

The early history of the telephone in Bath

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The city of Bath can fairly pride itself that it features in the history of the telephone, ten years before it was even invented. Moreover, it can be claimed that had it not been for events which then took place, Alexander Graham Bell may never have been able to make his notable discovery.

Bell was born in Edinburgh 3 March 1847.(1) From an early age he followed his father and made his vocation the study of the human voice, phonetics, elocution, and the teaching the deaf to speak. Even after the telephone had brought him fame and fortune he maintained this particular interest. In September 1866 Bell, only nineteen but mature for his years, was engaged to teach elocution for a year at the Somersetshire College in Bath. He first lodged at 22 Charles Street, little knowing that some hundred years later a large four-storey building would rise directly opposite, - the city's principal telephone exchange.

On 29 January 1867 he moved to somewhat more elegant quarters at 21 Bennett Street. It was about this time that results were made known of research by eminent German physicist Herman von Helmholtz (1821-94) into the compound character of vowel sounds. The subject was intimately related to speech, and of intense interest to Bell, who determined to repeat the experiments.

A particular vowel sound is always recognisable, irrespective of the pitch, because in addition to this variable frequency it always contains a characteristic invariant component.(2) Helmholtz had synthesized vowel sounds by generating pure tones, combining the resulting frequencies in variable proportions. Nowadays, this would be done by an electronic synthesiser but he generated his tones with tuning forks, maintained in constant vibration by electrical means. To do this, he used the principle of the trembler bell, a simple device to the modern school-boy, but far beyond Bell's experience. Consequently, before pursuing his main objective, he had first to master the electrical technology on which it depended.

In February 1867, he experimented in electromagnetism at his new address. With the assistance of a friend, he suspended wires between the windows of 18 and 21 Bennet Street and succeeded in transmitting telegraphic messages using Wheatstone needle instruments. Later, the knowledge and experience which Bell thus acquired were to be invaluable to him.

At the end of the academic year, Bell left Bath and there is an interval of close on nine years before he applied for his historic US Patent No 174,456 for the telephone on 14 February 1876.

Bell's Development of the Telephone

With other members of his family, Bell emigrated to the New World on 21 July 1870, and arrived in Quebec on 1 August. He later moved on to the United States, and in Boston embarked on efforts to perfect a 'harmonic telegraph'; a system whereby a single-line wire would provide a number of independent signalling channels. The idea was that the channels should all employ interrupted direct current but, in each case, interrupted at a different frequency. At the receiving end a series of reeds was to be provided, each being tuned to the frequency of one of the channels. Each reed was mounted in front of an electromagnet, through the coils of which the line current passed. The reeds themselves were permanently magnetised. The currents sent to line were generated by a series of transmitters, which were devices similar to a buzzer, each one tuned to a different frequency.

On 2 June 1875, Bell and his assistant Thomas Watson were carrying out tests.(3) Bell in one room had three transmitters, T1, T2, and T3, and also a receiving station comprising receivers, A1, A2, and A3. In a near-by room with a second set of receivers, B1, B2, and B3, Watson was adjusting B1, when the reed stuck to the electro-magnet. Bell called out to him to pluck it free, and when Watson did so, Bell was surprised to observe that the reed of the corresponding receiver A1 in his room was thrown into vibration. Immediately he



realised that the vibrating armature of B1 was inducing an alternating current in the coil of its electro-magnet, which was operating the receiver A1 in his room.

Bell had already thought of this possibility but had not investigated it, believing that the power transmitted would be insufficient to produce a useful effect.(4) Concurrently with his telegraphic experiments, he had been pondering upon the problem of telephony. He now saw that the greatest problem in the development of a successful telephone had been overcome.

The key concept was that of 'undulatory current', that is, one which varies continuously, reproducing an electrical analogue of varying air pressure at the transmitter, generated by the waves in the air arising from the speaker's voice. This concept may seem simple today, but in the 1870s it was revolutionary. We need to be reminded that the whole climate of thought was that of the electric telegraph, which used only intermittent or reversing elements of **direct** current to transmit signals.

Bell was thus able to build on the basis of his experience in Bath and his first primitive telephone held great promise, but it required considerable development before it could be marketed as a commercial proposition.

Bell's competitor, the contemporary American Thomas Alva Edison (1847—1931), ran what amounted to a highly successful invention factory, from which emerged major contributions in such diverse fields as telegraphy, electric lighting and power distribution, storage batteries, the phonograph, and cinematography. Moreover, he was a shrewd man of business. To compete with this new invention, it was necessary for him first to circumvent Bell's master patent in the United Kingdom. In doing so he devised the carbon transmitter, the electrical resistance of which varied in response to the pressure exerted on its diaphragm by the sound waves from the speaker's voice. The variation in resistance was used to modulate the current from a battery. It was much superior to Bell's transmitter, because it amplified the sound, whereas Bell's transmitter could only transform part of the feeble energy of the voice into electrical form. Edison's receiver was, however, far from being commercially practicable.(5)

When the Edison company began operations in London at about the same time as Bell, it became apparent that the Bell company had an effective receiver but a weak transmitter, whereas the Edison company's transmitter was excellent but its receiver was barely serviceable. Fortunately the two companies had the good sense to see where their best interests lay, and in May 1880 they merged to form the United Telephone Company. Edison's transmitter and Bell's receiver were adopted, both so soundly conceived that improved versions are still in universal use today.

The Post Office viewed the lusty new rival in the field of tele-communications with grave misgivings. The Telegraph Acts had conferred on the Postmaster General a monopoly of telegraph operation, and in 1880 the Post Office brought an action against the Edison company for its infringement. By the time the case was due to be

