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Historic Places Investigation

The Time Ball, Guildhall, Kingston upon Hull: History, context and significance

Lucy Jessop

Discovery, Innovation and Science in the Historic Environment



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**THE TIME BALL
THE GUILDHALL
KINGSTON UPON HULL**

HISTORY, CONTEXT AND SIGNIFICANCE

Dr Lucy A Jessop

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Front cover image: the north face of the Guildhall's clock tower and time ball, looking towards the river Humber, taken by HexCam Ltd's drone. HGH16V085 © Historic England

SUMMARY

Since 1915, a time ball has surmounted the clock tower of Hull's Guildhall, a Grade-II*-listed building (National Heritage List for England 1279708). The Guildhall, built between 1905 and 1915, is located on Alfred Gelder Street; its entrance elevation and the principal face of the tower looks towards Lowgate. The architect Sir Edwin Cooper (1874-1942) added the time ball to the Guildhall's design in 1914-15 at the request of the Corporation of the City and County of Kingston-upon-Hull. This report forms part of the consultation between Hull City Council and Historic England to see how the time ball can be restored to working order. The report was commissioned by Kerry Babington, Inspector of Historic Buildings and Areas, Planning Group, Historic England.

Time balls – particularly surviving and working ones – are unusual structures. This report seeks to set Hull's time ball within its historical context, considering the wider history of time balls from their introduction at Greenwich in 1833 and their adoption across the world to their obsolescence in the early 20th century. It discusses how Sir Edwin Cooper's design of the tower changed once the time ball was decided upon by the Corporation and how the time ball was constructed in the early years of the First World War when the Guildhall was finally completed, as well as the challenges experienced in making it work. It then considers the significance of Hull's time ball.

CONTRIBUTORS

The research, text and many of the photographs contained within this report were produced by Dr Lucy Jessop, Senior Investigator, Historic Places Investigation North, Historic England. The report was edited by David Went and Clare Howard. Drone images of the time ball and the clock tower of the Guildhall were commissioned for Historic England by David Andrews and David Went. The drone survey was provided by HexCam Ltd. Laser scanning of the tower and time ball was carried out by members of Historic England's Geospatial Imaging Team and the resulting ortho images – derived from a combination of the drone images and the laser scan point cloud – were produced by Jon Bedford with assistance from David Andrews.

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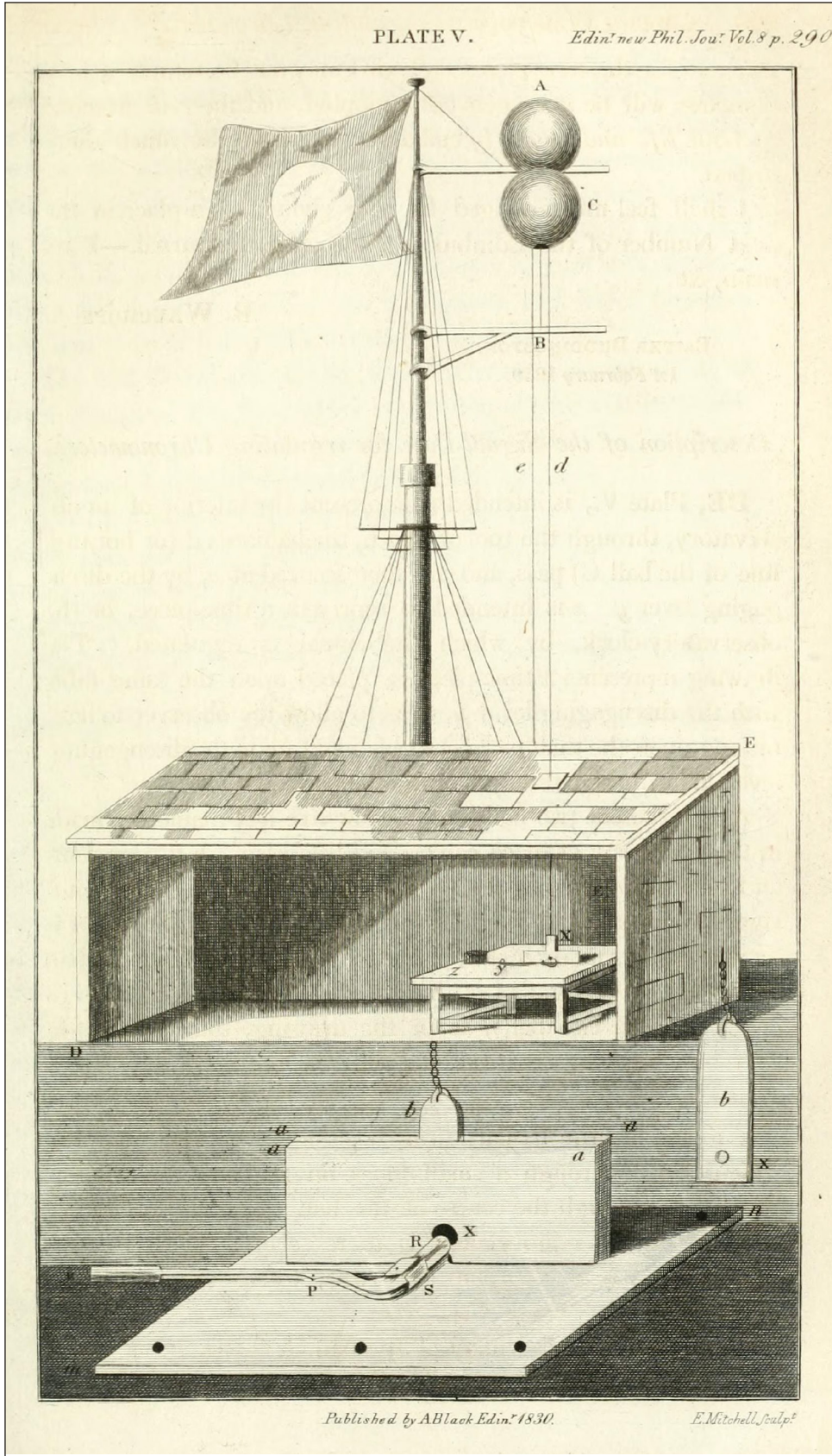


Fig. 1: Captain Wauchope's design for a time ball, as published in the *Edinburgh New Philosophical Journal*, Vol VIII, 1830, 290. Reproduced from <http://biodiversitylibrary.org/page/24456697>

THE HISTORY OF TIME BALLS

The early history of time balls

Measuring and telling the time is a basic preoccupation of humanity, but the ability to tell the time at sea brought immense benefits for an island-bound, mercantile nation such as Great Britain. The Royal Observatory at Greenwich, London, had long sponsored and invested in research, such as the 1714 Longitude Act to encourage developments in the measurement of longitude whilst at sea. As a result, chronometers – portable timepieces for use at sea – were developed to help navigators with their longitudinal calculations, but they required hand-winding and then to be correctly set in order to do their work with accuracy. Establishing the exact time – Greenwich mean time – was the job of the Observatory, whose next step was the invention of a visual time signal which would allow the navigators and mariners of the Port of London to set their chronometers to the correct time. The result was the invention of the time ball, a visible signal connected to a highly-accurate clock.

An early prototype for communicating time via telegraphs – perhaps using signal stations – was developed by Captain Robert Wauchope (1788-1862) of the Royal Navy; it was planned as early as 1818 and tested at Portsmouth in 1829-30 [Fig. 1].¹ In 1833, he wrote to the Lords of the Admiralty to suggest that a time ball be set up at Greenwich; they referred the matter to the Astronomer Royal, John Pond (1767-1836), and the Observatory's time ball [Fig. 2] was working by the end of

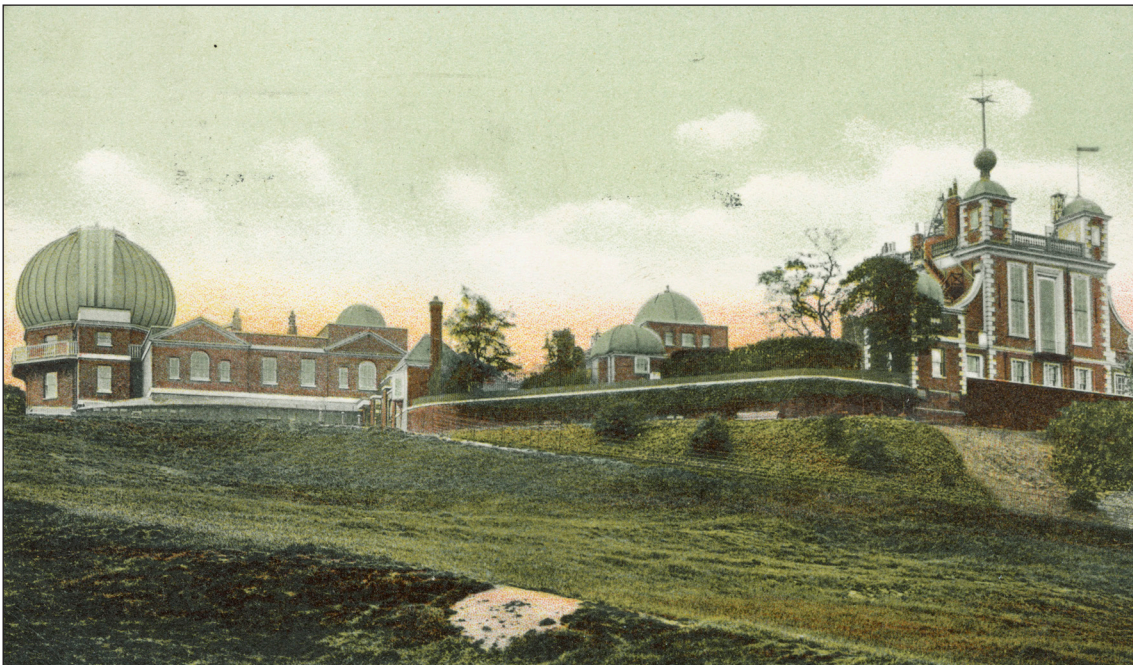


Fig. 2: The Greenwich Observatory, from an old postcard. PC09838, source: Historic England

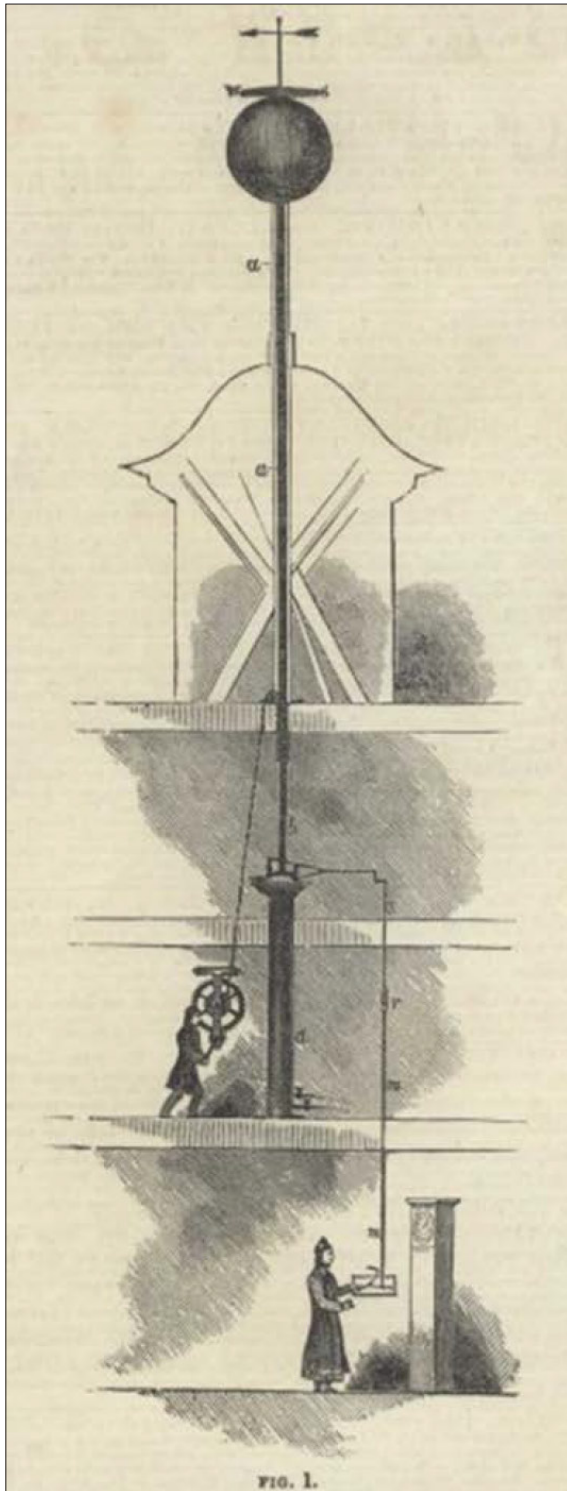


Fig. 3: *The Greenwich Observatory Time Ball*, from "The Illustrated London Almanack" for 1845, Just Published. "The Time Ball, Royal Observatory, Greenwich." Illustrated London News [London, England] 9 Nov. 1844: 304. Illustrated London News. Web. 20 Mar. 2017.

