

Buildings of the Radio Electronics Industry. In Essex

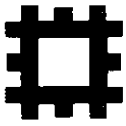
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INTRODUCTION

In November 1998, Essex County Council commissioned a brief assessment survey of the surviving structures relating to the radio electronics industry in Chelmsford District from Royal Commission on the Historical Monuments of England (RCHME). The evaluation was carried out to RCHME guidelines (RCHME 1996). The records created are defined as lying between Level 1 and Level 2, providing a visual record of the buildings identified, along with information on location, age and type. Additionally, a fuller descriptive text has been produced than would normally be expected at Level 1, and some archive material consulted. In most instances all the descriptions were produced from external observations only. The arrangement of the site summaries is chronological, based on the earliest association of the site with the radio electronics industry.

Subsequent to the production of RCHME's first report *Buildings of the Radio Electronics Industry, Chelmsford, Essex* (RCHME 1999), Essex County Council commissioned a second phase of work. This was directed at recording any remaining Marconi sites in Chelmsford District not identified in the first brief and extended the survey to cover the rest of the county. The methodology used in the second phase of work was identical to that used in the first phase of work. This report is a revised and extended version of the report issued in 1999 and contains some revision of the earlier work and descriptive summaries of radio electronics buildings in the remainder of the county.



A BRIEF HISTORY OF THE RADIO ELECTRONICS INDUSTRY

Summary

Just over a century ago, in 1896, Guglielmo Marconi brought his radio telegraph apparatus to Britain in search of backers to exploit his invention commercially. The following year the Wireless and Telegraph Company was formed, and in 1899 it acquired a former silk mill in Chelmsford for the manufacture of Marconi radio equipment. The establishment of the radio industry in Chelmsford was typical of many so called 'genius' industries of the late-19th century, and enabled Britain to benefit from new enterprises created from the discoveries of foreign inventors.

In the early 20th century the propagation of radio waves was one of the key new technologies, leading to greater safety at sea, changing the conduct of war, and bringing to everyone potential access to instant information, entertainment and communication. Chelmsford, as the Marconi company's main manufacturing and research centre, has had a crucial role in this story. In turn the growth of the company has brought wealth to the town through the thousands of people it has employed, and through its factories has left its mark on Chelmsford's townscape. Slightly further afield in the county, Marconi established other research and manufacturing centres, and radio stations, reinforcing the importance of Essex in the global history of telecommunications.

Early history, 1896-1914

In February 1896 Guglielmo Marconi (1874-1937), unable to find financial backers for his wireless telegraphy apparatus in his native Italy, arrived in England. In the following year a group of financiers, led by his cousin, Henry Jameson-Davies, approached him with the offer of forming a company to promote his inventions, and on 22 July 1897 the Wireless Telegraph Company was founded. Some of the earliest experiments were conducted on the Isle of Wight, at first transmitting from shore to ship and later across Poole Harbour to Bournemouth. Another early Marconi transmitting station at Lizard rock, Cornwall is now preserved by the National Trust. Less than two years later, on 27 March 1899, the first international transmission was made, when he transmitted a Morse message from France to Dover. Just over two years later on, 2 December 1901, a message was transmitted across the Atlantic from Poldhu, Cornwall, to St Johns, Newfoundland (Pocock 1968, 43-53). In 1899, Marconi's association with Chelmsford began when the wireless Telegraph and Signal Company acquired a former silk mill in Hall Street for the manufacture of wireless telegraphy equipment.

It was in the field of maritime communications that Marconi instruments first prospered. Prior to the advent of radio ships on transatlantic voyages had been out of contact for between five and six days. Radio communications brought obvious advantages in terms of safety but they also allowed



ships to maintain contact with the outside world and on board newspapers such as the *Cunard Bulletin* and *The Atlantic Daily News* appeared. Marconi radio telegraph instruments, of polished wood and brass, operated exclusively by Marconi employees, began to be installed on board ship, most famously on the *Titanic*, permitting communications between ship and shore and between ships. The potential for commanding naval formations was quickly appreciated and as early as 1899 two Royal Navy cruisers, HMS *Juro* and HMS *Europa*, signalled to one another in the Atlantic using Marconi equipment (Pocock 1968, 46).

The large colonial powers were swift to exploit the new technology to link far-flung outposts of their empires – a cheaper and more flexible alternative to earlier cable telegraph systems. It is no coincidence that by 1900 it was the colonial powers, Britain, France, Germany, Italy and Russia (with its large landmass) where the radio industry was first established. The invention was also quickly adopted for military use, five sets on horse drawn carts were operated by the British using Marconi personnel during the Boer War 1899-1901 (Terraine 1982, 39). During the Chinese Boxer Rebellion (1900) wireless stations were established by western powers in the Taku Forts, and during the Russo-Japanese War in 1904 ships on both sides were fitted with wireless sets (Fortescue 1913, 117). The potential of using balloons or aircraft spotters was quickly appreciated and in 1908 experiments were carried out to exchange wireless messages with balloons and a few years later with aircraft.

The commercial exploitation of this new technology also continued and in 1908, Marconi established the first Trans-Atlantic wireless station at Clifden, County Galway, later building a radio station at Waunfawr and a receiver station at Tywyn, North Wales (Williams 1999, 65). Along with Marconi's stations at Glace Bay, Nova Scotia and Coltana, Italy, Clifden was one of most powerful transmitters in the world.

The First World War, 1914-1918

The Royal Navy quickly adopted the new technology and at the outbreak of war in 1914, 425 ships and thirty shore stations were equipped with wireless sets (Terraine 1982, 40). The Army had been slower to adopt wireless communications, partly due to the bulky nature of the equipment (Hartcup 1998, 14-16).

War has been seen as one of the most important stimuli to the development of new technology in the 20th century. The most important advances in radio brought during the Great War were the replacement of spark gap transmitters with Poulsen arc transmitters in naval sets by the end of 1916, and towards the end of the war by equipment using valves. This innovation permitted a microphone to be attached to the transmitter, and headphones to the receivers, allowing voice telephony - a far more effective means of communication than Morse code.

Just prior to the war Marconi's set up an experimental station at Brooklands, Surrey, to investigate ground-to-aircraft communications, and after the outbreak of war its staff were seconded to the



Royal Flying Corps. Work by Marconi's and others during the war succeeded in producing working sets for transmitting Morse and later voice messages between aircraft and the ground. This was of crucial importance as many aircraft on the western Front were used for artillery spotting, so much so that by November 1916 the British had 543 ground stations for disseminating information from spotter aircraft to artillery batteries. Radio telephony was also later widely used by aircraft involved in home defence (Hartcup 1988, 127-8, 152-6). The knowledge gained during the closing months of the First World War of co-ordinating air defence by means of telephony provided valuable experience when Britain's air defences were renewed in the late 1930s.

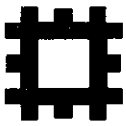
The Inter-war years, 1918-1939

In the aftermath of the war emphasis of radio research and development moved to public broadcasting. Marconi's Chelmsford factories were closely associated with these innovations, and on 15 June 1920 the first official radio broadcast was made by Dame Nellie Melba from Marconi's New Street works. By 1922, regular broadcasts were being made from Writtle, Station 2MT (Hannah 1978, 175). In the same year the British Broadcasting Company (BBC) was formed from a consortium of six firms, British Thomson-Houston Co, General Electric, Marconi, Metropolitan-Vickers, Radio Communication Co, and Western Electric; and by the end of the year it had established eight main stations in large conurbations, each with a broadcast range of only thirty miles (48km) for valve sets and less for crystal sets. In an effort to fill the gaps it was proposed to build a powerful central transmitter operating on long waves. The experimental transmitter, 5XX, was erected in 1924 at Marconi's New Street factory, Chelmsford, and was at the time the most powerful transmitter in the world; later, in July 1925 it was moved to Daventry, Northamptonshire (Bussey 1990, 7-9). The start of public broadcasting led to a rapid growth in the home market both for ready-assembled radios and for kits for radio amateurs to construct their own sets. In the decade between 1924 and 1934 there was a phenomenal growth of interest in the new medium and radio licence holders multiplied eleven-fold from 600,000 to 6,600,000 (Bussey 1990, 53).