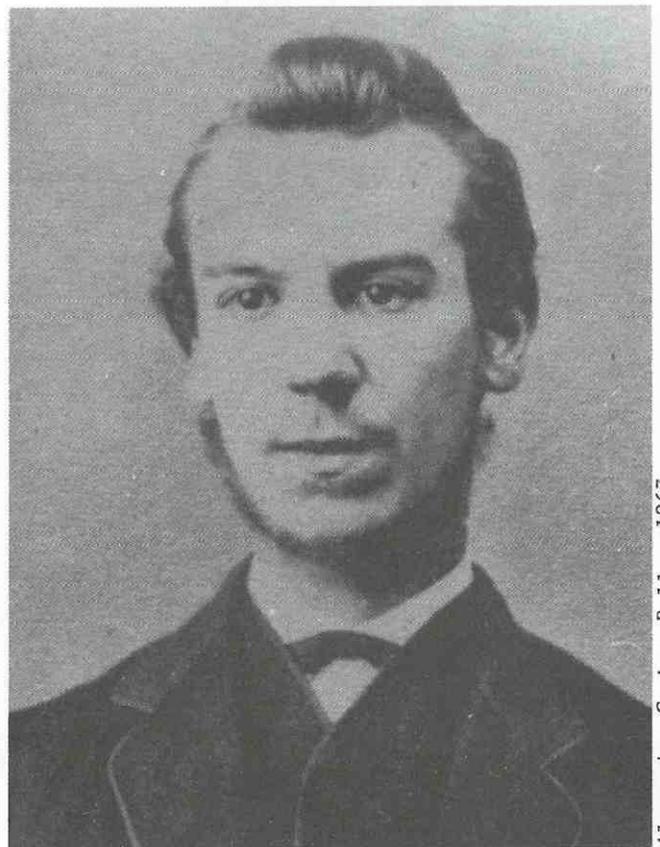
heard, the merger had already taken place, but the United company agreed to accept service of the writ, confident that the Post Office would fail in its action. However, when Mr Justice Stephen and Mr Baron Pollock delivered judgment on 20 December, they decided in favour of government control of the telephone. The Government then permitted the company to continue its operations under licence, on condition that it paid the Post Office ten per cent of its gross revenue.

Early Days in Bath

In Bath, the firm of Davis & Sons had been gas-fitters and plumbers since 1828. As the new electrical technology developed, they extended to electric bells, burglar alarms, and quickly included the telephone in their specialities. Their advertisement of 1879 refers to 'Pneumatic Electric Bells and Telephones'. By 1884 they had been appointed as the Bath agents of the United Telephone Company. The first telephone circuit in the city cannot be identified beyond doubt, but Mr E A Coleman recalls the following anecdote:

My father and his two brothers were all employed by Davis & Sons, as was their father before them. It was my father who installed the first telephone in Bath. . . . it may have been in Bathwick Hill. Apparently he was working at the top of a pole engaged in running the telephone wires, when he saw a man on the ground taking a great interest in the job. This man picked up odd strands of the wire which my father had cut off, and repeatedly held them end-on to his eye.

Father having descended from the pole . . . explained what he was doing, whereupon the fellow felt he was having his leg pulled. Walking away, he remarked that the whole thing was impossible, as there was no hole in the wire. I have some sympathy with the man, as until then it had not been possible to speak to anyone at a distance other than through a speaking tube.



Alexander Graham Bell, c1867

One of the earliest circuits ran between Davis & Sons' premises at 12 and 36 Walcot Street and Mr Charles Edmund Davis's house at 37 The Paragon. Another early installation is stated to have been in the offices of Stone, King, King, Stone, & Watts, Solicitors, at 13 Queen Square.(6) still in business at the same address, as Stone, King, & Wardle.

The Moves to set up a Public Telephone Service

At the very outset, the telephone had been thought no more than a means of point-to-point communication, an electrical alternative to the speaking-tube, but before long the concept of telephone exchanges came into being. It is surprising that it was not planned earlier, because telegraph exchanges enabling subscribers to signal direct to one another had been in use for a number of years; in New York for example as early as 1871.(7) The first telephone exchange in this country was established in London by the Telephone Company Ltd in the autumn of 1879, followed quickly by others in provincial cities. An exchange began operating in Bristol in December 1879.

In 1885, plans were made to hold a Fine Art and Industrial Exhibition in Bath at the Brock Street Hall, opening on Easter Monday, 6 April. Its patronage included the Mayor of Bath, Handel Cossham, a leader in Bristol's coal-mining industry, and noted philanthropist, whose name is commemorated by the Cossham Memorial Hospital. His involvement in Bristol commerce may have convinced him of the usefulness of the telephone in business. On 19 March 1885 he attended the Surveying Committee, supporting an application to run an overhead wire from the Theatre Royal to Brock Street Hall (later the site of Trinity Presbyterian Church). The intention was to demonstrate the telephone by relaying performances from the theatre. The telephone wire was to cross George Street, Gay Street, and Brock Street, and permission had already been obtained for it to run over the intervening houses. The committee agreed on condition that it was taken down within a month,(8) and that their consent should not rank as a precedent. No doubt this public demonstration helped to prepare public opinion for the moves to set up an exchange in Bath.

The United Telephone Company had devolved its operations to regional subsidiaries, leading to the formation of the South Western Counties & South Wales Telephone Company on 17 December 1884. The first move towards a public service at Bath took the form of a letter to the Surveying Committee 23 November 1885, in which the company sought permission to 'fix their overhead wires in order to connect Bath with Bristol; Mr H F Lewis, the company's Bristol manager, attended to explain its proposals.

Considering the proven utility of the telephone, the committee's reaction was astonishingly tepid. 'Alderman Bright moved . . . that the subject be postponed for a fortnight, before they allowed a mighty cobweb to be spread over the city of Bath'. The proposition was only carried on the casting vote of the chairman, Alderman C F Marshall. Indifference was again in evidence at the next meeting, when Mr Lewis explained that the company did not propose to erect poles in the streets; that service would be provided within a radius of

one mile from St Michael's Church; that the company did not expect profit until a hundred subscribers had been connected; that the principle hospital and police station were normally connected free, and at Bristol few serious fires occurred because the fire brigade could be called so quickly that they usually reached a fire within seven minutes.

It was agreed that Mr Lewis should canvass potential subscribers, and that the matter be dealt with further at a later meeting. On 4 January 1886 the committee considered a further letter stating the company's intention to set up an exchange in the city but no wire would cross a public street at a height of less than 35 feet. A sub-committee was appointed to liaise with the company.

The company now issued a prospectus to potential subscribers and, fortunately, a copy has survived at Camden Works Museum. The exchange would be open from 9 am until 7 pm on weekdays, the charges being £18 for one year to business subscribers and £12 to domestic users. A subscriber who placed an order for telephones at both Bath and Bristol would be granted a reduction of £3 per annum, indicating the company's enterprising approach. The prospect of telephonic communication between Bath and Bristol was regarded as important.

Premises for the exchange were secured at 11a Union Passage, stated to have been above Edward Peacock's fish and poultry shop at 14 Union Street.(9) The upper floors may have extended over number 14, but the premises seem mainly to have been above number 15, occupied at that time by Thomas Brown, Hosier. In these early days, telephone exchanges were commonly sited on the upper floors of town buildings, being cheaper and more suitable for overhead wires than ground floor accommodation.