the year.² Wauchope saw that time balls could have a wide application and through his influence early examples were established on St Helena in 1834 and at the Cape Observatory, South Africa, in 1836.³

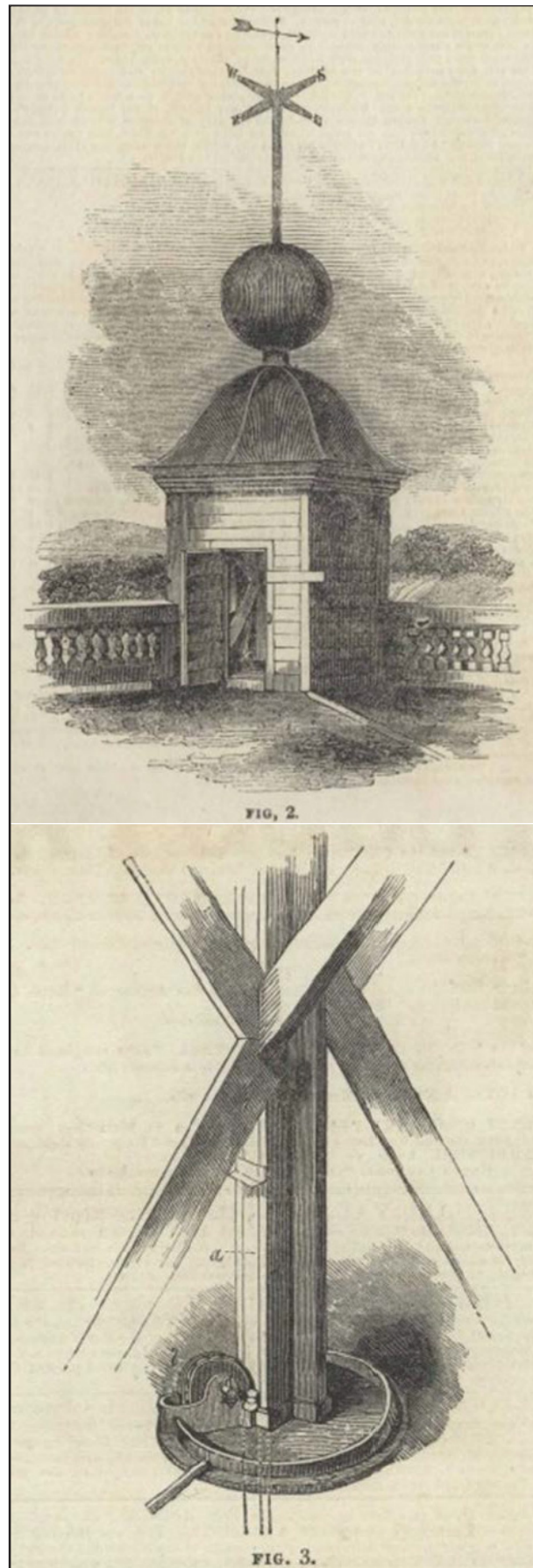
In September 1833, a large leather-covered, wood-framed ball with a diameter of 1.52 metres (5 feet) was mounted— for maximum visual effect – on a mast high on the roof of the north-eastern turret of the Royal Observatory at Greenwich.⁴ The moment of dropping of the ball at 1pm precisely allowed mariners anchored on the Thames, and the public, to set their chronometers and watches accurately every day. The ball was hand-operated, winched to the top of the mast at 12.55 pm, then hand-triggered when one of Graham's astronomical month clocks reached 1 pm. The moment of 1 pm, when the ball was released and started to drop by gravity, could then be visually seen by interested observers for the setting of their watches and chronometers.⁵ 1 pm was apparently chosen because at noon navigators or 'astronomers might be busy observing the meridian transit of the Sun'.⁶ The Greenwich time ball apparatus was supplied by Maudslay, Sons & Field, who would later supply Edinburgh, Deal and Sydney; these time balls all still exist.⁷

A detailed, illustrated article on the working and mechanism of the Greenwich time ball was published in the *Illustrated London News* of 9 November 1844; it was, it said, derived from the newly published *Illustrated London Almanack* for 1845 [Figs. 3-6]. It refers to the time ball as the means of 'the regular publication of the time', a neat phrase which demonstrates

why the concept became as popular as it did, in an era of having to constantly adjust one's watch or use it for navigation.⁸ Its illustrations are reproduced here to explain how the Greenwich time ball operated.

There have been many changes to the Greenwich time ball in its 180-year existence. Initially worked on a system of weights and pulleys, later 'a cast-iron cylinder and piston were fitted to slow down the rate of fall'.⁹ The system was prone to being affected by the weather, particularly in snow, hard frost or high winds. The ball itself was initially black, as reported in 1879, but the wood and leather one was replaced in aluminium in 1919 and has been painted red since the 1920s.¹⁰ The clock from which the time ball mechanism runs has been changed many times over; it was initially driven by the Graham clock which was replaced by the Shepherd Motor Clock in 1852, then by the Mean Solar Standard Clock in 1855.¹¹ And with the introduction of British Summer Time during the First World War, 'drops were made throughout the year at the same mean solar time, and, hence, took place at 2 p.m. by the clock during the summer'.¹² In 1960, the raising of the ball was automated.¹³

Fig. 4: As Fig. 3, from "The Illustrated London Almanack" for 1845, Just Published. "The Time Ball, Royal Observatory, Greenwich." Illustrated London News [London, England] 9 Nov. 1844: 304. Illustrated London News. Web. 20 Mar. 2017.



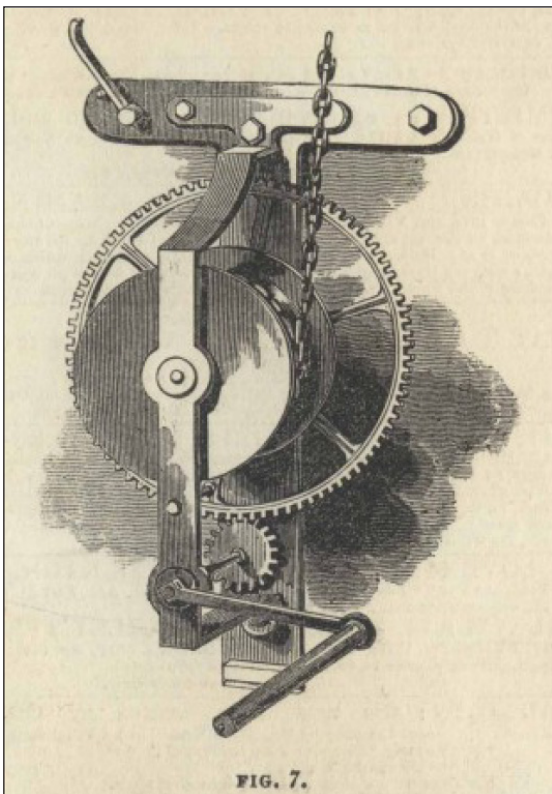
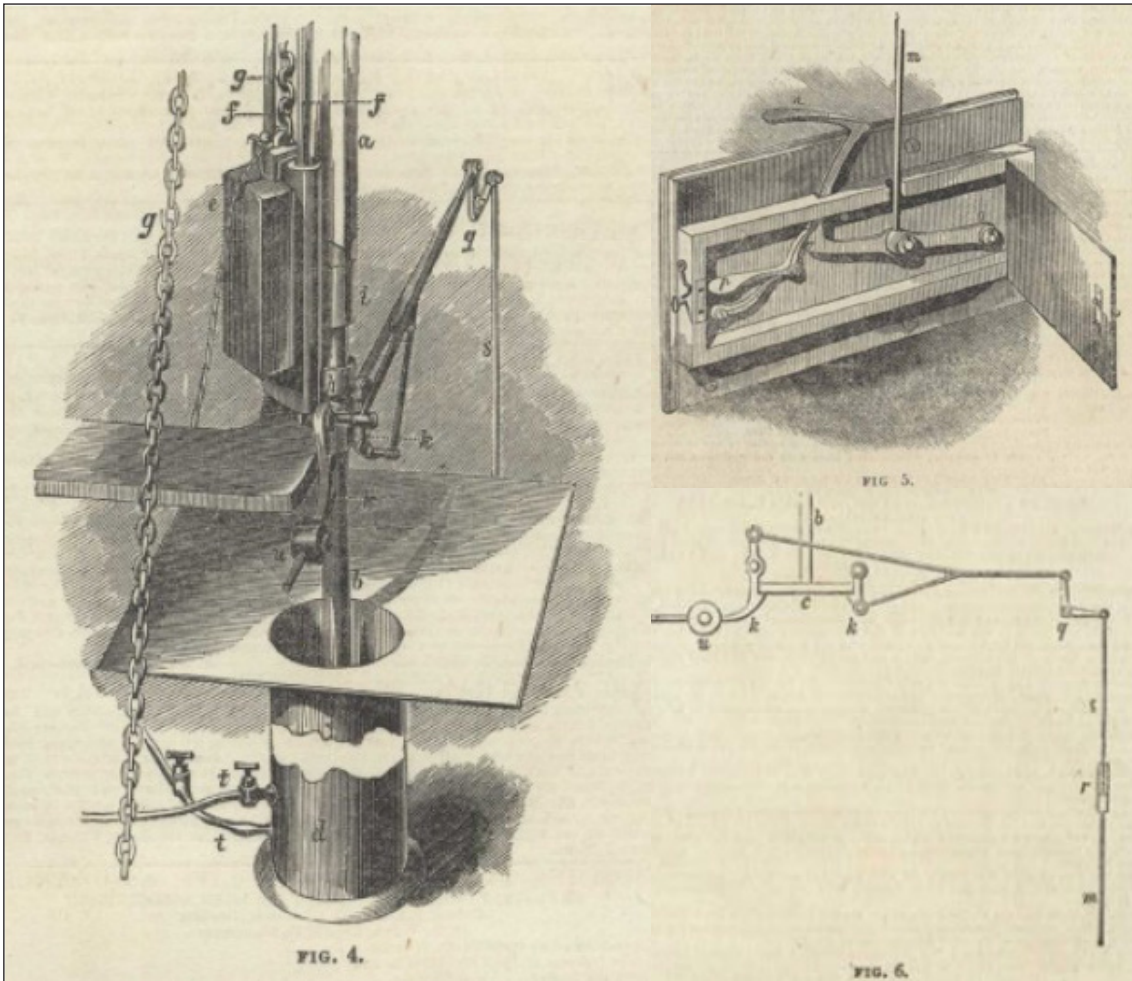


Fig. 5 (above): The Greenwich Observatory Time Ball, figs. 4, 5 & 6 from "The Illustrated London Almanack" for 1845, Just Published. "The Time Ball, Royal Observatory, Greenwich." Illustrated London News [London, England] 9 Nov. 1844: 304. Illustrated London News. Web. 20 Mar. 2017.

Fig. 6 (left): As above, fig. 7 from "The Illustrated London Almanack" for 1845, Just Published. "The Time Ball, Royal Observatory, Greenwich." Illustrated London News [London, England] 9 Nov. 1844: 304. Illustrated London News. Web. 20 Mar. 2017

The major innovation in time ball technology came in 1852 when the Observatory at Greenwich was connected to the Electric Telegraph Company. This allowed an electrical impulse representing the time signal which could be disseminated instantly via the Company's telegraph network; this network was installed alongside the railways as they were built. A direct electrical connection ran from Greenwich to London Bridge, from where a signal was sent by the South-Eastern Railway Company to Deal, Kent to the time ball installed on top of the signal tower on the sea front in 1853.¹⁴ Deal's time ball was operational between 1854 and 1927, designed for shipping anchored in the Downs, the anchorage much used by the Navy in the English Channel.¹⁵ The tower with its time ball is now run as a heritage visitor attraction [Fig. 7].