By the early 1930s Marconi's was one of the principal suppliers of telephones, telegraph and wireless equipment for the British services, armed forces abroad, and civilian aerodromes (Admiralty 1931, vii). Under the trade name Marconiphone the company was also a leading manufacturer of wireless sets for the domestic market.

The Second World War, 1939-1945

From the mid-1930s great efforts were put into the development of radio direction-finding equipment (RDF), or radar, using reflected radio waves to detect the approach of hostile aircraft. This new technology was swiftly put into place along the east coast and, couple with the ability to communicate with the pilots by radio, played a fundamental role in winning the Battle of Britain in 1940. Shortly afterwards airborne radar was developed to detect intruders at night, enemy U-boats and ships. Radar was also used to guide anti-aircraft guns onto their targets, and, as the allies



moved onto the offensive, radar-guided bombing devices. As one of the leading electrical manufacturers Marconi's was approached by the Air Ministry to design and produce radar sets, and to meet these commitments a new research centre was established at Great Baddow. Research here was, for example, at the forefront of the development of the cavity magnetron - a powerful generator of microwaves for use in radar sets (Latham 1989, 34-5). The Chelmsford factories manufactured a variety of equipment, but with special emphasis on naval sets. By the end of the war radar, which was in its infancy in 1939, had been developed into a new and vast technology.

The Post-war years, 1945-1999

In the late 1940s Britain's wartime radar system was substantially updated to meet the threat posed by fast jet aircraft under a scheme codenamed 'Rotor'; mobile equipment primarily for overseas use was codenamed 'Vast'. As initially envisaged the programme was split into two parts - Stage I which involved the refurbishment of existing equipment types; and Stage II which would see the introduction of more powerful radars from 1957. The Marconi Telegraph and Wireless Company was, not only, one of the prime contractors for the supply of the equipment but also undertook development work in association with the Telecommunications Research Establishment. For Marconi's Chelmsford factories in the 1950s, the refurbishment of Britain's radar defences, and the expansion in the use of electronics in other defence systems represented a boom time. This growth was reflected in the expansion of pre-existing factories and the acquisition of new sites, while increasing prosperity amongst the workforce is, for example, illustrated by the growth in size of the car park at Great Baddow.

At the start of the refurbishment programme, in 1948, Marconi's were invited to submit a report on the main types of existing radar equipment and suggest various improvements (Gough 1993, G-2). In August and September 1948 Marconi's at Chelmsford received a contract to improve the Type 7, 11, 13 and 14 radars and improve the display screens (Gough 1993, 49). Work in the early 1950s included the development of L-band (23cm wavelength) radar and the development of a moving target indicator. For the latter work Marconi's site at Bedell's End proved to be too good for the refinement of the clutter development system and in about 1954 the test equipment was moved to Bushy Hill, north of South Woodham Ferrers (Gough 1993, 125-6; Simons and Sutherland 1998, 179). Subsequently Marconi received a contract from the Ministry of Supply to study the problems of developing an Anti-Ballistic Missile system; this work, which began in 1954, was terminated in 1960 after the decision had been made to install the American Ballistic Missile Early Warning System at Fylingdales, North Yorkshire (Gough 1993, 200-2). Marconi's continued to secure government commissions and at the end of the decade received a contract to develop a passive tracking system codenamed 'Winkle' (Gough 1993, 181-2), and for the manufacture of five large Type 84 L-band radars.

Defence contracts continued to be important throughout the 1960s, but, as one of the pioneers of military radar technology, Marconi's was well placed to exploit the potential of civil Air Traffic



Control radar systems, which were beginning to be developed with the growth in civil air travel. Work included the manufacture of approach control and airfield surveillance radar, display consoles and the development of a computer for flight plan processing called Myriad (Gough 1993, 208, 268), 319) – a project later abandoned in favour of the American IBM system. Also by building on wartime naval radar systems Marconi's also expanded into mercantile marine in the late 1940s, culminating in around 1960 in the construction of a purpose-built headquarters, design office and factory in New London Road for the Marconi International Maritime Company. In the defence industry, the 1960s were characterised by the amalgamation of many smaller well-known companies into large national concerns. In November 1967, the General Electric Company (GEC) acquired Associated Electrical Industries (AEI) and in the following year English Electric, Marconi's parent company since 1946. The separate radar interests of these companies were brought together in August 1969 as Marconi Radar Systems Limited (MRSL), with its headquarters at Writtle Road (Simons and Sutherland 1998, 174).

In the 1970s, Hawker Siddeley and Marconi were given the contract to develop the Nimrod early warning aircraft, but after many problems with its systems, it was cancelled in 1986 in favour of an American alternative (Hartcup 1993, 233-5). More successful were the Stingray and Tigerfish torpedoes, using advanced electronics, developed by other areas of the Marconi group (Hartcup 1993, 272-4). Radar, nonetheless, continued to form a major part of Marconi's business, but as part of the defence arm of GEC the development of electronic intelligence systems began to assume greater significance within the Marconi group. The importance of this field for the future defence systems was acknowledged in January 1999, when British Aerospace (now BAE Systems) announced they were to pay £8 billion for GEC Marconi (Gow 1999a, 21).

Marconi in Chelmsford and Essex

By the late-19th century Chelmsford was already associated with a number of new industries, including Crompton's Arc Works in Anchor Street – pioneers in the manufacture of electrical components – and Christy Brothers whose Broomfield Road Ironworks had, like Crompton's but slightly later, diversified into electrical engineering (Kelly's 1895). In 1899, the American Hoffman Manufacturing Company established a large multi-storey factory in New Street to produce precision steel bearing – the first major project to encourage the expansion of the town northwards.

Chelmsford's early association with the electrical industry may have been one of the factors that attracted Marconi to the town. Characteristically for a new industry his first workshop was established in a pre-existing building – a former silk mill in Hall Street. Early additions here and nearby behind Mildmay Road were either temporary or, at most, lightly built structures performing diverse functions, ranging from research and development to woodworking and associated crafts involved in the manufacture of the earliest wireless sets. The close association with Chelmsford was broken briefly, when in 1904 Marconi's established a large four-storey



works at Dalston, in North London. This move appears to have been too ambitious and four years later the factory was re-established in Hall Street. By 1911, however, the company, has prospered, and enjoying its position as the world's leading supplier of radio equipment, was able to contemplate an impressive head office and integrated factory on New Street close to Hoffman's ball bearing factory. The factory site was laid out in February, on the county's cricket ground, and seventeen weeks later it was operating and host to the International Radiographic Conference (Baker 1970, 138). At the outbreak of war the Hall Street factory was taken over by the Admiralty, the capacity of the new factory appears to have been sufficient to meet the demands of the war, unlike the Hoffman Company, which erected new workshops on the western side of New Street. The Hall Street site was retained for sometime and during the war was used for intercepting German communications (Baker 1970, 159), in 1919 the Ordnance Survey marked it as Marconi Signal Station. Just to east, on the north side of Rochford Street, they also marked a mast on a plot of land with a single building, which may have been linked to the signal station.

As the radio industry expanded the Marconi Company began to dominate the town. An early acquisition was the site of Broomfield Pottery to the north of the town. Its hill top position commanding good line of sight in all directions was ideal for a radio station and it was developed first as a receiver station, and later as a research station, which operated into the 1950s. The Marconi school also became a feature of the town, established to train radio engineers from around the world how to operate and maintain Marconi equipment. The first school was set up at Frinton, Essex in 1901, but it was moved to the Hall Street works in 1904 and then out to the Broomfield site in 1911 (Baker 1970, 274). In 1921, it acquired the former Chelmsford College building in Arbour Lane - a large Victorian villa with residential accommodation. This was considerably expanded in 1935 with the construction of an modernist style college building, incorporating laboratories, lecture rooms, and offices. It was again enlarged in the early 1950s, a time of major expansion in the demand for the company's products.

In 1919, Marconi's established a small experimental station at Writtle, 2km (1 ¼ miles) west of the town, at first to investigate installing radios in aircraft. It was this site in 1922 that Marconi's used for the first the regular public broadcasts. In 1919, the company also acquired a late 19th-century redoubt at North Weald Bassett. By 1922 they had redeveloped the site as their central transmitting station, and it was one of the most advanced radio stations in the world, and with its receiver station at Brentwood, it handled most of Marconi's Trans-Atlantic traffic and a lot of the Continental wireless telegraph traffic. However, in 1929 as a result of the restructuring the British wireless and cable services the Marconi Company lost all its wireless stations. This marked a move away from the early emphasis of the company of exploiting Marconi's patents on telegraphic communications, to a company focused on research and manufacturing.