It is difficult to state precisely when an exchange like Bath can be said to have opened.(10) As soon as the first subscriber was connected he would expect service, if only to Bristol. An indication that communication had been established between Bath and Bristol is given by the Bristol Times & Mirror of 11 August 1886:

Telephone Communications between Bath and Bristol

The Western Counties and South Wales Telephone Company (Limited) are extending their system with a deal of enterprise and judgement. Yesterday the first of a series of long distance wires was opened, Bristol being connected with Bath for telephonic communication by a wire which the most complete tests have demonstrated to be one of the best ever erected by the company. We were able to converse easily with an employee of the company in Bath, whom we could hear as distinctly as if he were in the same apartment as ourselves. Whistling, breathing, and whispering could, without difficulty, be distinguished, and the person in Bath readily caught and repeated numbers and figures spoken rapidly and at random at a considerable distance from the transmitter in Bristol. . . . Although the telephone is not yet in general use in Bath (at least there is no exchange) a good number of gentlemen have promised to become subscribers as soon as communication is established between Bristol and Bath. Now this is accomplished, we hope that there will be in our sister city a large acquisition to the business of the company.

Perhaps not all was quite so satisfactory as this eulogy might imply. The following letter to the Editor appeared in the *Bath Chronicle* on 30 September:

Sir,
I notice that in your edition of the 14th that there is a letter signed 'Aeolian Harp' in which it is stated that the company has coolly fixed the wires to the chimney stacks without consulting the ground landlord, owner, or occupier, etc. Now as we are the only Company in Bath running wires at the present moment it will naturally be assumed that we are the offenders; I must therefore beg to ask your kind insertion of this letter. We have no wire or wires in Bath attached to a chimney-stack, we would avoid doing so as we do not consider the practice a desirable one, and we never place an attachment on any property until we have received a consent in writing to do so.

H F LEWIS
General Manager and Secretary
Western Counties Telephone Company.

Mr Lewis may have had the best of intentions but anyone familiar with the pranks of some telephone engineers would be in little doubt as to which side of the story is the more likely to be true. However, the company was circumspect where the Town Council was concerned. The Watch Committee minutes of 20 August recorded that:

An application from the Western Counties & South Wales Telephone Co. Ltd. for permission to place a pole standard on the Police Station was referred to the Town Clerk, and if he saw no objection then he was requested to sign the Telephone Wayleave consent.

On 27 August 'the Town Clerk informed the Committee that he saw no objection to the application . . . and that he had accordingly signed the consent'. The wires were erected, and the exchange was ready for its formal opening by Anthony Hammond, the Mayor of Bath, Monday, 8 November 1886.

Bath gets its first Exchange

Reports appeared in the Bath and Bristol papers, the following being taken from the *Bath Chronicle* of 11 November:

On Monday the telephone communication between Bath and Bristol was formally opened at the exchange in Union-street by the Mayor (Mr A Hammond) . . . /who/ pointed out the advantages of the telephone including the great use he found in communicating while in the hospital. . . . Telephony, although in an initial stage and very useful was, he believed, capable of still further development.

The business men of Bath had at last shaken off their apathy, and come to appreciate the advantages of the telephone over the telegraph for discussion and immediate reply. As far as is known, the Bristol exchange had opened in obscurity. That the Mayor of Bath presided over the opening of the exchange in his city is an indication of the stature which the telephone had achieved in the intervening seven years.

The number of connections when the exchange opened is stated to have been ten,(11) which increased to between thirty and forty in the

next two years. By that time there were two day and one night operators. Call offices (known in the early days as 'call rooms') were provided at Combe Down, Kensington, and Weston. There is good reason to think that, as in Bristol, the subscribers' installations were connected to the exchange by a single wire with earth return.(12) This followed telegraph practice and was economical of line plant. Copper wire weighing approximately 55lb(13) to the mile was used. However, the arrangement was liable to overhearing because the common impedance of the earth return was shared by the subscribers' circuits.

Jealous of the telegraph revenue, the Post Office had done nothing in the first few years to encourage the development of a trunk system. In 1884, however, Mr Fawcett the blind Postmaster General, initiated a more progressive policy. In 1888 there were two trunk lines to Bristol, which gave access from Bath as far as Sharpness, Gloucester, Newport, Cardiff, and Swansea. By 1892 it became possible to call London, although the calls were routed circuitously by way of Bristol and Birmingham.

In 1889 the company reversed its policy of devolution, and over the following five years its progeny were re-united under the banner Of the National Telephone Company Ltd. The Western Counties and South Wales Company was absorbed on 1 January 1892.

The Second Exchange

It appears that by 1892 the exchange at Union Passage had outgrown the accommodation, because the company took a fifteen year lease from 25 December 1892,(14) on the upper floors of 11 Northgate Street over Cooling & Sons, Seed Merchants. The exchange was moved during 1893 and stayed for the remainder of the manual era.



Bath manual exchange, 11 Northgate Street, 1908, showing the exchange derrick. Photograph by courtesy of the Post Office Records Office.

The overhead wires terminated at the exchange on a large rectangular structure erected on the roof, to be borne away over the housetops. An old postcard photograph, taken probably around 1905, shows the structure, known as the derrick, and also a tall gantry with arms at right-angles, erected above a building between High Street and Union Street. Apparently the council had been opposed to telephone poles in the streets, but it is also unlikely that the company favoured them. It would have been necessary for poles to have been provided in almost every street, or to erect very high, stout ones, giving sufficient height for the wires to pass over buildings to subscribers' premises. It would have been preferable to support wires from the roofs although that was not without problems. Property owners liked to blame the telephone company for any defect on their roof, whether or not actually at fault.

Like most exchanges installed at this time, the new exchange was of the magneto type, as probably was the previous one of 1886. In this system the subscriber called the operator by turning the handle of a small alternating-current generator. This caused an indicator on the switchboard to release a small shutter, so signalling the call. The system lacked sophistication, but was very robust, making it suitable for military use. Subscribers were asked to turn the handle again when their call was finished for the operator to disconnect. They often forgot to do so, but 'to ring off' became part of every-day speech. It is now many years since anyone in this country 'rang off', but the expression still persists.