Fig. 7: The former semaphore tower, with its time ball, at Deal. DP026931 © Historic England Archive

The wider adoption of time balls

The telegraph network, which increased as the growth of the railway accelerated, allowed other maritime towns and cities to have a time ball of their own set on public buildings for the easy and accurate regulation of chronometers. Edinburgh had a time ball (a wooden frame covered in zinc) set up on the Nelson Monument on Calton Hill in 1852; it was later linked to a 1 o'clock gun fired from Edinburgh Castle.¹⁶ The white Edinburgh time ball was restored to working order in 2009. The time gun was an audible variant for communicating the time; this type of time signal reached a far wider audience than that conveyed by time balls, for which a line of sight was required. But time balls remained 'the favoured time signal' of the later 19th century; time guns required a mathematical calculation to 'allow for the transmission of sound', otherwise an incorrect time of several seconds would be recorded.¹⁷

Liverpool instituted a time ball at the Observatory on the river Mersey, near Waterloo Dock north of the centre of the city, in September 1853; its daily signal at 1 pm was also later replaced by a gun.¹⁸ Glasgow was not far behind Liverpool: a zinc-covered mahogany time ball was set up 'on the tower of the Sailors' Home' on Broomielaw alongside the Clyde in 1857 to provide a 1 pm signal; it used compressed air to prevent 'the shock which would otherwise result from the velocity and weight of the ball'.¹⁹ Another time ball, in nearby Greenock, was considered as early as 1853; it would have formed part of a monument to James Watt but it does not appear to have been constructed.²⁰ Gravesend considered setting one up on the Town Hall in 1860, for the benefit of the town and of shipping on the Thames.²¹ In 1861 Pond's successor as Astronomer Royal, George Airy (1801-1892), recorded that the following time balls were in existence in Britain: Greenwich, Deal, London (City Observatory), Liverpool (Victoria Tower), Portsmouth, Edinburgh and Glasgow.²²

Even one individual had his own time ball. John, 2nd Baron Wrottesley (1798-1867), was a lawyer and gentleman-astronomer whose home, Wrottesley Hall, was near Wolverhampton. He was a founder member of the Royal Astronomical Society and received its Gold Medal in 1839, serving as its secretary from 1831 to 1841 then as president for 1841 to 1842; he was elected a fellow of the Royal Society in 1841, the year of his father's death.²³ As early as 1829, Wrottesley had his own observatory at his house in Montpelier Row, Blackheath, London, complete with an assistant to help him.²⁴ In 1858 he added a time ball to his personal Observatory at Wrottesley Hall, having it dropped at 3 pm on Tuesdays and Saturdays.²⁵

In Britain, the concept of the time ball was swiftly turned into a commercial opportunity, allowing individuals as well as companies to set their timepieces accurately. The first commercial time ball was in London, on the dome of the Electric Telegraph Company's West-End offices on 448, Strand [now Jigsaw]; its zinc ball, painted bright red, was operational from late August 1852 [Fig. 8].²⁶ The Electric Telegraph Company was showing off its rapidly-expanding telegraph service; its London time ball showed that the company was dedicated to delivering time as well as words across the nation. Some of its other offices

were soon equipped with a time ball, such as that in Castle Street, Liverpool which was installed by September 1853.²⁷ The company's successor, the Electric and International Telegraph Company, had a time ball in the window of its office in Market Street, Bradford by July 1860 (with a drop at 10 am).²⁸

In fact, the Company actively promoted its telegraph service by sending a member of staff out to lecture about its technology in British cities, with a demonstration of a time ball, the printing telegraph and – with a touch of the occult – spirit rapping as part of the entertainment. This, for example, occurred in York in November 1856, when a Mr E Graves lectured in the Festival Concert Room; he returned to Yorkshire to visit Barnsley in December 1859 and Bradford in March 1860 to give the same performance.²⁹ Hull was not immune from this: Mr E W Bayley, superintendent of the United Kingdom Telegraph Company, gave a lecture on telegraphy in February 1866 at the Royal Institution, Hull, speaking of, 'the advantages to shipmasters and others by ports like Hull exhibiting time balls and firing time guns.'³⁰

The consequence of this sort of promotion was the popularisation of time balls in commercial establishments, particularly in jewellers, and watch- and clock-makers.



Fig. 8: The electric time ball mounted on the office of the Electric Telegraph Company, Strand, in 1852. BM 1880 1113.2824 © Trustees of the British Museum

A small time ball could be set up in the shop window, somewhere on the shop front or outside the door so that the public could view them, but their purpose was likely to have been a way of promoting the accuracy of the shop's products. These small commercial time balls were recorded in Bath in 1860 (Alexander Mowat, 7, Quiet Street), Cardiff in 1866 (W Weichert, 112, Rothsay Terrace, Bute Docks), Worcester (Messrs Skarratt, Broad Street), Inverness (Messrs Ferguson, Union Street) and Norwich (Dixon, London Street) in 1873, Southampton in 1874 and elsewhere.³¹

Hull was no exception to the national trend, as we shall see below, with at least two shops having time balls from 1865, but Yorkshire had some spectacular examples dating from the 1870s. These include the magnificent Time Ball Buildings, 25-26 Briggate, Leeds, an earlier building decorated for J Dyson, watchmaker [Fig. 9]. In May 1878, the *Leeds Times* announced that Dyson:

...has just fixed an electric time-ball outside his premises. It is the only one of the kind thus externally fixed, and is the largest in the North of England. The ball falls at one o'clock p.m., being released at that precise moment by a special current of electricity direct from Greenwich.³²

Time Ball Buildings is listed at Grade II* (NHLE 1255855), due to its rare surviving external time ball and its elaborate decorative scheme. Dyson may have been competing with another firm, Potts and Sons of Guildford Street, whose shop-window time ball had been operational from 1875.³³ Bradford had a shop-window time ball linked to Greenwich in December 1876; it was at Wray's, under the Mechanics' Institute Buildings, and it had previously been manually operated.³⁴ A civic time ball soon followed, paid for by Mr Ripley, the town's MP; painted red, with a gold band, it was placed on the balcony in front of the tower of the Bradford Exchange in August 1877.³⁵ In July 1877, H L Brown, a jeweller at 24, Angel Street, Sheffield, paid for a Greenwich signal for a time ball set up 'outside his shop door'.³⁶ Interestingly, H L Brown – now relocated to premises on the corner of Leopold Street and Barker's Pool – still have an audible 1 pm time signal, reputed to sound rather like an air-raid siren.³⁷

Time balls continued to be considered to be of civic benefit into the later 19th century and they were not limited to maritime towns and cities. A fairly short-lived time ball was installed on the Exchange in the Market Place, Nottingham between September 1876 and 1886.³⁸ In 1878, one was erected on the clock tower of Blackburn's market hall, along with a time gun, to give a 1 pm signal which would be more accurate than the town's various clocks.³⁹ In 1888, Charles Tertius Mander had one erected on the corner tower of his bank on Lichfield Street, Wolverhampton; this was immortalised in a 'Time Ball' product brand made by the Wolverhampton-based company William Cozens & Co.⁴⁰ Norwich had a commercial time ball from 1873 at the jewellers run by Mr Dixon (see above); by 1875 he had a large red and gold ball above the shop window with a smaller ball in the window linked to an electric bell.⁴¹ Despite this, it was felt that the city should have a time ball of its own, and a black one was eventually set up on the battlements of Norwich Castle in 1900, connected to a gun for an audible signal.⁴²

In the manner of many places around Britain, Queen Victoria's Golden Jubilee in 1887 was commemorated in Margate [Fig. 10] by the erection of a clock tower. Unusually, and as a nod to its maritime location on Marine Terrace – though undoubtedly the town was far more a resort rather than a working port – it included a time ball at the top which rose and fell on a 10 ft high copper tube.⁴³ Margate's time ball, inaugurated when the clock tower opened in 1889, was restored in 2014 with a copper-coloured ball and a completely new mechanism invented by Keith Scobie-Youngs of the Cumbria Clock Company. This consists of:



Fig. 9: Time Ball Buildings, 24-26 Briggate, Leeds, with two commercial time balls on display. Decorative scheme of circa 1878 for John Dyson. <http://www.geograph.org.uk/photo/2718110> © Stephen Richards / Creative Commons Licence

...an inverter motor system, controlled by a micro-processor which is fully programmable so that, if required, the ball can be raised at different times. The lift and the drop of the ball is controlled by cables attached to the ball and run over tow pulleys at the top of the mast, and from here the cables descend through the hollow mast, through the tower right down to the control unit at ground level.⁴⁴



Fig. 10: Margate's seafront clock tower with its time ball. AA050473 © Historic England Archive

Brighton has a similar combination of free-standing clock tower and time ball, built in 1888 and operationally short-lived due to the noise of the wind blowing through the tube; it was restored back to working order in 2002.⁴⁵ However, unlike Margate's example, the Brighton' tower and time ball is located in the centre of the town at the junction of West and North streets, well away from the sea front.

Time balls across the world

Britain's colonies, linked to each other and to Britain by maritime trade, were enthusiastic adopters of time balls. South Africa had one of the earliest, at the Cape Observatory in 1836, at Simon's Town in 1857 and a later one in Port Elizabeth; by August 1865 they were all linked together by telegraph, along with the Cape Town time gun.⁴⁶ The new Observatory in Sydney, Australia was to be equipped with a time ball in 1857 for the benefit of 'nearly every vessel in the harbour'.⁴⁷ In 1861, George Airy recorded the existence of time balls in Simon's Town at the Cape, Madras, Calcutta, Sydney (Australia), Quebec (Canada), and Williamstown in Victoria (Australia); only Washington (see below) was not in a British colony.⁴⁸ Wellington, New Zealand, had an operational time ball in 1865,⁴⁹ and Hong Kong's first time ball was constructed in 1884; it was moved to a new location in 1907 and used until 1933.⁵⁰

Beyond the bounds of the British Empire, the rest of the world was swift to take up this new technology. The United States of America had a time ball as early as 1845 at the Naval Observatory in Washington DC, from where a Time Service was disseminated in 1865.⁵¹ Other time balls were then erected across America. Germany was an enthusiastic adopter of railways, telegraphs and time balls, with a Dr Erb, professor of astronomy in the university of Heidelberg, reported as planning in 1852 to erect in Bamberg, Bavaria, 'a high tower to contain an electric clock, time ball, and other apparatus, by which the clocks of all the railroads in Germany will be regulated'.⁵² It was not, however, until the 1870s that Germany set up time balls in cities across the North Sea and Baltic coasts of Germany and modern Poland, such as at Wilhelmshaven, Bremerhaven, Stettin and Danzig, as well as in the important maritime and mercantile cities of Bremen and Hamburg; they functioned until the 1920s.⁵³ Denmark, Finland, France, Latvia, Norway and many other European countries had them, as did China and other places across the world.⁵⁴

The decline in the number of time balls came with changes in the way in which time signals were disseminated from Greenwich, as electric signals were superseded by radio technology; radio time signals started in 1905.⁵⁵ In 1924, the BBC first broadcast the 'pips' to mark the hour and there became little need for an electrical time signal delivered directly from Greenwich. The Hull time ball of 1914-15, then, was perhaps one of the last of its kind in Britain.