This realignment of the business, and the anticipation of a marked expansion in the domestic radio market probably led to plans to expand the New Street site. In 1935, it was proposed to bring all the engineering, sales and other staff from Elettra House, London to New Street. A new



five-storey office, Marconi House, was planned but was not ready for occupation until shortly after the outbreak of war. The production side of the factory was also enlarged (Baker 1970, 275). In the late 1930s the Marconi Company was also at the forefront of the development and manufacture of radio direction finding (RDF), or radar, equipment. In 1938, the company acquired a large greenfield site at Great Baddow, 2km (1¼ miles) south east of the town, for a new research establishment. The Air Ministry took over most of the Great Baddow site in April 1940, the remainder was acquired by the Admiralty Signals Establishment in May 1941 (Baker 1970, 308). Crucial work carried out there included the development of the resonant cavity magnetron – the vital component of a radar set used to generate microwaves. In 1942, the English Electric Valve Company erected a new factory covering 9,000 sq ft (836 sqm) in Waterhouse Lane, then on the western outskirts of the town; its most important product was the magnetron (Baker 1970, 316). The former radio station at Writtle continued in use as a research station and worked on the development of radar navigation equipment for bombers. It was perhaps also around this time that a small factory for specialised engineering products was set up at Guy's Farm, Writtle, and a test site at Bedell's End also near to Writtle.

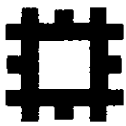
Post-war Marconi's was one the prime contractors involved in the refurbishment of Britain's radar stations. The growth in the application of radar for military and civil use is reflected in the continuing expansion of existing Marconi factories and the construction of a new factory in Waterhouse Lane, and a new headquarters and factory for Marconi International Maritime Company Limited in London Road. These new 1960s factories spearheaded the post-war westward spread of the town into areas of former agricultural land. Marconi's also acquired the Crompton Second Arc Works in Writtle Road, which it used mainly for testing new equipment. They also took over a former Victorian school at the junction of Victoria Road and New Street for use as the Marconi Athletic and Social Club. The Installation Department occupied Broomfield House, close to Broomfield Church, other sites were occupied on a temporary basis, including offices rented in the town and sites for test aerials in the surrounding countryside.

This expansion spread beyond the Chelmsford area. In 1954, a new research station was established at Bushy Hill, north of South Woodham Ferrers. This was initially linked to Marconi's work on developing a new L-band (23cm wavelength) radar, with a clutter rejection system for the RAF, after the topographic position of Bedell's End had proved to be too good to fully test the equipment. In 1956, further test facilities were acquired when Marconi's began using Rivenhall airfield. Further factory space was also required, this was partly to meet the demands of an expanding market, but was also necessary to provide a clean, dust-free and environmentally controlled manufacturing areas for increasingly sophisticated equipment. These new products also required large design teams and administrative staffs to bring the projects to fruition, all of which needed to be accommodated. In selecting sites for factories the industry was footloose, as its products were relatively small in number, but high in value. For its modern factories it chose new industrial estates, at Basildon, Billericay and Witham. The completion of these factories in



the early 1960s marked the highpoint for the radio electronics manufacturers in Essex with the greatest number of factories in production.

Most of these factories survived through the 1960s and 1970s, although with a few losses. However, the end of the Cold War in 1989, and the resultant downturn in defence spending, hit defence-oriented, high-technology companies such as GEC-Marconi hard. Over the last decade there have been significant numbers of redundancies, contraction and factory closures particularly around Chelmsford. This has been part of global phenomenon as, in the post Cold War defence 'draw down', capacity was reduced and defence companies have merged to form large multinational conglomerates. At the end of 1999 the defence arm of GEC (GEC Marconi) was acquired by British Aerospace (now BAE Systems) creating Europe's largest and the world's third largest defence technology company (Gow 1999b, 23, Guardian 1999, 25). Despite these losses the electronics industry, nevertheless, remains as one of the most important employers within the county.



OUTLINE CHRONOLOGY

Early History

- 1874, Apr Guglielmo Marconi born Palazzo Marescalchi, Bologna, Italy
- 1887 First demonstration of Hertz's electromagnetic waves
- 1894, Oct Start of Marconi's experiments at Bologna
- 1895, July Start of Marconi's outdoor experiments
- 1896, Feb Marconi emigrates to Britain
- 1896, May Marconi contacts War Office
- 1896, Aug Marconi meets War Office with regards to Morse signalling
- 1896, Sept Account of Marconi's work is published in *The Times*
- 1897, Jul 2 Wireless telegraph and Signal Company registered
- 1897, Dec Marconi begins experiments to transmit radio messages from shore to ship from The Needles Hotel, Isle of Wight
- 1898, Jan 3 Marconi sets up another shore station at Bournemouth
- 1898, Jun 3 Lord Kelvin became the first person to send a paid radio-telegram, when he sent a message from Marconi's station on the isle of Wight.
- 1899, Mar Admiralty negotiate for supply of radio apparatus
- 1899 Marconi establishes first radio factory in the world in Hall Street, Chelmsford
- 1900, Mar Name changed to Marconi's Wireless telegraph Company Limited
- 1900, Apr Marconi International Marine Company registered
- 1900, Jun Admiralty order for Marconi equipment
- 1900, Sept First Marconi sets delivered to the Royal Navy
- 1900 First wireless college in the world established at Frinton, Essex
- 1901, Jan 23 Marconi's first long distance transmission from the Isle of Wight to the Lizard Peninsula, Cornwall.
- 1901, Dec 12 Marconi's first transatlantic wireless transmission St John's, Newfoundland to Poldhu, Cornwall
- 1903 Receiver station established at Pottery Lane, Broomfield
- 1904 New Marconi factory opened at Dalston, North London
Marconi school moved to Hall Street, Chelmsford



Wireless Telegraphy Act

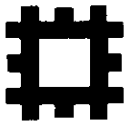
- 1908, Feb Marconi establishes public Trans-Atlantic wireless telegraph service
Dalston factory closes, Hall Street reopens
Post Office Wireless Telegraph Section formed
- 1910 Experiments with wireless transmission from aircraft during the annual Salisbury Plain manoeuvres
- 1911 Training school moved to Broomfield research station
- 1912 Marconi establishes new factory in New Street

The First World War 1914-1918

- Introduction of the radio valve
Development of wireless telephony
Trials of wireless sets in aircraft
Hall Street site is used to intercept German communications

The Inter-war years 1918-1939

- 1919 Small experimental station established at Writtle to investigate the use of radios in aircraft
Marconi purchases yacht Elettra for radio research
North Weald Redoubt purchased as site for a radio station
- 1920, Jun 15 First official public radio broadcast by Dame Nellie Melba from Marconi's New Road factory
- 1921 Marconi School of Wireless Communications established in Arbour Lane
- 1922, Feb First regular public radio broadcasts made from Marconi's Writtle station
Ongar Radio Station and receiver station at Brentwood take over most of Marconi's continental and Trans-Atlantic circuits
- 1924 Large experimental long-wave transmitter erected in New Street works
- 1925, Jul Transmitter 5XX moved to Daventry
- 1936 Robert Watson Watt begins research on Radio Direction Finding (RDF), or radar, at Bawdsey Manor, Suffolk
- 1937, Jul 20 Guglielmo Marconi dies
- 1937 Land purchased at Great Baddow to build Marconi research centre



The Second World War, 1939-1945

Development of radar for detecting approaching aircraft: used also for locating ships and submarines and for gun laying

Airborne radar developed to detect aircraft in flight and to aid in bomb aiming

1942 English Electric Valve Company established in Waterhouse Lane

The Post-war years, 1945-1999

1949 Rotor scheme initiated to modernise Britain's radar defences

1954 Marconi's establish research centre at Bushy Hill, South Woodham Ferrers

1956 The Marconi Company acquire Rivenhall airfield for equipment testing

1963 Elletra House, New London Road, Chelmsford opened as headquarters of Marconi International Maritime Company

Company name changed to The Marconi Company Limited

196? Marconi's build new factory in Waterhouse Lane, Chelmsford

1965 Marconi Specialised Components Division open a new factory in Radford Crescent, Billericay

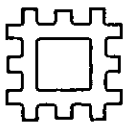
1969 Marconi's acquire Hawker Siddeley's factory in Writtle Road (Formerly Crompton's Second Arc Works)