In its latter days, the exchange in Northgate Street was extended with switchboards which, while still magneto, were of different type. When the subscriber signalled, a small lamp lit up to show the operator that he was calling. The supervisor sat at a desk facing the switchboard, her back to the windows overlooking Northgate Street, in full view of the passengers on the top deck of passing tram-cars. The building, like those in Walcot Street occupied by Davis & Sons, has now been demolished.

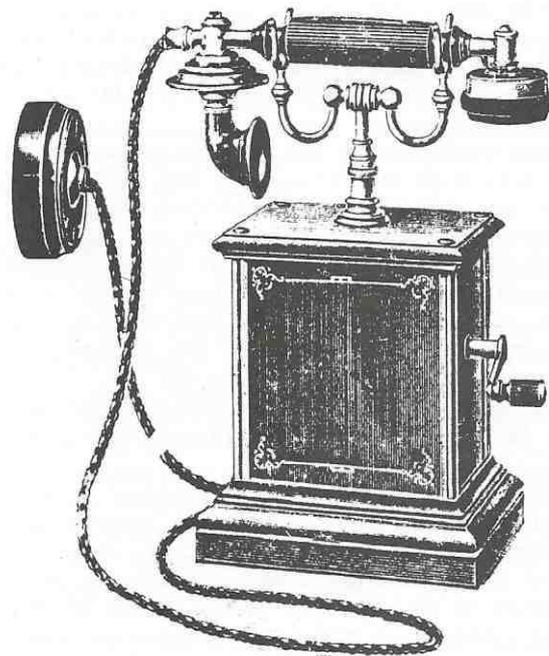
The Early Days of the Trunk Service

As noted previously, the company operated a trunk service in the early days which, particularly after 1884, gradually extended in scope. Thus, by 1892 London had become within range of Bath.(15) The trunk circuits were expensive, and calls were normally limited to a duration of three minutes.

The Post Office had been worried from the outset by the fear of losing revenue from the telegraphs. No doubt it saw the course which events must inevitably take and decided that, from April 1896 it would take over the trunk service, thus recouping revenue lost on the telegraph. It added substantially to the company's trunk network, much of the new construction being carried out by the Royal Engineers. The trunk service was grafted to the existing postal organisation, and trunk exchanges, which initially were quite small were installed in 239 of the larger post offices, including one at Bath.(16) At this time, the Bath Post Office was in York Buildings in George Street.

At most trunk exchanges there was no service at night and, on Sundays, only during an hour or two in the morning. Thus, the service at Bath was improved in May 1896 by switching the incoming ends of the trunk circuits through to the National Telephone Company's exchange when the trunk exchange was closed. In August 1905, an agreement was made enabling the Post Office to take over the company's system on 1 January 1912. In the interim period, harmonious relations were encouraged and various petty restrictions were lifted. Henceforth, there was to be free inter-communication between Post Office and NT Company exchanges in the same area. There had been continued agitation by business interests for the telephone service to be nationalised under the Post Office.

On 1 October 1906 the cheap night rate for trunk



A GEC magneto table instrument

calls was introduced from 7 pm to 7 am when the rates were halved. To avoid 'abrupt and uncouth expressions' by operators a number of Standard Operating Expressions were introduced on 1 December 1908.

On 25 December 1911 the Anglo-French telephone service was extended to Bath.

In the days before underground trunk cables became practicable, there was no alternative to the heavily-constructed overhead routes which, right up to the thirties, were such a characteristic feature of nearly all main roads and railway lines, and some canals. Stone—hrowing by bored rustics was pin-pricking compared with the tremendous havoc which could result from a severe blizzard.

Trouble was likely when soft falling snow accumulated on the wires, and then froze to form cylinders of ice two or even three inches in diameter. The difficulty can be illustrated by the example of a route of poles carrying 17 arms, each bearing six wires with every wire weighing 400lb to the mile, when the normal static load on a pole

amounted to 13cwt. The additional load due to weight of ice could be 14 tons, while the maximum horizontal force exerted by a cross wind could be as much as 29 tons weight.(17) No route, however strongly constructed, could be expected to stand such punishment. Some of the worst damage ever known occurred on 27 March 1916, when heavy snow, in conjunction with a north-easterly gale severely damaged pole routes in some of the midland counties.

The Introduction of Underground Cable

The 'mighty cobweb' which Alderman Bright in Bath had predicted came closer to reality as the end of the 19th century approached. By 1900 there were 300 subscribers and 11 trunk and junction circuits, and by 1912 these figures had increased to 1100 and 29 respectively. Besides their unsightliness, overhead wires were a potential liability. This had been demonstrated dramatically on 25 December 1886, when a blizzard caused severe damage to overhead plant in London. As a result, the telephone service was dislocated for weeks, and the cost of repair was £30,000.(8)

Overhead construction was the obvious method of distribution in the early days, but with the passage of time several factors emerged which favoured underground cable. They included: the unsightliness of overhead wires; the advantages of metallic circuits serving every subscriber by a pair of wires which avoided over-hearing; the development of dry-core cable; the increasing number of subscribers, allowing the use of underground cable to become more economical; the much lower fault liability of underground circuits.

Overhead wires in Bristol were replaced by underground cable in 1900, so it is not surprising that moves in the same direction were made in Bath at about the same time. The company had attempted to obtain legal powers to lay underground cable as of right, but without success; in part because of the opposition from Town Councils and kindred bodies, that of Bath amongst them. Their opposition was in defence of their own powers more than aversion to underground cables but, eventually, negotiations for the laying of underground cables were finalised between the two parties on 23 March 1897.

When the Surveying Committee met on 31 July 1899

... the National Telephone Company asked for permission to lay underground mains in the Lower Bristol Road in order to complete their service of underground mains in the city and Mr Perkins explained that when they were completed nearly one third of the present overhead wires would be taken down.

A further Agreement was entered into on 7 September 1900. As from 1 January 1900 the Company agreed to pay the Corporation 2s per annum for every subscriber connected, and 10s per annum for every pole. The telephone rates charged to Bath subscribers were not to be increased without the Corporation's consent, but this would not preclude the possibility of a Measured Rate tariff being introduced as an option to subscribers.

The Extension of Telephone Service around Bath

From about 1895, telephone service began to be extended to the suburbs of the cities and to the

larger country towns. As a rule, the National Telephone Company installed an exchange, and provided access to it over its own junction network, while from April 1896 onwards, trunk service was the responsibility of the Post Office. In a few places, however, the local exchange was provided by the Post Office. Initially it would have been uneconomical to provide full-time operators, and the work was on a part-time basis. At the most, a single-position switchboard was used, and in some cases, it may well have been nothing more pretentious than a box fixed to the wall.