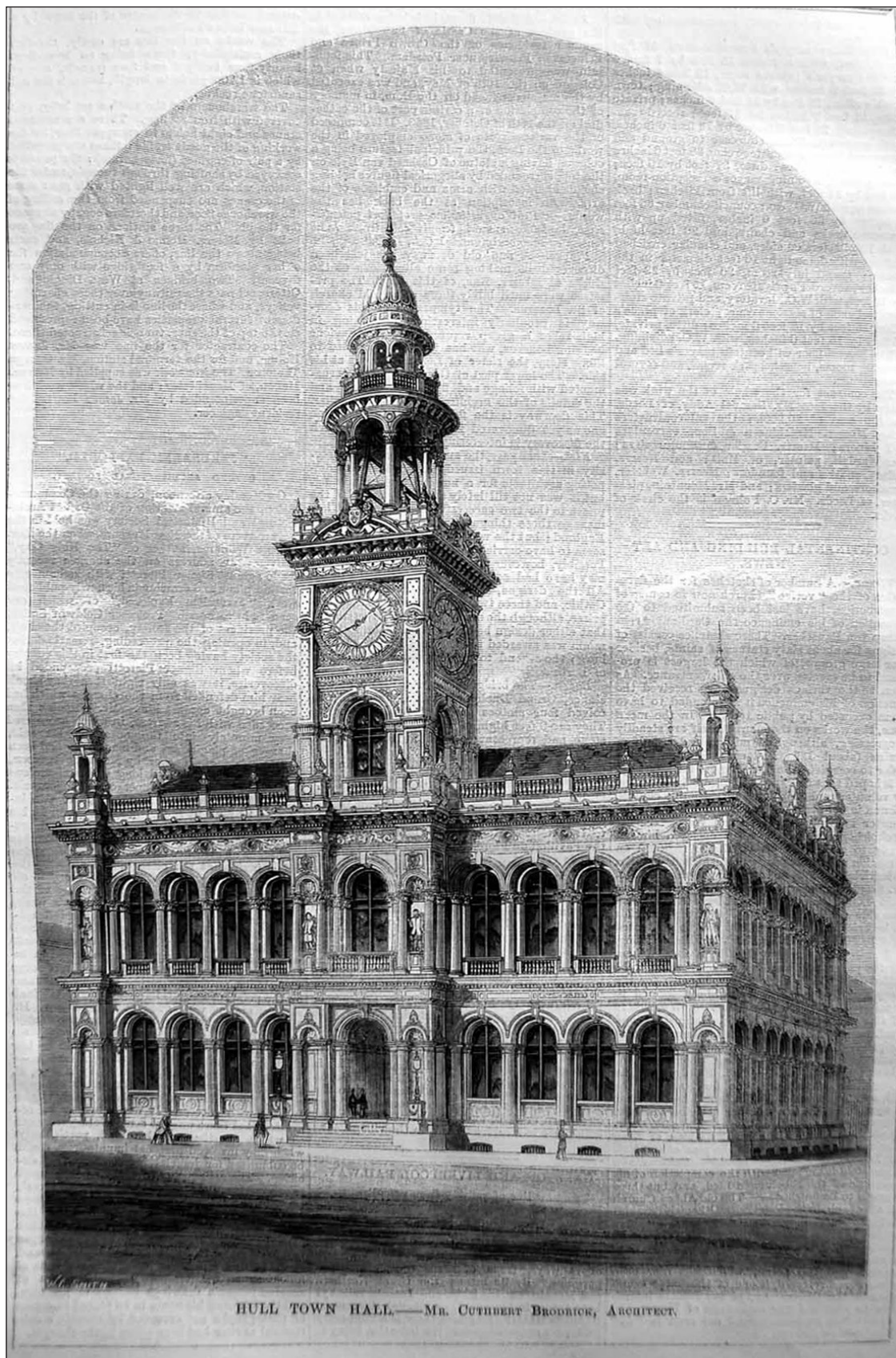


Fig. 11: Hull Town Hall, designed by Cuthbert Brodrick, completed in 1866, from The Builder, 18 June 1864, 455

THE HULL TIME BALL

Time-telling in the city of Hull

In the late 19th century Hull, or Kingston upon Hull as it is more formally known, was growing in affluence, size and importance. The population of the borough stood at 65,670 in 1841; by 1901 it was 240,259, reaching 277,991 in 1911, which demonstrates that its port, foreign trade, fishing and associated industries were booming.⁵⁶ Architecturally, this affluence and self-confidence was embodied by the construction of a new purpose-built town hall [Fig. 11] which was designed by the Hull-born architect Cuthbert Brodrick (1821-1905) and completed in 1866.⁵⁷ It was an ornate building of two storeys with an arcaded principal elevation facing Lowgate and a fancy central clock tower with domed cupola.

The best years of Hull's economy were yet to come: it is widely understood that Hull was 'at its most prosperous and self-confident in the years before the First World War' when it was the third most valuable port in Britain after London and Liverpool.⁵⁸ City status had been granted in 1897 and in 1901 it was the fourth largest city in Yorkshire after Leeds, Sheffield and Bradford.⁵⁹

Until the construction of the Guildhall and the addition of its time ball in about 1915, Hull's time was provided by the clock of Brodrick's Town Hall. Alongside it, Hull had at least two shops displaying time balls in the second half of the 19th century. The first to do so was Bethel Jacobs at 7 Whitefriargate, a jeweller, gold and silversmith; he advertised in December 1865: 'Chronometers rated and tested by the Time Ball, which is in direct communication with Greenwich daily'.⁶⁰ Jacobs may have started his time-ball service a few years before this, in July 1863.⁶¹ Jacobs did not keep his monopoly for long, being joined in October 1871 by the Hull Observatory at 50, Lowgate, which was not an actual observatory but a shop selling and repairing chronometers, watches, clocks, and sextants and offering chronometer rating. They advertised thus: 'Public time ball signals, direct from the Royal Observatory, Greenwich, every morning, in the Lowgate Window, at Ten o'Clock.'⁶²

Sir Edwin Cooper and the competition to extend Hull's Town Hall

At the start of the 20th century, the Corporation of the City and County of Kingston-upon-Hull was housed in the Brodrick-designed Town Hall. By 1900, it was a small building in relation to the growing size of the city and its attendant administrative needs, and it did not reflect the city's growing status. This was recognised by W Alfred Gelder (1855-1941, knighted in 1903 and thereafter known as Sir Alfred Gelder), who was an architect and mayor of Hull between 1899 and 1903. Under his watch, a new street (now Alfred Gelder Street) was driven through former yards and slums, and other property at the rear of Brodrick's Town Hall – particularly

the gas works – was bought up and demolished in preparation for work on the extension of the Town Hall [Fig. 12].⁶³

In 1902, the murmurings of a rebuilding of Hull's Town Hall reached the London architectural establishment. *The Builder* recorded 'Considerable controversy in Hull', reporting that the Corporation had proposed that their own 'official Surveyor' would design it, a decision which they lambasted as 'not a satisfactory prospect for the city'. Hull, they wrote, 'is a city poor in architectural attractions' and was 'too large and important a city to be satisfied with doing things in this kind of second-class manner.'⁶⁴ Joseph H Hirst (1863-1945), then City Architect and the designer of Hull's City Hall (1903-9), swiftly defended his abilities but the journal, ever keen to promote the interests of the architectural profession as a whole, pressed on:

But we do not see, nevertheless, that the people of Hull should be contented with having a new Town Hall carried out by the official architect any more than we in London are content to have a Government building carried out by the Office of Works.⁶⁵

The result of this pressure from the architectural establishment was the decision to throw the design of the Town Hall extension open to competition.

The winner of the competition, whose drawings were published in *The Builder* on 11 July 1903, was the firm of Russell, Cooper, Davis & Mallows of London; the architect responsible was T. Edwin Cooper (1874-1942). Cooper won the first prize of £300, to be paid as part of the architect's fee. It was a considerable achievement: this £100,000 commission was the third – and largest – competition win that he had achieved so far, after winning the competitions for Scarborough's Municipal Schools (£20,000) and College (£15,000), both in his North Yorkshire home town.⁶⁶ Cooper's career was generally London-based and he was known for his skill in winning competitions, gaining commissions to build the Port of London Authority's building near the Tower of London, the Star and Garter Home at Richmond, the headquarters of Lloyds of London, and Marylebone Town Hall. He was knighted for services to architecture in 1923 and won the RIBA's Gold Medal in 1931.

Chosen for the masterful use of a difficult site, clever planning, grandeur and a muscular use of stone and baroque detail, Cooper's design answered the city's requirement for the extension whilst keeping open the question of whether the old Town Hall should be retained. Cooper's entry provided two variants: one with Brodrick's Town Hall retained and one with it replaced. His firm stated in *The Builder* that the £100,000 budget:

...is not considered sufficient to provide all the requisite new accommodation, together with a new Town Hall, in a manner compatible with the dignity to which the city aspires...⁶⁷

They also recognised that there was considerable sentiment attached to the old Town Hall and that Brodrick was a 'recognised master'. However, they looked on its retention as 'a more or less temporary expedient' because its age would mean that it would 'fall into decay in the near future' and so:



Fig. 12: Hull, reproduced from the 1893 1:2500 Ordnance Survey map. Brodrick's Town Hall is shown with its clock tower facing Lowgate, with other elevations facing Hanover Square and Broadley Street. © and database right Crown Copyright and Landmark Information Group Lts (All rights reserved 2017) Licence numbers 000394 and TP0024.

A proposed future Town Hall and rates offices is, therefore, incorporated in the design, and when erected would, with the remainder of the building, form one harmonious whole, with the large hall well defined.⁶⁸

From the start, then, Cooper wanted to replace the existing Town Hall with a design of his own [Fig. 13] which included – as Brodrick’s design did – a tall, central clock-tower dominating the Lowgate elevation, even though the money was not as yet forthcoming to pay for it. It would be balanced by a further tower at the western end of the site. The speculative design of the tower, as we shall see, provided Cooper with plenty of ideas for the future when it became a reality.

The Town Hall, designed by Cooper, was consequently built in three phases by the contractor Quibell, Son & Greenwood of Hull. The first contract of 29 July 1904 was for the western end of the site, mostly comprising the Law Courts and the second contract of 1906 gave it its top storey and pushed the new building further east up Alfred Gelder Street as far as the old Town Hall.⁶⁹ At both these stages, the old Town Hall by Cuthbert Brodrick was to be retained and the budget remained at about £100,000 as intended in 1903 when Cooper won the competition.

The decision to rebuild the Town Hall in its entirety

In January 1911, Alderman Hall, Chairman of the Town Hall Sub-Committee, stated that ‘the time had arrived when it would be necessary to connect up the Town Hall Extension to the existing building’; the committee, he said, had to decide on spending £6,500 on this or considering pulling down the old Town Hall and rebuilding it.⁷⁰ Cooper, attending the meeting, put forward his justifications for rebuilding. The new building could house expanding departments in proximity with each other, ‘as is the usual custom in large Town Halls’; the stonework of Brodrick’s Town Hall was ‘badly perished, and in need of repair’; the old building would need expensive alterations; and the different floor levels of old and new would mean that the ‘the Mayor and his Apartments, the Banqueting Room, &c., would be practically disconnected from the Council Chamber and Committee Rooms in the new building’.⁷¹ Cooper presented some sketch plans, which included a clock tower, and thought that the approximate cost would be between £20,000 and £25,000; the committee decided that he should prepare working drawings and estimates, which should then be submitted them to them.⁷²

During this process, public opposition mounted. At the Property Committee meeting of 19 May 1911, it was reported that the Hull Property Owners’ Protection Association had protested strongly against ‘the proposal to pull down the front of the Town Hall’ and resolved ‘to use every legitimate means to oppose the same.’ A similar resolution was passed by the Newland Ward Ratepayers.⁷³ But the rebuilding concept gathered momentum, with Cooper presenting a new document to the Town Hall Sub-Committee with perspectival sketch and estimates already agreed by the contractors Quibells, on 9 June 1911. The cost was to be £27,521

for the complete design, or £24,326 if the tower was excluded, and Cooper again argued that all council departments should be under one roof, as seen at London's new County Hall.⁷⁴ The Sub-Committee recommended that the design – including the tower – should be proceeded with. A vote of the Property Committee on 16 June 1911 confirmed this, although Councillor Morrill was a solitary dissenter.⁷⁵

The tower, however, remained a little in doubt. On 11 March 1912, the Town Hall Sub-Committee, under pressure from the Local Government Board who wondered if there was 'any real architectural justification' for it, resolved that 'the erection of the Tower be not proceeded with at present.'⁷⁶ Only a few days later, however, on 15 March 1912, this was thrown out by the Property Committee, allowing the tower to be constructed, albeit by a rather narrow winning margin of 6 votes to 5.⁷⁷

The concept of having a completely new building to house the Corporation, perhaps allied to the magnificent scale of Cooper's design, prompted another significant change. In 1912, the name of the building changed, from the Town Hall – as embodied by the demolished Brodrick building – to the rather grander 'Guildhall'. That is how it will now be referred to here. Not content with Cooper's designs for the Guildhall, on 20 December 1912 the Property Committee recommended that they would be revised to make a 'more imposing' entrance from Lowgate at a cost of an additional £600 or £700; this provided a grand central corridor to connect the Lowgate entrance with the grand stair at the heart of Cooper's building.⁷⁸