1992 Marconi factory in Writtle Road closes

199? Marconi College, Arbour Lane closes

1998, Jan 1 Final broadcast of 500kHz Morse Code by UK coastal radio stations

1999 GEC-Marconi acquired by BAE Systems



1 THE ANCHOR WORKS, ANCHOR STREET, CHELMSFORD



Figure 1 The Anchor Works, Upper Anchor Street (AA99/01810). (C) Crown copyright.NMR



The Anchor Works (TL 7053 0612) began as an ironworks in the early 19th century. With a house fronting Moulsham Street, this large concern also had frontages on Queen Street and Anchor Street, and it is on the latter that industrial buildings survive. The works was acquired by R.E.B. Crompton in or before 1878. Crompton, a pioneer in the development of electrical components, was engaged in electrical engineering by 1886 if not before (Kelly's 1886), manufacturing arc lights and dynamos, at what came to be known as Crompton's Arc Works. Following a fire in 1895 Crompton and Co. built a new factory in Writtle Road, while retaining the Moulsham Street address at least until 1902 (Kelly's 1899, 1902). From that year the Clarkson & Capel Steam Car Syndicate Ltd adapted the southern part of the site for the manufacture of steam cars, while the northern part appears to have been rebuilt as a power station for the Chelmsford Electric Lighting Company Ltd. (Kelly's 1902). Both concerns changed their names at an early date: the car factory is listed as [Thomas] Clarkson Ltd in 1906 and as the National Steam Car Co. in 1914, while the power station appears as the Electricity Supply Corporation from 1908 (Kelly's 1906-14). The latter is marked as Electricity Works on the 1919 Ordnance Survey: the 'Motor Works' was still operating at the time of the 1940 revision (OS Essex NLIV.15, 1919 & 1940). The site included a house, which Moulsham Street to the east; dating from the mid-19th century, and thus from the ironworks phase of the site; it is currently a private residence, while the remainder of the southern part of the site (excluding as far as Queen's Street) has been redeveloped for housing. The former electricity works, fronting Anchor Street (formerly Upper Anchor Street), is now the Devon House Health and Fitness Club, and is listed Grade II.

The earliest surviving elements of the complex are possibly two ranges to the rear of the Anchor Street frontage, and are probably fragments of the ironworks/car factory. Of brick construction, one with a slate roof and the other with corrugated asbestos cement, they present few features on the visible parts of the exterior, but both have a series of cast-iron plates which may be associated with internal line-shafting.

The range fronting Anchor Street has stylistic details suggesting a date *c.* 1900, and appears to be the purpose-built electricity works that was established by 1902. A highly simplified elevation of the works, submitted as part of a 1904 application to erect a wrought-iron boiler-house chimney, corresponds in essentials to the present structure (ERO, D/B7 Pb 120). It shows, from east to west, an entrance and covered yard, a three-bay two-storey office range, a tall north-lit engine house with a large stack inset in the west wall, and a lower boiler house with a frontage similar to that of the engine house. The 1919 Ordnance Survey maps shows the boiler house extending further to the rear than the engine house, and also a rear range behind the offices (OS 1919). The entrance (minus its roof), offices, and engine house survive, together with what may be fragment of the boiler house, west of a later house.

The engine house consists of a tall single storey presenting six bays to the street, while the two-storeyed office range, fenestrated as three bays, occupies a single wide brickwork panel, to the east. At the east end there is a contemporary yard entrance. The building has a high plinth, in



blue engineering brick, rising to ground-floor sandstone sill band, and thereafter pier-and-panel walling in yellow brick, with detailing in orange brick and terracotta. The detailing aprons to the windows, and fluted terracotta key-blocks to the heads (cambered on the offices windows, semi-circular on the tall workshop windows), and moulded impostes, cornices, copings and finials. Pediments distinguish the office front (swept) and the large workshop entrance (segmental), which has a keystone. The original central office entrance has been reduced to a small window, and the westernmost workshop window has been lowered top provide an additional doorway. The workshop consists of two north-lit elements, gabled east-west, the north roof having a blocked oculus to the west. West of the main range there is a length of wall in yellow brick, incorporating a louvered window; this appears to be a small fragment of the boiler house, retained as part of the electricity sub-station.

South west of the street front there is a two-storeyed range, probably steel-framed, with steel trusses and a covering of asbestos. It appears to date from the inter-war period, and has large windows suggesting a continuing manufacturing or assembly role for the building at this date.



2 THE OLD SILK MILL, HALL STREET, CHELMSFORD



*Figure 2 Marconi's Wireless Telegraph Co Ltd, Hall Street, from south east (AA99/01808).
(C) Crown copyright. NMR*

The former silk mill (TL 7100 0630) dates from 1858 and is listed Grade II. It occupies a corner site, with a south front to Hall Street and an east elevation set back from Mildmay Road. A contemporary mill-owner's or manager's house (now known as Albert Cottage, and not separately listed) stands immediately to the west on Hall Street. The mill was extended at an early date by the addition of an office range, which projects eastwards from the main front. Until sometime between 1890 and 1895 the mill was used by the firm Samuel Coutauld and Co., initially for silk throwing, latterly for the manufacture of crape (Kelly's 1870-95). The mill was acquired by Guglielmo Marconi's Wireless and Signal Co. Ltd. (later Marconi's Wireless Telegraph Co. Ltd.) in 1899) and was used in the development of and manufacture of radios until 1912, when the New Street opened.

Surviving building control plans for the period 1900-14 illustrate the expansion of the site during Marconi's occupancy. In 1902 a Packing Shed was built in the yard to the west of the mill, and in 1908 another replaced this in the same position (ERO, D/B7 PB 39 & 282). Thereafter site constrictions led to further expansion occurring on the south side of Hall Street, west of an existing maltings on Mildmay Road. A temporary Test Room and Workshops building was erected in



1909, and a Testing Room and Designers' Office followed in 1910 (ERO, D/B7 Pb 323 & 383). These early additions were all lightly built of timber with a covering of corrugated iron. Certain other accommodation was provided in the form of 'removable huts'. A four bay north-lit building by Johnson & Hawkes followed in 1911, comprising a Drawing Office, Woodwork Shops and a number of stores among other things, and incorporating a radio mast (ERO, D/B7 PB422). By this date the Testing Room and Designers' Office had been re-designated the Field Station department, suggesting a research and development role, and an extension to the south was proposed. The R&D facility was retained when production was moved to the New Street site in 1912, as the four bay masted building appears on the 1919 Ordnance Survey map labelled 'Marconi Signal Sta[ation]', together with a small building (possibly one of the 'removable huts') present by 1911 (OS Essex NLIV.15, 1919: ERO D/B7 Pb 422).

As originally built the mill complex consisted of a series of ranges enclosing a small yard, the east side of which was formed by the mill, the north side by a range comprising an engine and boiler house, the south side by a manger's house ('Albert Cottage') and the west side by ancillary buildings. Of the four ranges, only the mill and the house survive. The mill consists of two storeys and two parallel twelve-bay ranges, gables north-south behind a four bay front and divided by a central valley. Construction is of pier-and-panel walling in yellowish brick, with stone dressing and roofs of Welsh slate. On the south front giant pilasters divide the bays, and there are paired pilasters at either end of the elevation. An entablature and parapet, concealing the roofs crown the elevation. Large iron-framed windows set beneath segmental brick heads light the interiors. Evidence for steam power was not seen. The office addition projects eastwards from the south end of the east elevation, and has a rounded south-east corner. The pier-and-panel brickwork is in keeping with the original build, but the first floor is lower, and there is a simple brick cornice and parapet. Where the addition meet the mill there are straight joints. The addition incorporates an entrance in the north elevation, and presumably covers the original mill entrance.

The house, of two-storeys, has yellowish brick, a hipped slated roof and a three-bay front incorporating a central entrance. The window bays are recessed in the manner of pier-and-panel walling, but the piers are left plain. The entrance and ground-floor windows have stucco surrounds incorporating simple entablatures: the entrance surround is rusticated and keyed. The stylistic details suggest that it is contemporary with the mill, or nearly so.



