by divided management. Yet the Post Office supervisory staff soon greatly outnumbered that considered necessary by the companies. There appeared to be gross overstaffing. The Playfair Committee of 1876 commented that the engineering division was both costly and complicated in organisation. Its main function was to maintain 63,000 miles of wire upon the roads, to undertake new extensions, and to maintain 12,000 instruments. It had only a general supervisory duty towards the 45,000 miles of wire maintained by the railways. The companies had employed 534 persons to maintain 80,000 miles of wire and 10,000 instruments. The Post Office employed 590 staff to maintain less stock, without

obvious reason. A report in February 1876 recommended a large reduction and reorganisation of the engineering division. The explanation given for the great cost of this establishment was that its function had been to effect rapid development of the system. However, this contingency could have been met by increasing temporary rather than permanent staff, and in any case there appeared to be scope for economy in all departments, without reducing efficiency.

The Post Office staff at the head office in Telegraph Street, throughout the day, was largely female. By November 1871 539 women were employed, while district branches were often worked by young and 'generally well educated women'. Economy was the main reason; wages which would draw male operators from an 'inferior' class would draw 'superior' females. Moreover, because females retired on marriage, fewer of them reached the pension list than males. Over a long period women were as efficient as men in most tasks, although absenteeism and non-eligibility for night duties were disadvantages. So postal authorities in all countries, seeking to reduce costs, increased the employment of women. By 1880 the Post Office employed 1,556 women as telegraphists, out of a total of 5,611; the companies had employed 479 women.

The dual system of maintenance of telegraph systems by the railway companies and the Post Office was also inefficient and costly. The companies, notably the Electric, had erected and maintained the railway company wires for payment. Various concessions were granted, such as free wayleaves and free carriage of men and stores employed in maintaining the lines. Under the 1868 Act, the postmaster-general paid the railways 'to maintain all posts and wires used for public messages'. By 1873-4, including fares for transit of men and materials, this was costing £33,000 annually and by 1876-7 £48,215.

Both the UKTC and Magnetic systems had been based on roads and canals, as was the Electric in Ireland. It was necessary, therefore, for the Post Office to provide for the maintenance and renewal of the road telegraph system, to which it added extensively, by retaining many of the staff of the companies. The 1875 Treasury Committee suggested that arrangements be made with the rail-

way companies, outside the 1868 Act, for the latter to maintain all telegraphs running alongside railways; then the postal staff so employed could be dispensed with. However, the railways were largely unwilling to modify the terms established by the Telegraph Acts; and there was also some concern about entrusting to the railways the maintenance of postal telegraph lines. The committee commented that if in negotiations the railways made unreasonable demands, a bill should be introduced to amend the Telegraph Acts—‘the legislation was merely tentative and based upon imperfect knowledge’.

The right, accorded to the railways by the 1868 Act, of sending postal telegrams free was to prove another burden. Certainly Scudamore had been convinced there would be no abuse of this privilege, as the railways were getting no more than they had had from the companies. The free messages would be open and written on paper of a distinctive colour, to prevent any abuse. However, the number of free messages, at first relatively insignificant, increased out of all proportion to the growth in ordinary public telegrams.³¹ Few railway companies before 1870 did not enjoy the privilege, and as most new lines were worked or leased by one or other of the older companies, it was extended. The resulting loss of revenue was impossible to check effectively, although messages were examined at ‘considerable expense’ and some were disallowed. Not until 1890 were negotiations opened with the privileged companies. All but two of those mentioned in section 9 of the 1868 Act, the Caledonian and the North Staffordshire, were induced, after much pressure, to accept commutation of their privileges to a fixed number of messages and words per annum.³² However, the cost to the Post Office revenue was great, as the following table shows:

<i>Free Messages</i>	<i>England & Wales</i>	<i>Scotland</i>	<i>G.B.</i>
1871	97,102		
1876	196,474	37,015	233,489
1880	359,254	62,868	422,122
1885	609,525	181,424	791,031
1890	1,234,312	181,424	1,459,550

Thus the telegraphs sank into debt. In the search for a solution the commercial viability of a uniform 1s tariff became increasingly

questioned. Unless this was changed, it was contended, revenue would never cover working expenses, interest on capital, and the ultimate extinction of the debt. The 1875 committee felt that the introduction of the uniform tariff in 1870 should have been accompanied by the withdrawal of the free words allowed for addresses, which would have brought the system into line with that common on the continent. The concession was frequently abused, by lengthening names and addresses. A cheaper tariff of 6d for 10 words, inclusive of addresses, might be introduced, or alternatively a system of charging 1d per word, as on the Atlantic cable and other extra-European lines. Either tariff might clear the wires of much unremunerative work and make room for the increase in traffic likely to result from lower prices, without extending plant. However, W. S. Jevons contended that the only justification for a 6d rate would be 'to convince the public that high profits do not always attend low prices'.³³ Much of the cost of a telegram was the same whether the message was long or short; so the scheme would probably cause more loss than gain. In Belgium and Switzerland low prices for internal telegraphs had never paid working expenses, the international telegraphs at higher charges being the real source of profit. The Post Office considered that a 1d per word was 'oppressively and needlessly high'.³⁴ Even though it would encourage economy of words, to the advantage both of the public and the department, it was opposed to the spirit of the Telegraph Act.

There was no further detailed inquiry into the state monopoly until 1914 and the matter was allowed to drift; it was convenient that the annual loss could be blamed on the high price paid, and there was an understandable tendency for the main beneficiaries of the system, the press and general public, to treat the loss lightly. Comparison with other government-operated telegraphs showed that Britain's system was not the leader in making losses. Statistics published in 1875 by the International Telegraph Office in Berne revealed that out of sixteen European states there were ten in which gross earnings were less than expenses.³⁵ By 1875 the British system was carrying more inland messages than any other in Europe, with a lower percentage of working expenses. Indeed, the department's performance in commercial terms improved

steadily throughout the period 1876-81 as the following table shows:³⁶

	<i>% of Total Expenditure to Total Revenue</i>	<i>Net Revenue</i>	<i>Interest Payable</i>
		£	£
1876-7	90·97	202,431	307,172
1877-8	90·75	196,072	314,175
1878-9	84·81	267,722	322,037
1879-80	79·82	333,504	326,417
1880-1	80·08	451,465	326,417

Total receipts increased from £1,298,558 to £1,592,948 while messages transmitted soared from 21,726,142 to 29,441,982. In August 1881 the telegraph operators received a pay increase, thus raising substantially the proportion of salaries and wages to total expenditure. That the increase was inevitable (Postmaster-General, Henry Fawcett, admitted in the Commons debate of 16 August 1881 that telegraph operators 'were underpaid'), did not harm the finances any the less. But the major blow to financial stability was the introduction of the 6d uniform rate in October 1885.

Between June 1880 and December 1881 pressure groups, mainly chambers of commerce and shipping associations, presented petitions advocating lower charges for inland telegrams. These views were popular with a majority of the House of Commons and the press, and on 29 March 1883 the resolution of Dr Cameron, MP for Glasgow and leader of the 'lower tariff' pressure group, that 'the time has arrived when the minimum charge for inland postal telegrams should be reduced to 6d', was carried by a majority of 68 to 50, against the advice of the government. Cameron argued that revenue was increasing and that therefore 'the taxation of the telegraph' should cease. The Chancellor of the Exchequer, Hugh Childers, hoped that 'the house would not agree to the motion'.³⁷ The telegraph accounts laid before Parliament showed a profit but it was barely enough to pay the interest on the debt and no allowance was made for renewals, future increases in pension charges and other possible contingencies.

As a result of the vote a committee was appointed by the

postmaster-general, including senior Post Office staff (F. E. Baines, S. A. Blackwood and J. C. Lamb), to consider ways of effecting the decision without producing a serious loss to the department. The committee was aware that the financial position, which was approaching equilibrium in March 1881, was changing. The August 1881 pay increase was having its effect on costs and it would be difficult to reduce the charge for telegrams without seriously increasing losses.

The committee recommended that addresses should be charged for. Only in the UK were addresses free, which ensured a full address with greater certainty of accurate delivery, and did not place the poor, 'whose addresses are presumably long', at any disadvantage compared to 'richer classes whose addresses are comparatively short'.³⁸ Yet the words in the address cost just as much to transmit as those in the text. The committee recommended a tariff of 6d for 12 words including the address, plus $\frac{1}{2}$ d for each additional word. This met the views of the chambers of commerce; it recognised the principle that payment should be in proportion to the service; it was a simple tariff and it offered the public a substantial gain in allowing short messages for much less than the 1868 tariff. Although long messages would be dearer, the committee contended most messages could be substantially shortened. In France the average length of telegram, including addresses, was 15.16 words, in Germany 11.6, while in the UK it was 28.18 words. There was obviously wide scope for compression.³⁹ The committee estimated that in the first year there would be a profit of 1.22d per message on ordinary inland telegrams, but overall the service would make a surplus of only £47,428, with losses on the press service and free service to other government departments.

As a result of the Commons' decisions and the recommendations of the committee, the Post Office spent £500,000 on erecting 15,000 miles of additional wires, and engaged 1,202 more telegraphists and learners, in anticipation of a great expansion in business.⁴⁰ On 30 March 1885, Shaw-Lefevre, Postmaster-General, brought in a bill to provide for the tariff recommended by the committee. He reminded the Commons that Cameron's resolution had been carried against the advice of the government. Since 1883 the financial position of the department had grown

'decidedly worse', net revenue having fallen from £550,000 to £317,750—the latter yielding barely 2½ per cent on capital invested. There was also a new and dangerous factor—the competition of the telephone, which was taking away the most profitable business. Nevertheless, despite these warnings and general misgivings within the Post Office, the bill became law and the 6d tariff came into effect on 1 October 1885.

From this date the deficit increased rapidly. Overall working expenses increased to 118·4 per cent of total revenue by 1900–1, and huge losses developed throughout 1900–14. The lower tariff certainly opened a new era in messages transmitted, which jumped from 33,278,459 in 1884–5 to 50,243,639 in 1886–7, over 66 million in 1890–1, and a peak of over 90 million at the turn of the century. The average cost of a telegram to the public was reduced from 1s 1d (5.4p) to 7¼d (3p). However, a very large addition was made to staff, the main element of costs. Central telegraph office staff increased from 497 to 3,531 between 1870 and 1913. One interesting side-effect was the mushrooming of 'telegraph colleges', claiming for £5 5s to produce a good signaller. In fact these 'plug factories' flooded the market with 'ham' operatives.

Critics of the system claimed bitterly that the state was expending over £1 million annually 'in providing business and the racing community with telegrams at under cost price'.⁴¹ In 1888 the Select Committee on the Revenue Departments' Estimates commented: 'a great commercial department like the Post Office cannot afford to disregard commercial principles.' It viewed with 'grave concern' the increasing costliness of the service as a whole and the constant pressures upon it for increasing and unprofitable expenditure. However, if the Post Office was to provide a national service at an attractive price, against the increasing competition of the telephone, there was little prospect of a profit in the commercial sense, as the history of the telegraph in the twentieth century was to show. In 1912 the telegraph plant was re-valued; the cumulative excess of expenditure, including capital expenditure, over revenue and assets was estimated at £21,796,520.

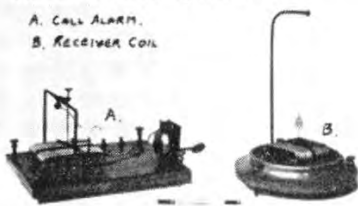
Against the loss of money must be set the benefits to the community. By 1900 the number of telegrams transmitted was greater

than in any other country in the world. A system existed by which, at a charge of approximately 6d, a telegram could be sent to anywhere in the United Kingdom. However, the telegraph habit never developed to the extent that Scudamore had envisaged, largely because of the telephone, but also because of the cheapness of the ordinary letter post. The minimum price of the telegraph, even after 1885, precluded its use for private purposes by any but well-to-do. Nevertheless, the money provided by taxpayers was 'virtually repaid in services for which a higher charge could have been levied'. In January 1876 the *Edinburgh Review* summed up the situation: the Post Office was 'a servant of the nation'; it 'should primarily consider the benefit derived by the public from the service . . . some loss may be wisely undergone rather than a most important means of communication be curtailed'.⁴²

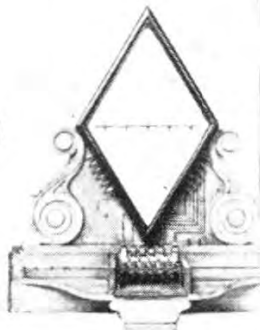
Notes to this chapter are on pages 280-1

SCHILLING'S NEEDLE TELEGRAPH, 1825.

A. CALL ALARM.
B. RECEIVER COIL.



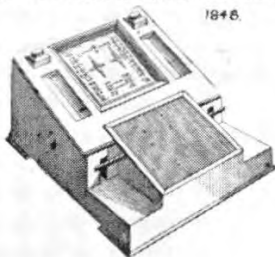
COOKE AND WHEATSTONE'S 5 NEEDLE TELEGRAPH, 1837.



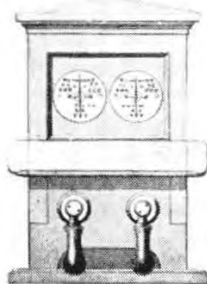
COOKE'S 3 NEEDLE TELEGRAPH, 1836.



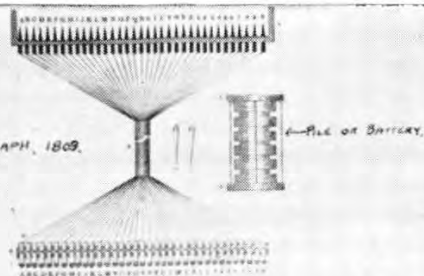
HENLEY'S 2 NEEDLE MAGNETIC TELEGRAPH, 1848.



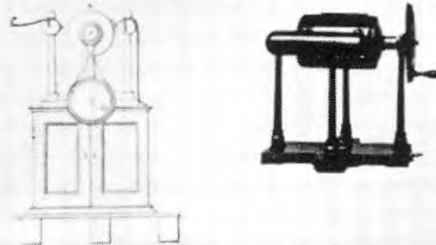
C. AND W. DOUBLE NEEDLE (FINAL FORM).



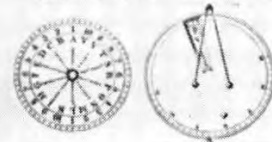
SÖMMERING'S WATER TELEGRAPH, 1809.



RONALD'S PITHBALL AND DIAL TELEGRAPH, 1816.
ELECTRICAL MACHINE TRANSMITTER.



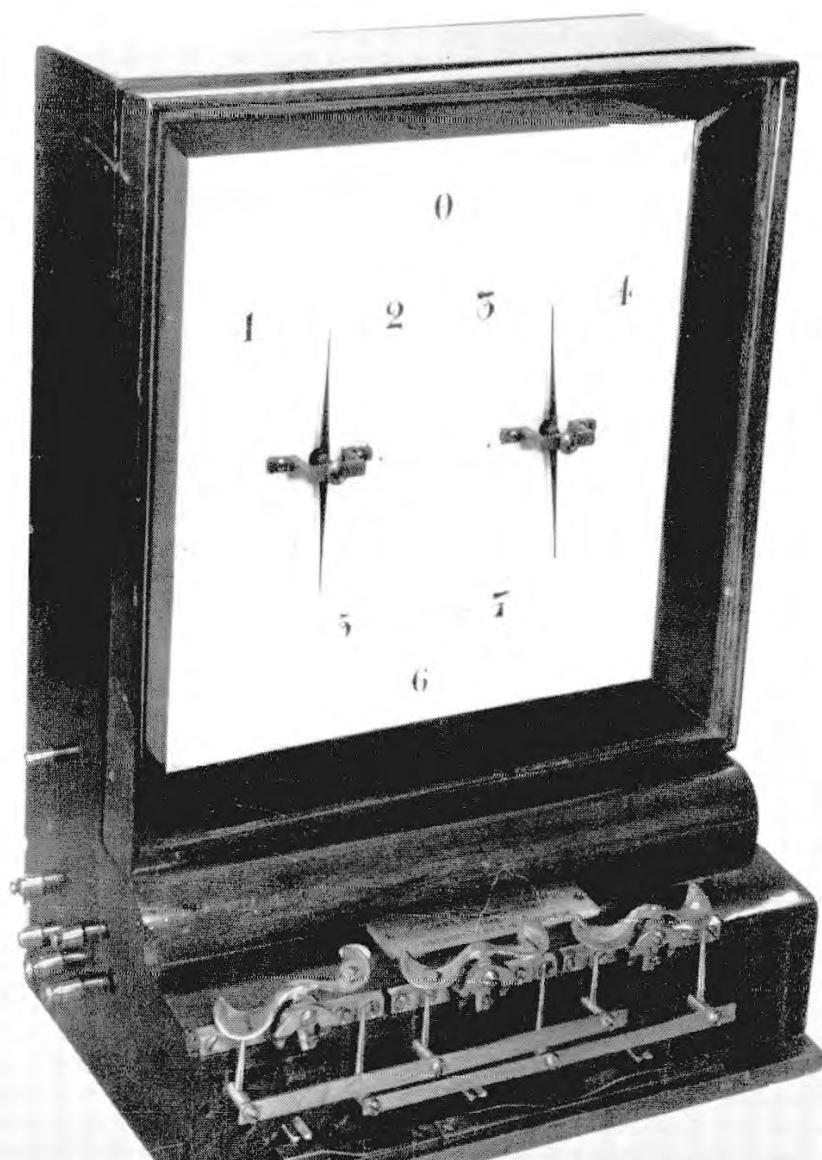
DIAL APERTURE AND PITHBALLS.



Page 197 (above left) Some early telegraph instruments. Baron Schilling's Needle Telegraph, 1825, the prototype of the needle telegraph; Cooke's 3-needle telegraph, 1836; Cooke and Wheatstone's 5-needle telegraph, 1837 and double-needle telegraph in final form circa 1842; Henley's 2-needle Magnetic Telegraph, 1848; (above right) Soemmering's water telegraph, 1809; Francis Ronalds' Pithball and Dial Telegraph, 1816. In 1870, Ronalds received a belated knighthood in recognition of his services to telegraphy (below) St Martins-le-Grand, London, in 1819 and in 1937 with the Central Telegraph Office, destroyed by an incendiary bomb in 1940



CENTRAL TELEGRAPH OFFICE



Page 198 (left) William Cooke's Portable 2-needle telegraph as described in his patent No 7614. The 2-needle telegraph resulted in the emergence of a specialist class of operator; (above) Wheatstone's ABC instrument, patented 1858. The instrument was so simple in its construction that anyone who could read could work it. To transmit a word it was necessary to depress the button against the desired letter. The instrument was in use until well into the twentieth-century. One was in North Wales on a Post Office circuit in 1950

TELEGRAPH MONOPOLY AND TELEPHONE DEVELOPMENT

In 1876 Professor Alexander Graham Bell patented the telephone. It was exhibited at the Philadelphia Exhibition in the same year and was immediately used for business purposes in Boston. In 1877 William Preece, perhaps the outstanding telegraph engineer of the nineteenth century, brought over the first pair of telephones from America and exhibited them to the half incredulous members of the British Association at Plymouth.¹ In September Preece provided a description of the Bell patent for the Post Office and recommended the department to secure the use of the apparatus and the right to manufacture it. He considered that although the telephone was not yet generally applicable, there were many instances where it was perfectly practicable and would lead to great increases in private wire business.²

After some negotiations an arrangement was reached between the Post Office and Bell's agent in London, Colonel Reynolds. The Postmaster-General, John Manners, approached the Treasury in February 1878 for sanction to supply the telephone. He considered that in many places the department would be compelled to establish such a system; otherwise it would have to abandon remunerative systems of private wire. If renters insisted upon telephones being substituted for Wheatstone's ABC instrument, the department would have to comply or allow private contractors to meet the demand. There would be no risk to the Post Office, which proposed merely to hire the instruments, not to buy or sell. Manners commented, 'At present the telephone could not be utilised on public wires in any way and it is only under certain circumstances that it can be rendered effective for private wire purposes.'³ On 21 February 1878 he denied in the Commons that he intended to introduce the telephone in the United Kingdom.

While the Post Office awaited the Treasury reply, the Telephone Company was registered, on 14 June 1878, to acquire and work Bell's patent. There then followed protracted negotiations; the

company proposed that the department should licence it to put down pipes and wires under cover of Post Office powers. It was clearly in the interests of the company to have the department as its ally, at worst exercising a benevolent neutrality, if it was necessary to apply for parliamentary powers. The company did not propose an exclusive licence, preventing arrangements with other telephone companies or excluding the use of any new inventions. It was confident of the extended use of the apparatus and considered that the Post Office, by erecting telephone wires, and by profits on telephones which it would supply at cost price, could make good any loss resulting on the ABC system.⁴

In August 1879 a rival company, the Edison Telephone Company, was formed to acquire and work the patents of Thomas Edison. At the same time the Lancashire Telephone Exchange Company was launched to establish exchanges in Manchester and the principal towns of Lancashire, and to work in connection with the Telephone Company. Advertisements and letters appeared in the press regarding the proposed establishment in London and the larger towns, of 'telephone exchanges' similar to those which, allegedly, had been in operation in Chicago and other American cities since 1878.⁵

The system of exchanges was generally based on a plan to lead the wires of subscribers to a common centre, where by means of a simple switching arrangement, each subscriber could converse directly with any other in the scheme. In larger towns there might be two or more centres, connected with each other, and the next stage was the connection of different towns. The Post Office realised that unless the local operations of such exchanges were restricted to a very limited area, they would seriously interfere with its telegraph local message and private rental business, while the proposal to connect various towns would create competition for public message business.

Two important questions were raised by these schemes and submitted for legal opinion: whether messages transmitted by a telephone were 'telegrams' within the meaning of the Telegraph Acts, and, if so, whether the proposed exchanges infringed the exclusive privileges conferred upon the postmaster-general by the Telegraph Acts, or came within the exceptions from them allowed

by section 5 of the 1869 Act. In 1878, when the postmaster-general had inserted in a telegraph bill a clause to include telephones in his telegraph monopoly, the House of Commons had struck it out.⁶ The legal pronouncements were in favour of the department. Telegrams, defined by the Telegraph Act 1869, section 3, as 'any message or other communication transmitted or intended for transmission by a telegraph' included telephone messages. Telephone exchanges could not be established without infringing the postmaster-general's monopoly.⁷

The Post Office accepted that the development of the telephone might be of great advantage to the public and should not be hindered but was concerned to protect the capital invested in telegraphs. There appeared to be two possible courses of action. It could either do what the companies proposed, in connection with private wire systems, or, until the capabilities of the telephone were better known, it could allow the companies to proceed under licence, as provided by section 5 of the 1869 Act. The latter had already been done in 1872 to allow the Exchange Telegraph Company to begin operations.

However, it was difficult to assess the terms under which licences might be issued. The schemes were in their infancy and much would depend on the limits within which the companies were allowed to extend their wires from the central exchange, and on the number of subscribers. In September 1879 the Post Office was thinking in terms of a radius of half a mile from the central office, at a fixed royalty of £100 per annum and 25 per cent of gross profits.⁸ As the effect on the public message business was still uncertain, it was considered desirable to grant a licence initially for a short period only, so that the terms might soon be revised, if necessary. Significantly, the postmaster-general suggested that a clause be inserted, empowering the department to purchase the undertaking on expiry of the licence. For the present, the Post Office proposed not to allow two or more exchanges to be connected together, as such connections would probably interfere with its business.

The Treasury approved these proposals on 4 October 1879, and the Post Office informed all telephone companies that their operations would infringe the postmaster-general's monopoly. If

the companies did not obtain a Post Office licence, steps would be taken to protect public revenue. The companies replied that they did not intend to apply for a licence. Legal proceedings were begun by the attorney-general, on behalf of the postmaster-general, against the Edison Company in November 1879, and against the Telephone Company in December. In May 1880 the two companies amalgamated under the title of the United Telephone Company; the Bell company had the better receiver, the Edison the better transmitter. However, the lawsuit was to occupy the whole of 1880, seriously impairing the working of the company and the development of the telephone.