The exchanges were usually installed in unpretentious private houses, the operating work being performed by a caretaker-operator and the members of the family. At Post Office exchanges, the sub-postmaster was usually also caretaker-operator. The number of connections in the early days was very small. In 1899 Bradford-on-Aven had six and Trowbridge ten. The fact that NT Co exchanges could be provided on Post Office premises at Saltford and Box was a sign of the friendlier relations which now existed between the Post Office and the Company. It had not always been so, for the Post Office had actually forbidden it on 2 November 1897. From about 1905 the Post Office started to serve the larger villages by call offices with increasing liberality, until the advent of rural exchanges in the 1920s. The call office might be connected to an exchange some distance away, thus Colerne was connected to Bath exchange on 27 October 1914.

Timsbury and Marshfield are examples of rural areas where exchanges were not provided until the twenties. Both were of the Central Battery Signalling type (Timsbury CBS1, and Marshfield CBS2) which the Post Office developed for localities where no public electricity supply was available. Primary batteries energised subscribers' transmitters, but called the exchange by simply lifting the receiver. Power for signalling was provided by a central primary battery at the exchange. The virtue of the system was that the drain on this central battery was low enough for primary cells to be used. It was not practicable to make use of secondary cells, because of the difficulty of keeping them charged. Other exchanges would have been of magneto type at the outset, although under the Post Office were often replaced by more modern switchboards, usually CBS. Devizes and Trowbridge became CB10, a Central Battery system in which all the power requirements were furnished by a battery of secondary cells at the exchange.

In the early days the duties of the operating staff were not onerous, since there were few connections, and hours of service did not usually extend much beyond those of business. But as time went by the demand extended and, from 11 November 1913, continuous service was provided at all new exchanges. However, a supplementary charge of £1 per annum was often made to the subscribers for night and Sunday service.

The subscribers appreciated the personal attention they received, which often went far beyond operating instructions, but the increasing work load imposed a severe strain on the caretaker-operators. When, eventually, a small rural exchange was superseded by a Unit Auto-

matic Exchange, the caretaker-operator was usually only too thankful.

The Bath Sub-Exchanges

At this point it is convenient to refer to the exchanges established in the outer parts of the city, and its immediate environs; Batheaston, Lansdown, Weston, Combe Down, and Newton St Loe.

Batheaston The company acquired a house in The Batch, in which the exchange was opened on or about 9 August 1898, probably from the outset at 'Fairview', now 24 The Batch. A lease on this house was taken for five years from 25 March 1907, which was as long as the company would have any interest in it. (19) In 1899 there had been

- 501 W S Pritchard, Fly Proprietor, White Hart Hotel
- 502 G F Metzger, City Electrical Engineer, Fern Cottage
- 503 John Biggs & Company, Avondale Brewery
- 504 George Cooling & Sons, Batheaston Nurseries.

Lansdown The company leased 1 St Stephen's Place, St Stephen's Road, for twenty-one years from 24 June 1902, (20) and the exchange opened on or about 23 December, the caretaker-operator being Mrs Edith Pickett. Little else is known as it closed on or about 8 January 1907. The reason is unknown but, at this period, it was not unusual for exchanges to be closed or to have their names changed. Possibly its existence was not justified when the Post Office took over the Company's system.

Weston The company leased 14 Newbridge Hill for twenty-one years prior to opening an exchange about 28 February 1905.(21) Until 1906/7 the caretaker-operator was George Hext (or, more likely, Mrs Hext), when his place was taken by Walter Owen. He was replaced in his turn by Mrs Elizabeth Nash in 1914/15. In 1912/13 the house was re-numbered as number 29. Mrs M J Seviour is Mrs Nash's daughter, who contributed the following:

I was born in the exchange at 29 Newbridge Hill, Weston, which had been the National Telephone Company's exchange. I used to operate the switchboard, quite irregularly, from the age of seven. My mother was in charge from 8 pm until 8 am, and on Sunday afternoons. There was a telephonist on Sunday mornings. There were three magneto positions, and the normal staff was three telephonists. The switchboard was on the ground floor at the back, in what would normally have been the dining room. In the garden was a pole, and many of the subscribers' circuits were overhead. Among the engineers I remember Tom Fletcher, Harold Horsell. and Jock Bucklitch, and they used a motor-cycle combination for transport.

Combe Down On 25 December 1905 the company, leased for twenty-one years 3 Trafalgar Place,(22) now 18 Combe Road. The exchange opened about 26 December 1906. There was a succession of caretaker-operators, presumably the wives of the occupiers listed as follows: 1906-1913, T E Longman; 1914, F W Bowen; 1915-17, F J Miller; 1918-20, Mrs Nash; 1921, Unknown; 1922-26, F Miller; 1927 onwards Mrs Wilkins.

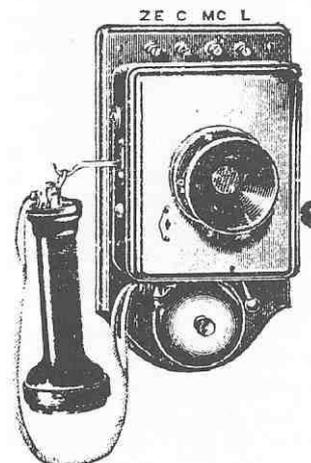
Newton St Loe The exchange was opened about 26 June 1911 at number 1 Newton St Loe, Yew

Tree Cottage. The switchboard was situated in the front passage-way or hall-way. The caretaker-operator was Mrs Montague, and this lady's daughter, Mrs Symas, later became caretaker-operator at Flax Bourton.

The Development of the Manual System

The manual telephone system in Bath had now been established in its entirety, and it continued to grow and, at the same time, to age. In the early years of the century, party-lines became popular as a means of providing an economical service to such people as small tradesmen. For example, the letter-heading of W J Scudamore, Plumber, Chelsea Road, Lower Weston, shows the number Weston 1x3.(23) To call him, the operator would plug into the number Weston 1, and ring three times on the X leg of the circuit to earth. Had the number been 1y2, she would have rung twice on the Y leg. The disadvantage of the system was that all the X subscribers' bells rang whenever any X number was called, similarly for Y subscribers. This was something of a nuisance in itself, but also meant that there was no real privacy.