3 MARCONI RADAR, WRITTLE ROAD, CHELMSFORD

This large site (TL 6980 0600) fronting Writtle Road to the south, and bounded by Crompton Road to the west, the Waterhouse Lane site to the north and the railway to the east, is said to have been established in 1896 on a greenfield site by the firm of Crompton & Co., who were pioneers in the manufacture of various kinds of electrical equipment, including generators, transformers, and electric motors. The 1895 revision of the Ordnance Survey map shows the site still in (or lately in) agricultural use, with a large clay pit occupying part of open field (OS Essex LI1.7, 1895). Crompton's were certainly established on the site by 1899, when Writtle Road is given precedence over Moulsham Street in the firm's directory entry (Kelly's 1899). Building control plans chart a rapid sequence of additions in the period up to 1914 (the last date for which they are available), including a Lamp Shop, Varnishing Shop, Experimental Department and additions to a Foundry (for a full list see sources below). One corrugated iron building is described as being built jointly for Crompton's and the Barcheller [*sic*] Pneumatic Tyre Co. and was perhaps associated with the manufacture of insulated wiring (ERO, D/B7 Pb 464: not seen).

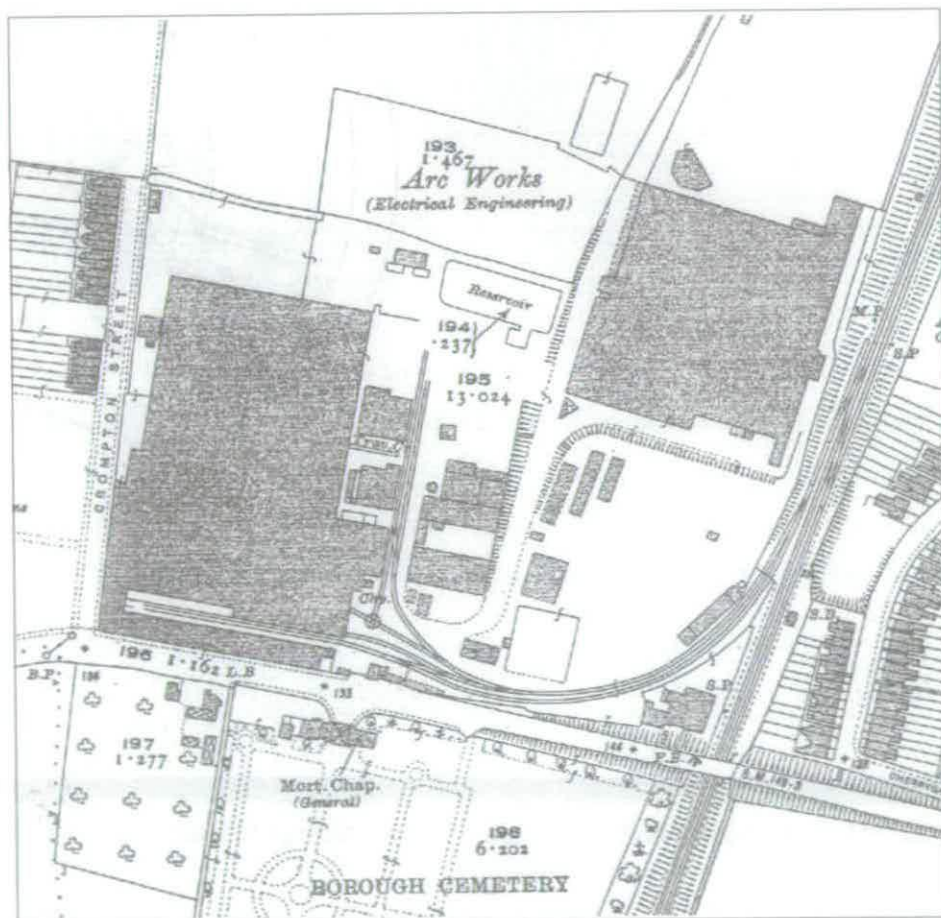


Figure 4 Extract from 1919 Ordnance Survey map

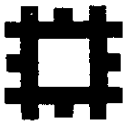


The earliest depiction of the site as transformed by Crompton's is on the 1919 OS revision, which shows two main blocks, one fronting Writtle Road in the south-west corner of the site, and served by a spur from the Great Eastern railway: the other (possibly resulting from secondary expansion) alongside the railway (but not originally linked to the spur) to the north east (OS Essex NLIV.14, 1919). On the east side of the Writtle Road block a series of smaller buildings are shown. The firm may also have built terraced housing shown on Crompton Street. During the 1930s/or the Second World War the site was expanded, in part on land to the north west which was hitherto in agricultural use. The structures to the east of the Writtle Road block were consolidated, and some were demolished to make way for new buildings, while on the Crompton Street side a number of small extensions were added, infilling up to the street line, which diverged from the return elevation of the original works. To the rear of the Writtle Road block a large steel-framed shed was added end-on to Crompton Street, and a detached range of five north-lit bays was built to the



Figure 4 Marconi Radar (formerly Crompton Parkinson) Writtle Road (AA99/01812). (C) Crown copyright.NMR

north east. These are shown on the 1947 Ordnance Survey map (OS Essex NLIV.14, 1947) and on contemporary aerial photographs. Hawker Siddeley acquired the site after the Second World War, and subsequently by Marconi Electronics, who used for the manufacture and testing of radar equipment until closure in the early 1990s.



The original buildings are of brick construction and one- or two-storey height, and are distinguished by the use of gable oculi. The public and office front takes the form of a two-storeyed L-plan building with a street range of 23 structural bays, in pier-and-panel construction (yellow brick with red brick details), and a much shorter return range. The street elevation is articulated by a roughly central entrance bay and two flanking bays, all three of which project slightly beneath gables and have windows closely spaced in the form of triplets (here treated as single bay). The structural bays defined by the piers each contain two windows on each floor and have dentilled brick decoration on the eaves. The entrance has Portland stone dressings, banded pilasters and an entablature incorporating a scrolled signboard in relief. In the gable there is an aedicule incorporating a terracotta design depicting a horse rampant impaled by a dart. The flanking gables each have a keyed oculus, as do the gables of the main roof. The windows have flat brick arches and brick arches with an ogee motif, and sandstone sills, many replaced by concrete. Pre-cast concrete was used from the outset for keystones and copings. The main goods entrance to the site is at the east end of the building, and the best rooms in the office range are placed at the opposite end, where the west elevation is given modest emphasis by the incorporation of a two-storeyed bay window probably denoting a board room or similar accommodation. The corner of the building (where the two roads meet) is canted.

Behind the Writtle Road frontage there are a series of brick north-lit sheds with plain oculi in the gables. The southern most range, placed in the re-entrant of the L-plan office range, has matching brick walls with detailing in red brick. Other ranges extending northwards are in red brick throughout, but the scale of the office front suggests that these too must have formed part of the primary phase. Another building which looks original to the site is a gate lodge or time office at the site entrance on Writtle Road. This single-storeyed building has been re-fenestrated, but retains a keyed oculus in the south gable. The a large block alongside the railway could not be examined closely, but from map and aerial photographic evidence it would appear to have been built as fourteen north-lit bays by 1921. Between the and 1947 it was linked to the railway spur by the construction of a covered siding along the east side, and also extended northwards by two wide bays. A subsequent northwards extension has been demolished.

In the south-east corner of the site there are two buildings which must be early, if not original and which appear on the 1919 Ordnance Survey map (OS Essex NLIV.14, 1919). One is a single-storeyed brick building with segmental arches and a slanted roof, which is aligned to respect the former railway spur. In the corner immediately alongside the Writtle Road railway bridge there is a red-brick and slated two-storeyed building, which probably represents an early addition to the site. It has a broadly domestic scale and appearance, and outbuildings on the west side which resemble service buildings, but the detailing is very plain and the storey heights (a much taller ground floor) suggest an ancillary/institutional function). This would be in keeping with its location, isolated from the remainder of the site by the railway spur, and served by an original first-floor entrance, reach via a bridge from Writtle Road – an arrangement which suggests site security was not of paramount importance. Vestigial Arts-and-Crafts detailing (e.g.



the use of tile in one of the surviving original gables) might indicate a date early in the 20th century. The east elevation has been considerably rebuilt at first-floor level.