On 20 December 1880 judgement was given by Mr Justice Stephens and Mr Baron Pollock in favour of the Post Office.⁹ A telephone was a 'telegraph' within the meaning of the Telegraph Acts; a conversation through a telephone was a communication transmitted by a telegraph and a telegram within the meaning of the Acts. Therefore there was an infringement of the postmaster-general's exclusive privilege. The result of this definition seemed to be that any apparatus for transmitting messages by electric signals was a telegraph, whether a wire was used or not. It would include 'electric signals made, if such a thing were possible, from place to place, through the earth or air', as well as a set of bells worked by wires pulled by hand, if they were so arranged as to constitute a code of signals. The companies had maintained that the telephone was an entirely new invention, not anticipated when the Telegraph Acts were passed. However, although telephones were not specifically mentioned, it was clear that the Acts were drawn up so as to embrace future discoveries using electricity to convey information. It was probable that the government of 1869 intended that the monopoly it was purchasing should include not only existing processes, but also any associated processes that might be discovered in the future. The result of the judgement was that the telephone companies had to accept the postmaster-general's terms or give up business.

Anticipating the judgement, the Post Office made arrangements to establish exchanges in connection with post offices. It was ascertained that the department could be supplied with an improved form of telephone, the Gower-Bell, manufactured by

Messrs Scott & Wollaston. The latter held a licence from the Telephone Company to use Bell's patent throughout its term, on the understanding that it did not itself establish exchanges. There appeared to be no stipulation that persons to whom it sold telephones might not establish exchanges. An estimate was obtained that the cost of 5,000 telephones, over two years, would be £45,000, while the cost of new wires would be approximately £100,000.¹⁰ Scott & Wollaston's licence was acquired by Gower, who formed the Gower Bell Telephone Company. There was a risk that the telephone companies might offer Gower payment for his rights; he had already refused an offer of £67,000 and on 20 December allegedly declined to negotiate a return of the licence for less than £100,000.¹¹ It might be in his interest to continue to supply the department rather than sell out, if the Post Office system could be developed. Proposals were submitted to the Treasury on 13 December by Henry Fawcett, the blind economist and new postmaster-general.

The Post Office was concerned at press reaction that the judgement might result in a disservice to the public and a general discouragement to inventors of telegraph apparatus; but the press assumed that the Post Office would not itself provide a telephone service. However, there was now nothing to stop it setting up exchanges provided Treasury sanction was obtained. Fawcett alleged that the object of the company was not so much to meet a public want in a lasting and efficient manner, as to establish a system which would compel the government to purchase:

they are straining every nerve to give to their business an appearance of success by carrying their wires to the premises of people who have never asked for them, and by offering to these people a year's use of their system free. They are erecting their lines without regard to public safety, or private rights, and in a manner which is certain to cause general outcry.¹²

If the Post Office was to content itself merely with granting licences, inevitably powerful agitation would develop for the purchase by the state, of the companies which had established and popularised the system. It would be urged that there was a public need which could only be supplied by the resources of the state.

Fawcett doubted whether it would be possible to resist the

agitation. It would mean not only purchasing plant at an inflated price but replacing wires which stretched dangerously over houses and across streets, with underground ones. He therefore proposed that the Post Office should at once set up a telephone system of its own and leave the companies no time to establish vested rights and a practical monopoly. It already had a system of intercommunication in several towns using ABC instruments. To establish exchanges in other towns it merely had to substitute telephones. The department considered it would have the general support of the public.

On 16 December 1880 the Treasury consented to the Post Office proposal, but for the establishment of a limited system only, 'to enable the Post Office to negotiate with telephone companies in a satisfactory way for licences'.¹³ Understandably, the Treasury was less than enthusiastic. By 1880 it had had sufficient experience of the unprofitability of the telegraphs to make it very wary of experiments with the telephone. The Gladstone government was probably more concerned with the cost of the occupation of Egypt than with financing a Post Office telephone system.

On the day of the Edison judgement the Post Office advertised that it was prepared to provide a system of telephone exchanges whereby renters of private wires into postal telegraphic offices would be connected with each other by either ABC or telephone instruments. The annual rental for a telephone in London would be £15, if the premises were within half a mile of a telegraph office, £19 if between half and one mile, and proportionately higher for longer distances.¹⁴

Although notice of appeal against the judgement was immediately given, the companies soon expressed a desire to negotiate, and agreement was reached by April 1881. The companies would accept the judgement, abandon their appeal and take a licence from the Post Office. The United Telegraph Company still claimed a monopoly of telephone patents in the UK, including Gower-Bell. Thus, although some exchanges had been started with instruments purchased from Gower, the majority were worked under licences granted by the Urc. Settlement with the company influenced the provincial exchanges, and resulted in the latter taking licences.

The Post Office licences clearly defined the terms and conditions under which a company might operate. The UTC, which reserved the London area for itself could work within a radius of 5 miles of the centre. Within that area it was allowed to establish whatever exchanges it required and to connect them together. It was to pay a royalty of 10 per cent of gross receipts, and the licence was to run for thirty-one years, subject to a possible determination at the end of the 10th, 17th or 24th year should the department so choose. Fawcett was prepared to give scope for the pioneering zeal of profit-seeking companies but their leases were so defined as to preclude the high compensation given to the telegraph companies.¹⁵

The Post Office was clearly aware of the likely adverse effect of telephone exchanges on local telegram business. However, the royalty would bring in a substantial sum, an important factor in view of the feeble financial record of the department, and there would be a further source of profit in the wires which the department had the option of erecting for the UTC. Similar terms were granted to provincial companies, including the National Telephone Company, to operate in Yorkshire, the Midlands and Scotland, and the Lancashire & Cheshire. The granting of a licence in no way precluded the Post Office from establishing its own system, should the companies' rates prove so excessive as to restrict use. For its part the Post Office would forgo all claims to royalties for the years before 1881 and would not press for costs in the recent lawsuit.

A further consideration was to allow company exchanges to be connected by wires to post offices. This was clearly an advantage which the companies would desire for their subscribers. The Post Office view was that where it had already established a system, its subscribers should not lose this advantage. Therefore, connection would only be allowed where no Post Office system had been established, and then only for sending telegrams into a post office for transmission over public wires. In April 1881 the department also refused permission for the companies to erect interurban trunk wires; it would do so itself and use would be authorised for one year only, any extension to be on a year-to-year basis. Payment would be made direct from the company's subscribers to the

Post Office, which would also fix the number of subscribers; the rental would be the same as would be required for trunk wires connecting the department's own system of communication. Thus the department had the power to withdraw the concession at any time, 'it would be difficult for any improper use to be made of the wires'.¹⁶ The limit was fixed at one year because it was thought undesirable to hand over for longer, to a private company, authority to operate between neighbouring towns; this was a profitable business which had helped substantially towards the meagre net profits earned by the telegraphs. Not surprisingly under these restrictions the development of interurban trunk lines was severely handicapped.

By the end of November 1881 it was broadly decided to retain for operation by the department those areas not then occupied by telephone companies, and where there appeared to be some 'urgency in public demand'. The effect of departmental policy on telephone development was revealed in December 1882 by the *Compagnie Internationale des Telephones*.¹⁷ In the USA, where there was hardly a town without a telephone exchange, there were already over 100,000 subscribers; Boston had 10,325, New York 4,060, Chicago 2,726. In Europe, Paris had 2,422, but London only 1,600, one for every 3,000 inhabitants. At the 1881 electrical exhibition in Paris about ninety exhibitors showed telephones and associated apparatus yet the UK exhibits were disappointing.¹⁸

In January 1882 the Post Office had to consider issuing a licence to the newly formed London & Globe Telephone & Maintenance Company. The existing telephone companies were naturally opposed; there was the exceptional position of the UTC, as pioneer and owner of the master patent, in the settlement of the litigation. Between 1881 and 1882 the number of subscribers had increased by 100 per cent; but the companies had fully met the requirements of the public, and because of the control operated by the postmaster-general over the UTC, no monopoly could be alleged. The universal experience was that a telephone service was worked most efficiently and economically by a single company. Competition would merely increase costs, through duplication of facilities. In Belgium, initially, three companies had operated, but

the government had been compelled to insist on an amalgamation and had given a long and extensive lease. New York was the only city of importance in which two competing exchanges were in operation—much to the confusion of the public, which was sometimes forced to use both to obtain reliable service.¹⁹

Nevertheless, by July 1882 Fawcett's conclusion was that it was undesirable to refuse new licences. The conditions under which they would be granted would require careful consideration but competition would be allowed where telephone exchanges were already established. The Treasury agreed that competition between the companies should be encouraged. In July 1882 Fawcett announced in the Commons: 'It is not in the interests of the public to create a monopoly in relation to the supply of telephonic communication.' Fresh licences would be issued, although licencees would have to make their own arrangements with local authorities and with any persons affected.²⁰

During 1882 the Post Office wished to increase its staff in order to compete more effectively with the telephone companies in private wire business. It believed that the public preferred its service, but if its facilities were not publicised, the obvious way of obtaining a telephone was through the companies, which kept up an 'incessant canvass'.²¹ Canvassing was important, therefore, to the growth of the Post Office private wire business; many contracts would not have been continued beyond the terms of the original leases without it.

The Treasury view was that the Post Office and the companies could not be regarded merely as commercial competitors. Canvassing was not the duty of any Post Office officer and it refused to sanction the appointment of the three travelling clerks demanded. It desired the Post Office to refuse applications for fresh wires except in districts where it had a practical monopoly and where applications were outgrowing the existing systems and could not otherwise be supplied without great inconvenience.²² In June 1883 the Treasury commented that it was a sound principle that the state 'as regards all functions which are not, by their nature, exclusively its own, should at most, be ready to supplement, not endeavour to supersede, private enterprise', which should be allowed full scope within official restraints. 'A rough

test of the legitimacy of its procedure is not to act in anticipation of possible demand.' The existing companies might have a stronger case for being bought up if they could allege that by official pressure, avowedly outside the Post Office monopoly, business was ruined. It was difficult, in the Treasury view, to see how any such plea could possibly be urged, if the companies were left to develop trade as they chose, while the Post Office only intervened when invited. The Treasury commented significantly: 'it is perhaps to be regretted that the Department ever travelled into functions outside its monopoly . . . the numbers of the Post Office are already those of a large army', appreciably adding to the public charge.²³ The Treasury did not want the Post Office to do more than await public demand. This rebuttal effectively ended Post Office ambitions and was partially responsible for the major change of policy towards the companies in 1884.

There was now strong pressure from press and Commons to ease the restrictive clauses of the basic licence. In the Commons, E. Dwyer Gray, chairman of the Telephone Company of Ireland, enlisted the sympathies of Home Rule members and raised debates and asked questions at every available opportunity. On 22 May 1884 he described the charge for royalty as 'grossly unfair' and accused the Post Office of vacillation and of practising a policy of strangulation. It was not protecting the public but merely destroying the profits of telephone companies. Fawcett, aware of the Treasury attitude, described his position as trustee; he confessed that certain Post Office conditions had checked private telephone development but he hoped soon to be in a position to announce modifications.²⁴

On 13 June 1884 a leading article in *The Times* attacked the permanent officials of the Post Office. In December 1880 the paper had forecast the deplorable consequences of the affirmation of the Post Office monopoly of telephone communications, when its officials had stepped in with a claim which they were 'unfortunately able to establish'. The action of the Post Office since then had been to throw every possible difficulty in the way of the telephone companies and of public use of the telephone. The negotiations under which licences were granted to the companies were in many respects as completely prohibitive as an absolute refusal—

'the telephone could only be used under absurd restrictions and at a high rate of charge'. As a result of Post Office interference there were as yet few towns which were linked in direct telephonic communication. Clearly Post Office officials feared that any great increase in the use of the telephone would be at the expense of the telegraph and would serve, by reducing receipts, to direct attention again to 'the improvidence of the bargain by which the telegraph was taken over . . . at terms scarcely bearing impartial examination'. The Post Office telegraph was the 'bantling' (brat) of the permanent officials and they had spared no pains in opposing any improvement which might imperil the 'bantling's' prosperity. Parliament must liberate the telephone from 'the bonds of red tape in which it is being strangled and allow its future to be shaped by the operation of the ordinary laws of political economy'. The conduct of the department, although not legally dishonest, was morally indefensible.²⁵

On 24 June 1884 Fawcett suggested that the telephone companies might meet and put their demands in writing. Next he contacted the Treasury recommending concessions in the terms of the licences. Two conditions particularly prevented any general use of the invention: that fixing the radius within which subscribers could be connected to an exchange, and that compelling the licensed company to supply the Post Office with any variety of patented telephone it used, which had been inserted to ensure that if the Post Office were ever required to establish exchanges which would connect with instruments used by licensees, it would be able to do so. The first clause prevented expansion to people living outside the radius, and thus trunk line development had been stunted. Since the second condition was imposed, the UTC and subsidiary companies had accepted new licences only under exceptional circumstances. The effect of this refusal had practically been that exchanges had not been opened in any town for which the licence had not been granted previously. There had been deputations from towns desiring the UTC to establish exchanges and complaining that the condition deprived them of the service; it was difficult to justify the position of the department.²⁶

Fawcett considered that these hindrances should be removed, either by freeing the companies from them or by acquiring their

patents and supplying a telephone service through the Post Office. The latter would require a large purchase price, possibly over £2 million, even though the patents had less than seven years to run. In addition, the existing plant of the companies was almost entirely overhauled; the Post Office would within a short time be compelled to place this largely underground.

On 7 August 1884 Fawcett announced in the Commons that licences were to be issued to telephone companies to develop oral communication freely to all parts of the country. No written message could be accepted or delivered by companies at any point, the 'really essential difference existing between telegraphic messages and the oral communication of the telephone'. The royalty of 10 per cent on gross receipts was to be extended to private wires. The Post Office department should still be unfettered in its rights to supply private telegraph communications on its own account whenever it was in the interests of the public to do so. There was likely to be some adverse effects on telegraph business, yet the anticipated reduction in telegraph tariffs would tend to make the competition of the telephone less important.²⁷

The reaction to Fawcett's concessions was generally favourable, although *The Times* doubted whether he had gone far enough 'to set the telephone free to give rational scope to the ingenuity of inventors and the enterprise of capitalists' and to give the public the advantages which the business community in the USA derived from the development of an invention 'not less fruitful in promise than the telegraph'.²⁸ Fawcett, an economist, 'must feel keenly that he is not in the right place as an apologist of monopoly'. But as postmaster-general he was bound to defend 'the rights' of the department, even when they were 'wrongs' in relation to non-official interests. The Post Office must forget the notion that the telephone should be controlled so as to prevent the telegraphs from making further losses. Experience in the USA had shown that telephone and telegraph did not necessarily interfere with each other, but might develop vast and independent areas of new business at the same time. The Post Office was bound not to hinder any changes in the conduct of business which might be naturally produced and must be for the general advantage. The telephone companies protested vigorously against the payment of

a royalty on private wire business, which had been specifically exempted from the Post Office monopoly. Legally it had no claim and when the new licences were issued in November this clause was omitted.

The major effect of the 1884 changes was the growth of inter-urban trunk lines. The first, between London and Brighton, was open at the end of the year, built by the Post Office and worked by the UTC. Henceforth trunk development was rapid, especially in the North and Scotland: Edinburgh and Glasgow, 1884; Manchester and Liverpool, 1885; Manchester and Leeds in 1886. Most were built by the companies but some by the Post Office.²⁹

There continued to be intermittent proposals for the Post Office to take over the telephones. (In January 1882 rumours to that effect had been so persistent that *The Times* had announced it as a fact.) *The Economist* vastly preferred a state to a private monopoly, and the Associated Chambers of Commerce wanted a national telephone system with lower charges, to prevent the creation of a monopoly by private companies to the detriment of the state. However, the Post Office naturally did not want to purchase before the expiry of the patents in 1891.

In March 1888, in a representation to the postmaster-general, the companies complained of the refusal by local authorities and Parliament to grant them compulsory powers to acquire wayleaves for their wires, so increasing costs and involving separate and tiresome bargains. They also complained against the department of the annual charge made when the trunk wire was run for and rented to the companies, and of the heavy charge for connecting telegraph offices with exchanges—or rather for the permission to telephone companies to do so at their own expense. Such connections had obvious advantages both to the public and to the Post Office, especially in country districts. In the United States telegraph companies actually paid telephone companies a commission on telegrams received through their wires. It was alleged that in parts of the UK where there was not sufficient population to justify the opening of a telegraph office, the Post Office used the railway telegraph as a feeder to its telegraph system rather than telephone company wires.³⁰

To strengthen their financial and bargaining power, the three

main companies, the UTC, the National, and the Lancashire & Cheshire, amalgamated under the title of National Telephone Company in April 1889. The capital of the company was raised to £4 million; *The Economist*, strongly in favour of nationalisation, said it was '50 per cent water'.³¹ The Post Office informed the companies that amalgamation was not in the public interest and had not been contemplated when the licences were issued. 'Any assurance outside the licences which the companies may conceive themselves to have received from the Postmaster-General' could not be regarded as applicable.³² The companies retorted that the union would undoubtedly lead to increased economy and efficiency in working. 'The interests of the public would be better served if the heavy tax imposed by the Post Office department upon telephonic communications, ultimately paid by the public in increased charges, was removed' and better facilities granted to telephone companies. The directors were unwilling to believe that 'the present postmaster-general would attempt to reverse the policy of his predecessors or withdraw from any assurance given by the department'.³³

The highest possible testimony to the real usefulness of the telephone was that it had progressed despite the narrow policy of the companies and the 'tyrannical conduct' of the Post Office. In London there was 'a gigantic public nuisance by the running of overhead wires in all directions across main thoroughfares'. Lines were put up in haphazard fashion without regard to future requirements or public convenience, and there was a bewildering number of exchanges. 'There was no single town in civilised Europe which was so behindhand in its telephonic communication and none which had been so obviously spoilt and disfigured by wires running in all directions than London', stated the Duke of Marlborough in the Lords in July 1889.³⁴ The telephone would never be a useful invention unless the government was prepared to take it up. He suggested a joint committee of both Houses be appointed to consider the question. The service in London was dear and inefficient, and use of the telephone was entirely restricted to annual subscribers who had instruments fixed in their home. The UTC had issued warnings to its subscribers against permitting non-subscribers to send messages. *The Economist* in

July 1890 asked, 'What hope was there of our getting to something like continental standards?'³⁵

In 1891 the controlling patents ran out, but the postmaster-general did not intervene. The Post Office did not consider the time was right for nationalisation. Instead, the department compromised under the Telegraph Act, 1892.³⁶ Trunk lines were to be taken over gradually by the Post Office, which was to lease to the companies its powers of acquiring local wayleaves. These powers, however, could still not be exercised without the consent of local authorities, and this was sometimes withheld when relations between local authority and company were not harmonious, as in the case of Glasgow and London. The former persistently opposed the NTC wayleave rights in its streets and threatened to start a rival municipal scheme. Technically there had been great progress but the British telephone system was still 'imperfect . . . as compared with other countries'.³⁷

Select committees on the telephone service in 1895 and 1898 investigated the numerous complaints about the excessive charges and inefficiency of the NTC; the 1898 committee recommended competition as a remedy. In fact it favoured state management; the UK trunk system, which was in the hands of the government, was 'the most extensive in Europe'.³⁸ It was the exchange system in private hands which was defective. Hence, in 1899 the Telegraph Act authorised municipalities to operate telephone systems. Several towns, including Brighton, Portsmouth, Swansea, Glasgow and Hull set up exchanges but Hull alone was successful in the long term. For the privilege of independence the municipalities paid an annual royalty of 10 per cent of gross revenue. Most municipalities were slow in adopting technical improvements and they had not the expert staff of the NTC. By 1905 the municipal subscribers were barely 5 per cent of the total.

During the same period the Post Office entered into local competition with the NTC in London, which was divided into three areas, one allotted to the company, one to the department, and one, the central area, open to both in competition. In July 1900 an injunction was issued by the courts to stop the NTC from opening up London streets to lay wires without the consent of the postmaster-general and the County Council. In November 1901 agree-

ment was reached between the postmaster-general and the NTC. London subscribers were to have access to both systems. More significantly still, the agreement provided for the purchase of the NTC metropolitan plant and assets by the state, at valuation and without goodwill, on 31 December 1911, the date foreshadowed long before. This agreement served as the model for the national agreement of February 1905, which was ratified by Parliament in August 1905. On 31 December 1911, when the licence granted to the NTC expired, the long struggle between private and public monopoly ended; a single state-owned telephone system was set up at a cost to the Post Office of £12½ million, compared to the £20 million originally claimed by the NTC.³⁹

Thus from the beginning the telephone was regarded as a competitor to the telegraph and so was hampered in its growth. In particular, it competed in local traffic, which afforded the telegraph, under the 1885 tariff, the greatest promise of growth; in large towns especially it captured much Post Office business, at a time when the telegraph deficit was increasing. The Post Office could contend, in support of its policy, that it was protecting the public investment in the telegraph, but it is doubtful whether the cost, in delay in development of the telephone and increased costs for telephone users, was offset by better telegraph services or any long-term saving of public money. The Post Office policy appeared to be a deliberate attempt to stand between the public and the full utilisation of a great scientific invention. It was not surprising that the limited service given by the companies created a 'prejudice against the use of the telephone', which took some time to disappear.⁴⁰ The separation of trunk lines and local services impeded standardisation and research. Not until after 1911 was there any great expansion in the use of the telephone; messages transmitted increased tenfold between 1911 and 1913, from 42,388,000 to 486,443,000.⁴¹ The UK lagged behind the USA and the Continent of Europe in total number of telephones, while London compared unfavourably with many other capital cities in the number of telephones per head of population. However, the frequent changes of government policy in relation to the telephones was not the only factor. Any policy of fostering competition was thwarted by the patent monopoly established by the UTC;

between 1884 and 1892 the UTC and its offshoots had a relatively free hand in the development of the telephone but their methods brought bitter complaints. Similarly, the Bell companies in the USA held a patent monopoly until 1894 and were noted for their unprogressive spirit and high charges. It was the storm of competition which burst on them after 1894, which transformed them into enterprising and efficient undertakings. In the UK also, the competition of the municipalities and the state, particularly after 1900, stimulated extensions and better service.

Notes to this chapter are on pages 281-2

CHAPTER ELEVEN

THE PRESS SUBSIDY

In 1868 newspaper proprietors were generally dissatisfied with the service they received from the telegraph companies. Serious delays and errors occurred, for example in the transmission of Mr Gladstone's 1860 budget speech, and much news was sent which the newspapers did not require, whilst material requested was often refused. Newspapers could not rely on receiving the information for which they paid, sometimes being carelessly left out of the distribution. Charges depended both upon distance and the pressure which the Intelligence Department of the companies was able to exert. The *Northern Whig*, for instance, was told that it might lose the service altogether, because it had supported nationalisation of the telegraphs.¹

Thus the newspapers desired to organise their own press bureau. In October 1865 a meeting of a number of provincial daily newspaper proprietors formed the Press Association, with a capital of £12,000, each newspaper proprietor having the right to one £10 share. The meeting had been initiated by John Edward Taylor, son of the founder of the *Manchester Guardian* and for long a leader in the fight against the Intelligence Department monopoly. The object of the PA was to improve the news supply to the provincial daily newspapers. However, it was unable to function, as the companies refused to transfer to it their existing contracts with the provincial press.²

Any concerted opposition by the press to the 1868 Act would have delayed, even possibly defeated, the measure. Scudamore was, therefore, unwilling to arouse the active antagonism of the press and was ready to concede its demands to ensure concurrence. On 15 May 1868 he informed the newspaper owners that the Post Office would transmit news at rates at least as low as those of the companies. Transmission of news should be regarded as a matter of national importance and 'charges for such transmission should include no greater margin of profit than would suffice to make the service fairly self-supporting'.³ On the same

day the postmaster-general informed Parliament that his department would make arrangements for the press 'more satisfactory than those in force'. None of this was written into the bill. If it had, the Post Office might have been accused of bribing the press.