The addition of the time ball

The first documented suggestion that a time ball could be added to the tower of the new Guildhall came at a meeting of the Property Committee on 15 May 1914, when the Chairman [Alderman Hall] stated that:

...Councillor Johnson had suggested to him the desirability of the Corporation providing an electric time ball for the tower of the Guildhall, which would be connected by electricity, through the Post Office, with Greenwich, and would drop at 12 (noon) each day, in order to obtain general accuracy in time...⁷⁹

The committee resolved to ask the architect, Edwin Cooper, to report back about the cost of this; Councillor Johnson thought that, beyond the installation, it would cost a guinea a year to run. On 12 October 1914, the same committee heard that Cooper had found the cost of an electric time ball to be £75, and that it would be done by 'Mr. Alexander Shaw, of Story Street, Hull, who has done all the electrical work on the building'.⁸⁰ Cooper suggested a further sum of 'approximately £25' for builder's work in connection with the installation. The motion was carried: Hull's Guildhall was to have its time ball.⁸¹

Alexander Shaw (1849-1922), the electrical engineer responsible for the time ball's mechanism, was born in Perthshire, Scotland, and ran his own business in Hull from 1900.⁸² He was responsible for the supply and fitting of 'all the elaborate

electric light fittings' in the Town Hall extension, as the *Hull Daily Mail* reported on 7 July 1908, and he later ran his business from 64 & 66 Brook Street, adjoining Paragon Station, Hull.⁸³

Cooper's tower designs

The introduction of a time ball at this stage of the Guildhall's construction had a considerable effect on the building's design. In fact, the upper stages of the tower were completely redesigned *circa* November 1914, although there are no surviving drawings: all of Cooper's drawings for the tower relate to either the 1903 competition, the 1905 alteration to the approved design or the 1911 3rd contract.

The Builder illustrated Cooper's proposed new clock tower as submitted for the competition in 1903 [Fig. 13 and 14]. A plain tower in ashlar, with heavy, horizontally-rusticated pilaster-like strips at the corners, housed the four clock faces with a cornice above to protect them from the elements. Above this, the rustication continued to either side of a large panel containing a masonry swag; this level formed a podium for the decorative, triple-tiered lantern. The lowest level of the lantern rested on this podium, with a large window set into a rusticated niche in the manner of Wren's doorway to the tower at St Mary le Bow, Cheapside, London. This



Fig. 13: The competition-winning design for a completely new Hull Town Hall, by Edwin Cooper. Published in *The Builder*, 11 July 1903



Fig. 14: Detail of the clock tower from the perspectival view of Cooper's competition-winning design, published in The Builder, 11 July 1903

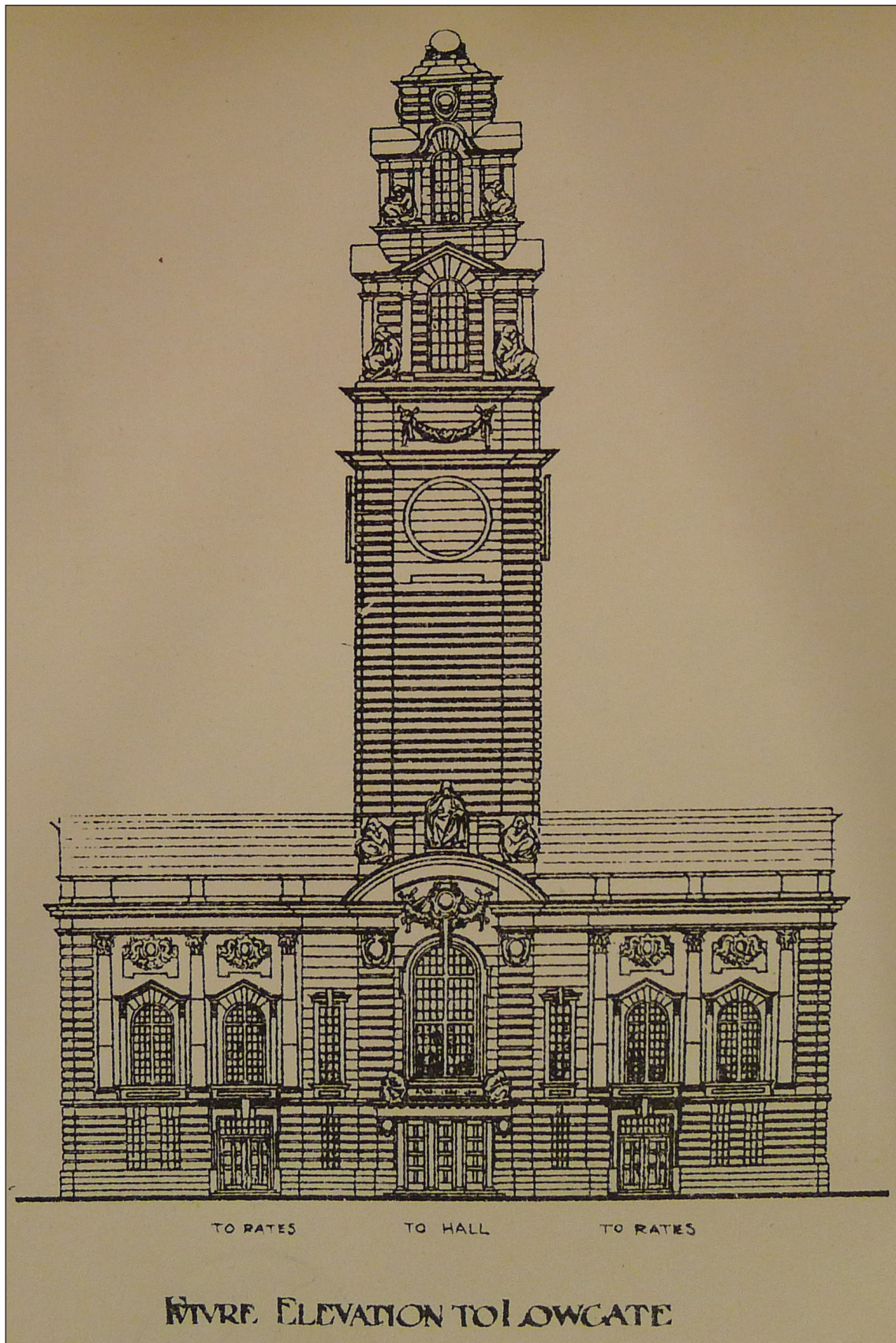


Fig. 15: 'Future Elevation to Lowgate', from Cooper's competition-winning design, published in *The Builder*, 11 July 1903

confection of window and niche is framed by a pair of Ionic columns supporting a triangular pediment; this columnar feature projects at the centre of each face of the lantern with a sculpture of a Michelangelo-like seated female figure to each corner of the tower. A narrower second lantern sat above this, based around an octagon with a similar pattern of roofed, projecting round-headed windows but with urns – or, as one of the variant drawings show [Fig. 15], more seated figures – at the tower's corners. This time, the roofs above the windows were formed into baroque pediments made from a combination of concave and convex curves. To cap the tower off, Cooper planned a small, octagonal windowless level decorated with more horizontal rustication with cartouches, above which diminishing levels of mouldings formed a base for four *putti* holding up a large sphere or globe. Even when the approved design was altered in 1905, the new perspectival view published in *The Builder* [Fig. 16] showed exactly the same tower design.⁸⁴

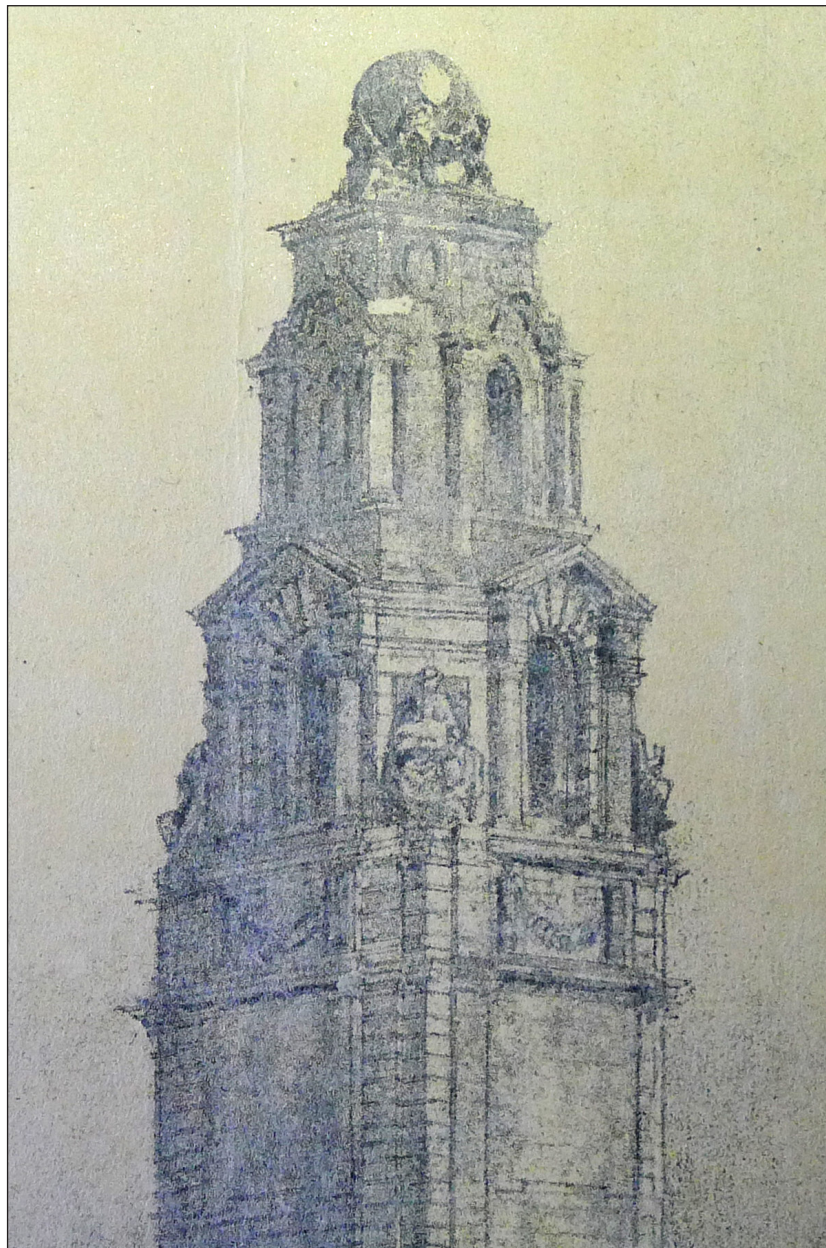


Fig. 16: Detail of the revised perspective of the Town Hall extension by Cooper, published in The Builder, 2 September 1905

Of course, it was still a distinct possibility in 1903 and 1905 that the tower – and the rest of Brodrick’s Town Hall – would never be replaced to Cooper’s design. By the time that the Corporation finally decided to complete the Town Hall in the manner that Cooper had envisaged with the sacrifice of the old Town Hall, Cooper envisaged a simpler lantern. The contract drawings of 1911 [Figs. 17 and 18] continue the earlier concept of a plain tower with horizontally-rusticated but