Set well within the site on the north side of the reservoir, remote from other buildings of a similar age, there is a brick building, gabled east-west and incorporating pier-and-panel construction. Scale and situation suggest that it may have been a powerhouse (part of it is currently an electricity sub-station), while the relatively articulated exterior suggests a comparatively early date. It does not appear on the 1921 map, but may date from later in the 1920s or perhaps the 1930s expansion. The one – and two-storeyed extensions, which lie between the Writtle Road block and Crompton Road, are the product of a number of phases. Expansion in this area seems to have progressed through the inter-war period and beyond (the use of traditional materials on the street frontage perhaps perpetuated because of residential properties on the other side of the road). Towards the northern perimeter of the site there is along single-storeyed building with corrugated iron sidings and a segmental roof. This is post-1947 on map evidence, and has perhaps been re-erected from elsewhere.

Large steel-framed sheds with brick infill panels were present on the site during the Second World War, as some retain traces of camouflage paint; the earliest probably date from the late 1930s. A block of three north-lit sheds set back behind Crompton Road frontage to the north of the north-lit sheds described above is probably among the earlier examples, and retains camouflage traces. To the north east there are five ranges of north-lit sheds. Further steel-framed sheds, generally with roofs of corrugated asbestos cement, have infilled the yard to the north of the time office. Later examples have Fletton brick, and later still blockwork, infill panels, including the large engineering shop, which extends east-west in the middle of the site. A tall brick structure on the west side of this yard may be a boiler house. Structures infilling the area between the yard and the railway seem generally later in date, probably of the 1950s and '60s, though still steel-framed with brick. At the north end of the site there are two structures, one an oil-and –paint store, which are built of Fletton bricks and are probably also post-Second World War.

The intermingling of early and later buildings in the northern and eastern parts of the site suggest that some early buildings may have been cleared to make way for later structures. Most of the later buildings are large engineering or assembly shops.



4 WIRELESS STATION, POTTERY LANE, BROOMSFIELD

Broomfield, Pottery Lane (TL 7017 0844), in 1903 Marconi built a wireless receiver station on the site of Broomfield Pottery (OS Essex XLIII.16), by 1911 it was a research station and part of the Marconi training school (Baker 1970, 97, 274). It was built in a prominent position and at the time of its construction would have commanded good views in all directions. The plan of the station is shown by the Ordnance Survey in 1947 (OS Essex Sheet LIV.10, 1947), but with no indication of function, it continued in use until the early 1960s, but was cleared shortly afterwards to make way for a housing estate.

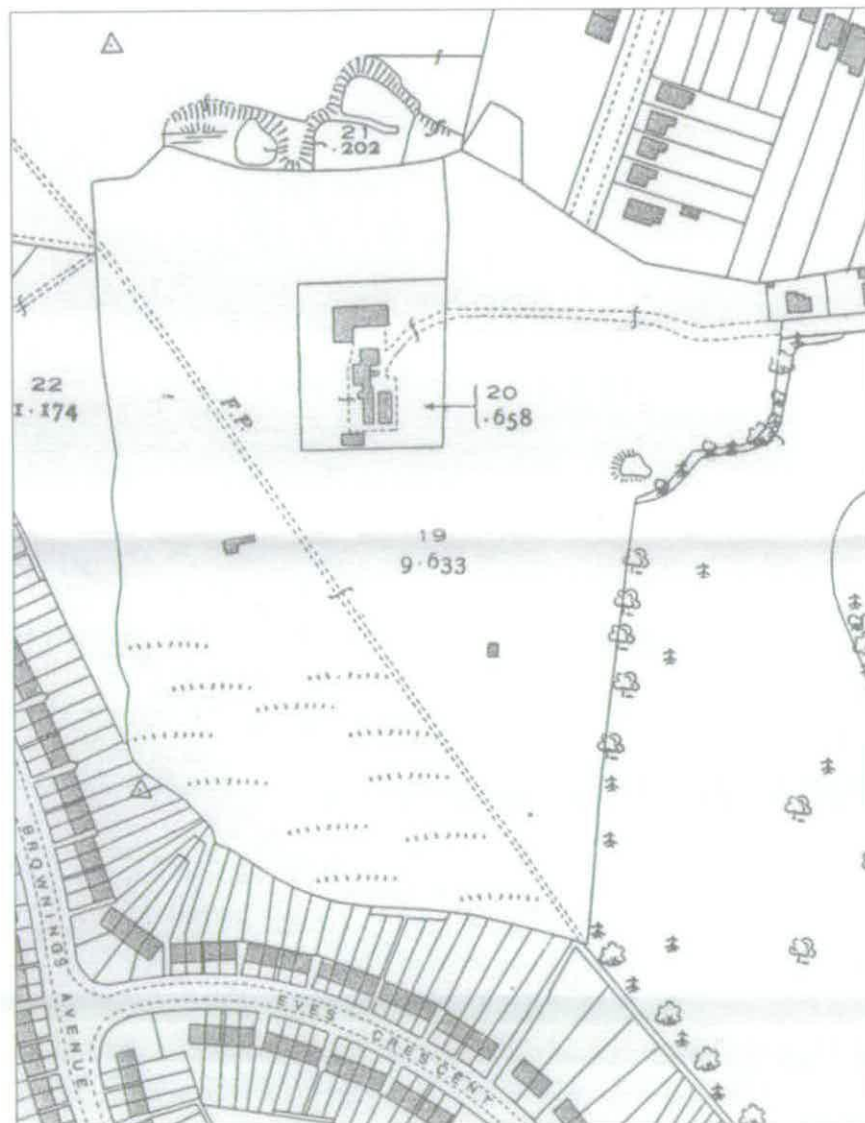
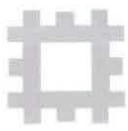


Figure 5 Site of Marconi Radio Station, as depicted on the 1947 revision of the Ordnance Survey 1:2500 (revised in 1939)



5 MARCONI COMMUNICATIONS, NEW STREET, CHELMSFORD

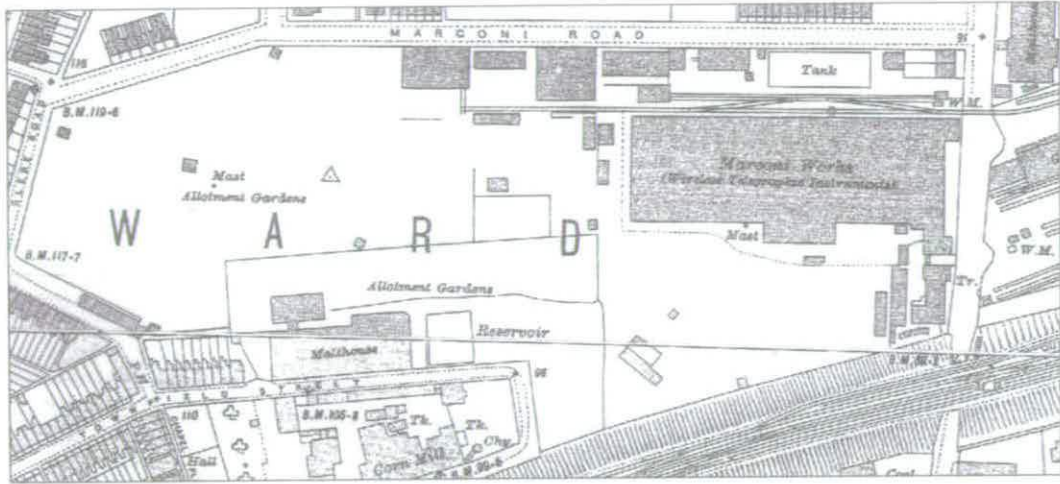


Figure 6 The New Street sites, as depicted on the 1919 revision of the Ordnance Survey, 1:2500 map.