The tariff established by the Telegraph Acts was very favourable to the newspapers: for 1s 7s words might be sent between 9am and 6pm and 100 words between 6pm and 9am. Identical messages sent simultaneously to several newspapers might be multiplied to any number on payment of an additional 2d for every 75 (or 100) words, no matter where the location. Thus a correspondent sending a 1s telegram from London might hand in a list of 100 addresses and the cost would be only 17s 6d (87½p), although the message might be despatched to the furthest ends of the British Isles. It was this cheap copy rate that made the economic service to the PA possible. It was considerably cheaper than the companies' tariff, particularly over distances above 200 miles. Finally, to enable competition as well as co-operation between newspapers, 'special wires' were to be provided at £500 per annum. The Post Office supplied apparatus, clerks and the use of the wires from 6pm to 6am. This service had been available from the companies but on a rental which varied with distance, costing as much as £1,000 per annum to Ireland. As a result only nine private wires were rented, five of them by Scottish newspapers.⁴

The result of the low tariff was a large expansion of press work. Whereas the companies transmitted a daily average of 6,000 words during the parliamentary session, by 1871 the Post Office sent 20,000 words.⁵ A very large proportion of the news of every leading provincial newspaper was received by telegraph. The copy was largely collected and distributed by the PA and the Central News, founded in 1871 by William Saunders, MP and social reformer. In 1872 the Exchange Telegraph Company was formed. One of the founders was Sir James Anderson, captain of the *Great Eastern* when it laid the Atlantic cable. Its primary aim was to report Stock Exchange news, and it soon gained the exclusive right to be represented on the floor of the exchange. The company's apparatus, patented by F. W. Higgins, its chief engineer, became a familiar sight in the vestibules of principal hotels, clubs, banks and exchanges. The piano-type keyboard, with its alternate

black-and-white keys, and glass-domed pedestals, remained virtually unchanged for nearly one hundred years.

It soon became clear however that the newspapers were being subsidised and press work became a 'fruitful source of loss'. In 1875 the Treasury committee commented that the wires were 'heavily occupied' with press work; at extraordinary times they were 'absolutely flooded' with this 'most unremunerative traffic', at the expense of more lucrative work.⁶ Efficient transmission required large investment in plant, together with additional annual expenditure. In September 1875 a confidential report revealed that while the approximate yield from news transmissions was £50,000, the cost was £70,000.⁷ This was the first of many attempts by the department to evaluate precisely the cost of press work. It was transmitting 220 million words annually for the press at an average price of 4d per 100 words, and 180 million words at the 2d copy rate.⁸ Charges in the USA for press work were approximately four times higher. The service supplied to many provincial towns, including Nottingham, Hull, Leeds and Bradford, produced a considerable loss, while much of what was transmitted never appeared in newspapers. In 1876 the Playfair committee denied it had sufficient evidence to establish the loss on press telegrams at £20,000.⁹ However, it recommended that any losses should be clearly ascertained, and that copy rates be raised to cover them and confined to copies delivered by hand in the same town. This proposal had been considered by Scudamore in 1868 but he had withdrawn it because of the likely press reaction.

With the financial position deteriorating, there was support for the policy of making the press pay more. The economist, W. S. Jevons, asked, 'Was the immense quantity of press work sent through the wires really necessary? Why should it be subsidised by government and taxpayer?' The 1868 Act had provided that newspaper rates should be given to hotels, newsrooms, exchange rooms and licensed houses, a continuation of the service rendered by the companies which provided results for the 'race loving' public. The PA sent the racing results to the same list of addresses daily. The words must not exceed 75, and the PA was charged for the transmission of only one message. Thus in 1875 446,000 messages were transmitted free, each a loss to the Post Office.¹⁰ In

October 1875 the department announced its intention to discontinue the 'continuous counting' of sporting messages as from January 1876. Gamblers would no longer be provided with telegrams at under cost price.

The press reacted to these 'hostile changes' by sending a deputation of MPs and newspaper owners to the postmaster-general.¹¹ Dr C. Cameron, MP, owner of the *North British Mail*, stressed the hardship on the provincial press of a change in the tariff and the 'gross breach of national faith involved'. 'The press was an important educational machine and engine for the diffusion of knowledge.' The result of this vigorous opposition was that the worst fears of the press were allayed; other rates remained unchanged. In 1877 the chairman of the PA commented that the postal authorities had given 'a distinct and binding pledge that no further changes would be attempted without the direct intervention of the legislature'.¹²

Press tariffs were reviewed in 1884 by the committee considering the 6d uniform rate. The advantages of press work to the Post Office were listed. Generally messages were for a number of addresses and so several slips could be punched at the same time, entailing less work both at the 'sending' and 'receiving' station, because by the use of carbonics a dozen copies could be written at once. Plant was used more intensively, especially at night. The chief disadvantage was that it was impossible to provide for press work with the same certainty as for ordinary commercial work; consequently there was a waste of labour as maximum provision must always be made. During a parliamentary session it was necessary to keep a large force available for emergencies; frequently, the House would rise suddenly or a debate lack the expected interest. Without doubt there was an enormous strain upon both officials and staff. When Gladstone's Home Rule Bill was introduced on 8 April 1886 no less than 1,500,000 words were sent from the Central Telegraph Office in London. By 1877 over 5 million words were being transmitted weekly for the press; the average cost of a press message was estimated at 1s 6d.

Clearly the Post Office was increasingly concerned about its deficit, and desperately searched for ways to remedy the deteriorating situation. In June 1893 the Postmaster-General, Mr A!

Morley, informed Sir Edward Read, MP for Cardiff, that in the year ending 31 March 1892 the Post Office had transmitted 5,590,160 press telegrams at a loss of at least £300,000.¹¹ They had been dealt with in the same offices, under the same supervision, and to a large extent on the same wires as ordinary telegrams; therefore it was impossible to state their cost separately although it was largely in excess of receipts. Whilst the average receipt for an ordinary inland telegram was about 7½d (3p), that for a press telegram was 5d (2p), although the latter was longer and more difficult. In 1888 it had been estimated that the average press message, 114 words, was approximately four times as long as an ordinary. The postmaster-general admitted that the Post Office had no idea that the 1868 scale of charges would result 'in such a heavy loss'.

The press response was rapid and pointed. On 1 July 1893 the *Journalist & Newspaper Proprietor* commented that the postmaster-general's reply was full of 'sinister significance' for all pressmen, pointing to a contemplated revision of existing rates. The 'solemn contract' of 1868, between the country and the press, could not be disturbed without breach of faith. The major effect of the special rates had been virtually to bring into existence an entirely new branch of the press, 'a whole school of halfpenny evening papers'. In 1870 there had been only two; by 1893 there were about seventy, to the benefit mainly of the working class. To raise the existing rates so as to equal the 'extravagant cost of telegrams as computed by Post Office officials' would mean snuffing out 75 per cent of useful distributors of news and result in the 'deprivation of national pastime and enlightenment to many thousands of poor toilers'. Cheap telegraphy stimulated the appetite for news and made competition keener: 'Is not all this whining a curious phenomenon coming as it does from a department which on the whole makes a net profit?' If the loss on press messages was a thorn in the side of the postmaster-general, then let him subsidise his unprofitable department 'out of the bloated revenue derived from penny post'. Any loss was more than offset by the benefit to the whole nation of the widespread diffusion of general information. In December 1893 the *Bristol Times* admitted 'the amount of loss is large' but it was little compared to the

savings made by foreign newspapers, for instance, in the United States, where there was a 'determination to treat publishers well'.

The *Manchester Sunday Chronicle* of 3 December 1893 took a different line, describing the press rate as 'an impudent and barefaced robbery, albeit an inadvertently legalised one . . . being perpetrated upon taxpayers'. The newspaper 'sharks' had driven a coach through the 1868 Act at a cost of £6 million between 1870 and 1893. It was only the 'struggling rags' of newspapers, whose existence depended upon the cheap telegram, that had anything to fear from reform and they could well be spared. 'Were we living under a system of state socialism it might be deemed advisable that a state press should be subsidised by the state telegraphs but surely a free press should scorn to be paupered.' These differing views reflected the deep rivalry and suspicions within the newspaper world, particularly between the daily and weekly sheets.

In a letter to *The Times* on 15 March 1895 A. G. Jeans, chairman of the PA, reopened the issue, which was never dormant long. He challenged the postmaster-general's figure of £300,000. 'The press would be very glad to have a thorough investigation as to how the figure was made up—'did the Post Office take account of the revenue which newspapers brought in by means of letters in answer to advertisements?' In April 1895 the postmaster-general informed the Commons that he would arrange such an investigation if satisfactory assurances were given that the press would abide by the result and would undertake not to oppose legislation for the revision of charges if they were shown to be insufficient.¹⁴ No assurances were in fact given by the press and the matter rested.

By the early 1900s the Post Office was transmitting approximately 110 million words weekly for the press, compared with 32 million in 1871, at an estimated loss of approximately £375,000 per annum. In June 1904 J. C. Lamb, the second secretary, prepared a memorandum for the postmaster-general. His impression was that the large and wealthier provincial newspapers, who could afford private wires, might not offer very strong opposition to a change in the tariff, unless from 'esprit de corps', but that the smaller newspapers, which 'deserved encouragement in the public interest', would oppose strenuously and find powerful support

inside Parliament. They would also naturally be joined by the news associations. Unless therefore the government was prepared for serious opposition, it should hesitate before considering the revision of the press tariff. If it were decided to act, the newspaper associations should be taken into confidence and every endeavour made to conciliate them and obtain suggestions before any announcement was made.¹⁵ A further statement in October 1906, emphasised the large increase in news association 'classified' work. Immediately after 1870 there had been proportionately more direct transmissions from reporters to single newspapers, which had paid better, as the Post Office had fewer copy addresses to transmit. Since then the number of press agencies had greatly increased and had taken over almost the whole of verbatim and column reporting of great speeches, squeezing out the individual reporter and flooding the Post Office with shoals of addresses at the 2d copy rate.¹⁶ By 1900 there were over twenty press agencies in London alone. Simultaneously great expansion had occurred in the use of leased special wires by the large provincial newspapers. It paid them better to withdraw from ordinary wires work which would necessarily have paid full rates, for instance page advertisements from London to one newspaper. It was doubtful whether the telegraph department profited from leased special wires; wages in particular had much increased since 1870, and the Post Office continued to supply operatives until after the outbreak of the 1914 war.

In July 1907 a detailed inquiry was made into the relative amount of work and cost involved in press and ordinary telegrams at various stages. Careful returns were taken at all important offices and the results examined by traffic, accounting and administrative experts. It was estimated that total expenditure chargeable to press work for the year ended 31 March 1906 was £369,000, while total revenue was £146,000, producing a loss of £223,000. For the first time the basis upon which the department arrived at its figures was revealed: it debited press messages with one-eighth of the whole cost of telegraph work and one-tenth of engineering costs, plus £20,000 for delivery.¹⁷

There is no reason to doubt that between 1907 and the Holt Committee of 1914, which investigated the organisation of the

service, the press loss continued at over £200,000 annually.¹⁸ In the Commons debate of 10 June 1914, Sir H. Norman commented, 'We have all got into the way of accepting the large annual loss on the telegraph service as something like a law of nature which has to be borne because it cannot be altered.' The *Glasgow Evening Citizen* of 1 June 1914 wrote, 'If press services are given below cost price that is bad business and indefensible, for newspapers are commercial undertakings and there is no conceivable obligation on the part of the State to supply them at an annual loss to the Treasury.'

In August 1914 the debate was cut short by the outbreak of war, which resulted in a large increase in press telegrams and so in the loss. It was against this background that the Postal & Telegraphs Rates (Statutory Limits) Act became law in October 1915.¹⁹ It increased the charge for the ordinary inland telegram from 6d to 9d (3½p). In the debate of 14 October 1915 Sir Herbert Samuels, Postmaster-General, commented, 'If 6d for 12 words is unremunerative, 1s for 100 words is far more so', particularly since it was paid only for the first telegram of a batch, the rest going to any number of addresses at a very cheap copy rate. Great businesses had been built up on the strength of 'excessively cheap rates', as 90 per cent of press telegrams were sent at the copy rate; 36 per cent were never published, which though inevitable, as it was difficult to distribute precisely the material required by newspapers, accounted for much of the heavy loss. Samuels proposed an increase in press tariffs to 1s for 60 words, day rate, with a 3d copy rate. The new scales might result in a loss of business but overall he estimated that revenue would increase by £60,000. As the government recognised that the press was in a difficult position in wartime, with circulation up but advertising revenue down, it was proposed that the new rate should not come into force until the year beginning 1 January 1917.

There was, of course, opposition to the proposed increase, which it was contended would fall almost exclusively on the provincial press. Cheap telegraphy had greatly benefited MPs, enabling speeches in the House to be reported promptly in the provinces. Higher charges would mean that many MPs would find they were no longer reported in their constituencies. The

measure was criticised as a 'curtailment of publicity of debate and speech making',²⁰ and attributed to the 'slackness of management which characterises government departments . . . the Post Office had never managed to resist any organised movement for increases in wages'. Telegraph clerks had now arrived at the 'dignity of being income tax payers'. Basically these were the cries of a vested interest seeing its privileged position challenged and weakened.

The long-term result of the war was a diminution of press work, from 11 per cent of total telegraph work in 1912 to 7 per cent by 1918. The introduction of new charges was delayed until 1920, although the Post Office continued to make a substantial loss on the service, particularly on the multiple rate, while revenue dropped by approximately one-third from the pre-war 1913 total of £148,000, as the following table shows:²¹

Year	PRESS TELEGRAMS 1921-7		
	Revenue	Estimated Cost	Deficit
	£	£	£
1921-2	134,000	640,000	506,000
1922-3	110,000	491,000	381,000
1923-4	91,000	355,000	264,000
1924-5	84,000	314,000	230,000
1925-6	84,000	299,000	215,000
1926-7	82,000	295,000	213,000

The PA continued to refute the department's estimates of losses.²² It contended that the estimates were based on a much larger percentage of the total costs than was warranted by the traffic. There were 14,000 telegraph offices in the UK; less than 10 per cent handled press work, and only 1 per cent did so daily, while even in the 75 offices which handled provincial newspaper work, it was unlikely to amount to one-eighth of the total telegraph work. The chief source of expense in the 'old days' had been the writing up by hand of messages at the receiving office; this was now done largely by high-speed automatic printing telegraphs. Messages transmitted had declined to about one third of the prewar figure, from over 4 million in 1913-14 to approximately 1½ million in 1926. The PA was increasingly using private newspaper circuits for much material formerly sent over Post Office wires at the

cheap duplicate rate. It contended that this had enabled the Post Office to achieve substantial economies, including the earlier closing time of many offices, and had freed much equipment for remunerative work. Moreover, press associations increasingly used the telephone for the collection of provincial news, especially for reports of public speeches and racing news. Thus the department was largely relieved of the cost formerly incurred of sending a special staff, 'the flying squad', with expensive apparatus to handle press work on such occasions. Moreover, no credit appeared to be given in the estimates for revenue from private newspaper circuits. The PA alone was paying over £25,000 annually for such rentals, apart from the very large amount for telephones and private telephone lines. Whilst the old night wires, 'special' newspaper wires, staffed by the department at an inclusive charge, were unprofitable, the leasing of private wires at current rentals was certainly profitable.

In April 1926 the Post Office received the support of an unexpected ally. Harold Harmsworth, Lord Rothermere, proprietor of the *Daily Mirror*, wrote to the Chancellor, Winston Churchill, from the south of France:²³ 'It is absolutely degrading that an extremely prosperous business like the newspaper one should be in receipt at this time of what amounts to a subsidy of £250,000 per annum.' He urged an increase in rates, to produce a fair commercial profit. The letter reflected the concern of the *Mirror*, already selling over a million copies a day, to maintain its position against possible rivals.

A confidential memorandum was prepared for the Postmaster-General, Sir William Mitchell-Thomson. The Post Office could not expect to make a 'fair commercial profit' out of press telegrams, without increasing the present rates 'by four or five times'. Inland telegrams were carried at a loss; to require a remunerative rate only for press telegrams would savour of discrimination, although some increase was justified. In August 1926 Winston Churchill was informed of these conclusions. The postmaster-general stressed that the amount of the press loss, £215,000 in 1925-6, did not necessarily represent the additional cost of the service. If the press telegraphs disappeared, there would be relatively little saving on plant and accommodation, and the

effective saving in operating costs would be less than those debited against the press. The apportionment of costs was the important factor; one page of press work was counted as three pages of ordinary, and on that basis 6 per cent of operating costs was correctly attributed to the press.²⁴

Sir William Mitchell-Thomson believed that if charges for press work were increased to anything approaching a commercial level the traffic would be practically extinguished. 'The Post Office would not be sorry and the Exchequer would stand to gain', but most of the smaller provincial newspapers would either be closed or driven to obtain news from other and less reliable sources, as they were less able to afford additional costs than London newspapers. A heavy increase had been and would be denounced as 'playing into the hands and consolidating the position of Lord Rothermere and his co-proprietors of the London press'. The postmaster-general considered that any measure would be vigorously opposed by the majority of the press, and would result in a relatively small saving of not more than £50,000, against a total telegraph deficit on the inland service of £1.3 million. Even when statutory authority had been obtained in 1915 to increase charges, the press had succeeded in inducing the government to defer its operation for four years. If at any time it was decided to raise tariffs as a whole, an increase in press rates should be included. In the meantime the Post Office was doing its best to bring down costs as far as possible and would review the whole question of the inland telegraph service.

In October 1926 the Newspaper Proprietors Association informed the postmaster-general that the press did not desire to be subsidised by the rest of the community; clear evidence should be afforded them of the figures on which the statement was based. Post Office officials regarded the approach as significant, since it suggested that press objections to unremunerative press telegrams were not confined to Lord Rothermere. A deputation from the Newspaper Proprietors called on Sir Evelyn Murray, Post Office secretary, on 4 November. Both inside and outside the Commons there continued to be discussion on press charges. Typically, a resolution by C. E. Brocklebank, MP for Nottingham, stated, 'While valuing highly the services rendered by the

Press it is considered quite unnecessary to subsidise the wealthy organisations controlling it.'²⁵

In November 1927 a committee under the chairmanship of Sir Samuel Hardman-Lever was set up to inquire into the inland telegraph service.²⁶ Its report in January 1928 adopted a non-committal attitude to increasing charges for ordinary telegrams but it could see no justification for the continuation of the special press tariff. It recommended substantial increases, approximately 33 per cent, in the basic press and night wire rates and advised that the copy rate be abolished except for addresses in the same town. The press reaction was foreseeable. 'If it is the intention and desire of the Post Office to finally kill the press telegram and to lose revenue it can achieve this end easily by simply adopting this report.'²⁷ The National Union of Journalists, representing 4,700 working journalists, 90 per cent of the total, were apprehensive of the copy rate restriction. It would mean great hardship to freelance members, largely dependent on their ability to sell small news items to a wide market of newspapers which did not restrict themselves to stereotyped services. Under the existing rates, a freelance reporter might telegraph an interesting item to a dozen papers for an outlay of 3s 9d (19p); under the proposed rate the same circulation to different towns would cost 16s (80p). The risk was so great that few journalists would run it and there would be an enormous decline in traffic. Large papers had special correspondents but in small towns one man served many. The journalists preferred a reduction in the unit number of words to be telegraphed for 1s rather than an increase in charges. The telegraph was the quickest and most efficient means of sending multiple press messages.²⁸

Anything increasing newspaper rates would tend to reduce the number of independent newspapers, stimulate newspaper amalgamations and make journalists redundant. Newspapers were reducing their telegraph costs by instructing journalists not to send in reports unless they were ordered. When newspapers merged into one group, a single news report was circulated over the group's special wires to its various newspapers. Yet the taxpayer was under no obligation to subsidise journalists and a bad system was not justified because some people made a living by it. Yet vested interests were there and could not be ruthlessly disregarded.

Clearly the tendency towards newspaper combinations, if carried far enough, would render the copy rate of little importance to the freelance journalist. But despite the activities of the two big combines, the *Mirror* and the *Mail*, the day of the independent provincial newspaper was not yet over.

The Post Office set about preparing alternative schemes to the Hardman-Lever proposals, which were considered too drastic to have any chance of acceptance and likely to result in much less traffic and little increase in revenue. In May 1928 a modified tariff was suggested, to raise the single rate of 1s 4d (6½p) and double the copy rate to 6d, while advancing the hour at which the night rate, for 80 words, began, from 6pm to 2pm.²⁹ However, opinion within the Post Office was that while the existing tariff represented a substantial subsidy to the press, it would be difficult to justify on grounds of public policy any increase in existing rates for which legislation would be necessary. This would meet an extremely hostile reception unless the acquiescence of the press organisations was obtained beforehand. Experience had shown that the press was able to mobilise a body of opinion in the House of Commons, which bore little relation to the merit of its case. The smaller provincial papers carried considerable weight in the press organisations, and were not likely to agree to any change which would produce a substantial increase in revenue to the Post Office. A small independent increase in press charges would make only an insignificant impression on the existing loss. It was not worth the opposition which it was sure to provoke. The Post Office was therefore disposed to leave things as they were, unless a change in the ordinary telegraph rate was to be implemented.

Thus after many acrimonious words between Post Office and press the matter rested. Basic press rates remained unchanged at one of the lowest rates in the world although in July 1940, in line with increases in ordinary rates, press telegram rates were increased to 1s 3d. Multiple rates remained unchanged at 3d, and were abolished only in 1955, by which time gross income from the press had fallen to £32,000, from a mere 373,000 messages. The Post Office continued to lose on the service because both political parties were in favour of a cheap press and were concerned about adverse comment if tariffs increased. It was also never quite

certain how much the loss was, though there was no doubt it existed. Certainly the public benefited; through cheap telegraphy the provincial press especially, and small newspaper groups were able to continue to circulate independently the foreign news collected by Reuter's and the leading newspapers. In 1854 the total circulation of daily papers was under 100,000 copies per day, of which *The Times* accounted for 51,000. With cheap telegraphy the *Daily News* was selling 150,000 copies daily in the 1870s; by 1900 the *Daily Telegraph* was selling 300,000 daily.³⁰ There was no greater power to be found to 'lead or mislead a more numerous, literate public'³¹ than that which the press, by means of the telegraph, supplied. Politicians knew that they addressed an immense audience with every important speech reported verbatim. Industry and the City benefited by the publication of market prices in newspapers. The political, social and economic impact of mass communication was first felt in the years after 1870, stimulated by a cheap rate for press telegrams.

Notes to this chapter are on pages 282-3

CHAPTER TWELVE

USES AND MISUSES

In the United Kingdom, unlike on the Continent of Europe, there was never a suggestion that government control of the telegraphs was a political-strategic necessity; the state monopoly was set up as a business proposition. Therefore, it might be argued, its progress should be judged on commercial criteria: profitability, efficiency, revenue per employee and return on capital employed; the service ought to have paid interest on its debt, made provision for redemption of the capital and been self-financing, and an economic price charged for it.

The financial failure of the department proved to be a major obstacle to further government industry for the next fifty years, during which state expenditure, as a proportion of the gross national product, steadily increased. There were, in the 1870s and 1880s, occasional proposals to purchase the railways but it was never practical. The railways represented too massive a capital, too influential an interest. Even the nationalisation of the telephones was delayed thirty years. The accounts of the telegraph department seemed to demonstrate what was previously feared, that a government department could not compete in economy with a commercial enterprise subject to competition. Partly, it was contended, this was a function of 'the unfortunate error of granting the Post Office a legal monopoly of the telegraph', totally unnecessary if the state had been capable of operating the business efficiently.¹ Partly, it reflected the fact that constant pressure could be brought by the public, or by bodies having political influence, to obtain reductions in rates, and by staff to obtain improvements in wages and conditions. Also, it was argued, the same general level of efficiency of staff would not be obtained in a government department, where employment was permanent, compared to private employment, where pay and promotion depended to a greater extent upon efficiency. Initially, there had been a more optimistic view. *The Economist* of 18 November 1871 commented that the ultimate effect of the transfer 'cannot be



ANNO TRICESIMO PRIMO & TRICESIMO SECUNDO

VICTORIÆ REGINÆ.

C A P. CX.