As mentioned earlier, arrangements had been made for the National Telephone Company's system to be taken over by the Post Office, 1 January 1912. The transition, when it came, appears to have been uneventful. There is verbal evidence that the trunk exchange remained in the old post office until 1921, when there were four or five operating positions.(24) However, trunk calls from Bath were controlled at the Bristol Trunk Exchange by January 1922.(25) The transfer was probably because of shortage of accommodation in the George Street post office where, as early as 1872, there had been complaint in the press about its inadequacy. There was little point in transferring to the local exchange in Northgate Street because, there also, the increasing number of connections was fore-shadowing accommodation difficulty.



A simple battery wall set made by GEC

During the manual years, there were few spectacular or revolutionary improvements in service, but modest benefits were introduced by degrees, for instance

14 October 1913 Emergency calls to Fire and Ambulance were freed of charge

- 25 November 1913 Fees for incoming calls to call offices were abolished
- 1 July 1914 Reduced charges for cancelled and ineffective trunk calls were abolished
- 1 May 1923 Weather forecasts were made available by telephone.

On 30 September 1915 trunk charges were increased to a maximum rate of 12s (6Op) for three minutes. The corresponding present charges (May 1986) are 44p Peak Rate and 35p Standard Rate for subscriber-dialled calls, illustrating that technical improvements have cheapened the service, notwithstanding inflation. nto account.

With the growth in traffic, direct junction routes became justified to neighbouring exchanges Miss Fare recalls that in 1926 there were direct circuits to Bradford-on-Avon, Bristol, Chippenham Devizes, Midsomer Norton, Radstock, Swindon, and Trowbridge, in addition to the local exchanges.

With the exception of the principal outlet to Bristol, these routes were small, and worked as jack-ended signal junctions, calling the distant switchboard on equipment analogous to that used by subscribers.

The outgoing Bristol route, however, was large enough to justify Order Wire working. In this system, the outgoing junctions were accessible from jacks on the switchboard in the same way as signal junctions but, at the incoming end, each circuit terminated on a single cord circuit. One junction was reserved for outgoing operators to pass their demands. It was connected permanently to the incoming operator's headset, and at the outgoing end any of the operators could speak on it by pressing a spring-loaded button on the key-shelf of her position.

As outgoing operators passed their demands in rapid succession, the incoming operator allocated them a free junction, connecting the plug of the corresponding cord circuit to the number required. There was no time for her to report that it was engaged or unobtainable; if this was so, she plugged into a jack which returned an 'engaged' signal, or 'busy-back', or 'number unobtainable' tone. Order wire working was at least twice as fast as signal junctions, and there was no more hectic duty than operating an order wire position. In the old city manual exchanges, there were whole suites of order wire positions, and the sight of the operators working under pressure, often out of chairs and at full stretch is one which the writer remembers vividly, after more than fifty years.

Mrs Ena Ashford, a contemporary of Miss Fare, gave a remarkable demonstration of the familiarity acquired by operators of numbers on their exchange by recalling, after well over fifty years, more than thirty of the busier numbers. Among them were:

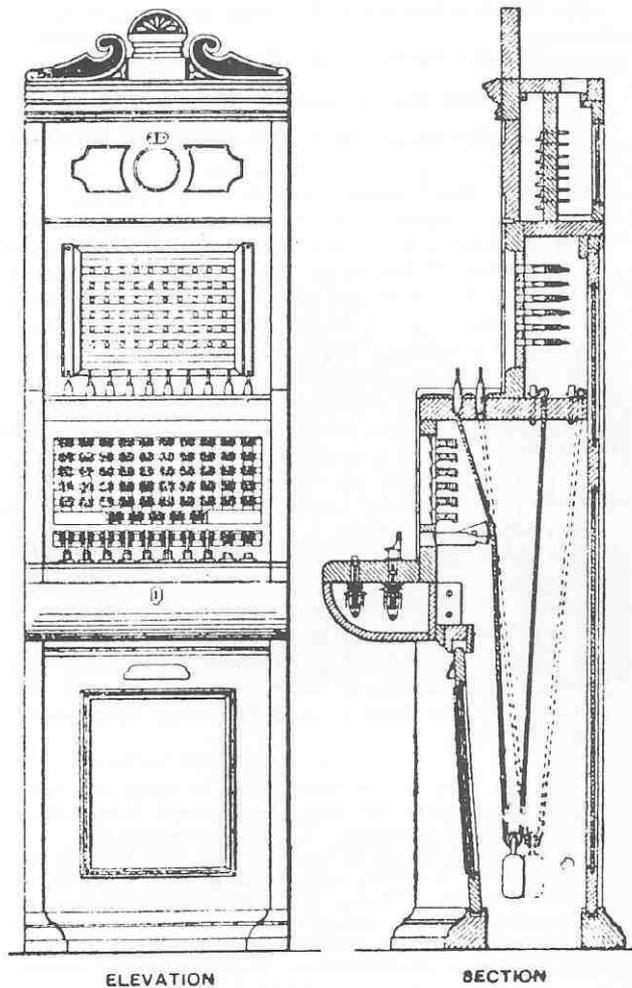
- Bath 23 Spear Bros & Clark Ltd
- Bath 47 Great Western Railway, Enquiry Office
- Bath 52 LMS Railway, Passenger Office
- Bath 53 York House Hotel

As time went on the Post Office showed more enterprise in developing the telephone service and the numbers of new subscribers began to be published in the newspapers.

With the passage of time, not only did the mag-neto exchanges in Bath become increasingly out-moded; the main exchange outgrew its accommodation. As Mrs Ashford writes, 'How well I remember that old exchange above a shop on very dodgy floorboards - how they took the weight, heaven alone knows!'

Miss Fare adds further personal recollections:

There was an Assistant Supervisor, two Supervising Telephonists, and a day staff of about 26. The switchroom was heated by coal fires, one at each end of the room. Fire drill could be hair-raising. There was a contraption which held one person, and was lowered from the switchroom window into the street. Volunteers were asked for, to be 'rescued'.



Fifty-line double-cord standard switchboard.

Small auxilliary swtichboards had to be crammed into whatever space was available, and it became clear that the exchange would have to be replaced. Apart from lack of space, switchboard wiring deteriorated as the metal slowly crystallized and became brittle, giving rise to maintenance problems after about thirty years' service. If a jack in the subscribers' multiple became disconnected because a wire had snapped, it was useless to attempt repair, being impossible to get at the fault without displacing the multiple cabling. The slightest movement was sufficient to bring on several additional faults. The more practical solution was to change the subscriber to a spare number, free of faults, put pegs in



Bath Toll Exchange in the 1950s

the jacks belonging to his proper number, and instruct operators to connect calls to the substitute number without comment.