Marconi's purpose-built factory in New Street (TL 7080 0735) dates from 1912 and is listed Grade II. It occupies a large site north of the town centre, bounded in part by the railway to the south, New Street to the east, Marconi Road to the north and Glebe Road to the west. The goods entrance is towards the northern end of the New Street frontage, with the workforce entering and leaving via another entrance at the opposite end of the main office range. Manufacturing capacity was laid out behind the office front, with power generation located on the Marconi Road perimeter and some ancillary functions placed on the New Street frontage south of the offices. Open ground to the south and west of the workshops was used, at least in part, for radio masts, which have been dismantled. Surviving building control plans chart the construction of the ancillary structures during 1912 (see below), but plans of the offices and the main factory building appear to be lost. They may have been under construction a little in advance of the other buildings. The world's first public radio broadcast was made from New Street by the opera singer, Dame Nellie Melba, in 1920. The site remains Marconi's corporate headquarters. A large new office complex was built at the west in recent years, but most of the original buildings, stretching back from the New Street frontage, have survived.

The public face of the company is expressed in the two-storeyed main office range on New Street, built in a variant of Edwardian Baroque style to a design by the London practice of William Dunn and Robert Watson. The front is articulated by a centrepiece and flanking wings (the north wing somewhat longer than the south) to give 3=5=1=5=3 bays (Figure 7). The range is constructed of yellow brick, with hipped roofs of Welsh slate; Portland stone quoins are confined to the centrepiece and wings, and the banded treatment of the stacks. The windows are mostly tall sashes with flat-arched heads composed of tiles, but the five-bay sections vary this rhythm with a number of tripartite sashes. The centrepiece incorporates the entrance, with the name 'MARCONI' in gilt



letters, beneath a balcony reached via a walk-in sash window on the first floor, perhaps denoting the position of the boardroom. The centrepiece rises to an open segmental pediment which incorporates a cartouche. Set back behind the centrepiece on the ridge of the main roof there is a domed clock tower with a weather vane. According to an undated block plan now in the Roberts Archive the range housed a series of offices on the ground floor, together with a showroom in the north wing. On the first floor there were further offices, including a drawing office above the showroom.



Figure 7 The Marconi Offices on New Street (AA99/01803). (C) Crown copyright.NMR

Well-ventilated north-lit engineering shops stretch westwards from the office range. Plainer in treatment, they nevertheless incorporate tile arches at various points and a dentilled eaves. A tower breaks the run of north-lit roofs towards the west end, and has further windows of this type, plus a tiled and keyed oculus, and parapets decorated with ball finials. The function of the tower is uncertain, but it is paced opposite the original powerhouse to the north: Other services besides electricity (hydraulic power? water?) may have been distributed from a common point within the workshop complex. Large semi-circular headed openings at intervals on the north side of the engineering shops appear to be for the reception and despatch of goods, which arrived on a rail siding which entered the site through a goods entrance. A small original weigh-house (ERO, D/B7, Pb 530) and a platform alongside the workshops survive. The five bays of workshops were divided axially, giving large workshops in the southern three bays (from east to west: mounting shop; condenser and winding shop; and machine shop), while the remaining two bays were



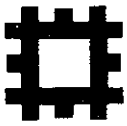
devoted to smaller stores and test rooms, with the exception of a large carpenter's shop at the west end. the latter is likely to have been used for assembling the wooden casings of early wireless sets. On the south side of the factory a projection house male and female lavatories. Remodelling on two storeys, probably in the 1930s has complicated arrangements at the west end of the workshops.



Figure 8 The Marconi Offices on New Street (AA99/01804). (C) Crown copyright.NMR

Two buildings lying north and south of the office range are plainer in style but contemporary, appearing on the 1919 Ordnance Survey map (OS Essex NLIV.11, 1919). To the south there is a two storeyed building of yellow brick and Welsh slate, with flat arches of tile to the openings. It consists of a main range fenestrated as six bays, with a two-bay wing projecting on the front at the north end, and an original rear wing visible at the south end. On the main range the third bay from the south is carried up to a shaped gable set between tall brick stacks. Positioned next to the staff entrance, the building fulfilled a number of purposes. The north wing, the only basemented part of the building, formed the gatekeeper's house. The remainder of the building provided a kitchen and dining rooms for male and female staff on the ground floor, while the first floor was largely taken up by a club room and a reading room (ERO, D/B7 Pb 516).

At the north end of the New Street frontage, at the junction with Marconi Road, there is a semi-detached, mirror-plan pair of two-storeyed houses. Again these depart in various respects from the treatment of the office range, but the porches, carried on elaborately carved timber brackets, and five panelled front doors, arguably continue the baroque theme, and the building control plans date them firmly to 1912 (ERO, D/B7 Pb 530). A distinctive feature is the use of



lozenge-pattern glazing in the small ground-floor windows on the end walls. The omission of the houses from Roberts plan presumably reflects their domestic function.

On Marconi Street the original Turbine Room and Boiler House (with limestone windowsills and another keyed oculus) survives. Originally of seven bays gabled east-west, later extended two bays (one of them blind) to the west, it has high windows and ridge-mounted louvers. The surviving building control plans show the Turbine Room occupying the western four bays and the Boiler House the eastern three, close to the remains of the contemporary 'Well House' and a reservoir (ERO, D/B7, Pb 507). A large stack, projecting slightly from the south-west corner of the Boiler House, has been demolished. The building was extended to the south, after 1919, by the addition of a further gabled range alongside. A photograph in the Spalding Collection shows it prior to the extension (ERO, Spalding Collection, 781). Slightly to the west, also fronting Marconi Street, a building comprising a timber rack and coal store, and west of this an eight-bay 'Transport House', probably also belong to the original layout of the site in 1912. The Transport House was extended and adapted to provide test rooms and stores, and a Packing Shed was constructed south of the timber rack, to plans approved in June 1913 (ERO, D/B7, Pb 665). None of these buildings west of the Turbine Room survives. Further westward expansion is recorded on the 1919 Ordnance Survey map (Figure 6), which also shows the positions of two masts and a number of freestanding huts.

Of the later additions to the site the five-storeyed block, Marconi House, built around 1939, immediately east of the modern office block is perhaps the most significant. Of ferroconcrete construction, with a white painted exterior, it incorporates a circular turret on the south-east corner, windows set at the corners elsewhere, and a fluted frieze. It appears on the 1939-40 revision of the Ordnance Survey Map (OS Essex NLIV.11, 1939-40). To the south there is a three-storeyed shell-roofed (wave-profile) building of six bays, with a tall second floor, perhaps indicating an ancillary function such as a canteen. Its appears to date from the 1950s or 1960s. Other post-1940 ranges lie to the east of the 1930s block, but are not easily viewed from public vantage points. On the east side of New Street, on the north side of the former goods sidings, a modest single-storeyed building with later extensions appears to have belonged to the Marconi site latterly, but originated as part of the railway goods yard.

The 1980s office block (?planned around a courtyard) at the west end of the site created a new main entrance from Glebe Road. The building on three storeys, has walls faced in brick, and on the west front reproduces the essential form of the original front, with a glazed centrepiece, with wings projecting beneath hipped roofs.



6 WIRELESS STATION, ROCHFORD ROAD, CHELMSFORD



Figure 9 Possible wireless station in Rochford Road, Ordnance Survey 1:2500, 1921, Essex LIV.15

The site of a possible Marconi Radio Station (TL 7114 0627) is marked on the 1921 Ordnance Survey map (Essex LIV.5). This shows a small building with a mast to its rear, the suggestion that it might be a radio station is reinforced by its proximity to the Marconi Signal Station in Hall Street. No trace of the features shown on 1921 now survive and a 1960s house occupies the plot.