An Act to enable Her Majesty's Postmaster General to acquire, work, and maintain Electric Telegraphs. [31st July 1868.]

WHEREAS the Means of Communication by Electric Telegraphs within the United Kingdom of *Great Britain* and *Ireland* are insufficient, and many important Districts are without any such Means of Communication :

And whereas it would be attended with great Advantage to the State, as well as to Merchants and Traders, and to the Public generally, if a cheaper, more widely extended, and more expeditious System of Telegraphy were established in the United Kingdom of *Great Britain* and *Ireland*, and to that end it is expedient that Her Majesty's Postmaster General be empowered to work Telegraphs in connexion with the Administration of the Post Office :

May it therefore please Your Majesty that it may be enacted ; and be it enacted by the Queen's most Excellent Majesty, by and with the Advice and Consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the Authority of the same, as follows :

Preliminary.

1. This Act may be cited as "The Telegraph Act, 1868."

Short title.

p. 440.

12 M

2. The

Under the Special Patronage of Her Majesty



And H. R. H. Prince Albert

CALVANIC AND MAGNETO

ELECTRIC TELEGRAPH, G.T. WESTERN RAILWAY.

The Public are respectfully informed that this interesting & most extraordinary Apparatus, by which upwards of 50 SIGNALS can be transmitted to a Distance of 280,000 MILES in ONE MINUTE,

May be seen in operation, daily, (Sundays excepted,) from 9 till 8, at the
**Telegraph Office, Paddington,
AND TELEGRAPH COTTAGE, SLOUGH.**

ADMISSION 1s.

"This Exhibition is well worthy a visit from all who love to see the wonders of science."—Morning Post.

Despatches instantaneously sent to and fro with the most confiding secrecy Post Horses and Conveyances of every description may be ordered by the ELECTRIC TELEGRAPH, to be in readiness on the arrival of a Train, at either Paddington or Slough Station.

The Terms for sending a Despatch, ordering Post Horses, &c. only One Shilling.

N.B. Messengers in constant attendance, so that communications received by the Telegraph, would be forwarded, if required, to any part of London, Windsor, Eton, &c.

THOMAS HOME, Licentee.

G. NURTON, Printer, 48, Church Street, Portman Market.

THE WONDER of the AGE!!

INSTANTANEOUS COMMUNICATION.

Under the special Patronage of Her Majesty & H.R.H. Prince Albert.

THE GALVANIC AND ELECTRO-MAGNETIC

TELEGRAPHS,

ON THE
G.T. WESTERN RAILWAY.

May be seen in constant operation, daily, (Sundays excepted) from 9 till 8, at the
**TELEGRAPH OFFICE, LONDON TERMINUS, PADDINGTON
AND TELEGRAPH COTTAGE, SLOUGH STATION.**

An Exhibition admitted by its numerous Visitors to be the most interesting and attractive of any in this great Metropolis. In the list of visitors are the illustrious names of several of the Crowned Heads of Europe, and nearly the whole of the Nobility of England.

"This Exhibition, which has so much excited Public attention of late, is well worthy a visit from all who love to see the wonders of science."—Morning Post.

The Electric Telegraph is unlimited in the nature and extent of its communications; by its extraordinary agency a person in London could converse with another at New York, or at any other place how ever distant, as easily and nearly as rapidly as if both parties were in the same room. Questions proposed by Visitors will be asked by means of this Apparatus, and answers thereto will instantaneously be returned by a person 20 Miles off, who will also, at their request, ring a bell or fire a cannon, in an incredibly short space of time, after the signal for his doing so has been given.

The Electric Fluid travels at the rate of 280,000 Miles per Second.

By its powerful agency Murderers have been apprehended, (as in the late case of Tawell.)—Thieves detected, and lastly, which is of no little importance, the timely assistance of Medical aid has been procured in cases which otherwise would have proved fatal.

The great national importance of this wonderful invention is so well known that any further allusion here to its merits would be superfluous.

N.B. Despatches sent to and fro with the most confiding secrecy. Messengers in constant attendance, so that communications received by Telegraph, would be forwarded, if required, to any part of London, Windsor, Eton, &c.

ADMISSION ONE SHILLING.

T. HOME, Licentee.

G. NURTON, Printer, 48, Church St. Portman Market.

Page 232 Advertisements issued in 1845.

The one on the right mentions the apprehension of the murderer John Tawell. The exhibition at Paddington had been visited by several of the crowned heads of Europe and nearly the whole of the nobility of England

other than the strengthening of public opinion in favour of the acquisition of monopolies by the State'.² However, the lavish expenditure of public money was entirely foreign to nineteenth-century Britain and financially there was a considerable discrepancy between what was promised and what was achieved.

The telegraph system, as it grew, tended irresistibly towards a monopolistic structure; even in the USA it was the first industry to be dominated by a monopoly. Everything pointed to a system uniformly controlled. The question remains whether its development was best obtained by placing a monopoly in the hands of the state. The English companies had considered amalgamation but legislation had limited mergers between them. Would this have been better than a state monopoly? Would it have been better to have dealt with the telegraph companies as with the gas and water companies, affording them privileges on condition that they offered the public certain definite and constant advantages and relying on dividend limitation as a major weapon of control? A possible comparison is with the USA telegraph system, which alone among the advanced countries of the world continued in private hands. In 1843 the US Government had aided the construction of the first telegraph but in March 1847, because of the unwillingness of Congress to authorise any extension of the service and because of a deficit in postal finances, the control of the telegraph was left to private enterprise. By 1877 the Western Union Telegraph Company operated 77,000 miles of line and 190,000 miles of wire from over 7,500 offices.³ Yet it has been contended that the telegraph in the USA was not wholly a force for the good.

It was used to stifle freedom of the press. It was made to spread false reports, so that unscrupulous men might manipulate the country's money and stock exchanges. It was employed to foster selfish monopolies detrimental to the American people. It was used to sow the seeds of international strife as well as understanding.⁴

The companies of the UK never had this much power, perhaps because the country was so much smaller and more integrated, and possibly because the tradition of competition and free trade was more firmly established. Nevertheless, the experience of the USA illustrates the potential dangers, had not the Post Office decided on the take-over. Before the select committee of 1868

evidence was given to suggest that sections of the press were intimidated by the telegraph companies.⁵ Without doubt, control of the telegraphs in the wrong hands would have created a damaging and powerful influence. On the other hand, evidence of the censorship possessed by state telegraphs on the continent showed a possible danger of public ownership.

It had been contended at the time of the transfer, that a government monopoly would tend to discourage invention and innovation. These expectations were only partly justified; indeed engineers from the USA looked to the UK to develop their inventions when they could not get them taken up in the USA.⁶ Throughout the period after 1870 innumerable improvements in methods and appliances, which resulted largely from the ideas of American inventors, produced a vast increase in the working capacity of the wires.

In 1870 each wire afforded only a single channel for communication; by 1900 a single wire could be used for simultaneous transmission of two messages under the duplex system, devised by Stearns, an American inventor. Out of Duplex sprang Quadruplex working, again adopted first on the Western Union system. Clerks worked in pairs at either end of the single wire through which a double stream of messages was sent in both directions simultaneously. Quadruplex was further developed into the system of Multiplex which could send three or more sets of messages and was used on the busiest circuits. Only after 1880 were these latter instruments common in the UK although they were already in use in the USA.

The Wheatstone automatic and the Morse sounder remained to the end of the century the most common instruments in the system. The sounder was acoustic rather than visual. It was based on an electromagnet formed of an upright rod of soft iron, surrounded by a coil of silk-covered wire with an outer covering, usually of gutta percha, to protect it. The ends of the coil were connected through a pair of terminals on the wooden base, to the line wire and earth respectively. The armature of the electromagnet consisted of a bar of soft iron, which moved on a horizontal axis between two stops. The sounds were made by the armature striking against the stops. The letters of the alphabet

were denoted by various combinations of long and short signals, respectively known as dots and dashes. The dots, were formed by giving a short stroke to the key, the dashes by depressing it more slowly. One dash equalled three dots. Considerable experience was necessary before an operator was able to transmit or read off signals satisfactorily. Normal speed was 40 words a minute. By 1914 the Wheatstone-Creed apparatus was being used extensively on news circuits, as, being a high-speed system, it was well suited to simultaneous transmission to a number of stations on the same line.

In 1870 a speed of 60–80 words a minute was the highest obtainable; by the end of the century 600 words per minute was standard. Increasing use was made of pneumatic tubes, as auxiliary to the telegraph. Useful to carry large numbers of messages over short distances, systems were built in London and other large cities, and one connected the House of Commons to the Central Telegraph Office. By 1880 there were over 21 miles of tube in London compared with only 2½ in 1870.

Considerable extension of underground telegraph lines took place, particularly in cities, and by 1900 those in London were almost all so laid. The wires were drawn together into iron or earthenware pipes, usually 4in in diameter, which could take as many as 128 wires. In January 1886 a heavy snowstorm in London dramatically illustrated the danger of overhead wires. Scarcely a district escaped damage and danger.

In Grays Inn Road a large iron standard, probably 20 ft long, was thrown on the street with all attached wires from the top of a house three storeys high. In Clerkenwell Road, a man named Ambrose, in coming out of the Criterion public house, was struck by a wire which penetrated both eyes in a shocking manner. At Farringdon Road two wires broke, one catching the cabman of a Hansom cab across the breast. Across the Haymarket, one of these broken, twisted wires was hanging like a noose, much to the amusement of the crowd, who wanted to see how cabmen and busdrivers avoided being snared by it.⁷

In January 1882 the Sheffield Town Council was informed of the death of a child during a recent fire. The fire-engine had been forced to stop three times by low telegraph and telephone wires, and each time the escape had to be lowered.⁸ In London alone

there were 800 miles of overhead wires which were not only dangerous but unsightly. An underground system was clearly preferable since it also provided greater reliability of communication. Between 1876 and 1881 the Germans had built such a system linking all the major commercial and military centres, extending from Konisberg in the north to Metz and Strasbourg in the west, so that when violent storms swept over Europe in 1884 and 1886 communication was interrupted in England, France and Belgium but not in Germany.⁹

It is doubtful if the Post Office made optimum use of its apparatus; *The Times* was constantly critical. It is significant that in 1878 the Institute of Electrical Engineers commented on 'some neglect of public duty' and the 'evil effects on scientific research' of the Post Office monopoly,¹⁰ a reaction to the decision to send no contribution to the Paris International Exhibition of 1878. In November 1877 *The Times* was lamenting the 'decadence of English telegraphy'.

The period when the telegraph was in widespread use was brief. It declined rapidly when the telephone became available, especially after 1911, and even when increased facilities and lower charges resulted in vast increase in use between 1870 and 1914, it was still very much the ancillary of the penny post. Even in business the telegraph was probably not used habitually by the smaller tradesman. The variations in gross telegraph revenue were an index of the state of trade. In the USA and certain continental countries, for example Germany, the telegraph maintained its importance. Possibly there the post was neither so efficient nor so cheap as the British penny post, while distances were greater.

Yet, as with other improvements in communications, the telegraph made its contribution to Britain's economic growth in the nineteenth century. Local trade was increasingly affected by regional, national and international factors. The increased scale of operations, which the telegraph made possible, was a significant factor in the development of big business and the rise of large financial organisations. The telegraph broke down the isolation of the country as did the canal and the railway. It unified the commercial community and stimulated changes in the methods and organisation of distributive businesses both wholesale and retail.

It made the world market a possibility. (Its most efficient use was between the Cotton and Corn Markets of Liverpool and the New York Cotton and Chicago Corn Markets). The telegraph was the essential medium of day-to-day communication, the post the auxiliary.

Possibly it was not as useful to industry as it might have been, because of the doctrine that it should be a service to the public generally and not to particular industries. In the USA there was a greater willingness to provide rental facilities for private industry. The Post Office attitude resulted from the small land area of the UK, crowded with wires for the public service. It needed to act carefully lest it be accused of giving preferential service to particular sectors of the community. Exceptionally, from an early date the stock exchanges of provincial towns were connected direct to the Stock Exchange in London and until the twentieth century stock exchange traffic remained a significant part of total inland business. Other industries might have been helped by a rapid telegraph service, for example, marine insurance in provincial cities such as Liverpool.

Certain trades developed the use of the telegraph quickly. The fish trade used it to notify other centres of catches, and to gain market information. The perishable nature of the commodity necessitated the disposal of all supplies as rapidly as possible. In Aberdeen arrangements existed whereby every fish merchant could have telegraphed orders delivered to him personally, while he attended fishmarket sales. Here too, a pneumatic tube system was laid between the head post office and the fishmarket office. The fruit, meat, Jersey potato, Irish and British provision trades especially benefited from the 1885 tariff reduction,¹¹ the Liverpool provision market showing a particularly rapid growth. Manufacturers used the telegraph when there was likely to be delay in fulfilling an order, or if for any reason there was a sudden influx of business. Different centres dealing in the same commodities became closely knit by the telegraph; for example, Glasgow and Middlesborough, which were both engaged in the iron trade.¹²

Internationally, improvements in telegraphic communication enabled manufacturers and suppliers to be instantly aware of market conditions. Organisations developed inland for the distri-

bution of accurate information on raw material prices and supplies. The development of world produce markets, involving uniformity of usage, trading conditions, the distribution of information and the practice of arbitrage, depended upon the efficiency of the telegraph. Metal markets, shipbroking and insurance all grew to service the international economy. The cable companies made their greatest impact on the international money markets; funds flowed across Europe and the world. Without rapid communication it would have been impossible for the industrial and commercial world to have absorbed vast increases in the supply of gold or to have provided the enormous subscription of English capital to foreign loans, whereby the development of Canada, Brazil and Australia was possible.

The increasing significance of telegraphy was indicated by its rating at international exhibitions after 1851; it was placed in a separate class, on a parallel footing with railway engineering.¹³ The growth of periodicals on telegraphy and the formation of societies provided a basis for the mutual exchange of information and ideas. To the end of the century the telegraph and the submarine cable were the major projects by which electricity was exploited. The making and laying of cables gave rise to research on resistance and on insulating materials under pressure. The great importance of an accurate record of the depth of sea in which a cable was being laid, together with the tedious and troublesome character of ordinary sounding by lead line, led to the invention of the 'bathometer' in 1876, which gave the depth without the use of a line.

Copper mining was stimulated as the Post Office increasingly used copper for conducting purposes and for all important circuits after 1884. At the beginning of the telegraph era Cornwall was a net exporter of copper but by the 1880s, when copper was in demand for many industrial purposes and when the cable boom reached its peak, the Cornish mines were unable to supply UK needs, the best copper ore was giving out and British capital was being invested in the Rio Tinto.¹⁴ The demand for the products of the chemical industry were considerable, nitric and sulphuric acid especially being required in large quantities. Paper manufacture and printing were among the more rapidly expanding industries

after 1850, stimulated both directly and indirectly by the telegraph industry. Chemical treatment of timber, particularly using creosote, was developed for the protection of posts. Although the telegraph revolutionised railway operations and management, it was many years before the early distrust and cynicism within the railway world gave way to mutual respect and co-operation under the companies. As late as 1863, on most railways 'the telegraph was held in lowest estimation', its construction the last thing thought of.¹⁵ It was frequently left in the hands of staff 'incapable of working it' or with too much other work to attend to, which at times led to serious accidents and mistakes. Thus although 'as a secondary power' the telegraph was invaluable, railway managers were prejudiced against it. An efficient code of regulations for its use was lacking and thus the telegraph might become a source of danger instead of ensuring safety. Attempts to cut costs on telegraph installations often resulted in inefficiency and even accidents. Not until the late 1860s did the majority of railway engineers and managers appreciate the contribution the telegraph could make to more economic and efficient working. By the late 1870s the block system was in common use (between 1869 and 1879 the number of block instruments used on the LNWR increased from 311 to 3,000) and the most dramatic improvements were seen in passenger safety. By 1871 only one passenger was killed for every 31¼ million carried,¹⁶ an achievement maintained in following years. At the more important junctions the system of electric signals was supplemented by ingenious mechanical arrangements, which made it impossible for the signalmen inadvertently to clear signals which would lead to an accident. Machinery governed and locked every motion he made, so that he could not make a mistake. By 1900 there were few safer places on earth than an English railway carriage.

In war the telegraph became essential; it could 'scarcely be carried on without it'.¹⁷ It was in constant use in the transportation of armaments, prisoners and soldiers and the regulation of traffic on field railways. It revolutionised military thinking and the planning of campaigns. The first military application occurred during the Crimean War, when a 340-mile submarine cable was laid across the Black Sea from Varna to Balaclava, giving direct communica-

tion with London and Paris. The British Commander-in-Chief, General Simpson, was pestered with minor administrative inquiries from Whitehall and is said to have commented, 'The confounded telegraph has ruined everything.' The telegraph was used during the Indian Mutiny but its greatest use came during the American Civil War when over 15,000 miles of wire were used and more than a thousand operators employed. In 1866 the Prussian victory at Konniggratz was facilitated by the concentration of forces made possible by efficient use of the telegraph. In the Franco-Prussian war a Mlle Dodu received the military medal for bravery while directress of telegraphy at Eughien. The Prussians having occupied her office, she carried the apparatus into her private room on the first floor and by intercepting messages received by the enemy saved a French corps from destruction.¹⁸ The telegraph was also significant in Egypt, the Transvaal and the Middle East. The press benefited too, and Reuter made his name by having representatives with the French and Austrian armies during the campaigns of 1859, and during the 1860s by supplying advance news of the American Civil War. During the Italian campaign of 1859 about eighty of the most experienced operators of the French telegraph department were sent into Italy to organise the lines. Emperor Louis Napoleon sent twenty short despatches each day from the front. At the battle of Tofrek in 1885, in the Sudan, the electric telegraph was first used in the front line.¹⁹

The War Office realised that skilled telegraphists were essential to active operations in the field and an agreement was made with the Post Office for the training of military personnel by the latter.²⁰ Royal Engineers were first employed on state telegraphs in 1870 and a Telegraph Battalion was organised, which in times of war supplied officers and men for field telegraph duties. Initially the military establishment employed under the Post Office was fixed at 6 officers and 160 NCOs. Between 1877 and 1886 9 officers and 255 men were withdrawn for war purposes in Egypt, South Africa and the Sudan. The experiment was successful; men were available to undertake, with little supervision from their officers, the operation of any system of telegraph. Previously, war telegraphists had been recruited from the volunteer corps of the Post Office, but they had little training in the active life of a soldier.

Consequently when in the field, they required more help and supervision than was possible. Furthermore, the continuous sedentary employment of a telegraphist tended to impair physique.

Inevitably, the cable system built up during the previous fifty years was subjected to its first real test during the First World War. Before the outbreak of war there was much discussion on the relationship of warfare and telegraphy. In authoritative circles the vital importance of the cable network was properly appreciated. Early in the war, in September 1914, a German cruiser smashed the Pacific cable on Fanning Island but within a short time the staff were able to make improvised repairs and communication was resumed. Cable ships employed to lay and repair submarine cables played an important part during hostilities and inevitably a number of them were casualties; the Post Office repair ship, *The Monarch*, was sunk by a mine in the Straits of Dover.²¹

In the United States a military telegraph system was constructed by the government particularly where population was sparse on frontier lines and where Indians were 'troublesome'; approximately 2,500 miles were erected. Occasionally communication was interrupted when lines were cut down by posses when lynching criminals, and one wit cynically commented, 'Another argument in favour of underground wires.'²² The lines also conveyed meteorological information, which had earlier proved of service to shipping. In 1860 the Board of Trade arranged with the Magnetic for information, such as the state of the weather and the direction of the wind, to be telegraphed daily between London and Paris. If the science of meteorology was to be useful, telegraphic information from many stations over a wide area was clearly essential.²³

Attempts were also made to establish communication with lighthouses, lightships and islands, and to improve safety off the coast. In 1870 an attempt was made to establish a floating telegraph station 50 miles off Land's End; £15,000 was spent to equip *The Brisk*, an old corvette, with a telegraph cable, but the experiment failed. The next similar attempt was made in 1881 when Captain Moody, RN, designed and patented a telegraph ship to be used in mid Atlantic to warn of the approach of cyclones. In 1884 the TCMC, aided by Trinity House, laid a cable between the Sunk

lightship and Walton-on-the-Naze, on the Essex coast.²⁴ The vessel carried a Morse transmitter, a Wheatstone ABC and a telephone. It was connected direct to the local post office 9 miles distant, and thence to Harwich and Ramsgate, so bringing within call all lifeboats in the area. Clearly this development was beneficial to the merchant marine. Lightships had first been used at the Nore in 1732; they were positioned near coastal sandbanks and submerged rocks, which offered no foundation for lighthouses, and by 1884 there were approximately fifty moored off the coast of England and Wales; the large lanterns at the top of their masts could penetrate in clear weather some 10 miles. Hitherto it had not been unusual for ships in great peril to be in sight of the lightship for possibly twelve hours and yet still be wrecked with tragic loss of life, because of lack of rapid means of summoning assistance. Such a disaster had occurred in January 1883 off the Welsh coast, when the SS *Agnes Jack* had gone down with all hands in sight of a lightship.

In fact, the Walton vessel of 189 tons was too small for the purpose, as she shipped too much water in heavy weather. She was severely strained, and was eventually replaced by a larger ship and moved to London for repairs. In heavy gales spray would at times obscure the light owing to the ship being pinned down by her moorings and pitching heavily. Thus the result was partial failure, as there were ninety days of interruption in about two years. In January 1884 attempts were made to establish communication with Fastnet, the rock lighthouse commanding the route to St George's Channel, round the south coast of Ireland. A cable was laid but, after several interruptions and expensive repairs, was abandoned in 1887. In the same year a committee was appointed by the Board of Trade to inquire into the desirability of electrical communication between lightships and lighthouses, and the shore. The majority of the committee came out clearly in favour,²⁵ but the means was only demonstrated in 1898 when wireless telegraphy was established between the South Foreland and East Goodwin lightship, a distance of about 12 miles. The equipment was hardly installed when the lightship was run into by a steamer. Wireless made it possible for the accident to be reported immediately to South Foreland lighthouse with the result that all lives

were saved, a triumphant demonstration of the power of the new invention.²⁶ By 1914 communication by wireless telegraphy was established with many lighthouses and lightships.

It was Sir William Preece, far-sighted engineer-in-chief of the Post Office and Fellow of the Royal Society, who in 1884 discovered that wireless messages could be sent by induction. He found telegraph wires 80ft above the Grays Inn Road carrying messages which should not have been there; they were coming from underground circuits. Preece argued that what could travel 80ft by accident, might travel further by design. In 1885 the Post Office carried out experiments at Newcastle, setting up two rectangles of insulated wire, parallel to each other, and found that electric pulses fed into one of the loops induced similar currents in the other. By this means it was possible to transmit over a quarter of a mile without connecting wires. Consequently, in March 1896 Preece allowed Guglielmo Marconi, a twenty-two year old Italian, to demonstrate his wireless telegraphy apparatus to a number of influential people at the Post Office. He gave Marconi official support in a series of trials of his system on Salisbury Plain. Preece was not at first impressed.²⁷ However, in 1897 Marconi introduced an elevated aerial to both his transmitter and receiver and this resulted in a dramatic improvement. Preece was now convinced and recommended in a report to the Post Office secretary, July 1897, that the government should purchase Marconi's patent rights for £10,000. However, the Treasury was unwilling to loosen the purse strings. Already in April 1897 a group of financiers headed by Henry Jameson Davies, Marconi's cousin, had arranged to purchase the patent rights for £15,000. By July 1897 the Wireless Telegraph & Signal Company was formed.