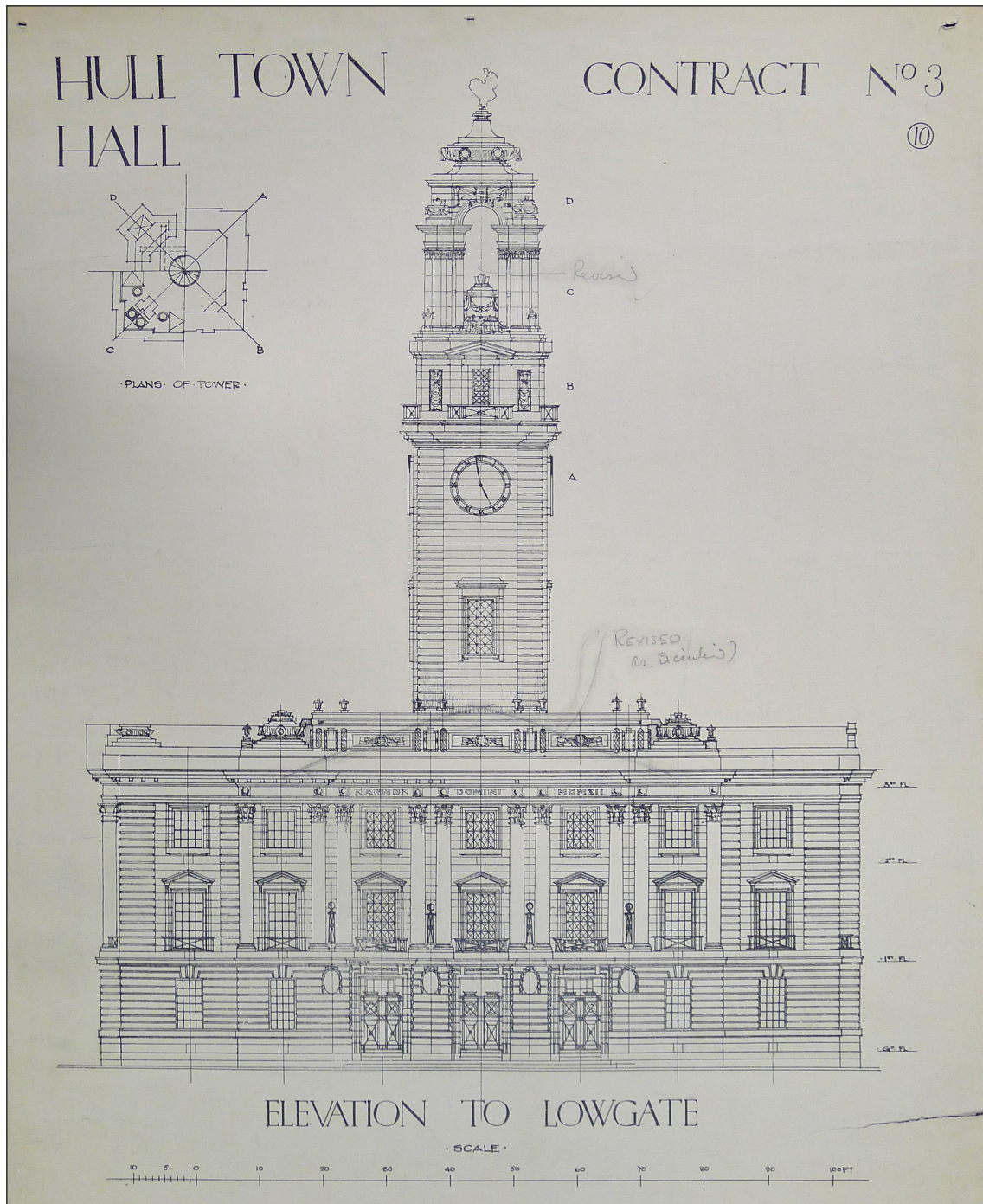


Fig. 17: Cooper's agreed elevation of the Lowgate elevation of Hull Town Hall, as per the third contract of 1911. HHC C TAA/20, folder marked 'TA 4893'. Reproduced by permission of Hull City Archives, Hull History Centre.

his earliest ideas for the Guildhall's tower – as illustrated in his competition entry of 1903 – of having a globe supported by four *putti*. This time, the *putti* visually supported the 'cup' into which the time ball would drop. The time ball thus became a rather neat spherical substitute for the 1903 and 1905 globe [Figs. 19 and 16].

The tower itself [Fig. 20] was simplified from the 1911 contract drawings: in execution, the rectangular windows, as we have seen, were omitted, except for the very tall, narrow windows on the north, south and west elevations. All the elevations of the bell chamber were given three tall rectangular louvred openings fronted by a screen of Corinthian columns and pilasters; the pediments and the trophy panels were expunged. The top of the bell chamber was given a basic balustrade with urns at the corners. The lantern became a simpler version of the 1911 bell chamber, with a single rectangular window with a plain panel – a nod to the trophy panels – to either side and a cornice with simple *paternae*. Externally, the windowless time ball chamber is expressed by diminishing levels of stonework, culminating in a fluted base upon which the *putti* stand, holding up a cup into which the time ball falls [see Fig. 19].

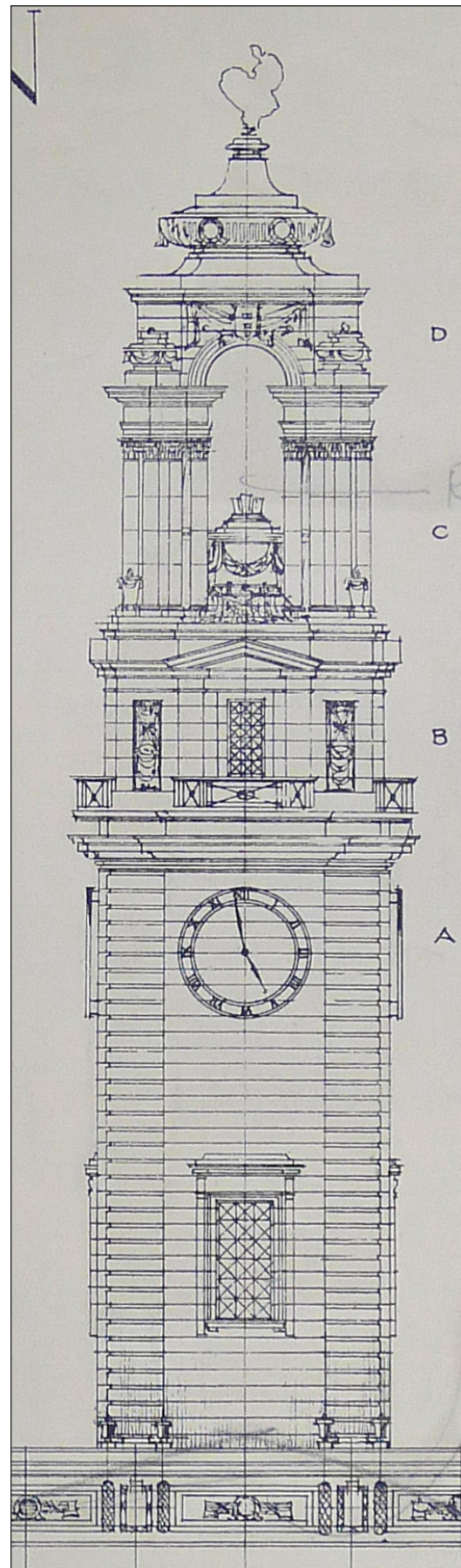


Fig. 18: Detail of the clock tower from Cooper's agreed elevation of the Lowgate elevation of Hull Town Hall, as per the third contract of 1911. HHC C TAA/20, folder marked 'TA 4893'. Reproduced by permission of Hull City Archives, Hull History Centre.

In his short treatise on the construction and design for municipal buildings, Cooper considered those designs influenced by Inigo Jones, Wren and his pupils, Chambers, Soane and 'others who produced good Architecture' to have a 'traditional feeling'.⁸⁷ Certainly, the influence of Wren and his school can be seen in the design of the elevations of Cooper's Guildhall, particularly in relation to their sculptural treatment. Cooper wrote:

The introduction of Sculpture as a foil to plain surfaces should be taken advantage of when possible. I do not mean decorative stone carving but sculpture in the true sense.⁸⁸

The use of horizontal rustication to contrast with smooth ashlar, the cutting back of the tower's corners to suggest pilasters, the subtle emphasis provided by urns, panels or other carvings: these are the sculptural tricks used in English baroque architecture, particularly by Hawksmoor, Wren's star pupil and right-hand man.



Fig. 19: Drone photograph of the putti supporting the 'cup' into which the time ball drops. HGH16V540 © Historic England

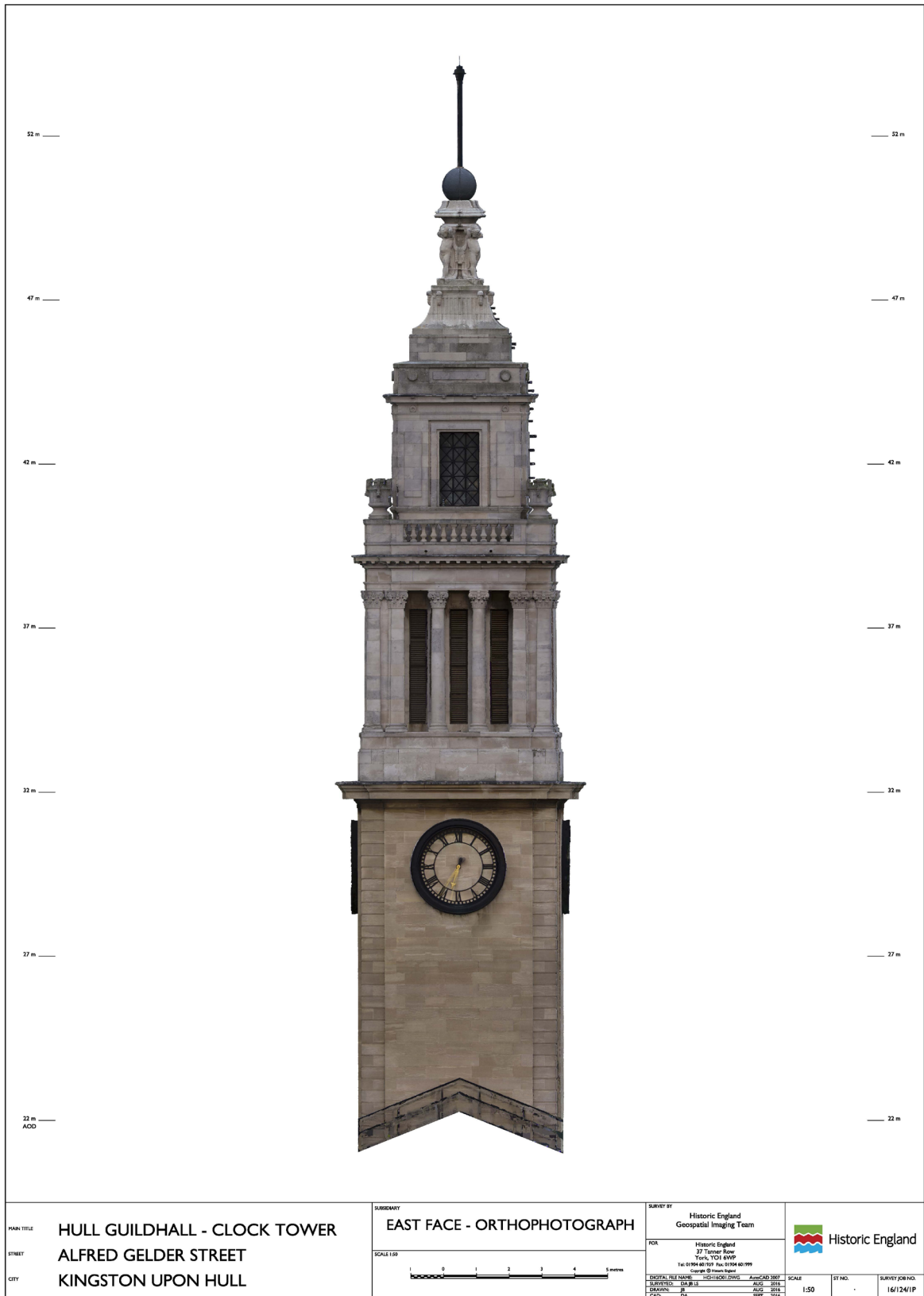


Fig. 20: Orthophotograph of the Lowgate elevation of the clock tower, with time ball, as constructed. © Historic England

The installation of the time ball

The construction of the tower and the time ball was presumably nearing completion by 5 March 1915, when Gent & Co Ltd produced a blueprint for the electrical circuitry on which Shaw's time ball mechanism was to run. Gent & Co were a Leicester-based firm of electrical engineers and manufacturers of telephones, bells, electrical clocks and fire alarms.⁸⁹ Their original blueprint for the circuit hangs in the tower of the Guildhall but a copy has been deposited in the Hull History Centre [Fig. 21]. It shows the 'connections for automatic time ball hoisting gear', with the telegraph wires coming in from Greenwich, a 220 Volt D.C. motor, relay coils, fuses, a time switch with 7-day cut-out, and a series of mercury switches, as well as the 'releasing magnet' which allowed the time ball to be automatically dropped. A contract was made by the Town Clerk with the Post Office to provide the circuit to deliver the time signal of 'true Greenwich mean time', so that the time ball would be dropped at 1 pm.⁹⁰