The time had come when something had to be done about the old magneto switchboard in its overcrowded building with the doubtful floorboards. When it reached the ripe old age of thirty-five it was at last relinquished.

A New Age Dawns

Almost as soon as the telephone had been invented, efforts had been made to devise a means of switching calls automatically. The early proposals were crude and impracticable, but in 1889 Almon B Strowger patented the basic ideas of the system to which he gave his name, and which eventually was adopted as standard by the British Post Office. Mr Strowger, an undertaker in Kansas City, apparently had become dissatisfied with manual working because calls intended for him were diverted to a competitor, whose wife was an operator at his local exchange.(26)

Other inventors contributed to the evolution of a thoroughly practicable system, among them E A Mellinger who, in 1907, reduced the wires connecting the subscriber to the exchange to two, instead of the five previously needed. Beginning in 1912 at Epsom, the Post Office installed a number of experimental exchanges of various types, and in 1918 opened its first large auto-

matic system. As the Head Post Office and the telephone exchange were both inadequate, a new building was erected for both requirements on the corner of Northgate Street and New Bond Street which was opened for postal and telegraph business on 16 May 1927. The installation of the exchange could not begin until the building was completed, and on 15 October the *Bath Weekly Chronicle* reported that a start would be made the following week with the installation of the automatic telephone system, a big undertaking expected to occupy a year.

In step with the operations at the Head Post Office, a building and satellite automatic exchange was provided at Batheaston on the opposite side of The Bath from the manual exchange. Ericsson Telephones Ltd were awarded the contract to supply equipment for 3050 lines initially and 5900 ultimately. Whether these figures refer only to the main exchange, or together with Batheaston, is not clear but the former seems the more likely.

Bath was the first exchange in the Bristol district to be converted to automatic working, and the change-over must have created a stir in the city. The Post Office went to great pains to ensure that subscribers knew how to operate the new system before it opened. A bridge-control automanual switchboard of ten positions was installed on the first floor to handle the calls which subscribers would still be unable to dial

for themselves. The transfer to automatic working was foreshadowed by the *Bath Chronicle & Herald* on 19 January 1929.

Change over in Bath to be made on January 26

The 2500 telephones in the Bath and Batheaston exchanges will be changed over to the automatic at 2 pm on Saturday the 26th. . . . The following Tuesday afternoon the Postmaster (Mr Harry Chambers) is inviting a number of people interested to see the apparatus and switchrooms actually in operation.

The reception at the exchange went off satisfactorily. The *Bristol Times & Mirror* reported on 30 January:

Mr W Pugh (Postmaster-Surveyor, Bristol) remarked that the Post Office had determined that the Bath public should have an automatic telephone exchange which should be second to none in the country. . . . Bath was the first town in the Bristol postal area to be provided with an automatic telephone exchange. For some three months prior to the installation of the new system a specimen demonstration automatic set was installed in the Head Post Office and demonstrations of the mode of operation were given by members of the engineering department. No fewer than 1,700 people availed themselves of the opportunity. . . . Major Batchelor told the guests that in 1912, when the telephones were transferred to the State, Bath had 1,106 subscribers and 29 trunk and junctions. The present exchange had 2,058 direct exchange lines, 3,937 telephone stations, and 142 trunks and junctions.

It should be noted that party-line working, although it had greatly diminished from the early years of the century, did not entirely finish with the opening of the automatic exchange. To the author's recollection, at least one (in the Englishcombe area) and possibly others, remained as Rural Party Lines until the closure of the auto-manual switchboard in the Head Post Office, then known as Bath Toll Exchange. The subscribers continued to be worked manually from the auto-manual board and had five-digit numbers beginning with 93. When lifting the receiver to make a call, it brought in a lamp-calling signal on the switchboard. The operator answered in the ordinary way, recording his number on her ticket before setting up the call.

If someone wanted a Rural Party Line subscriber he would make his call as if it were to any other Bath number, for example, to Bath 93124. The digits 93 routed the call to the switchboard, where the operator asked what number was required. The third and fourth digits 12 indicated that an X subscriber on line number 12 was required; if the digits had been 13, it would have shown that the called number was that of a Y subscriber on the same circuit. Similar discrimination applied between 14 and 15, and so on. The final digit & indicated that four rings should be given. To complete the call, the operator plugged into one of two jacks associated with the line, labelled 9312 and 9313 respectively, and gave the number of rings indicated by the final digit.

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The Scheme Completed

It is not clear why the operation on 26 January

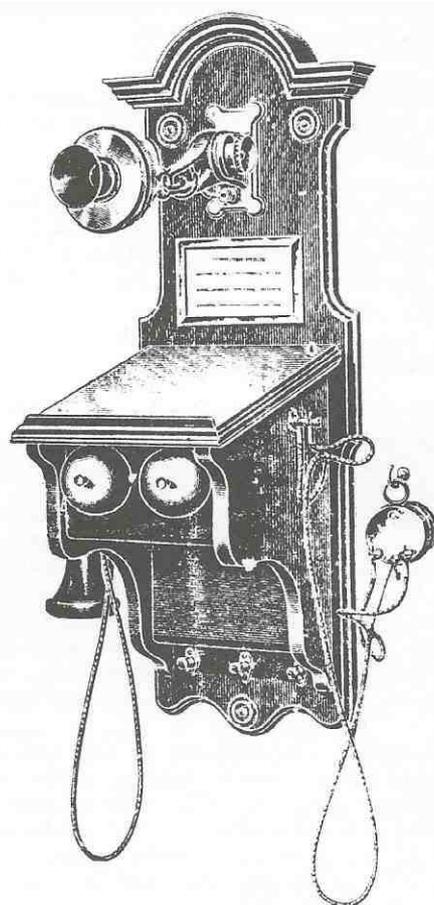
1929 included Batheaston but not Weston. There could have been various reasons: the security of tenure of the manual premises, the availability of a site for an automatic exchange, the adequacy of the manual exchange accommodation, difficulty in staffing, and last but not least, the condition of the manual switchboard.