On 7 July 1897 Marconi wrote to inform Preece of his commercial venture. The Post Office solicitor was confident that the new company could not offer services without infringing the monopoly, and technical staff were informed that Marconi could no longer negotiate with the Post Office as a private individual. Preece, for whom the news was a bitter blow, was obliged to inform Marconi that the Post Office must stop all experiments carried out at public expense, until a clear legal agreement existed between the department and the WTS. He attempted experiments

without Marconi at Dover in October 1897, but they were not notably successful.²⁸

However, the lack of official support did not adversely affect progress. By 1900 wireless was being tried in naval manoeuvres and its military importance was already clear. In December 1901 the first message in Morse code, a single letter 'S', was sent from the WSR station in Cornwall to Newfoundland, 1,700 miles away, where Marconi by means of kites had flown an aerial 400ft high.²⁹ In 1904 *The Times* equipped the *Haiman* with wireless, to collect and despatch news of the Russo-Japanese war at sea. However, the Post Office acted to protect its telegraphs from such competition. It refused a company application for a licence to establish a wireless telegraphy service between certain English cities. The refusal was made on the grounds that 'the installations are designed for the purposes of establishing exchanges which would be in contravention of the Postmaster-General's ordinary telegraph monopoly'. The Wireless Telegraphy Act 1904³⁰ forbade the installation and operation of a wireless telegraph except under licence from the Post Office. In order to protect its submarine cables the government inserted in the 'model wireless telegraphy licence' a prohibition on the sending or receiving of international telegrams, either 'directly or by means of any intermediate station or stations, whether on shore or on a ship at sea'. Thus the commercial use of wireless telegraphy apparatus was limited to communication with vessels. In 1909 the Post Office took over the main shore stations although at that time very few ships were equipped with wireless.

In 1910 Captain Kendall of the liner *Montrose* noticed that one of his passengers resembled Dr Henry Crippen, a warrant for whose arrest had been issued on 16 July. The result of the ship's wireless transmission, telling Scotland Yard and the world that Crippen was on board, was the arrest of the murderer. Thus it was not the wonder of technical achievement but a brutal murder in a London basement which brought the power of wireless to the public imagination. In 1913 the *Carpathia* raced across the icy North Atlantic, answering the desperate pleas for aid from the sinking *Titanic*. By March 1914 879 British ships had wireless installations, but according to J. H. Clapham there were 21,000

ships and nearly 13,000 steamships on the British register in 1914.³¹

The use of the telegraph fundamentally changed methods of fire-fighting. A considerable reduction in the number of serious fires was attained through a system of street call-points connected by telegraph.³² Such a system of electric fire alarms had been proposed by the firm of Siemens Bros to the town of Manchester. The proposal was based upon more than twelve years' experience in many towns on the continent, the first 'fire telegraph' being erected in Berlin in 1849, where it had given continuous proof of its efficiency and practical value. The Manchester Town Council objected to the plan of having a pane of glass broken for every alarm, as this might encourage hooliganism. Thus the introduction of fire telegraphs was postponed until 1880, when the system was introduced in London, the Metropolitan Fire Brigade erecting the first forty call points. Other towns followed London, with beneficial results.

The police also made use of the telegraph, Scotland Yard having a private line running from Charing Cross Station by 1850.³³ In September 1860 telegraphic communication was established between police stations in the City of London at a cost of approximately £600. The wires were, in certain cases, attached to church steeples so as to be as free from injury as possible. The police used the Wheatstone ABC. During 1872-3 there was a considerable extension of police telegraphs in London; various points in the Metropolitan Police district were connected with the nearest police station. Evidently too, the 'dangerous classes', 'assassins and burglars', made good use of the telegraph to decoy people from their homes. *The Detective*, a new weekly journal of 1858, urged companies to date stamp their telegrams only at the place where they were actually received, for telegrams written in London were dated 'Aberdeen' or 'Brighton' to deceive recipients.

The nationalisation of the telegraphs showed that a public department under the control of a minister was subject to the constant pressure of the House of Commons. Thus efforts to run the department efficiently might conflict with other considerations. Voting power meant that those within the service, organised into strong unions, might press for increases in wages, and improve-

ments in other conditions of service, sometimes without regard to the conditions of similar employment outside the government service. The implications of greatly increasing the number of civil servants was not considered in the House of Commons during the debates on nationalisation in 1868–9. It is probable, however, that politicians of both political parties had grave misgivings as to future relations between the state and its employees. In June 1868 the vote was given to inland revenue, customs and Post Office employees in a bill introduced by Charles Monk, a private member, which was carried against the protest of the Disraeli ministry and without the active support of the leading men of the opposition. Gladstone was apprehensive of the pressure which might be imposed by the civil service in possession of the franchise.³⁴ These misgivings have not been proved in the UK, because the power of patronage has never been great due to civil service reforms, though in the USA there might be a tendency to vote solidly for the candidate who promises most. However, Parliament may well have influenced the work and finances of the telegraph department, in the interest of staff. This was an inevitable risk with the existence of a large politically-minded press and organised bodies of Civil Servants. To secure both efficiency and economy in a public service, while at the same time maintaining improvements in living standards for state employees, was an object not easily achieved.

The Post Office administration was essentially geared to the formulation and execution of government policy and the discharge of ministerial responsibility to Parliament, a cautious procedure not likely to produce a more favourable return on its assets. Ministerial responsibility inevitably called for more centralisation of authority and policy-making than could possibly be justified on strictly business grounds. Civil Service gradings and hierarchies allowed much less flexibility than was desirable, and management down the line might have been constantly prevented from exercising its full initiative. As a branch of the Civil Service, the Post Office tended to manage by the rule book, with a consequent loss of efficiency.

The nationalisation of the telegraphs was not achieved because of a belief in socialism, but because it was believed that the Post

Office would operate a means of mass communication with more benefits to the community than the private companies. The implication of this, the need to equate efficiency with social benefit in terms of overall use of economic resources, may not have been immediately clear, either to the Post Office department or to Parliament. In April 1875, speaking of the policy of guarantees to check the pressure for additional telegraphic facilities, Chancellor Stafford Northcote said, 'The Government cannot give the answer which the private companies could, and I am sure did give. . . .'³⁵ The government had responsibilities to the community which went beyond those expected of a private company, a point worthy of note, not only in regard to the telegraph service but in the conduct or acquisition of any other business.

A further fundamental problem was raised: should one form of communication in the hands of the state subsidise another? The Post Office overall was operating at a profit, so was it really significant that the telegraph service was running at a loss if the letter service was able to meet the interest and funding of the telegraphs? Yet how, other than by measures of profitability, implying a certain return on capital employed, could the efficiency and utility of particular public enterprises be decided? The telegraph service had to be subsidised by the exchequer, but it would be misleading to treat the additional expenditure solely as a burden upon the taxpayer. The essence of an economic appraisal of any policy lies in setting the total value of benefits against total costs. Market forces may fail to reflect all these costs and benefits, and in this case measurement presents possibly insuperable obstacles; the benefits may be of such an intangible nature that a market price for them cannot be imputed.

Notes to this chapter are on pages 283-4

CHAPTER THIRTEEN

'BETWEEN UPPER AND NETHER MILLSTONES'

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BETWEEN THE WARS

The postwar decline in telegraph traffic began shortly after September 1920, when the minimum rate for an ordinary inland telegram was increased to 1s for the first 12 words or less, plus 1d for each excess word. In addition, a surcharge of 6d was imposed on Good Fridays and Sundays. In 1914 about 69 million inland telegrams had been transmitted, but by 1927 this had declined to 47 million and by 1935 to 35 million. The increase in tariff helped to accelerate the continuous decline, and the general trade and economic depression, which spread unrelenting after 1920 and continued for most of the interwar period, contributed. The fundamental reason was the continued growth of the telephone. Between 1924 and 1934 the number of telephones increased from 1.12 million to 2.35 million, as rates were reduced and an increasing amount of publicity was focused upon the service. From 1919 to 1939 the number of telephone calls increased from 716 million to 2,236 million, while the number of trunk calls increased from 46 million to 112 million. Thus even for long distances, thanks to technical progress, the telephone came to be preferred.¹

In retrospect, the process was inexorable, since both business and private user turned progressively to the telephone, as the most speedy means of communication for much of what had been traditional telegraph business. Telegraphist members of the Union of Post Office Workers realised that their conditions and prospects depended largely upon a healthy and progressive increase in traffic. If the increasing rivalry of the telephone was to be met, a great effort was required to popularise the telegraph. The telegraphists resented the fact that there had been little attempt to rehabilitate the telegraph or to encourage the public to use it more frequently. They saw more expensive telegraphs, a general reduction in facili-

ties, and extensive use of, in their opinion, less efficient apparatus, as seriously affecting the reliability of the service. They complained of the introduction of 'impossible' staffing standards, the failure to provide outlets for senior staff, and an almost complete cessation of recruitment, resulting in an older and therefore, on average, a more expensive staff. They resented the 'press subsidy' and the new 'walk' system for delivering telegrams which was introduced in 1921.

However, the Post Office was resigned to the continued decline of the telegraph. It was doubted whether there was any possibility of expanding traffic or even of arresting decline by publicity. The commodity was too well known, competing forms of communication too efficient. Even the night telegraph service was little used, because basic postal services were sufficiently rapid to ensure delivery by first post the next morning. Yet even against the depressing background of a shrinking market, the Post Office spent approximately £910,000 between 1920 and 1927, in installing underground routes and introducing new apparatus which in the long run would be more economic of manpower. In particular, there was the progressive introduction of printing telegraph systems.² Up to 1914 the inland system had been based mainly on Morse, which had involved telegrams being signalled and written up by hand from the sound of receiving instruments. In 1915 E. E. Kleinschmidt and Markum in the USA developed the teleprinter; in 1921 a similar machine was evolved by Messrs Creed & Co in the UK, and tried by the Post Office the following year. Its advantages over Morse were largely in simplicity of operation. The transmitting operator merely typed on an ordinary typewriter and the receiving operator had only to gum the typed slip, or detach the typed message, from a continuous roll of paper. The difficulties of Morse code were avoided and thus a higher output per operative was achieved. The Post Office estimated that the cost of one operative would be saved by each substitution of a teleprinter for Morse working, roughly £50,000 per annum, and by 1927 over 130 machines were in operation.³ On the very busy routes multiplex apparatus continued in use; here eight telegrams were transmitted simultaneously on one circuit, four in one direction and four in the other. The transmitters of the majority of

installations had Baudot keyboards with five 'piano' keys; other installations had keyboards similar to a typewriter. These typewriter-keyboards perforated the signals on to paper tape, which passed through an automatic transmitter. The receivers generally printed the telegrams on tape which was pasted on forms. The speed of a four-arm multiplex circuit with a Baudot transmitter was 240 words per minute; with the type keyboard the apparatus could transmit up to 320 words per minute.

With declining traffic the fullest advantage could not be taken of improved apparatus. In 1922 a 'zone' system was introduced, eliminating about eighty direct cross-country circuits worked by Morse and concentrating traffic on the main circuits using multiplex. In 1921, to economise on delivery costs, the Post Office introduced a 'walk' system, under which telegrams were sent out in batches, the delivery area being divided into definite walks. The normal interval between despatches was between 5 and 15 minutes, depending upon how busy the office was. It was possible that the last telegram of a batch to be delivered was the first received. The Post Office claimed that it was able to save £95,000 per annum by reducing the number of messengers by 800.⁴ This helped to reduce the serious problem of providing outlets for these boys after their period of messenger training was completed. The department asserted that the walk method was more regular and efficient than the old system. This was denied by the UPOW, which stressed, correctly, that speed was the essence of a telegraph service.

Against this background of low morale and diminishing traffic, the Industrial Court awarded new scales of pay to the UPOW in July 1927. Clearly, the financial state of the inland service, already carrying a deficit of £1,571,000 for the financial year 1926-7, would deteriorate further. In November 1927 the Postmaster-General, Sir William Mitchell-Thomson, announced the appointment of a committee to inquire into the service.⁵ Chairman of the small high-powered committee was Sir Samuel Hardman-Lever, who had made a reputation for himself as an actuary and had been brought from the USA by Lloyd George, to put into operation a new costing system for the Ministry of Munitions. He then became joint secretary to the Treasury and a director of both Dunlop

Rubber and the *Daily Mail*. As director of a great trust, very much affected by the administration of the telegraphs, Lever was an unfortunate choice. The more radical wing of the Labour Party was particularly incensed by it. The other two members of the team were Sir Harry Duncan McGowan, president and vice-chairman of ICI, director of Nobel Industries and Dunlop Rubber, and Lord Ashfield of Southwell. Ashfield was known to Londoners as managing director of Underground Railways and associated companies, including the London General Omnibus Company; his London combine was later to become London Transport. He was also a director of the Midland Bank, British Dyestuffs Corporation and several theatre companies.

The committee was 'to examine the possibility of effecting substantial economies in the working of the inland telegraph service . . .' and to report what changes in the tariff would be necessary 'to extinguish or substantially reduce the continuing deficit on the service'. Foreign telegraphs and wireless were specifically excluded; overseas traffic was growing and beamed radio services were developing rapidly, though still in their infancy; foreign charges were of course governed by international convention.

The committee reported in January 1928.⁶ The telegraph service had come to be regarded as a diminishing business; there was an atmosphere of inertia and lack of resilience, and it did not give the speed which was essential. Commenting on the operating staff, the committee painted a depressing but none the less probably accurate picture. There had been a reduction in the number of fresh recruits and consequently a rise in the average age. A large influx of telegraphists had resulted from the introduction of the 6d tariff in 1885; they were now reaching the age of retirement, and so approximately 70 per cent of male telegraphists on the inland service were on maximum pay. A telegraphist had little incentive, as promotion did not generally come till he was about forty-five years old. In theory younger men had outlets, by means of limited competition with other Post Office classes, to other grades, but in practice few telegraphists rose beyond their original position. Maximum efficiency was reached at a comparatively early age, usually after 4 to 5 years; thus by the age of thirty-five, mono-

tony of work and the mechanical nature of operating, together with the lack of incentive, tended to produce slackness. There was probably no marked decline in skill until the telegraphist was in his fifties but, as he got older, it was probable that keen supervision was required to get the best work from him. Among women the best work came from the younger ones. Although operator output was steadily rising, this was probably due to the introduction of modern apparatus rather than to any underlying improvement in efficiency.

The manipulative classes of the Post Office were established Civil Servants and subject to the general conditions of Civil Service employment. In practice it was rare for a telegraphist to be dismissed or even to have his pay reduced for slackness or inefficiency. In earlier years slackness might result in the postponement of an annual increment but this punishment ceased to be effective once maximum salary was reached. Even in cases of definite misconduct, for which reductions of pay or dismissal might be enforced, the staff had, and used, extensive opportunities of appeal. The committee considered that the right of appeal should be restricted and that postmasters should have more effective control over staff. An annual certificate of efficiency had to be given by supervising officers, but this did not involve manipulative tests. There were also staff, effectively redundant, subject to writers' cramp or some nervous disability, employed on work such as checking, although on maximum pay. If active people were employed on this, a staff saving of approximately 50 per cent could probably be made.

On supervisory staff the committee commented that, until recently, the Post Office had given seniority too much importance in the question of promotion. Too many supervisors were merely 'holding the wall up', had been trained on Morse, did not take kindly to modern apparatus and showed little interest in it. Yet keen and effective supervision was vital, especially with traffic in decline, to maintain clear control over the authorised establishment and effect revisions at short notice. Hitherto no precise standards had been adopted for supervisory staff but attempts were now made to establish such standards, based on the numbers employed and the character of the work. A reduction in super-

visory staff was necessary. The committee considered that substantial savings, possibly as high as 33 per cent, could be made in operating costs.

It recommended concentration on fewer types of apparatus to increase efficiency. Improvements to existing apparatus should be thoroughly tested before being introduced to the instrument rooms; the abolition of Morse working should be speeded up. The committee concluded that a deficit would probably remain, with the existing tariff, even under private enterprise, while under the Post Office, hampered by Civil Service conditions and with an established staff, it would be substantial. Growth was to be expected in the telephone and continued decline in the telegraph. The report finally disposed of the 'excessive price' argument as a reason for the deficit.

It was recommended that the Post Office consider means of popularising and speeding up the telegraph service, and of seeking new business. Many of the minor irritations should be swept away. The surtax for telegrams sent on Sundays should be abolished. The field should be widened by the introduction, at cheap rates, of a standard form of message for greetings, already common in many foreign countries. There should be careful study of foreign methods and experience. If the walk system of delivery was retained, a frequent and systematic revision should be made. On the tariff for ordinary inland telegrams the committee was non-committal; 'the effects of any increases in tariff should be carefully considered'.⁷

The Hardman-Lever Report was scarcely a favourable one for the Post Office. In the debate on the Post Office vote in July 1928, the postmaster-general emphasised that the existence of a deficit on inland telegrams was the common experience of every government in Europe; the best service in the UK compared favourably with the best American and German 'lightning' services.⁸ The average normal speed of telegraphic operations was certainly equal to that of any country in the world and a great deal better than most. The contrast between telephone progress and telegraph decline was emphasised. The year 1927-8 had been a record for telephone development; the total number of telephones had reached 1,631,191, and London was now third amongst the cities

of the world in numbers of telephones, a long way behind New York but near to Chicago. Critics argued that the Hardman-Lever Committee was unsatisfactory not merely in its formation but in the conduct of its commission. It had spent merely two months investigating the subject, an 'insufficient time to justify the statements made regarding the management of the telegraphs', and the implications of its findings encouraged people 'who wanted to argue against any policy of nationalisation regarding the telegraph services in the country'. It had spent only an hour at 'the Central Telegraph Office in order to find out what was wrong with British telegraphs'.⁹

In February 1929, directly as a result of the report, the Post Office set up a commission of inquiry into the organisation and methods of American telegraph companies.¹⁰ Its staff consisted entirely of permanent Post Office officials, and between September and October 1929 it visited the USA to investigate the American telegraph service. It inspected the offices of the Western Union and other companies in New York, Chicago, Philadelphia and Washington and discussed policy and details with executives.

It concluded that in certain respects the American telegraph service compared favourably with the British. Communication between large towns was more rapid, operator output was higher, fewer types of apparatus were in use, and there was a close adjustment of staff to traffic. The superiority was attributable largely to differences in conditions. The American telegraph companies, as commercial concerns, did not interpret so strictly the obligation to treat all sectors of the public alike and were not bound to study the interests of more remote districts. They were therefore able to concentrate on a high-grade service for business telegraphs between large centres of population. They had been able to develop the telegraph service as a separate business and had not had to dovetail it into an organisation carrying on other activities. Significantly remuneration was roughly related to merit; thus good work was stimulated by the hope of reward as well as by fear of dismissal. The companies were able to move their staff about with considerable freedom and could restrict annual leave to the less busy times of year. Naturally the feeling of despondency apparent in a declining business was absent. A profitable business gave

employees a direct interest in future growth, by offering them shares on favourable terms and by schemes of profit participation. Operator output was at a high level partly because the flow of traffic was more continuous, thanks to the great distances covered and the consequent scope for non-urgent messages at lower tariffs.

More significantly there were features which could be adopted in a government service: the rapidity with which the change to teleprinter and automatic apparatus was being made; the readiness to scrap apparatus in the interests of uniformity, before it became life-expired; the thoroughness of the training of operators and the high standards of qualifying levels; and the high degree of specialisation among instrument room staff.

Thus the commission's recommendations on apparatus were designed to secure the principal advantages of American methods. Multiplex working should be replaced where possible by teleprinters. On automatic multiplex and teleprinter routes, a considerably higher output should be demanded. The conversion of Morse circuits to teleprinter or telephone working should be carried further. As a first step every Morse circuit carrying 200 messages a day should be scheduled for teleprinter working as soon as possible. To publicise the telegraph attractive leaflets, informal in style, should be available at post offices, hotels and railway stations. They should aim in particular at dispelling the popular idea that a telegram always brought bad news. Equipment at larger public offices should be made more attractive, and the quality of delivery forms and envelopes improved. Significant users of the inland service should be canvassed regularly about any cause of dissatisfaction or reason for a decline in the use of the service, and to make it clear that the Post Office was anxious to satisfy its customers' requirements. Special delivery forms and envelopes for greetings telegrams at Christmas and other festive occasions should be designed. A policy of endeavouring to attract more traffic, at possibly unremunerative rates, might involve greater costs, but the commission's opinion, in the light of their American experience, was that the policy of acquiescence in the adverse trend of traffic should be modified.

Between 1929 and 1935 steps were taken to carry out some of

the recommendations and to improve the financial position. The Creed teleprinter was widely put into service as the standard inland apparatus, and the old equipment, Morse and Baudot, disappeared.¹¹ (There was no longer any need for the specialised skill associated with them, and one result was that the War Office became increasingly perturbed about the loss of a ready-made reserve of operators.) Rapid conveyors were installed in offices and in many parts of the country delivery was speeded up by the use of motor cycles. Closer scrutiny was initiated to adjust staff to traffic, and uneconomic routes were further eliminated. Moreover, readjustments were made in the apportionment to the telegraph accounts of common staff costs. Thus the deficit was reduced to £1.05 million in 1930-1 and to approximately £828,000 in 1931-2. Yet still traffic fell, from 50.9 million messages in 1923-4 to 33.7 million in 1933-4. The Bridgeman Committee of Enquiry on the Post Office, 1932, summed up the situation:

The Telegraph Service as such, in this country, is on the decline. It is in the unfortunate position of lying between the upper and nether millstones of an expanding telephone service and of a postal organisation which, with relatively minor exceptions, ensures the delivery of a letter anywhere within the boundaries of the British Isles within 24 hours of posting.¹²

In October 1934 the Post Office established yet another committee to consider the future of the telegraph service.¹³ Its first report in March 1935 pinpointed the problem. Traffic continued to fall; the deficit was approximately £650,000 on a revenue of £2.2 million. The average cost of an ordinary inland telegram was 1s 9d (9p), while the average receipt was 1s 3d (6p). Yet the committee was satisfied that a message service which undertook to find an addressee, without trouble to the sender, and which provided a written record, would always have a definite value even for the telephone user. For those not on the telephone the telegraph service was the only means of rapid communication available. Although it might not be capable of expansion far beyond its present level, it had a definite residual use.

As the telephone service expanded an increasing number of telegrams were sent to, or received by, telephone subscribers. There seemed a strong case for the amalgamation of the telegraphs

and telephones as had been recommended by the Bridgeman Committee. This would not necessarily mean any change in the grading of staff, but in the growing conditions of interdependence a healthier outlook would be produced if the telegraph service could ally itself with its chief competitor rather than struggle along in isolation. An appropriate basis was needed for distributing the telegraph loss between postal and telephone services.

The committee's most drastic recommendation was that charges should be reduced. Raising tariffs might ease the financial position but by accelerating the decline of traffic it would accentuate other problems. A reduction, though producing an immediate loss of revenue not likely to be recovered, would be beneficial, if a popular cheap tariff could be devised. The telegram would then be better able to hold its own against its competitors. Yet merely to reduce tariffs without concomitant measures to put the service on a more satisfactory basis, would be open to serious criticism. A great advantage of rate reduction was that it would provide an effective nucleus for publicity. Traffic might stabilise at a higher figure and a sustained publicity campaign might facilitate the rehabilitation of the service, which had come to be regarded as moribund. This was already being planned by the public relations department, which was designing new stationery to symbolise a new outlook in policy. The new tariff should not impose on the telephone service a financial burden great enough to affect its development or be unfair to subscribers. The committee recommended a return to a 6d (2½p) tariff for 9 words.

On 15 February 1935 the Postmaster-General, Kingsley Wood, foreshadowed extensive capital expenditure and improvements.¹⁴ He informed the House of Commons that the days of the telegram were not over; it was still a great social and business convenience, although the telephone was endeavouring to elbow it out. In almost every country in the world telegraphic traffic was declining, yet if only from the point of view of the large staff of the Post Office whose interests lay in the telegraph, they were 'out to make a real effort to improve that side of the business'. On 25 March 1935 Kingsley Wood wrote to the director general of the Post Office, Sir Donald Banks, 'The major rate reduction proposed will result in the traffic curve being increased but will not alter its

downward trend, the struggle to wipe out the telegraph deficit is not likely to meet with sustained success.' However, the new policy would restore morale and give the Post Office a respite sufficient to allow 'a marked reduction in the number of male operating staff, particularly of mature years'. 'The Post Office would never again be forced into the position of having large numbers of men employed in a declining industry.'¹⁵

On 29 April 1935 he announced a return to a 6d tariff,¹⁶ and thus followed the admirable precedent established in 1897 of marking a Jubilee by giving some material advantage to customers of the Post Office. The new rate marked the apparent confidence of the postmaster-general that the day of the telegram was not yet over and, it was hoped, would prove of substantial advantage to the business world, where the progressive linking up of the telegraph and telephone services had already opened new possibilities of rapid and economic communication. He also believed that the tariff would produce an increase in the exchange of greetings and congratulations. There was still a widespread public impression that telegrams were mainly used for bad news, though this was not well founded. In October 1934 a confidential census had been made of inland telegraph traffic. This showed that less than 2 per cent of telegrams were found to convey bad news, while 4 per cent carried congratulation of some form or another. Approximately 66 per cent of telegrams were concerned with business, the fish, meat and fruit trades accounting for about 12 per cent of total traffic—underlining the importance of the telegraph to the trade in perishable goods. Betting telegrams were the next largest category, amounting to 6.5 per cent.¹⁷ The telegram's usefulness for social purposes, in making and breaking appointments, also became apparent.