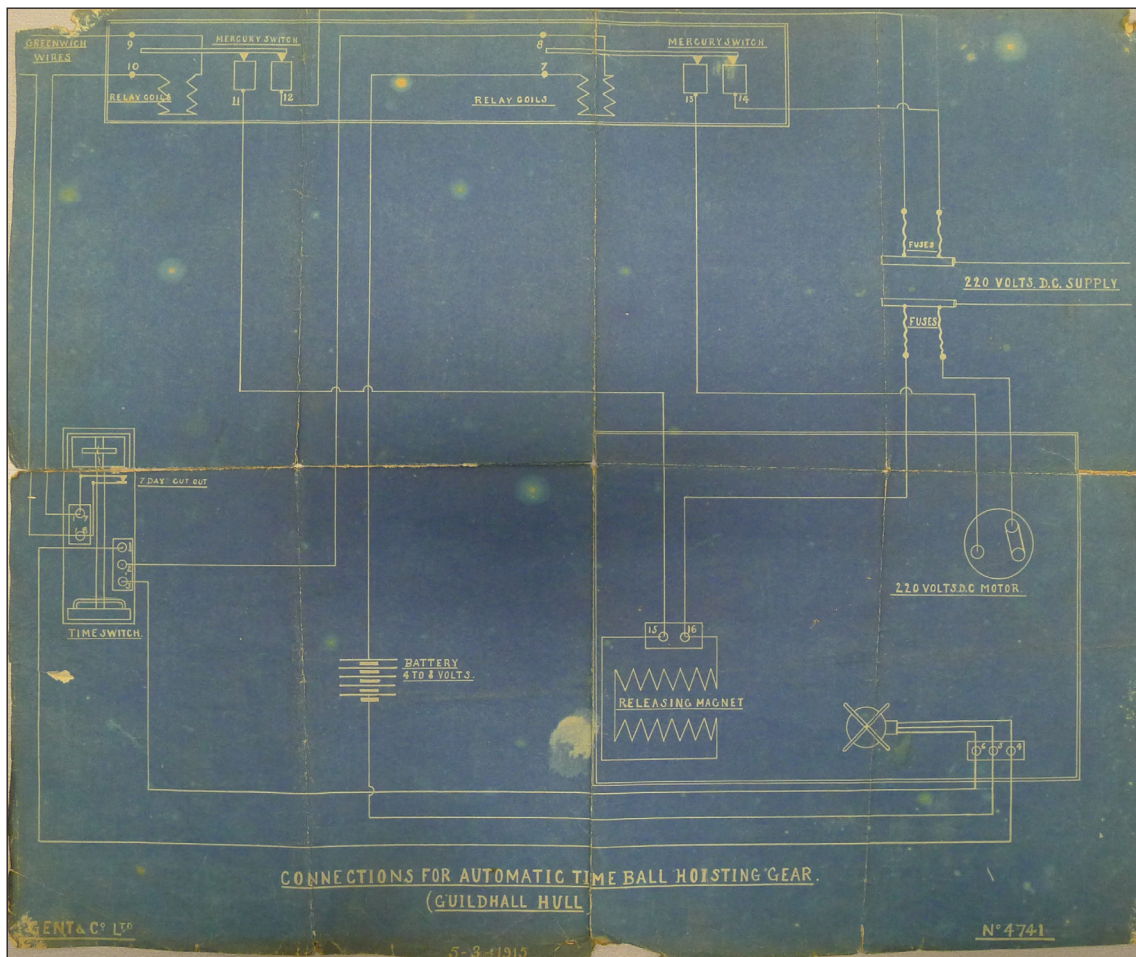


Fig. 21: A copy of the blueprint by Gent & Co Ltd for the electrical connections for Hull's time ball, 1915. HHC C DIDS/1. Reproduced by permission of Hull City Archives, Hull History Centre.

On 20 April 1915, the *Hull Daily Mail* reported that their reporter had been up in the new tower, which had had 'its swaddling clothes of scaffolding practically removed' to reveal the 'golden time-ball' which will drop at 1 pm daily to mark Greenwich mean time and the 'charming cupids' which hold its receptacle aloft.⁹¹ The clock faces were not yet installed on the outside of the tower, although the clock's bells and chimes were already in place in the bell chamber. The time ball itself, they wrote, was made of copper and had a 'golden' appearance; the cupids were intended to 'have borne upon their heads a basket of fruit and flowers, but the latter have had to make way' for the receptacle into which the ball drops. The tower, clock and time ball, then, were nearly complete in mid-April 1915. On 19 June 1915 the *Beverley and East Riding Recorder* declared that the Guildhall's clock, originally made in 1864 for Brodrick's Town Hall and reinstalled by Cooke and Son, was finished and that 'an indicator in the form of a moving gilded time-ball has been fixed in the tower'.⁹²

One final step was put in place in November 1916 to allow maintenance staff to reach the top of the tower. Stairs and fixed vertical ladders only reached to the height of the internal, windowless chamber which housed the time ball's mechanism; any maintenance to the structure or the mechanism above this level had to be reached by external means. The Property Committee asked the City Architect 'to provide foot irons at the back of the Guildhall Tower for the purpose of reaching the top of the Tower when necessary'.⁹³ These foot or step irons were

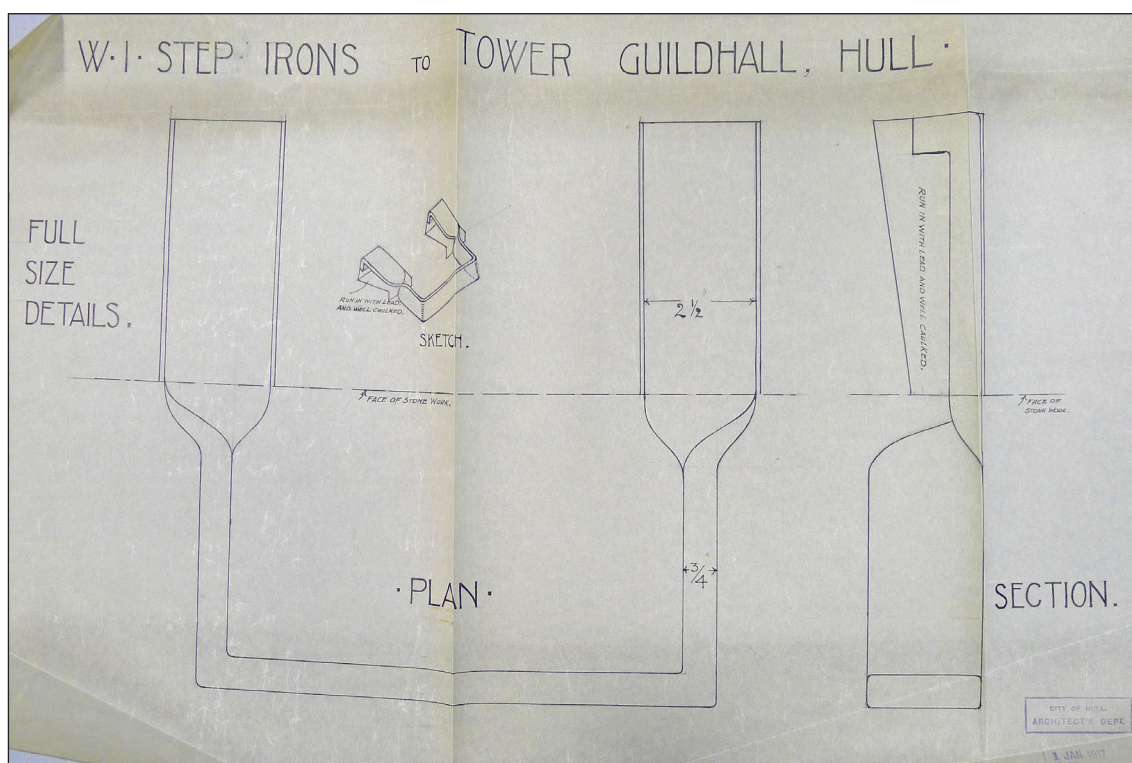


Fig. 22: Drawing for wrought iron step irons for the upper reaches of the tower and lantern, 1916. HHC C TAA/20. Reproduced by permission of Hull City Archives, Hull History Centre.

attached to the north face of the lantern, allowing external access to the final stages of time-ball chamber and the concave plinth for the *putti*. However, the *putti*, the mechanism within the tube hidden within them, the time ball, its cup and the mast remained completely inaccessible without scaffolding. A drawing of these step irons survives in the Hull History Centre, dated 1 January 1917 [Fig. 22].⁹⁴ Though hard to see from the ground, they are clearly shown by the Historic England drone footage of 2016 [Fig. 23].

Commissioning and decommissioning the time ball

However, there are no reports – either in the press or within council circles – to confirm the date at which the time ball was put into commission. In fact, it appears that it was not immediately commissioned on completion of the tower. In December 1918, soon after the end of the war, the Property Committee authorised the City Architect to:

...remove the covering from the time-ball, and that the Town Clerk make arrangements with the Post Office Authorities for the time-ball to be brought into use, in accordance with the Agreement entered into with the Postmaster-General on the 24th April, 1915.⁹⁵



Fig. 23: Drone footage of the step irons leading up to the putti on the north face of the tower. HGH16V052 © Historic England

This leads one to surmise that the time ball had not as yet been used. The *Hull Daily Mail*, on the other hand, reported on the decision ‘to work the time ball over the Town Hall Clock’, saying that it had ‘had a vacation owing to the air raids’, suggesting at least some degree of operation.⁹⁶ However, the City Architect reported to the Corporation in July 1920 that the machinery to operate the time ball ‘was not yet completed owing to the war, and part of the machinery had been damaged owing to the damp’.⁹⁷ This suggests that even by the middle of 1920 the time ball was still not operational, although work on getting it into service continued.

By early 1921, however, the concept of the time ball was coming under attack, and its cost was being rethought: the Post Office put up their annual fee for the electric signal from Greenwich from £5 to £7 10 s and the ball itself apparently required regilding. Councillors asked: ‘Who sees it?’ and stated that the time ball was too high up, though whether that was an issue for viewers or for servicing is unclear. The decision was taken to cancel the contract with the Post Office; with no time signal the time ball could not be used for accurate time-keeping.⁹⁸ £30 had been spent on repairing the time ball and the time signal fee in 1921-22 but on 28 October 1921 the City Architect ‘suggested that, as the Time Ball was not to be put into operation, the motor, which is fixed in the Tower, should be removed to the store.’⁹⁹ From these reports, and from information from the Guildhall’s Clock Custodian David Stipetic (*pers comm*, 14 February 2017), it seems that there was a narrow period around 1921-22 during which the time ball may have functioned, but once the motor was removed in late 1922 the time ball could drop no more.

The difficulties that the Corporation had with the operation of the time ball appear to have been numerous. The basic mechanism built and installed by Alexander Shaw in 1914-15, of which a photograph exists in the tower, was neither particularly strong nor durable. Indeed, the ‘main pulley wheel’ was made of a ‘cycle rim’, and Ray Galbraith, a former Guildhall electrician, wrote that, ‘Although there is nothing wrong with this, to me it indicates a rather make-do setup’.¹⁰⁰ At the time of writing in 1974, the electrical gear was still complete but without the motor; he considered that ‘the possibility of it [the time ball] ever having worked reliably for any long period was remote.’ The mechanism, as we have already seen, was prone to being damaged by damp and its windowless chamber was poorly ventilated, the only airflow coming from the hole in the floor from which the chamber was accessed from the lantern. This would have contributed significantly to the damp problem, as David Stipetic has said (*pers comm*, as before). A more stable atmosphere was required for more reliability.