Significantly, something similar happened at Bristol, where the whole city area was converted at the same time with the exception of Fishponds which remained manual for a further nine years. Fishponds was the most recent of the Bristol switchboards, having been in service for only ten years when the other exchanges were converted. This could well give the clue to what happened at Bath, as in 1929 the main exchange was 35 years old. Batheaston 30, but Weston only 24. However, the completion of the automatic scheme was not long delayed. A building was erected in Station Road, Weston, and the satellite automatic exchange was brought into the Bath linked-numbering scheme at 2 pm on 30 July 1931.

Mrs Nash, the caretaker-operator, was allowed to buy the house in which she had lived since 1915, and lived there until she died in 1944 at the age of seventy.

Epilogue

The conversion to automatic working brings to an close the early history of the telephone in Bath. However, there has been no shortage of further developments since 1931, as outlined briefly below.



Subscriber's wall set

It would be unthinkable today for a doctor to be without a telephone, but on 1 July 1931 the *Bath & West Chronicle* reported:

Every Doctor now on the Phone

Every practising doctor in the country now has a telephone. This is the claim of the Post Office authorities who say that, as a result of their recent extensive campaign, 12,500 medical men who were not equipped with a telephone were persuaded to have one installed.

The Post Office had replaced the magneto exchange at Combe Down by a Central Battery Signalling switchboard in the same premises prior to 30 September 1920. Between March 1933 and April 1934 an early type of Unit Automatic Exchange, the by-path type U 9 was provided, and this in turn was replaced by a UAX 14 between March 1940 and April 1941. The present TKX 1 (Cross-bar) exchange was provided in a new building on 2 May 1973, and the old building is now used as a place of worship.

During the year October 1937-September 1938 the manual exchange at Newton St Loe was superseded by a UAX 12, but closed on 11 November 1971, the subscribers since being served from the exchange at Saltford. The Weston (Bath) exchange lost its separate identity on 6 May 1940, when the subscribers became known simply by Bath numbers, similarly at Batheaston at an unknown date prior to 16 September 1944.

On 19 February 1941 the Post Office Circular announced the opening of 'Tennyson' exchange. In fact there was no exchange at all; 'Tennyson' was a cover-name for the Private Branch Exchange which served the Admiralty establishments which had been evacuated from London to Bath.

Because of the substantial increase in trunk traffic which the move generated at Bath, a new Trunk Exchange of sleeve control type was opened at Lansdown on 16 September 1944. The exchange controlled trunk calls from exchanges at Bath, Batheaston, Box, Bradford-on-Avon, Bratton, Combe Down, Keevil, Limpley Stoke, Marshfield, Newton St Loe, North Trowbridge, Tennyson, and Trowbridge. Thus it is apparent that at this date Batheaston still had its separate identity.

The auto-manual switchboard (Bath Toll Exchange) at the Head Post Office was closed on 21 March 1963, and the work transferred to the Trunk Exchange. The vacated accommodation was used to extend the automatic equipment. To meet the increasing requirements, a new main exchange, known as Bath Kingsmead, was opened on the corner of Monmouth Street and Charles Street on 1 April 1967. A tremendous amount of meticulous planning went into this very complicated operation which, in general, went very smoothly. There was, however, one minor hitch, and that was enough to make the reporter's day. With obvious relish, the *Bath Chronicle* headed its report of the transfer with the words: **Post Office cuts itself off**

A fire had occurred at Weston satellite exchange on 13 August 1962, and this made it desirable to close the exchange there as soon as possible. A short time before the main opening of Kingsmead, about 15 March 1967, the subscribers were transferred from Weston to the new exchange. Shortly

after Kingsmead opened, on 22 June 1967, Subscriber Trunk Dialling was provided. International Subscriber Dialling was added on 9 December 1976, and the final development to be recorded is the provision of Pay-phones for International Dialling on 26 January 1983.

The telephone service in Bath has come quite a long way since Anthony Hammond declared the first tiny exchange open a century ago. In retrospect, no-one could accuse him of exaggeration when he said: 'telephony, although in an initial stage and very useful, is capable of still further development'.

Notes and Sources

- 1 The main sources of information about Bell and his family are: Bruce, Robert V, *Alexander Graham Bell and the Conquest of Solitude*: Kingsbury, J E, *The Telephone and Telephone Exchanges*; and the Bell family papers, which are held by the Library of Congress, Washington DC USA.
- 2 The characteristic invariant component consists of two frequencies produced by the resonant cavities formed in the mouth behind and in front of the tongue. Alexander and his father discovered this for themselves, unaware that Helmholtz had anticipated them.
- 3 Kingsbury, p37
- 4 Kingsbury, p36
- 5 British Patent Spec. 5335 of 1879; Engineering 21.3.1879, p238; Kingsbury, p202
- 6 *Bath Chronicle*, 16.4.1938, Notes and Queries
- 7 Kingsbury, p85
- 8 Mr Davis undertook to do so, from which it appears that Davis & Sons provided the telephone circuit.
- 9 *Bath Chronicle*. 15.3.1926
- 10 A note that operations began on 27.8.1886 seems to have come from *The Electrician*. but from which issue is not clear.
- 11 *Bath Chronicle*. 15.3.1926 Ten connections could be an under-estimate. In the 1895 *Directory* (PO Records Office) Mr Freeman, the surgeon mentioned by the Mayor, had the number Bath 16, and he was clearly connected at the opening date.
- 12 *Bath Year Book*. 1891, p66
- 13 In his speech at the opening ceremony (*Bristol Times & Mirror*. 9.11.1886, p3) Mr Nash stated that a coil of 100yds weighed 31b.
- 14 N T Co Sites and Buildings List, PO Records Office.
- 15 *Bath Chronicle*. 15.3.1926, 'Day by Day'
- 16 *Post Office Circular*. 26.3.1896. During the year there were 6 additions.
- 17 Poole, J, *The Practical Telephone Handbook*, p372
- 18 Baldwin, F G C, *History of the Telephone*, p438
- 19-22 N T Co Sites and Buildings Book, PO Records Office
- 23 Camden Works Museum
- 24 Mr L Cottell stated that when he became a Boy Messenger in 1914 there was a Trunk switchboard of 4 or 5 positions at the Head Post Office.
- 25 Telephone Service Instruction E11, January 1922, lists no Bath group, and the Appendix RG 82, March 1922, lists Bath as being in the Bristol Group. (PO Records Office).
- 26 Robinson, J H, *The Story of the Telephone*, p99

Acknowledgement

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