The postmaster-general also announced the introduction of a supplementary 'priority' service. The normal high standard of service for ordinary telegrams would be maintained but there were occasions when special treatment was of importance. The 6d priority fee would meet this need, by securing precedence at all stages of transmission and delivery. Such telegrams would be distinguished by bright red envelopes. A cheap night telegraph letter service, 36 words for 1s, would be made available to any

point in the country, instead of being confined to certain towns, a clear benefit to residents of country districts. The batch rate for large numbers of identical telegrams, valuable for price quotations and circulars, would be available for batches of 100 or more at a rate of 4d per 16 words. Messenger boys would be distinguished by a new 'OHMS' brassard.

The new rates began on 31 May 1935 when the Prince of Wales opened the new King George V Telegraph Hall in the Central Telegraph Office, scarcely recognisable as the place which the Prince himself had visited in 1929. On 24 July the greetings telegram was introduced, delivered in a gold-coloured envelope specially designed by the artist, Mrs M. C. James, with a border of red and blue, and a dove carrying a letter in its beak in each upper corner. Hitherto, the recipient of a telegram had been unable to tell whether its contents were pleasant or unpleasant, and so was caused unnecessary tension. The message would be not in 'tape' but 'written'. If the experiment were successful, it was proposed to change the design at frequent intervals. Greetings telegrams would also be delivered at the time requested by the sender, so that they would arrive at the right moment at a wedding reception or banquet. In the interests of absent-minded persons, apt to forget or overlook dates of birthdays and similar occasions, the Post Office arranged to keep a diary and to deliver to the right person on the right date. There would be no charge for the secretarial services but each greetings telegram would cost 3d in addition to the minimum charge of 6d; it could be sent from any telegraph office, call office or private telephone. It was a great success, and by 1939 the Post Office was delivering over 4 million a year, approximately 8 per cent of inland traffic, compared with 2,946,000 in 1937.¹⁸ There were now greetings telegrams for Valentine's Day, Christmas, birthdays, weddings, anniversaries and births.

The 6d tariff resulted in an immediate increase in traffic. Between 1935 and 1939 telegrams transmitted increased from 35,292,000 to 50,395,000. The continued increase was attributable both to improvements in trade and to the cumulative effects of publicity. By 1939 over 20 million messages were phonograms—telegrams by telephone. The tonic effect of increased traffic stimulated productivity and improved morale. Little impression was

made on the deficit, although staff costs increased less than the traffic increase. The fall in traffic before 1935 had left many circuits and staff well below capacity. Now the increase in business and the revised methods of working made it possible to increase the number of circuits and to replace low-capacity working by high-capacity teleprinter operations, with a corresponding fall in operating time per message. Teleprinter ancillary working was introduced, where telegraph circuits carrying relatively light loads were terminated at a small switchboard at the central office, and operators there connected their teleprinter to the switchboard in order to send or receive messages. Thus both staff and teleprinter at central office were shared, and the cost of providing, maintaining and operating a teleprinter circuit was reduced. As war approached, automatic switching between teleprinter offices formed the basis for schemes to accelerate the sending of telegrams to any part of the country. Schemes were also being considered by which the transmission of telegrams would be through direct dialling connection between all units in the teleprinter network.¹⁹ Also introduced were systems of facsimile telegraphy, whereby a photograph, drawing or manuscript might be transmitted electrically from one point to another. The system could be used to transmit weather maps to aircraft, informing them of storm areas in their path, and it was also useful for newspapers.

ii

THE WAR AND AFTER

World War II witnessed a marked increase in the use of the telegraph service. With families dispersed and the deterioration of other methods of communication inland messages increased to a peak of approximately 63 million in 1945. In August 1940 a children's free telegraph service was instituted for evacuated British children overseas and their parents at home.²⁰ It was worked in co-operation with Cable & Wireless Ltd and enabled parents and children to send one free message every month through the imperial telecommunication system. In December 1940 the Central Telegraph Office was destroyed by an incendiary

bomb but dislocation was minimised by the fact that the Post Office had four emergency installations. To overcome difficulties in the City of London, a street telegram collection service, by means of messengers wearing armlets, was instituted from January 1941 and extensively used by city businessmen.²¹ Later in 1941 special circuits were set up between London and Manchester to carry service and press traffic. V for Victory was the most effective advertisement for Morse code and in 1942 the military authorities offered special enlistment in the Royal Signals for men capable of sending and receiving high-speed Morse. Male telegraphists over the age of thirty were included in the original list of reserved occupations. The maintenance of communications imposed a heavy strain on the cable network, partly through the tremendous increase in traffic and partly through the loss of certain routes by enemy action. With the entry of Italy into the war and the fall of France, the Mediterranean cables from Gibraltar to Malta were put out of action. Traffic from East Africa, Egypt, Malta and the Red Sea had to be routed via the Cape and up the East African coast. All telegraphic communication in building up the Allied armies in Egypt, before and during the battle of El Alamein, and the subsequent advance into Tunisia and across to Italy, had to be carried over this circuitous route.¹¹

The colours might have dimmed and the gilt might have come off the envelope but such wartime austerity had not chilled the public's love of the greetings telegram. A writer to *The Times* on 17 April 1943 wrote, 'The main value of the greetings telegram service lies in the envelope which at once indicates that it does not contain evil tidings.' In 1942 the Post Office introduced a 'standard text' greetings telegram, available for those serving in the forces overseas, but sadly, in the interests of economy, the suspension of greetings telegrams was announced in April 1943, together with the night telegram service. In July 1943 the ordinary rate was increased to 1s for 9 words. The wartime dearth of paper and string handicapped the system but by 1944 over 1,100,000 inland telegrams were being carried weekly, an increase of 30 per cent over the prewar total.

In the postwar period the deficit on the inland service was between £3 and £5 million per annum in the years 1945-58 and

down to £2.6 million in 1969-70. The variations have been due to many factors: changes in tariffs and methods of working, increases in wages and other costs. The dominant feature has been the continued decline in traffic, as is clearly seen in the following table.

NUMBERS OF TELEGRAMS-INLAND SERVICE 1945-70²³

<i>Year ended</i>	<i>(5-yearly figures)</i>			
	<i>Press</i>	<i>Railways¹</i>	<i>Public</i>	<i>Total</i>
<i>March 31st</i>	<i>000s</i>	<i>000s</i>	<i>000s</i>	<i>000s</i>
1945	152	601	62,200	62,953
1950	383	656	40,935	41,974
1955	372	695	24,639	25,706
1960	183	867	12,777	13,827
1965	82	809	9,575	10,466
1970	31		7,656	7,687

¹ The Railway free pass facility was abolished on 31 December 1967

In 1948 the first commercial accounts of the Post Office were published since those for 1939-40. The deficit on the inland telegraph service was £3.2 million—a loss on each of the 52.7 million telegrams carried of approximately 14.2d (6p). In July 1951 the Postmaster-General, Mr Ness Edwards, announced increased charges for several services. The ordinary telegram rate was increased to 1s 6d for 12 words or less, with consequent increases on all services geared to the basic rate. The effect was to hasten the decline in traffic, which by 1954 had reached 34.2 million messages with a deficit of £4.8 million. In response to this critical financial position drastic action was taken. In August 1954 the basic charge for a telegram was doubled from 1s 6d to 3s. The effect was a dramatic collapse of business, by over 100 per cent between 1954 and 1957, from 34.2 million telegrams to 16.8 million. Thus both halving and doubling of the basic rate was tried between 1935 and 1954, but neither solved the problem of declining traffic and increasing costs. In April 1963, with messages down to approximately 10 million, telegram charges were increased to 5s (25p) for 12 words plus 5d (2p) for each additional word. Throughout this period profits on other services exceeded the loss on the telegraphs, so that users of other services were effectively subsidising every inland telegram sent.

In 1957 the Central Office of Information undertook a con-

sumer survey of the telegraph service.²⁴ Its diagnosis of the situation broadly confirmed the Bridgeman Committee conclusions. 'Most of the fall in traffic in recent years is accounted for by the increasing use of the telephone service. There is plenty of room for decline in the future.' It tended to minimise the impact of the extensions of the telephone service on social telegraph traffic, where 'the postal services have been more serious competitors'. There were two further factors, not mentioned by the survey, likely to accelerate the decline in business traffic; the rapid growth of the private telegraph and telex, and the improvement and cheapening of trunk telephone services. According to samples, 55 per cent of business establishments never sent a telegram, about 41 per cent did so only for exceptional or emergency purposes, and only 4 per cent did regularly. This latter group was responsible for about one third of business telegrams, usually sent to give information on sales, orders, deliveries or prices. Clearly the telegram has been regarded by the business community as of only marginal importance in postwar years. Whereas before 1939 business traffic was the more significant, in recent years the proportions have been reversed.

In December 1957 the Postmaster-General, Ernest Marples, announced the setting up of the Advisory Committee on the Inland Telegraph Service, under the chairmanship of Sir Leonard Sinclair, and including Professor F. W. Paish of the London School of Economics, Sir Norman Kipping, director general of the Federation of British Industries, and Dame Frances Farrer, general secretary of the National Federation of Women's Institutes.²⁵ The committee was to advise on the future place of the inland telegraph service in the communications of the UK. It held eight meetings to receive evidence on the working of the service from Post Office officials and other interested parties, and reported later in 1958.²⁶ It saw four possibilities of dealing with the deficit: economising on the running of the service, adjusting the tariff, removing losses on services which were not part of the inland service but which were borne by it, and stimulating the greetings telegram business.

Of these possibilities the committee felt that an increase in tariffs was unavoidable. Yet the decline in traffic already posed

serious problems in keeping costs down; it would be necessary to be flexible both in the amount and timing of any new charge. Hitherto, the minimum charge for an inland telegram had carried with it a 'free allowance' of approximately 12 words, plus a relatively high charge for subsequent words. The committee favoured a change to a basic charge for every telegram, plus a relatively low charge for every word, since this would allow greater flexibility for future tariff changes, would be more equitable to the sender and would be less drastic than a substantial increase in rates.

It commented that approximately £550,000 of the deficit of £3,150,000 in 1956-7 had been contributed by losses on the inland press traffic, railway free pass telegrams, telegrams exchanged with the Irish Republic, and telegrams handled for overseas cable companies on the inland network. There was no reason, in principle, why these categories of traffic should be handled below cost. There had been an increase in the press tariff in January 1955, but the service still ran at a heavy loss. Traffic had fallen since the increase, so the deficit was lower than ever. The great bulk of press traffic was being carried on private wires to which standard rates were yielding an adequate return. However, the British press tariff was still only 20 per cent by day and 15 per cent by night, of the normal inland rate. In many other countries the press paid a much higher percentage of the normal rate: in Switzerland 80 per cent, in Belgium, Denmark and Finland 50 per cent, in Western Germany 66-100 per cent, according to distance; in France the press paid an exceptionally low rate of only 4 per cent.²⁶ The committee considered there was a case for increasing the press tariff substantially, while still retaining an element of preferential treatment comparable to that in other countries. It was suggested that 50 per cent of the inland tariff might be appropriate, since this was the internationally recommended concession for intra-European press traffic.²⁸

On the railway free pass concession the committee recommended it be terminated. It had cost the service £220,000 in 1956-7 and the arrangement was undesirable, since an incentive to economic working was removed if one nationalised industry carried part of the costs of another. The surcharge of 6d on telegrams from the UK to the Irish Republic was inadequate, as it

contributed £93,000 to the deficit; the surcharge on telephone calls from Great Britain to the Irish Republic was up to 100 per cent above inland rates. It was recommended that the situation be examined to consider the possibility of improvement.

In November 1950 the greetings telegram service had been re-introduced at a minimum charge of 2s (10p) for 12 words. By 1957 greeting telegrams numbered 3.4 million, approximately 20 per cent of total inland traffic. In March 1957, a de luxe wedding telegram on special forms was introduced at a supplementary charge of 2s. The service was an instant success and soon represented about 3 per cent of total traffic. Some increase in greetings telegrams was beneficial as a means of offsetting the rapid fall in traffic which had created uneconomic staffing. It was recommended that the Post Office should seek to develop a de luxe type of greetings telegram, for which a surcharge could be made; one possibility was a special 'storkgram', sending congratulations on the birth of a child.

The recommendations of the Sinclair Committee concerning greetings telegrams were quickly put into effect. In 1959 de luxe birthday and baby greetings telegrams were introduced, and in October 1961 de luxe all-purpose telegrams and twenty-first greetings. By 1970 greetings telegrams represented approximately 30 per cent of total inland traffic.²⁹ But tariffs were not raised until April 1963. Press telegram rates were increased at the same time, day rates to 5s for 50 words or less, and night rates to 5s for 65 words. The multiple-address rate was also revised; the ordinary fee, 5s for 12 words plus 5d for each additional word, for the first telegram plus 1s 8d for each copy. However, press rates, so long an issue in the history of the inland service, were of little significance by the 1960s. In 1970 press telegrams on the public wires numbered a derisory 31,000, yielding an income of £11,000. The railway free pass system continued to burden the Post Office until it was abolished in December 1967.

The situation has been reached where most people probably never get a telegram brought by a messenger from one year's end to another. If they do, it is assumed that their relatives have been struck by lightning or that they have won the pools or have been successful with their premium bond. The lines hum largely with

greetings, condolences and congratulations. Fundamentally, the reason for the demise of the inland telegram is that demand for it has been continually reduced by increasing competition from other Post Office services. The UK has not been alone in having a telegraph problem. In the twentieth century most West European services have made losses. Western Union operating the domestic telegraph system of the USA has continued to make a profit, but, largely for geographical reasons, direct comparison is misleading.

Clearly, as the number of telephones expands and Subscriber Trunk Dialling develops the consumer will reap the benefits of cheaper short-duration trunk calls. The 1960s witnessed a dramatic increase in the total of telephone stations from 7,855,721 in 1960 to 13,958,826 by the end of 1970. In 1958 the first STD in the UK was installed in Bristol; by 1961 it had reached the City of London. In 1963 it became possible to dial direct to Paris and in 1970 international subscriber dialling made possible a direct link between New York and London. Telex and private wire networks have expanded rapidly; they will continue to attract business users and telegraph traffic will continue to shrink.

It is clear that considerable amounts of telegraph traffic could, without serious inconvenience, be carried by postal, telephone or telex services. Telegrams of a greetings or social nature have become more important. But for many business telegrams a telephone call is a possible alternative, and in many cases postal or postal express services could be used. The 1958 advisory committee commented that already about 5 per cent of telegrams, those accepted after hours and not of a 'life and death' nature, were delivered by first post the following morning.

Since so much telegraph traffic appears to be inessential or open to transmission by other means, it is necessary to consider the justification for the maintenance of the inland service. Firstly, in 1970 the Post Office handled about 13,700,000 overseas telegrams, accepting them from senders and transmitting them abroad, or receiving them from overseas and delivering them in the UK. In addition, a further 500,000 foreign cable company messages are handled by the Post Office over the inland network, although these companies handle the bulk of their own traffic. Approxi-

mately 90 per cent of this overseas traffic is addressed to, or originates in, London and fourteen other major cities. However, the remaining 10 per cent is wholly dependent for delivery on the inland system and cannot be disposed of in any other way without neglecting international obligations. There would thus be a need for international negotiations before proposals for ending the service could be effected.³⁰

The other vital type of traffic is the 'life and death' telegram. In 1957 these represented between 1 and 2 per cent of total traffic, approximately 200,000 annually. From their very nature, they cannot be delayed, as lives may depend upon them. In 1957 telegrams carrying bad news, but of lesser urgency, amounted to about 300,000—approximately 3.3 per cent of total traffic. This type of message may originate at any time. Usually, a skeleton night delivery deals with those for large cities and a special delivery can be arranged for most other areas. This leaves a small proportion for which the assistance of the local police has to be obtained.

Apart from these two categories of traffic, for which retention of a nationwide telegraph service appears essential, there are more general reasons which make it desirable. First, in a country with a high standard of living it would be unacceptable to abolish such a service, and this has not been done even where the telephone is more widespread, for example in the USA and Sweden. Second, the service fills a small but essential gap in the communication facilities of the UK, a gap which 'concerns no one very often but many people very occasionally, and which, when it does concern them, matters very much to them'.³¹ Third, the abolition of the service would impose hardship on many people who have no telephone, including those who have applied for one but have been unable to get it. In October 1971 the Telephone Users Association calculated that approximately 150,000 people were on the waiting list for a telephone, the average waiting time being between four and five months.³² Fourth, the telegram is also used, in preference to a letter or telephone call, as the satisfactory medium for certain types of concise message of an impersonal nature where a written record is useful, such as booking a room or confirming an order. Greetings telegrams are still a treasured possession of many brides and parents. Thus there is a case for an

inland telegram service as an essential though shrinking element of the public service.

The inland public telegraph service may be gasping its last breath, as the age of steam to which it made a major contribution has already passed; yet the telegraph itself lives on. The teleprinter, that highly developed printing telegraph, is the instrument of the twentieth century, with hundreds of thousands in use all over the world. The great submarine cables too, are still important means of communication. The 1970 Post Office accounts show that the overall balance on Telegraph Account, inland and international, was a substantial £9,212 million. Income from international public messages, and international and inland telex services has shown dynamic increases in the last decade.

The greatest days of the telegraph however were between 1850 and 1914; in that relatively short space of time it encompassed the world, preceded by British capital, labour and enterprise. Lines of cable reached out from the world's great commercial and diplomatic centres. It fostered the growth of nationalism within countries as well as closer international relations and better understanding between them. The peculiarity of the telegraph was 'its great cosmopolitan character uniting all nations by one language'.³³ The speedy interchange of ideas and goods involved a growing realisation of the interdependence of nations, a vital part of the developing international economy. The physical gap which had existed between nations, separated by weeks or even months, was nullified by telegraphic communication. The telegraph, like the telephone after it, has proved a potent force in international understanding and peace, just as internally it quickened the pace of economic life and bound the country into a coherent whole. In the closer organism of the body politic the telegraph, together with the cheap press which it largely created, and the railway, brought together the people

to discuss together the social and industrial problems of the time, knowing each other's counsel, profiting by each other's experience, working out a common definite resolution and bringing it into effect by their own action.³⁴

Notes to this chapter are on pages 285-6

ABBREVIATIONS USED IN TEXTS AND NOTES

ATC	Atlantic Telegraph Company, incorporated 1856.
BETC	British Electric Telegraph Company, incorporated 1850.
BPP	Parliamentary Papers.
BRB	British Railways Board Historical Archives.
District	London District Telegraph Company, incorporated 1859, changed its name to London & Provincial Telegraph Company in 1867.
EIM	English & Irish Magnetic Telegraph Company, incorporated 1851.
Electric	Electric & International Telegraph Company, 1855, formerly Electric Telegraph Company, incorporated 1846.
FBI	Federation of British Industries.
GWR	Great Western Railway.
ICE	Institution of Civil Engineers.
IEE	Institution of Electrical Engineers.
ITC	International Telegraph Company, incorporated 1852, merged with Electric Telegraph Company in 1855 to form EITC.
JITE	Journal of Institution of Telegraph Engineers.
LNWR	London & North Western Railway.
LSWR	London & South Western Railway.
Magnetic	British & Irish Magnetic Telegraph Company, incorporated 1857 from the merger between the British Electric Telegraph Company and the English & Irish.
NTC	National Telephone Company, originally incorporated 1881, retained its name in 1889 after the merger between the United Telephone Company, the Lancashire & Cheshire, and the National.
POR	Post Office Records.
PRO	Public Record Office.
SCET	Report from the Select Committee on the Electric Telegraph Bill, 1868.
SCR	Select Committee into State of Communication by Railways July 1840.
STC	Submarine Telegraph Company, incorporated 1850.
TCCM	Telegraph Construction and Maintenance Company, incorporated 1864 from the merger between the Gutta Percha Company and Glass, Elliott & Co.

- UKTC United Kingdom Electric Telegraph Company, originally incorporated 1851, special act 1862.
- UPTC Universal Private Telegraph Company, incorporated 1861.
- UTC United Telephone Company, 1879.
- WFC Papers of William F. Cooke at the Institution of Electrical Engineers.

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APPENDIX I

The detailed Post Office calculations on the press loss, July 1907, based on the year 1905-6.

<i>Details of Expenditure, Post Office Appropriation Accounts, 1905-6</i>	£	<i>Total Expenditure all Telegrams</i>	<i>Proportion Attributed to Press</i>
	£	£	£
Maintenance of postal telegraph system	1,021,412		
Purchase and handling of stores	12,295		
	1,033,707		
Less salaries and wages incurred on capital works, payment by continental administrations, sale of old stores, etc	130,664		
	903,043		
Less maintenance and renewal of telephones	363,241	534,802	49,000
Central telegraph office		495,802	
Railway companies		58,915	
Manufacture of stamps		2,476	
Share of common expenses		2,339,042	
Expenditure charges on other votes			
Building, maintenance, furniture, rates, cost of audit, stationery, printing, inland revenue		121,986	
		3,018,231	
Deduct			
Works and alterations for railway companies, telegrams of Savings Bank Department, common receipts		31,456	
		2,986,775	

Estimated cost of telegraph delivery	<u>584,000</u>	
	One-eighth of	2,402,775 say 300,000
<i>Add</i> Estimated cost of delivery of press telegrams		20,000
Total annual cost of dealing with press telegrams		369,000
Total revenue from press telegrams (actual)		<u>146,000</u>
Deficit on press service		223,000

APPENDIX 2

TELEGRAPH TARIFFS AND SERVICES, 1870-1971

Principal changes in the general inland tariffs and conditions of service since 1870.

Charges in 1868 under the companies

Rates were based on distance. A message of 20 words, with an allowance of 10 words for the address, 1s (5p) for 100 miles, 1s 6d (7½p) for 100-200 miles, 2s (10p) for over 200 miles.

Press rates were: day rate (7am-7pm) 30 words for 1s up to 100 miles, 1s 6d up to 200 miles, 2s above 200 miles.

Night rate (7pm-7am), 40 words allowed. For each additional newspaper in the same town a copy rate of one quarter of these rates.

Special wires were provided for eight hours in the night at an annual charge varying with distance, from £500 to £1,000.

Charges introduced by the Post Office, February 1870

Ordinary telegram rate 1s for 20 words, addresses free throughout the UK, 3d for each additional 5 words or part of 5 words. Free delivery within 1 mile.

Press rates: Day rate (9am-6pm) 1s for 75 words or part thereof, Night rate (6pm-9am) 1s for 100 words or part 2d copy rate, any location in the United Kingdom. Special wires for night use at £500 per annum.

October 1885

Ordinary telegram rate 6d for 12 words or less plus ½d per word in excess of 12.

Night telegraph letter rate 6d for 36 words or less plus ½d for each 3 words or part thereof (service restricted to telegraph offices open at night).

1 November 1915

Ordinary telegraph rate increased to 9d for 12 words or less plus $\frac{1}{2}$ d per word in excess of 12.

Multiple address (in same delivery area): ordinary rate for number of words in addresses and text plus 3d for each address beyond the first.

Night telegraph letter rate, 9d for 36 words or less plus $\frac{1}{2}$ d for each 3 words or part thereof.

1 January 1920

Press telegraph rates increased to:

Day rate (9am–6pm) 1s per 60 words or part thereof.

Night rate (6pm–9am) 1s per 80 words or part thereof.