Another issue was that the limited height of the time ball chamber (at 2.13 metres, or 7 feet) restricted the size and heaviness of the weight mechanism, which originally consisted of an iron bar weighted with chains; a greater height (and thus drop) was required than was allowed by the space provided (David Stipetic, *pers comm*, as before). Ray Galbraith espoused a similar view, writing: ‘I should have thought a proper counterweight taken through the floor if necessary would have been better’.¹⁰¹

A further complication to any routine maintenance would have been the inaccessibility of the time ball itself, which could only be reached via the external step-irons; the sheer height of the time ball and its tower – the tower is 50.74 metres (166 feet 6 inches) tall - is significant here.¹⁰² Ray Galbraith described the anecdotal condition of the mechanism, writing that:

I have spoken to Mr. R. Oglesby who was the Guildhall Electrician up to 1954 or 1955 and he tells me that as a young man he was sent up to the Ball by the Electrician in charge who had been instructed to make a report on the outside gear. He reported that the chain and the groove it ran in was quite unserviceable. This would be around 1925.¹⁰³

Chains, the mast, the ball itself, and indeed any exposed part of the mechanism, would be routinely battered by the elements; if the time ball was installed in 1915, then within ten years it was 'unserviceable'. Indeed, 'around 1925' may refer to the attempt in 1921-22 to get it into working order, showing that even 6 or 7 years' exposure was highly damaging.

Despite the travails of the time ball, the Corporation were pleased with their Guildhall and with Cooper's part in its design and execution. Although there was no grand ceremony to mark its completion, probably due to the exigency of wartime, H A Learoyd, Town Clerk, wrote to Cooper in 1918 that he was:

...glad to write of the thought and care as well as great skill which you brought to bear in the architectural work of the large undertaking. The site was not of the easiest to work upon owing to the great length in comparison with the restricted depth but the result has in my view been quite good. The building has a fine exterior and inside I find the arrangement from the business point of view very convenient & they work well & smoothly. My own department is all that one could desire & successfully meet all the needs. Owing to the war not all the parts of the building are even yet put to the permanent use intended but the difficult task of providing for all departments has been well thought out; and the building as a whole is not only an ornament to the City but a well-conceived place of business utility.¹⁰⁴

When Cooper was knighted in 1923 for services to architecture, particularly for his design of the Port of London Authority building, Learoyd wrote to him again to say what a pleasure it was to see 'hard work recognised in the proper quarters.'¹⁰⁵

Despite the removal of Shaw's mechanism and the replacement of the time ball itself in fibreglass after a storm (David Stipetic, *pers comm*, as before), the present image of the Guildhall, with its tall tower surmounted by the *putti* supported the time ball, appears just as Sir Edwin Cooper intended and as it did in the early 1920s. If the proposed restoration to working order is successfully achieved, then the people of Hull will experience something that has not been seen – if ever – for nearly 100 years.

THE SIGNIFICANCE OF HULL'S TIME BALL WITHIN ITS WIDER HISTORICAL AND GEOGRAPHICAL CONTEXT

It is significant that the rebuilding of Hull's Town Hall, the recasting of the Town Hall as the Guildhall, and the addition of the time ball brought the city into line with other maritime cities, particularly London, Edinburgh with its port of Leith, Liverpool and Plymouth. It allowed Hull to join a club of proud manufacturing and mercantile cities across Yorkshire which already had a civic time ball – Leeds, Sheffield and Bradford had all achieved one already – at a time that it was cementing its city status and celebrating its affluence. Having a time ball also connected Hull notionally with other important places of international trade and shipping across Europe, the Empire and the rest of the world.

Hull's time ball is also important for being constructed during the First World War, a time at which little expenditure was being made on non-essential items. It was conceived before the outbreak of war, but that it was installed at all is a continuing expression of Hull's city pride and economic success, something which is also reflected in the completion of the Guildhall itself.

Considerable significance lies in the fact that Hull's time ball is a very late example of that technology, coming at a time when they were nearly obsolete. The introduction of Summer Time (GMT +1, now known as Daylight Saving Time) in 1916 may have added a considerable complication. Introduced to Great Britain on 21 May 1916 and lasting until 1 October that year, it followed the German example – started on 30 April 1916 – and allowed the nation to follow their wartime enemy's move, important for keeping up with production at home as well as on the battlefield.¹⁰⁶ There was now, in practice, no such thing as a constant, accurate set time of 1 pm during the period that the clocks were put forward; the clock to which a time ball and its electrical circuit were connected would have to be altered manually to suit the new rules.

Although the *raison d'être* of time balls was their visibility as a visual time signal, Hull's time ball was unusually high up on a tower, the design of which Cooper purposely altered to house it. Clock towers, tall buildings and towers in general were standard locations for time balls, but these structures were rarely as tall as the Hull Guildhall clock tower and were often not purpose-built. The Nelson monument on Calton Hill, Edinburgh, for instance, was an earlier structure of 1807-15; it is 32 metres (105 feet) high, although it is obviously sited on a steep hill. The time ball on the Hull Guildhall's tower, in contrast, is over 51.8 metres (170 feet) from the ground, with the look-out room above the bell chamber, just beneath the time ball chamber, at 39.6 metres (130 feet).¹⁰⁷ This is, of course, the means of making the time ball signal seen from the Humber, the docks ringing Hull's historic centre, and the river Hull; the additional height is particularly important as there is no high ground in the city on which it could be set.

The tower on which the time ball is mounted was designed by Sir Edwin Cooper, a leading Yorkshire and London architect. He was at the height of his career between

1900 and 1939, and his design of Hull Guildhall of 1903 was highly influential for his future career. By the time the Guildhall and its time ball were finished, he was an expert on designing civic buildings, coming second in the competition for County Hall for London City Council (later the GLC) but designing many key inter-war civic and mercantile buildings in London, including Marylebone Town Hall, Lloyds of London, and the Port of London Authority building.



Fig. 24: Drone footage of the time ball, looking east towards the King George Dock and the rivers Humber and Hull. HGH16V741 © Historic England

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ENDNOTES

Abbreviations

BM	British Museum, London
HHC	Hull History Centre, Worship Street, Hull
RIBA	Royal Institute of British Architects, London

- 1 Bartky & Dick 1981, 155-156; Wauchope 1830, 160-162.
- 2 Bartky & Dick, 160.
- 3 Ibid., 160.
- 4 Laurie 1958, 113.
- 5 Meadows 1975, 72.
- 6 Meadows 1975, 72; Howse 1975, 134.
- 7 Kinns 2010, 195.
- 8 *Illustrated London News*, 9 November 1844, issue 132, 304, accessed online via Gale Group's database, The Illustrated London News Historical Archive 1842-2003.
- 9 Laurie 1958, 113-114.
- 10 Ellis 1879, 3; Howse 1975, 136.
- 11 Howse 1975, 139.
- 12 Meadows 1975, 72.
- 13 Howse 1975, 136.
- 14 Ellis 1879, 11.
- 15 Meadows 1975, 72-73.
- 16 <http://www.edinburghmuseums.org.uk/Collections/History-Collections/Calton-Hill-Collections/Space-and-Time--Time-Ball>.
- 17 Kinns 2010, 196.
- 18 *Huddersfield Chronicle*, 24 September 1853, 3, accessed via www.britishnewspaperarchive.co.uk.
- 19 *Sheffield Daily Telegraph*, 28 August 1857, 4, accessed via www.britishnewspaperarchive.co.uk.

- 20 Kinns 2010, 202; *Sheffield Daily Telegraph*, 7 February 1859, 3, accessed via www.britishnewspaperarchive.co.uk.
- 21 *Maidstone Journal and Kentish Advertiser*, 1 September 1860, 2; 4 December 1860, 2, accessed via www.britishnewspaperarchive.co.uk.
- 22 Kinns 2010, 203.
- 23 Carlyle 1885-1900, 167.
- 24 <http://www.royalobservatorygreenwich.org/articles.php?article=1216>.
- 25 *Leeds Mercury*, 13 November 1858, 7, accessed via www.britishnewspaperarchive.co.uk.
- 26 *Yorkshire Gazette*, 21 August 1852, 8, accessed via www.britishnewspaperarchive.co.uk.
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- 30 *Hull Advertiser and Exchange Gazette*, 24 Feb 1866, 8, accessed via www.britishnewspaperarchive.co.uk.
- 31 *Bath Chronicle and Weekly Gazette*, 20 September 1860, 1; *Cardiff Times*, 28 September 1866, 4; *Worcester Journal*, 31 May 1873, 4; *Daily Gazette for Middlesbrough*, 20 June 1873, 3; *Norfolk Chronicle*, 18 October 1873, 5; *Hampshire Advertiser*, 19 August 1874, 2; accessed via www.britishnewspaperarchive.co.uk.
- 32 *Leeds Times*, 4 May 1878, 5, accessed via www.britishnewspaperarchive.co.uk.
- 33 *Leeds Times*, 8 May 1875, 3, accessed via www.britishnewspaperarchive.co.uk.
- 34 *Bradford Observer*, 30 November 1876, 8, accessed via www.britishnewspaperarchive.co.uk.
- 35 *Leeds Mercury*, 10 August 1877, 5, accessed via www.britishnewspaperarchive.co.uk.
- 36 *Sheffield Independent*, 21 July 1877, 2, accessed via www.britishnewspaperarchive.co.uk.
- 37 <http://www.sheffieldhistory.co.uk/forums/topic/4581-1-o39clock-hooter/>.
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- 81 Ibid.
- 82 *Hull Daily Mail*, 20 January 1922, 10; 24 January 1922, 3, accessed via www.british-newspaperarchive.co.uk.
- 83 *Hull Daily Mail*, 7 July 1908, 6; 31 October 1921, p6,
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- 95 HHC C TCM 2/32/2: City and County of Kingston upon Hull Municipal Corporation and Urban Sanitary Authority. Minutes of Proceedings of Committees. Property,... etc. 1918-1919, 26:
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- 103 HHC C DIDS/2: as above.

- 104 RIBA CoE/Add/1/4: correspondence of Sir Edwin Cooper, 1914-1919. H A Learoyd, Town Clerk, Guildhall, Hull, 8 Feb 1918 to Edwin Cooper.
- 105 RIBA CoE/Add/1/7: letters of congratulation concerning the knighthood of Sir Edwin Cooper, 1923. H A Learoyd, Town Clerk, Guildhall, Hull, 1 January 1923 to Edwin Cooper.
- 106 <http://www.telegraph.co.uk/technology/2016/03/26/when-do-the-clocks-change-and-what-time-do-the-clocks-spring-for/>.
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APPENDIX: ORTHOPHOTOGRAPHY OF THE CLOCK TOWER





MAIN TITLE HULL GUILDHALL - CLOCK TOWER STREET ALFRED GELDER STREET CITY KINGSTON UPON HULL	SUBSURVEY NORTH FACE - ORTHOPHOTOGRAPH	SURVEY BY Historic England Geospatial Imaging Team FOR Historic England 27 Toller Row York, YO1 6WP Tel: 01904 67191 Fax: 01904 671999 George D. Mann, Agent	
	SCALE 1:50 	DIGITAL FILE NAME: HULLGUILD01016 APPROVED BY: SCALE: ST NO.: SURVEY JOB NO.: SURVEYED: EA 1813 AUG 2016 1:50 - 16/124/1P DRAWN: - - - - - - - CDD: EA - - - - - - -	



MAIN TITLE **HULL GUILDHALL - CLOCK TOWER**
 STREET **ALFRED GELDER STREET**
 CITY **KINGSTON UPON HULL**



SUBSIDIARY **WEST FACE - ORTHOPHOTOGRAPH**
 SCALE 1:50

SURVEY BY
 Historic England
 Geospatial Imaging Team
 FOR
 Historic England
 37 Tanner Row
 York, YO1 6WE
 Tel: 01904 601010 Fax: 01904 601999
 Geomorph © Historic England



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SUBMITTED	DAI/RLS	AUG 2016	1:50	-	16/1241P
DRAWN	RL	AUG 2016			
CAD	DA	SEPT 2016			



MAIN TITLE HULL GUILDHALL - CLOCK TOWER STREET ALFRED GELDER STREET CITY KINGSTON UPON HULL	SUBSEQUENT SOUTH FACE - ORTHOPHOTOGRAPH	SURVEY BY Historic England Geospatial Imaging Team				
	SCALE 1:50 	FOR Historic England 27 Toller Lane York, YO1 6WP Tel: 01904 470999 Fax: 01904 461999 Company ID: 10596399				
		DIGITAL FILE NAME: 1601120412103 SUBMITTED: 04 JUL 2015 CHECKED: 08 JUL 2015 SCAN: 04 SEP 2016	ASSIGNED SHEET AUG 2015 AUG 2015 SEP 2016	SCALE 1:50	ST NO. -	SURVEY JOB NO. 16/1241P



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