Multiple address rate, 3d per (60 or 80) words or part thereof, whether in the same or different towns.

1 September 1920

Ordinary telegraph rate increased to 1s for 12 words or less plus 1d per word in excess of 12.

Multiple addresses (in same delivery area); ordinary rates for addresses and text plus 4d for each address beyond the first.

Night telegraph letter rate increased to 1s for 36 words.

Sunday surcharge of 6d introduced for all ordinary telegrams handed in on Sundays and (except in Scotland) on Good Friday and Christmas Day.

4 July 1932

Night telegraph letter service extended to town postal delivery very of all telegraph offices.

1 December 1932

Business reply telegrams introduced. Restricted to approved firms registered with local head postmaster at cost of £2 per annum. Specially printed telegram forms supplied to registrants.

31 May 1935

Ordinary telegraph rate reduced to 6d for 9 words or less plus 1d per word in excess of 9.

Greetings telegrams introduced. For the additional charge of 3d per telegram an ornamental telegram form and decorative envelope were used.

Priority telegrams introduced. For the additional charge of 6d per telegram, priority in transmission and delivery were provided. Delivery by a stated time not catered for. Night telegraph letters made available to all addresses.

1 July 1940

Ordinary telegraph rate increased to 9d for 9 words or less plus 1d per word in excess of 9. This affected multiple address telegrams, business reply telegrams, greetings telegrams, priority telegrams, all based on the ordinary telegram rate.

Press telegrams rates increased to:

Day rate (9am–6pm) 1s 3d for 60 words or part thereof.

Night rate (6pm–9pm) 1s 3d for 80 words or part thereof.

Multiple address rate unchanged.

Night telegraph letter rate increased to 1s 3d for 36 words or less, plus 1d for each 3 words or part thereof.

30 April 1943

Night telegraph letter service suspended.

Business reply telegram service suspended.

Greetings telegram service suspended.

19 July 1943

Ordinary telegraph rate increased to 1s for 9 words or less plus 1d per word in excess of 9, with consequent increases on the multiple address and priority telegrams.

20 November 1950

Greetings telegram service reintroduced. Minimum charge 2s for 12 words plus 1d per word in excess of 12.

1 July 1951

Ordinary telegraph rate increased to 1s 6d for 12 words or less, plus 1½d per word in excess of 12, consequential increases in

multiple address, priority, and greetings telegram. Sunday surcharge increased to 9d per ordinary telegram.

1 August 1954

Revision of telegraph charges:

Ordinary telegraph rates increased to 3s for 12 words or less, plus 3d per additional word.

Greetings telegrams rates increased to 3s for 12 words or less, plus 6d surcharge.

Priority telegrams increased to 3s for 12 words or less, plus supplementary fee of 1s, Sunday telegram surcharge 1s 6d, multiple address telegrams increased to 3s for 12 words, plus 1s for each address after the first.

Introduction of Overnight Telegrams whereby fully addressed messages were accepted between 8am and 10pm for delivery by post the following day.

Telegraph letter service withdrawn.

16 January 1955

Charges for inland press messages increased:

Single address increased to 3s for 60 words day rate, and 80 words night rate.

Multiple address increased to 1s per additional address if within the same town, otherwise full charges apply.

1 January 1956

Period of acceptance of Overnight Telegrams extended to 8am to midnight.

Free delivery of telegrams to any address in the United Kingdom made universal.

Ship-to-shore radio telegrams charge increased to 1s 4d a word.

1 March 1957

De luxe greetings telegrams (weddings) introduced at 5s for 12 words plus 3d per additional word.

1 April 1957

Standard birthday greetings telegrams introduced at 3s 6d for 12 words plus 3d per additional word.

14 February 1958

St Valentine's Day greetings form reintroduced (withdrawn 1953).

August 1958

Greetings telegrams accepted for delivery with telephonic address.

25 May 1959

De luxe baby greetings telegrams introduced.

27 June 1960

Standard birthday greetings telegram withdrawn.

2 October 1961

De luxe all-purpose greetings telegrams introduced.

De luxe 21st birthday greetings telegrams introduced.

29 April 1963

Inland telegraph charges revised:

Ordinary telegraph rate increased to 5s for 12 words or less, plus 5d for additional word.

De luxe greetings telegrams rate increased to 7s for 12 words or less, plus 5d per additional word.

Standard greetings telegrams rate increased to 5s 6d for 12 words or less, plus 5d per additional word.

Priority telegrams rate increased to 7s for 12 words or less, plus 5d for each additional word.

Sunday telegrams rate increased to 7s 6d for 12 words or less, plus 5d per additional word.

Overnight telegrams rate increased to 2s 6d for 12 words or less, plus 2½d for each additional word.

Press telegrams:

Day rate increased to 5s for each 50 words or less.

Night rate to 5s for each 65 words or less.

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INDEX

Abbreviations used are similar to those in the text and notes with the addition of the following:

PG	Postmaster-General
PO	Post Office
RC	railway companies
TC	telegraph companies

Basically an alphabetical scheme has been followed with the exception of Reports which have been entered chronologically.

Illustrations are indicated in **bold type**

- ABC apparatus, *see* Wheatstone
Aberdeen, 55, 237
Academy of Sciences, Barcelona, 15, 101
accounts, *see* telegraph companies and PO
addresses free, 194; *see also* PO
Aden, cable, 110
Admiralty, 16, 37, 38, 49, 53, 102
Advisory committee on future of the inland telegraph service (1958), 263-6
Agamemnon, 98, 108-9
Agnes Jack, SS, 242
agreements, *see* telegraph companies and railway companies
Aix-la-Chapelle telegraph, 40
Alexander, William, 24
Allan, Thomas, 59, 119-20
All the Year Round, 58
amalgamations, 54; estimated savings on, 134, 151, 233
American Civil War, 112, 126, 240
American Declaration of Independence, 40
American railways, 35; *see also* USA
American telegraph companies, 254
Ampère, André, 15
Amsterdam, 52, 53
Anderson, Sir James, 217
Anglo-American TC, 96, 114
Anglo-Indian TC, 155
Anglo-Mediterranean TC, 115
Annals of Philosophy, 20
arbitrage, 238
arbitration, Cooke and Wheatstone, 41
Arctic, SS, 106
Ashfield, Lord, 251
ATC, 78, 106, 110, 112-14
Atlantic cable, 42, 66, 108-9, 112-15, 118, 217; insulation fault, 109; manufacture, 107
atmospheric railways, 19, 38-9, 44
Australia, 238; link with UK, 116
Austria, 47, 65, 105
Austro-Prussian War, 66
automatic apparatus, 255, 260; *see also* Wheatstone
Bagehot, Walter, 159
BETC, 50, 53, 55
Bain, Alexander, 44, 79, 83
Bains, F. E., 49, 120, 194
Bain 'pointer', 81
Balmoral, 55
Baltimore-Ohio railway, 45
bankers, shareholders, 80
bank rate, changes in, 93
Banks, Sir Donald, 257
Barlow & Foster, 83
Barnard, Edward, 62
Bartholomew, electrical engineer, 62
batch rate, 259
bathometer, 238
battery, invention, 14
Baudot apparatus, 250, 256
beamed radio, 251
Belfast Newsletter, 71
Belgium, 45, 122; cost of telegraph system, 133, 166; higher press rate, 264; tariffs, 129-30, 143, 152; telegraph system, 40, 45, 48, 126, 151, 162, 192, 206, 236; uniform rate, 144, 152
Bell apparatus, worked by Magnetic, 82, 177
Bell, Prof Alex Graham, 199
Bell telephone, 202-3, 215
Berlin, 47, 245

- Berryman, O. H., USN, 106
 BETC, 50, 53, 55
 betting telegrams, 258
 Bidder, George P., 30-1, 35, 37, 42-3, 48, 78, 79
 Birkenhead Docks, 56
 Birmingham, 26, 62, 82
 Blackwall railway, 30, 33
 Blackwood, S. A., 194
 block system, 33, 44, 49, 239
 Board of Trade, 111, 122, 124, 125, 127, 138, 142, 241, 242
 Bonelli's TC, 159
 Boston, USA, 199, 206
 Boulton, Thomas, 48
 Bradford, 218
Bradshaws, railway directory, 79
 Braggington, George, 62
 Brassey, Thomas, 50, 78, 79, 113, 114
 Brazil, 238
 Brett, Jacob, 78, 102-3
 Brett, John Watkins, 50, 56, 78, 79, 102, 103, 106, 107
 Bridgeman Committee of Enquiry (1932), 256, 257, 263
 Bright, Charles Tilston, 79, 82, 97, 105 ff, 112
 Bright, E. B., 56, 67
 Brighton, 213
Brisk, 241
 Bristol, 31; STD, 266
 Bristol & Exeter RC, 171
Bristol Times, 220
 British Association, 111, 199
 British-Australia TC, 116
 British & Foreign Marine Insurance Co., 80
 British & Irish Magnetic TC (1857), *see* Magnetic
 British India TC, 116
 British Indian Extension & China TC, 116
British Quarterly Review, 136
 Brocklebank, C. E., MP, 226
 Brunel, I. K., 29, 30, 32, 34, 39, 113
 Brunel, Sir Marc I., 41
 Brussels, 58
 Brussels-Antwerp line, 40, 48
Bullionist, 145
 Burslem, 77
 Bushell, William Dome, 51
- cable companies, impact on international money markets, 238; wages in, 187
 cables, *see* submarine cables
 cable ships, 117, 241
- Cable & Wireless Ltd, 266
 Caithness, Earl of, 79
 Caledonian RC, 166, 170, 171, 191
 Camden Town, experiments at, 25-7
 Cameron, Dr C., 193, 194, 219
 Compagnie Internationale des Telephones, 206
 Canada, 109, 238
 canals, 54, 63, 87, 190, 236
 Canning, Samuel, 114, 115
 canvassing, by PO, 207, 253
 capital, *see* telegraph companies, railway companies and PO
 Carmichael, Sir J., 24, 79, 104
Caroline, SS, 113
Carpathia, 244
 Carthusian monks, 13
 censorship, 144, 186, 234
 census, inland telegraph traffic (1934), 258
 Central News Agency, 217
 Central Office of Information, 262
 Central Post Office, 49
 Central Telegraph Office, 219, 235, 254, 259; staff, 195; destroyed, 260
 Chadwick, Edwin, 39, 136
 chambers of commerce, 126, 128, 147
 Channel Islands, 177
 Channel Islands TC, 160
 Chappe, Claude, 16
 Charing Cross Station, 245
 Chartists, 50
 chemical industry, 238
 chemical marking telegraphs, 23, 81
 Chester & Holyhead RC, 38, 49
 Chetwynd, G., receiver & auditor general, 87, 154
 Chicago, 200, 206, 237, 254
 Childers, Hugh, Chancellor, 193
 children's free telegraph service, 260
 cholera epidemic, 49
 Churchill, Lord Alfred Spencer, 62, 64, 79
 Churchill, Winston, Chancellor, 225
 City of London, 229, 245, 261, 266; *see also* London
 civil servants, 252
 civil service, 160, 246
 Clapham, J. H., 244
 Clark, Edwin, 53, 111
 Clark, J. M., 185
 Clark, L., 83
 Clark, Latimer, 111
 Clay Cross Tunnel, 34
 Committee of Enquiry into accounts of telegraph companies (1869), 154

- Commission of Inquiry into the organisation and methods of American telegraph companies (1929), 254
- Committee on the construction and maintenance of submarine cables (1860), 111
- Committee on Public Accounts (1873), 179
- Committee on 6d tariff (1883), 193 ff
- Congress, 233
- Conservative Party, 146
- Consolidated Fund, 144
- Consols $3\frac{1}{2}$ per cent, yield on, 95, 96
- construction costs, *see* telegraph companies and *po*
- continuous counting, of sporting messages, 218 ff
- contractors, shareholders, 78
- Cooke, William Fothergill, 13, 18 ff, 34 ff, 47, 78, 79, 83, 97, 114, 115; Blackwall Railway, 30 ff; experiments at Euston, 25 ff; GWR, 29-30, 32; needle telegraphs, 197; partnership with Wheatstone, 22 ff, 40-2; *Telegraphic Railways*, 33 ff
- copper mining, 238
- copy rate, for newspapers, 217 ff, 222, 223, 227, 228
- Cornwall, 238, 244
- corn market, 237
- cotton market, 237
- Course of the Exchange*, 96
- Crampton, T. R., 104
- Creed & Co 249
- Creed, Robert, 25, 26
- Creed teleprinters, 256
- creosote, 239
- Crimean War, 53, 239
- Crippen, Dr Henry, 244
- Critchley, Thomas, 78
- Croll, Alexander, 62, 78
- Cromer-Tonning cable, 90
- Cropper, Edward, 54, 78
- Cunard Line, collision, 109
- Cyclops*, 106
- Daily Mail*, 225; group, 228
- Daily Mirror*, 225; group, 228
- Daily News*, 64, 186, 229
- Daily Telegraph*, 229
- Daniell, J. F., 41
- Daniell, James, 62
- Davies, Henry Jameson, 243
- Davison, William, 50
- Davy, Edward, 23-4, 83
- Dayman, J., Cdr, RN, 106
- Deane, J. C., 114
- deficit on working, *see po*
- de luxe telegrams, 265
- Denmark, higher press rate, 264; uniform rates, 144, 162
- Derby, The, 70
- Derby, Lord, PM, 110, 138
- Descriptions of an Electric Telegraph* (1823), *see* Ronalds, Francis
- Detective, The*, 245
- Disraeli, Benjamin, PM, 138, 141, 146, 246
- District TC (1859), 56-9, 66, 148, 155, 163-4; capital employed, 76-7; *po* price, 160, 167, 169; profits, 92-3; shareholdings, 79; share prices, 94, 167; system destroyed, 65
- dividends, 49, 50, 53, 91, 92, 96; limitation of, 53, 233; chart, 95; *see* Electric TC
- docks, 38, 55
- double-needle instrument, 32, 37, 80, 197
- Dover, 102, 103
- Dover-Calais cable (1851), 51, 103-4
- Dover-London telegraph, 40, 101
- Dover-Ostend cable (1853), 105
- Dublin, 53, 54, 83
- duplex telegraphy, 183, 234
- Dyer, Charles Kemp, 52, 45, 56, 79
- Eastern Counties TC, 30, 35
- East Goodwin lightship, 242
- East India Co, 48
- Economic TC, 159
- Economist, The*, 145, 146, 159, 168, 175, 211, 212, 230
- Edinburgh, 64, 82, 83, 127, 128, 176
- Edinburgh Chamber of Commerce, 125, 127, 128
- Edinburgh-Glasgow railway, 37
- Edinburgh Review*, 173, 196
- Edinburgh Water Company, 127
- Edison Telephone Company (1879), 200, 202
- Edison, Thomas, 200, 204
- educational standards, 187; *see also po*
- Edwards, Francis, 103
- Edwards, Ness, MP, *PG*
- Egypt, 115, 240, 261
- EIM (1851), 52, 83
- El Alamein, 261
- Electric & International TC (1855), *see* Electric TC
- Electrical Exhibition (1881), 206
- Electric clock, 53; *see* Bain, A.

- electricity, 14, 15, 20, 28, 238; installation, 117; frictional, 13, 15
- Electric, the, TC, 24, 43, 46 ff, 62 ff, 77, 112, 114, 119-20, 127, 139, 141, 147, 149, 155, 164, 169, 185, 190; Acts (1846), 50; (1851), 78; (1855), 53, 124; analysis of working expenses, 84-9; apparatus, 82; capital, 47, 76, 77; capital expenditure, 80-3; contracts, 49, 51; dividends, 50, 53, 91-2, 96, 99; expansion of system, 53, 68, 74, 75; instruments, 68, 80; investment rating, 94-6; legal and parliamentary expenses, 63, 84; lines, 53, 68, 73; maintenance, 84; messages transmitted, 67, 68, 73; press service, 71-2; profits, 50, 67, 91, 94; rates, 67; shareholders, 47-8, 78-9; shares, 49, 94, 167, 99; submarine cables, 52-3, 89-91; Trust Fund, 90-1; wages & salaries, 85; wayleaves, 88, 127
- Electric TC of Newfoundland, 106
- electromagnetism, 14, 17, 21
- Elsley, William, 62, 64
- Emden cable, *see* Magnetic
- Enderby & Sons, 22, 25
- engineering costs, *see* telegraph companies and PO
- English Channel Submarine TC, *see* STC
- Eton, 39
- European & American Printing TC, 55, 104
- Euston, 25-8 ff
- evening newspapers, 220
- Ewart, Sir Joseph, MP, 54, 78, 79, 80
- Exchange TC (1872), 201, 217
- exports of telegraphic apparatus, 117
- extensions, *see* telegraphic companies and Post Office
- facsimile telegraphy, 82, 260
- Fairbairn, William, FRS, 69, 111-12 ff
- Falmouth, 55
- Falmouth, Gibraltar & Malta TC, 116
- Faraday, Michael, 19, 20, 24, 101
- Farrer, Dame Francis, 263
- Fastnet lighthouse, 242
- Fawcett, Henry, MP, PG, 193, 203, 207-10 ff
- female employment, by telegraph companies, 56, 85, 86, 87, 132; by PO, 190, 252; wages 185, 187
- female shareholders, in telegraph companies, 80
- Field, Cyrus, 106, 107, 112 ff
- financial crisis (1866), 65
- Findley, Alexander, MP, 113
- Finland, higher press rates, 264
- fire alarm systems, 25, 245
- fires, 59, 235
- First World War, 241
- fish trade, 237, 258
- five-needle instrument, 30, 32, 197
- Fleeming, Forde & Jenkin, 155
- floating telegraph station, 241
- Forde, H. C., 155
- Fortnightly Review*, 183
- Foster, David, inventor, 52
- Foster, M. H., of Treasury, 150, 173
- Fowler, W. F., MP, 172
- Fox, Charles, 21, 26, 103
- France, 45, 46, 194, 236; cost of telegraph system, 166; electric telegraph in, 46; government, 103-4; lower press rate, 264; typewriters, 65
- Franco-Prussian War, 240
- frank message stamps, 77
- Franklin, Edward, FRS, 69
- free message concession, *see* railway companies and PO
- fruit trade, 237
- Fuller, J., inventor, 83
- Galton, Douglas, 111, 112
- Galvani, Luigi, 14
- Galway steamers, 55
- Gasworks Clauses Act (1847), 124
- General Board of Health, 49
- General Oceanic & Subterranean Electric Printing TC, 103
- Germany, 45, 105, 194, 236; telegraph service, 253
- Gisborne, F. N., 105, 106
- Gisborne, Lionel, 110
- Gladstone, W. E., PM, 120, 121, 152, 165, 204, 216, 219, 246
- Glasgow, 54, 64, 78, 82, 83, 107, 213, 237; private wires, 70; shareholders, 77
- Glasgow Evening Citizen*, 223
- Glasgow Herald*, 71
- Glass, Richard, 113, 115
- Glass, Elliott & Co, 105-8 ff, 112
- Glyn, chairman LBR, 25, 26
- gold, supply of, 238
- Goliath*, SS, 103
- Gooch, Daniel, MP, 113, 114
- Goschen, George, MP, 148, 149, 151, 157, 173
- Gosport, 37

- Government, British, 34, 108, 109, 110
Government and Telegraphs (1868), 141
 Gower-Bell telephone, 202-4 ff
 Gower-Bell Telephone Company, 203
 Grand Junction Canal, 63
 Grand Junction Railway, 26
Graphic, 178
 Gray, E. Dwyer, MP, 208
 Great Britain, 119, 121, 126
Great Eastern, the, 98, 113-15 ff, 217
 Great Exhibition (1851), 25, 51, 104
 Great Northern RC, 165
 Greenwich, 108, 113
 Greenwich Mean Time, 52
 greetings telegrams, 253, 255, 258, 259, 261, 265
 Grimston, Robert, 63, 74, 79, 141
 guarantees, to ATC, 108, 110; *see also* Post Office
Guide to the London and Birmingham Railway, 28
 gutta percha, 83, 101, 117
 Gutta Percha Company, 103, 107, 112, 117
 Gurney, Samuel, 56, 113, 79
- Haiman*, 244
 Hancock, Charles, 102
 Hanwell, 30
 Harcourt, Vernon, 165
 Hardman-Lever, Sir Samuel, 227, 250-1
 Hardman-Lever Report (1928), 227-8, 251-4
 Harmsworth, Harold, Lord Rothermere, 225
 Harrison, George, 128
 Hartington, Marquis of, PG, 156, 157, 168, 178
 Harwich, 242
 Hawes, Benjamin, MP, 48
 Hayward, Mr, 32
 Henley, W. T., 52, 78, 112, 113; works, 116
 Higgins, F. W., inventor, 217
 Highton, Edward, 50, 51, 79
 Highton, Henry, 50, 79
 Hill, Rowland, 122, 184
 Holland RC, 53
 Holt committee (1914), 222
 Holyhead, 55
 Holyhead-Dublin cable, 53, 105; *see* Magnetic
 Home Rule Bill (1886), 219
 Hornby, T. D., 78
 Hornby, H. F., 78
- Home Office, 50
 Home, Thomas, 33
 House of Commons, 44, 69, 102, 128, 146, 150, 152, 193, 194, 199, 207, 208, 210, 221, 223, 228, 235, 245
 House of Lords, 44, 212
 House, Prof Royal, 103
 House Top telegraphs, *see* overhouse telegraphs
 Hughes, Prof David, 64, 65, 79, 83; printing telegraph, 164
 Huish, Mark, 51, 79
 Hull, 213, 218
 Hunt, Ward, Chancellor, 138, 139, 148, 162
- Illustrated London News*, 36, 55
 India, 48; link, 66, 111
 Indian Mutiny (1857), 110, 240
 India Rubber, Gutta Percha & Telegraph Works, 117, 131
 Indians, 241
 Indo-European RC, 117, 150, 164
 Industrial Court, 250
 instruments, *see* telegraph companies
 Institution of Electrical Engineers, 236
 insulation, improvements, 32, 38, 82, 101; submarine, 108
 insurance, 238; and annuity scheme, *see* PO
 Intelligence Department, 71, 216
 International Telegraph Company (1852), 52
 International Telegraph Office, Berne, 192
 interurban trunk lines, 205-6, 211
 investment, in telegraph industry, 76; rating of companies, 94-6
Investors Guardian, 158
 Ireland, 51, 52, 54, 63, 108, 190; cables, 53; special wires, 217
 Irish Church Question, 146
 Irish Republic, 264, 265
 iron trade, 237
 Isle of Man, 177; cable, 55
 Isle of Man RC, 160, 180
 Isle of Wight cables, 55, 90
 Italy, 65, 261
 Italian campaign (1859), 240
- James, Mrs M. C., 259
 Jeans, A. G., 221
 Jersey & Guernsey cable, purchased by PO, 180
 Jersey potato trade, 237

- Jevons, Prof W. S., 136, 178, 183, 192, 218
 Joint Stock Company Registration & Regulation Act (1844), 47
Journalist & Newspaper Proprietor, The, 220
 journalists, 227-8
 Joyce, Charles, 62
- Kendall, Captain, 244
 Kingsley-Wood, MP, PG, 257
 Kingston & Dalkey line, 39
 Kipping, Sir Norman, 263
 Kleinschmidt & Markum, USA, 249
 Konisberg, 236
 Konniggratz (1866), 240
- Labourchere, Henry, 122
 Labour party, 251
 Lamb, J. C., 194, 221
 Lancashire & Cheshire Telephone Company, 205, 212
 Lancashire Telephone Exchange Co, 200
 Langworthy, E. R., 78, 79
 Leeds, 218
 Leeke, Admiral Sir Henry, MP, 62
 Leeman, George, MP, 147, 148, 149, 151, 157
 legal and parliamentary expenses, *see* telegraph companies
 length of telegram, 194
 letter post, 196
Leviathan, the, *see* *Great Eastern*
 Leyden jar, 13
 licences, to telephone companies, 200, 201, 202-9 ff, 214
 lighthouses, 241-2
 lightships, 242
 'life and death' telegrams, 266, 267
 Limehouse, 30, 59
 Liverpool, 25, 26, 54, 62, 64, 82, 107, 200, 237; Lime Street tunnel, 19, 27; corn and cotton markets, 237
 Liverpool Chamber of Commerce, 162
 Liverpool-Holyhead line, 55
 Liverpool-Manchester railway, 19, 26, 34
 LNWR, 51, 63, 64, 65, 96, 139, 164, 172, 239
 local trade, affected by telegraph, 236
 London, 26, 31, 52, 54, 55, 62, 69, 76, 78, 82, 105, 206, 213, 214, 217, 235, 242, 245, 253, 261; communication with Europe, 64, 65; meteorological information, 241; pneumatic tubes, 235; telephones, 213-14; STD, 266; wages in, 185, 187
 London & Birmingham RC, 21, 25, 27
 London & Globe Telephone & Maintenance Co, 206
 London-Brighton, telephone line, 211
 London, Brighton & South Coast RC, 166
 London-Bristol telegraph, 48
 London, Chatham & Dover RC, 166, 170, 171
 London & Croydon atmospheric railway, 39
 London District Telegraph Company (1859), *see* District RC
 London Docks, 55
 London-Dover line, 101
London Gazette, 136
 London-Paris telegraph link (1852), 104, 132
 London & South of Ireland RC, 66
 London-Weyborne telegraph, 89
 London-Yorkshire railway, 166
 Lord Stanley of Alderley, PG, 120, 121, 128
 Lowe, Robert, Chancellor, 159
 Lowestoft-Zandvoort cable, 91, 105
 LSWR, 37, 38, 165, 170
- McGowan, Sir Harry, 251
Magazine of Popular Science, 22
 Magnetic RC (1857), 56, 59, 62, 63, 66, 72, 77, 107, 155, 190, 241; capital, 76; costs, 80, 88; Irish cables, 105; PO purchase price, 160, 169; Reuter's contract, 71; shareholders, 54, 78-9; share prices, 167
 maintenance costs *see* telegraph companies
 Malaya, 101
 Malta-Alexandria cable, 105
 Manchester, 54, 62, 64, 82, 105, 107, 200, 245, 261; private lines, 72, 78; Town Council, 245
 Manchester Dock & Harbour Board, 56
Manchester Guardian, 71, 144, 216
 Manchester-Leeds railway, 37
 Manchester-Leeds telephone, 211
 Manchester-Liverpool telephone, 211
 Manchester Statistical Society, 136
Manchester Sunday Chronicle, 221
 Manners, John, MP, PG, 186
 Marconi, Guglielmo, 243-4
 marine insurance, 237

- Marlborough, Duke of, 212
 Marples, Ernest, MP, PG, 263
 Marshall, Charles, inventor, 14
 Mauley, Lord de, 104
 meat trade, 258
 Mediterranean Extension TC, 144
 messages transmitted, *see* telegraph companies and PO
 metal markets, 238
 Metz, 236
 meteorological information, 241
 Metropolitan Fire Brigade, 245
 Metropolitan Police District, 245
 Middlesbrough, 237
 Midland & Great Western RC of Ireland, 54
 Midland RC, 139, 165
 military telegraphs, 241; *see* war
 Milford Haven, 56
 Minorities, 30
 misappropriation of public funds, *see* Scudamore, FI
 Mitchell-Thomson, Sir William, MP, PG, 225, 226, 250
 Monk, Charles, MP, 246
 monopoly clause (1869), 157, 158-9; effects on telephone development, 200-15
 Monsell, PG, 186
Monarch, The, telegraph ship, 90; PO repair ship, 241
 money order offices, *see* PO
Money Market Review, 144
Montrose, 244
 Moody, Captain RN, 241
 Morley, A., MP, PG, 220
Morning Chronicle, 40, 87
Morning Post, 63
 Morse, Samuel, 23
 Morse apparatus, 176, 249 ff, 255 ff, 261; code, 244; flag and lamp signalling, 112; printing telegraphs, 45; recorder, 82, 87; sounder, 178, 234, 242
 MPs, benefits from cheap telegraphy, 223
 Multiplex working, 234, 249, 250, 255
 Muncke, Prof, 17-18
 Municipal telephone systems, 213, 215
 Murray, Sir Evelyn, 226
 Napoleon, 16
 Napoleon, Louis, 104
 National Bank of Scotland, 78, 80
 National Union of Journalists, 227
 nationalisation, 72, 119 ff, 138 ff, 186, 216, 230, 245, 246; *see also* PO, telegraph companies and railway companies
 needle telegraphs, 17; *see also* Cooke, W. F., double-needle and five-needle
 Negretti & Zambra, 70
 Netherlands, 105, 162
 Newall, & Co, R. S., 104, 107
 Newbiggin-Jutland cable (1868), 90
 Newcastle, 77, 82, 243
 Newfoundland, 54, 106, 108, 244
 Newmarket racecourse, 71
 Newton Abbot, 77
 news associations, 222
 New South Wales, 144
 Newspaper Proprietors Association, 226
 newspapers, *see* press, PO and telegraph companies
 news transmission, 40; *see also* press, PO and telegraph companies
Niagara, 108
 night telegraph service, 249, 258; suspended, 261
 night work, *see* telegraph companies
 Nine Elms-Gosport line, 37
 Nordeney-Lowestoft cable, 149, 155, 164
 Norman, Sir H., MP, 223
 North British RC, 166, 170
North British Mail, 219
 Northcote, Stafford, MP, 247
 Northcote-Trevelyan Report (1854), 160
 North Eastern RC, 191
 North Kent RC, 49
 North Midland RC, 34
 North Staffordshire RC, 191
 Northampton-Peterborough line, 37
Northern Whig, 216
 Norwich-Yarmouth line, 37
 Nottingham, 218
 Novello, Emma, 80
 O'Connor, V. O'B., 54
 Oersted, Hans, 15
 Orfordness-Scheveningham cable, 91
 Orkneys & Shetlands, 177; telegraph company, 160
 Overend Gurney & Co, 93
 overhead wires, 236
 overhouse telegraphs, 56, 58; destroyed, 65; 57
 overseas cable companies' telegrams, 264, 266, 267

- Pacific cable (1902), 118, 241
 Paddington, 29, 33, 39, 48
 Paddington–West Drayton telegraph, 29
 Paget, Lord Alfred, 79
 Paish, Prof F. W., 263
 paper manufacture, 238
 Paris, 16, 51; international exhibitions (1878, 1881), 206, 236; meteorological information, 241; overhouse system, 58; STD, 266; telephone subscribers, 206
 Paris–Versailles railway, 40
 passenger safety, on railways, 34, 239
 Passmore, W. D., 78
 patent rights, 43, 160
 patentees, as shareholders, 79; payments to, 83
 patronage, 160, 246
 Paxton, Joseph, 50, 79
 Peel, George, 79
 Peel, Sir Robert, PM, 102
 Pembroke dockyards, 56
 Pender, John, 54, 79, 107, 112, 113
 penny post, 120, 122, 130, 148, 184, 220, 236; profits, 184
 pensions, 183
 permeating keyboard, 21; *see* Wheatstone
 petitions, 128, 146
 Peto, Samuel M., 50, 78
 Philadelphia, 254; Exhibition (1876), 199
 phonograms, 259
 Pilkington, James, MP, 62
 Playfair, Dr Lyon, 183, 218
 pneumatic telegraphs, 19, 20, 27, 82; tubes, 235
 police work, 39, 44, 245
 Pollock, Mr Baron, 202
 Poplar, *see* Blackwall railway
Porcupine, 112
 Portable 2-Needle telegraph, 198
 Portpatrick–Donaghadee cable (1853), 89, 105
 Portsmouth, 17, 37, 213; fleet at, 16
 postcards, 128
 Post Office, 46, 65, 83, 93, 94, 96, 119–22 ff, 124, 127–9 ff, 133–52, 154–82, 184–96, 199, 200, 216–22, 224–8, 230, 236, 238, 240 ff, 246, 247, 249–59, 261–3, 265–6, 268; accounts, 182–3, 262, 268; addresses, free, 194; agreements with railway companies, 170–2; agreements with telegraph companies, *see* purchase; agreement with War Office, 240; apparatus, 178, 249, 253, 256, 260; capital expenditure, 180, 257; costs, 180–2, 183, 189, 195, 256; deficit, 180 ff, 195, 219, 256, 261–2, 264; press deficit, 194, 218–29, 264; educational standards, 187; engineering division, 189, 190; extensions, 180, policy, 177, 180, 184; free message concession, 191 ff; guarantees, 184, 185; insurance & annuity scheme, 122; interest on capital, 135, 180–1, 192, 193; intention to purchase, 65, 93, 94; legal monopoly of telegraphs, 148, 150, 157–9; licences to telephone companies, 200–1, 202–9 ff, 214; maintenance, 190; messages transmitted, 183, 260, 256, 259, 261, 262; messengers, 250, 259; money order offices, 184, 176; nationalisation, 133 ff; press service, 216 ff; press tariffs, 216–17, 228, 264–5; press telegrams, 220, 229; public relations department, 257; publicity, 255, 257; purchase price of telegraphs, 135–7, 159, 160, 164–9, 253; purchase of telephones, 214; relations with telephone companies, 200 ff; revenue, 135, 180, 193; calculations, 156; royalties from telephone companies, 205, 208, 211; Savings Banks, 122, 179; staff, 185, 189, 195, 251, 252, 253, 260, 262; tariffs, 248, 257, 258, 262, 265, 129, 223, 193; uniform rates, 128, 144, 157, 158, 162, 177, 191–2, 193–5; wages and salaries, 185–9 ff, 193, 222, 262
 postal services, 133, 249
 Postal & Telegraph Rates (Statutory Limits) Act (1915), 223
 Poynton Colliery, 38
 Preece, W. H., 35, 139, 140, 199, 243
 preference shares, at 10 per cent, 76; *see* telegraph companies
 press, 40, 49, 126, 144, 145, 147, 162, 173, 208, 216, 225–9; agencies, 222; attitudes to nationalisation, 144–5; influence in Commons, 228; messages transmitted, 217–21, 224, 228
 Press Association, 144, 216–18, 221, 224, 225
 press services and tariffs, *see* PO and telegraph companies
Princess Clementine, 102
 Prince of Wales, 259
 printing, 238
 printing telegraph systems, 249; *see also* Bain, A.
 priority service, 258

- private newspaper circuits, 225
 private telegraphs, 68-71, 149, 199, 263
 private telegraph schools, 187
 provincial press, 49, 72, 219, 222-3, 226, 228, 229
 Prussia, 46, 65, 240
Punch, 180
- quadruplex apparatus, 234
Quarterly Review, 42, 119
 Queens Institute, Dublin, 176
 Queen Victoria, 36, 104, 109
 Quiévrain, 48
- racing services, 71, 195, 218, 225
 Railway Act (1844), 124, 146, 174
 railway companies, 34, 127, 154; accidents, 35; capital, 76; compensation from PO, 170-3; contracts with telegraph companies, 49, 139; facilities, 73; free pass concession, 191, 264-5; interest in telegraph, 62, 79; offices rented, 87; maintenance of telegraph lines, 190; public messages and stations, 74
Railway News, 187
 railways, 13, 22, 25, 230, 236; engineering, 238; expenditure on 44-5; lines open, 51; telegrams on, 239
Railway Times, 31, 32, 36, 140
 Ramsgate, 242
 rationalisation, in telegraph industry, 54
 Read, Sir Edward, MP, 220
 Red Sea & India TC, 110, 111
 Reform Act (1832), 146
 Reform Act (1867), 146; bill, 136, 123
 Regents Canal Co, 96
 Reid, William, 103, 104
 relay apparatus, 24; *see* Davy, Edward
 rentals, telephone, 204, 206
 Reports:
 sc on Railway Communications (1840), 36, 41
 sc on Railway Safety (1841), 34-5
 SCET (1868), 74, 118, 148-51, 234
 sc on Telegraph Bill (1868), 149
 sc on PO (Telegraph Department) (1876), 180, 189, 218
 sc on Revenue Departments Estimates (1888), 195
 Reports to the PG upon proposals for transferring to the PO the control and management of the electric telegraph throughout the UK (1867-8), *see* Scudamore, F. I.
 Report by Mr Scudamore on the re-organisation of the telegraph system in the UK (1871), *see* Scudamore, F. I.
 Report of Committee appointed by Treasury (1875), 85
 Report of Committee on submarine cables (1860), 111
 Report of committee to inquire into the Inland Telegraph Service (1928), *see* Hardman-Lever Report
 Report of committee into the PO (1932), *see* Bridgeman Committee
 Report of the advisory committee on the future of the Inland Telegram Service (1958), 263-6
 Reuter, Julius de, 71, 240
 Reuter's, 71, 135, 149, 150, 155, 160, 164, 165, 167, 169, 229
 Reynolds, Col, 199
 Ricardo, Albert, 48, 78
 Ricardo, J. L., MP, 42, 43, 47, 48, 50, 78, 79, 96; advocates nationalisation, 120-1
 Ricardo, Samson, 48
 risk, in telegraph industry, 47, 76, 96
 roads, 54, 63, 190
 Rock Life Office, 78
 Roget, Dr Peter, 21
 Ronalds, Francis, 15-16, 38, 115; apparatus, 197
 Rotterdam, 52
 royalties, municipal, 213; telephone, 205, 208, 210, 211; Wheatstone's, 37
 royal engineers, 240
 royal family, private wire, 71
 Royal Society of Arts, 13, 14, 16, 21, 24, 101
 rubber, 101
 Rue, Thomas de la, 70
 Russia, 90
 Russo-Japanese War (1905), 90
- salaries and wages, *see* PO and telegraph companies
 Salisbury Plain, 243
 Salomons, David, MP, 69
 Salva, Francisco, 15, 101
 Samuel, Sir Herbert, PG, 223
Saturday Review, 183, 186
 Saunders, C. A., 41
 Saunders, William, MP, 217
 Seward, George, 111
 Schilling, Baron Paul, 17, 18; needle apparatus, 197

- Scilly Isles, 177; TC, 160
 Scotland, 53, 63; private lines, 72
 Scotland Yard, 70, 244, 245
Scots Magazine, 14
Scotsman, The, 180
 Scott & Wollaston, 203
 Scudamore, F. I., 120-2 ff, 128-30, 133-8 ff, 141, 142, 144, 147, 150-1, 154, 156, 159-62 ff, 166, 168, 172, 174, 178-84 ff, 189, 191, 196, 216, 218; calculations, 136-7, 178, 180 ff; 97, 188; confidential memo (1869), 147, 156; intervention in 1871 strike, 186-7; misappropriates funds, 179; report to PG (1866), 128-36; supplementary report (1868), 136-7
 semaphore system, 15, 56; superseded, 38
 SER, 52, 102, 103, 139, 155, 166
 shares and shareholdings, *see* telegraph companies
 share prices, chart 99; *see* telegraph companies
 Shattel-Arab river, 111, 112
 Shaw-Lefevre, MP, PG, 194
Sheffield Independent, 145
 Sheffield Town Council, 235
 shipbroking, 238
 shipping, 38; wireless telegraphs on, 244-5
Shipping Gazette, 87
 Siemens Bros, 245
 Siemens telegraph cable works, 116
 Siemens, Walter, 46, 101
Silvertown, telegraph ship, 117
 Simpson, General, 240
 Simpson, Lightly, 54, 79
 Sinclair, Sir Leonard, 263
 single lines, 19, 33, 35
 single-needle instruments, 178
 sixpenny uniform rate, 193-5, 251; *see* PO
 Slough line, 32, 33, 36, 39, 48
 Smith, W. H., MP, 79
 Smith, Willoughby, electrician, 114, 115
 snowstorms, 65, 91, 235
 Soemmering, S. T. von, 14, 197
 South Devon atmospheric railway, 39
 South Foreland lighthouse, 242
 South Western Railway, 36
 Spagnoletti, Charles, 49
 Spearman, Alexander, 121
 special wires, under companies, 72, 144; under PO, 217, 222, 225
 sporting news, 71, 219
 stationery expenses, *see* PO and telegraph companies
 Stearns, inventor, 234
 Stephens, Mr Justice, 202
 Stephenson, George, 34
 Stephenson, Robert, 25-7 ff, 29, 31, 50, 78, 79, 90, 111
 Steinheil, 23
 Stock Exchange, London, 51, 76, 82, 71, 237
 stock exchanges, 48, 49, 119, 146, 217, 237
 Stockton, 77
 Strand, the, 53
 street telegram service, 261
 strike, 186
 submarine cables, 51, 52, 89, 116, 155, 241, 268; boom in, 52, 115 ff, 238; capital employed in, 117, 238; coiling, 106; costs, 89-91, 101; damage to, 90, 104; insulation, 90, 101; paying out machinery, 114; picking up gear, 114; tariffs, 105
 Submarine TC, 55, 78; 89, 90, 96, 104, 149, 150
 Subscriber Trunk Dialling, 266
 Sudan, 240
 Swansea, 213; Bay, 102
 Sweden, 267
 Switzerland, telegraph system, 126, 129, 130, 133, 144, 162, 151, 192; higher press rate, 264
 Taff Vale railway, 139, 172
 tariffs, *see* PO and telegraph companies
 Tawell, John, 39, 44
 Taylor, John Edward, 216
 TCMC (1864), 112, 114, 115, 116, 241
 Telegraph Acts: 1863 Act, 46, 125; 1868 Act, 118, 154, 156, 184, 190, 191, 216, 231; Bill (1868), 136, 138, 159, 184, 190; 1869 Act, 160, 176-7, 201; 1892 Act, 213; 1899 Act, 213; Telegraph Extension Act (1870), 160
 Telegraph Battallion, Royal Engineers, 240
 Telegraph Capital Account, 160, 179
 telegraph colleges, 195
 telegraphists association, 185, 186
 telegraph companies, accounts, 89; capital employed, 76, 80; clerks, employed by, 85; costs, 80, 83, 85; continental receipts, 90; contracts with railway companies, 49, 139, 164-5; dividends, 134; employment of

- telegraph—cont.
 women, 85, 87; engineering costs, 85;
 extensions, policy on, 74; failures, 96;
 fuel, light & fittings, 87; instruments,
 68, 80; intimidation of press, by, 216,
 234; investment rating, 94–100; legal
 and parliamentary expenses, 63, 84;
 lines, 68, 80; loans, 76; maintenance
 costs, 84; messengers employed, 85;
 messages transmitted, 66, 67, 68, 73;
 monopoly of news collection, 144; net
 profits, 67, 91–2; night work, 87;
 payments to patentees, 83; press
 messages transmitted, 217; press ser-
 vices, 71–2, 216; press tariffs, 71–2,
 217; purchase terms, PO, 154, 155, 160;
 shareholders, analysis of, 54, 76, 78–
 80; share prices, 94, 147, 166–7; pub-
 lic network, 72, 73, 75; rates and rent,
 88; renewal of lines, 84; salaries/wages,
 85, 87, 185; stations open, 73; station-
 ery expenses, 88; submarine teleg-
 raphy, costs, 89–91, 101; tariffs, 53,
 63, 64, 66, 67, 143; training of staff,
 87; wayleave payments, 88; working
 expenses, 84–90
- Telegraph Gallery, at Electric's offices,
 86
- telegraph plant, revalued, 195
- Telegraphic Railways or the Single Way*
 (1842), 33
- Telegraph Street, Moorgate, 85, 190
- telegraph system, in large cities, 176; in
 London, 60–1
- teleprinters, 249, 255, 260, 268
- telegraphy, at international exhibitions,
 238
- telephone, 195, 196, 199 ff, 230, 236,
 253, 257; companies, 182, 208–9;
 development, 199–212; effects on local
 telegraph traffic, 234, 205; growth of,
 234; rentals, 204; trunk calls, 248, 263
- Telephone Company, the (1878), 199
 200, 202, 203
- Telephone Company of Ireland, 208
- telephone exchanges, 200, 201, 207
- Telephone Users Association, 267
- telex, 263, 266
- Thames, 13, 22, 25
- Thomson, Prof William, 107, 112, 114,
 115
- Threadneedle St, new Magnetic offices,
 55
- Till, Richard, 50, 78, 79
- Times, The*, 16, 24, 32, 37, 38, 40, 47, 51,
 52, 109, 115, 186, 208, 211, 221, 229,
 236, 244, 261
- time-ball, 53
- timber, chemical treatment of, 239
- time-tables, 33, 34
- Titanic*, 244
- Tofrek, battle of (1885), 240
- Tonbridge–Maidstone railway, 37
- Trafalgar (1805), 40
- Transvaal, 240
- Treasury, 24, 135, 180, 182, 199, 201,
 203, 204, 207–9 ff, 223, 243; guaran-
 tees, 110
- Trinity Bay, 107, 109
- Trinity House, 241
- tunnels, 19, 444, 48
- turnpike trusts, 87, 88
- two-needle instrument, 32, 33; *see*
 double-needle
- type printing telegraph, 64, 65, 82
- UKTC, 59, 71, 72, 76, 190; costs, 83–5 ff,
 88; opposition to, 62–5; PO purchase,
 148, 155, 160, 164, 167, 169; profits,
 92–4 ff; shareholdings, 78–9; uniform
 rate, 62, 67, 163
- UKTC Act (1862), 63, 124
- underground telegraph lines, 83, 235,
 249
- uniform rates, 62, 67, 128, 144, 149, 177,
 157–8, 162–3; questioned, 191–2
- UK, 40, 130, 194, 211, 230, 233, 234, 237
 249, 253, 263, 264, 266, 267; cables,
 107, 116, 118; telephones in, 214, 215;
 proportion of inland telegrams to
 letters, 137; telegraph costs in, 133
- Union of PO workers, 248, 250
- UPTC, 69, 71, 76, 83–4 ff, 135, 149, 150,
 155; PO purchase price, 160
- USA, 126, 129, 199, 233, 234, 236, 237,
 241, 246, 249, 250, 254, 267; cables,
 112, 115, 118; messages transmitted,
 126; press, 218, 221; railways, 13;
 telegraph system, 36, 45, 51, 254;
 telephones, 199, 206, 210, 211, 214,
 215
- Valentia Bay, Ireland, 66, 107–9 ff, 114
- Varley, Cromwell, inventor, 83, 111
- Varna–Balaclava cable, 239
- Victoria, Australia, 144
- Volta, Alessandro, 14
- wages, *see* PO and telegraph companies
- Walker, C. V., 102, 155

- Walker, Joshua, 25
 walk system, 249, 250, 253
 Walton-on-the-Naze, 242
 War Office, 240, 256
 war, telegraphs in, 239 ff
 Washington, USA, 45, 254
 Waterlow, Messrs Sydney & Alfred, 56
 Watson, Sir William, 13
 wayleaves, 49, 170, 182; telephone company difficulties, 213
 Weaver, Henry, 67, 74, 141, 185
 Wellington, Duke of, 37
 West Drayton, 29, 30, 32
 Western Germany, 264
 West India Docks, *see* Blackwall Railway
 Western Union Telegraph Company, 233, 234, 254, 266
 Westminster Bank, 70
 Weymouth-Channel Islands cable, 55
 Wheatstone, Prof Charles, 13, 24, 25, 26, 34, 37, 40, 42-4 ff, 47, 68, 97; ABC apparatus, 69, 83, 160, 164, 178, 199, 200, 204, 242, 245, 198; arbitration, 41; mechanical ingenuity, 20-3; partnership with Cooke, 40; shareholder in UPTC, 79; work in submarine cables, 102, 111-12, 115
 Wheatstone-Creed apparatus, 235
 Whitby, 77
 Whitehall, 240
 Whitehaven-Portpatrick cable (1854), 89
 Whitehouse, Edward, 105
 Whitehouse, Wildman, 107
 Whitworth, Joseph, 112
 Wilson, R., solicitor, 43
 Windsor, 36, 37, 42
 wireless telegraphy, 242-3, 251; Act (1904), 244
 Wireless Telegraphy & Signal Company (1897), 243
 Wollaston, Charlton J., 103, 104
 world produce markets, 238
 World War II, 260
 writer's cramp, 252
 Yarmouth, 37, 55; single-line to Norwich, 37, 44
Yorkshire Gazette, the, 144
 'zone' system, 250