7 MARCONI WIRELESS STATION, LOWFORD LANE, WRITTLE

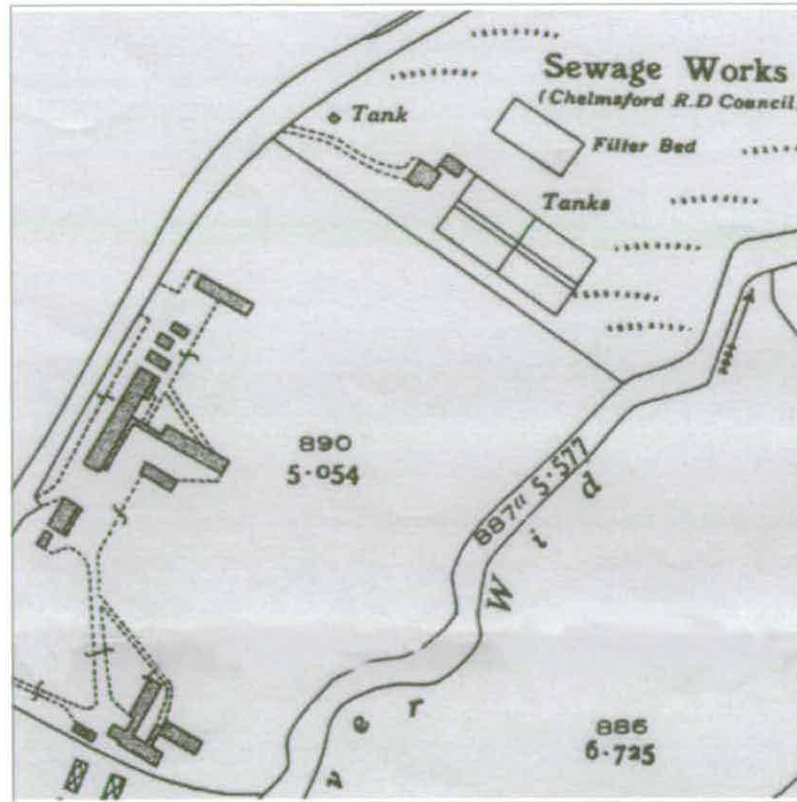


Figure 10 Marconi Wireless Station, Lowford Lane, Writtle, as depicted on the 1947 revision of the Ordnance Survey 1:2500 map.

Writtle, Lowford Lane (TL 6815 0640), in 1919 Marconi established a small experimental station at Writtle to investigate the use of radios in aircraft. The exact plan form of the early station is unknown, although the third edition of the Ordnance Survey map was published in 1921, it was surveyed in 1919 probably prior to the construction of the station (OS Essex LIV.14). In the early 1920s it was developed as a radio station, and from 14 February 1922 the first regular public entertainment broadcasts were made from a timber hut on this site, with the call sign 2MT, these continued until January 1923. The site was then used for research, including during the Second World War the development of radar navigation for bombers. In 1947, the site was depicted with a central T-shaped block with surrounding sheds (OS Essex LIV.14). In 1960 the hut, from where the first public broadcasts were made, was moved to King's Road School, Chelmsford, it has subsequently been acquired by Chelmsford Museums Service.



The site has been entirely cleared and is now covered by Melba Court, an apartment building. The only trace of the former wireless station is a section of wire mesh fencing supported by cranked concrete posts along its northern perimeter.



8 THE MARCONI SCHOOL OF WIRELESS COMMUNICATIONS, ARBOUR LANE



Figure 11 Marconi School of Wireless Communications, Arbour Lane from south west (AA021641). (C) English Heritage

The Marconi School of Wireless Communications (TL 7180 0757), was established in 1921 in a pre-existing Victorian villa, Telford Lodge, which had formerly been occupied by Chelmsford College - a private secondary boarding school known as Botwrights. Ordnance Survey maps indicate that the villa was built between 1873 and 1897 (OS Essex LIV.4, 1873 and 1897).

The site was considerably expanded during the mid-1930s with the construction of a new double storey, Modernist style accommodation block to the rear of Telford Lodge, which replaced an earlier rear extension. Adjacent to this was constructed the new purpose-built Marconi School of



Communications. This double-storey brick building was built in Modernist Deco style with a projecting semi-circular turret at its western end; facilities inside the college included a library, teaching and research laboratories, and offices. Over the main entrance a stone plaque read MWTCO (Marconi Wireless and Telegraph Company), set in relief. This building, and the extension to Telford Lodge, was designed by William Walter Wood FRIBA and erected by Messrs H Potter of Chelmsford. It was also around this time that three timber huts were built in the grounds, to house radio transmitter and receiver equipment, one of which survived until the time of closure (Baker 1970, 275).

During the Second World War a reinforced concrete air raid shelter was built at the rear of Telford Lodge. Linked to Marconi's post-war business expansion and the need to train customer's engineers the college was considerably enlarged during the early 1950s. Starting in 1950 a single storey drawing office was added to the rear of the 1930s school building. Three years later a new double storey and single storey technical block covering 20,000 sq ft was begun, when completed it could accommodate 100 students, and included two lecture rooms, ten laboratories, a workshop, a technical library, a quiet room, and rooms for teaching staff. By the mid-1950s the 1930s training block had been converted into further accommodation and the 1950 drawing office converted into a dining room. During the 1960s the two pre-fabricated huts were added to the site, other minor buildings on the campus included a bicycle shed and store shed. The college closed in the late 1990s.

In March 2000 the site was cleared with the exception of Telford Lodge, prior to demolition a full survey was undertaken by Essex County Council Field Archaeology Unit (for the full report see Garwood 1999).



9 MARCONI RESEARCH CENTRE, GREAT BADDOW

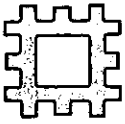
The Marconi Research Centre (TL 728 038) lies on the south eastern outskirts of Chelmsford and the village of Great Baddow, on West Hanningfield Road and adjacent to open countryside. The site was purchased in 1937 and was in operation by March 1939.

In common with other late-1930s defence industry establishments the new research centre was built on a greenfield site. Prior to the construction of the factory a few houses were strung out along Hanningfield Lane. To the north of the main gate are two houses, which still survive. South of the main gate a row of cottages occupied a narrow strip of land adjacent to the road – the northernmost one of which has been demolished. Adjacent to it was another cottage, which has also been demolished, although the base of its brick chimney stack remains. To its south a third cottage survives.



Figure 12 Great Baddow RAF air photograph taken in 1949 (NMR)

The earliest available air photographs of the site were taken in May 1946, and provide a snap shot of the extent of the site at the war's end (106G/UK 1496 10 May 1946, F20 541 Sqn frames 4068-4070). The main entrance to the site is off West Hanningfield Lane; this is protected by a



brick entrance lodge. This has a square brick base on which is placed an octagonal upper storey with window openings on each elevation. Brick piers surmounted by lanterns flank the double gates to the site.

The main office block is a brick built double-storey structure. It is arranged symmetrically around a central projecting entrance that rises above the office wings to either side. The porch and the central bay of the entrance are finished in limestone – a modest elaboration which would be absent from later wartime utility standard buildings. At either end of the building the end bays project forward and also rise above the height of the wings. The main office block is connected to the rear assembly sheds by two wings and a single-storey central corridor. The assembly sheds are ‘T’-shaped in plan comprising three long central bays with seven-bay wings to either side forming the cross of the ‘T’. The roofs are north-lights and were covered by camouflage paint. Around are a number of minor sheds.

Away from the main building the centre also occupied two fields to the south and one to the west. These were used to carry out trials of experimental radio and radar equipment. In the southernmost field were five small huts, a mast and empty hardstandings; two of the huts appear to survive. In the field to its north were two huts and three masts, and in the western field were two masts and two bases. Tracks in the grass criss-cross between these features.

Photographs taken just over a year later seem to show that the western field had been abandoned. But in the southern field another small mast had been erected in the southeast corner; mowing or grazing patterns in the grass also indicate four square enclosures in the southwest corner with a small square enclosure at the centre (CPE/UK/2221 14 Aug 1947 F20 58 Sqdn, frames 5077-5080). Photographs taken in the late 1940s show this pattern remained unchanged except for minor works in the southernmost field. In May 1951, the foundations were being dug for a building in the southwest corner of the field; this building still remains (58/673 12 May 1951 F10 Mag M16 Essex, frames 5162-5163).

Unfortunately no more air photographs are available for the 1950s when the centre underwent a major expansion. The end of the process is, however, documented by photographs taken in August 1961 (F96, F43 58/RAF/4648 29 Aug 61, frames 0283-6). These show that a short extension had been added on to the central bays of the main assembly shop. To its rear a long freestanding range had also been built parallel to, but slightly longer than, the main office block. In the angles of the ‘T’ other buildings had also been added. To the south of the main entrance the row of cottages had been demolished and the field between them and the main building acquired. In this field was constructed a square single-storey building – perhaps a canteen and social club.

The field to the west, given up in the late 1940s was reoccupied. In its southwest corner two large store sheds were erected, both two bays wide with twin pitched roofs. Four smaller buildings were



also erected. During the 1950s one of the wartime Chain Home radar transmitter towers was moved from RAF Canewdon, Essex (one of the original twenty Chain Home radar station operational during the Battle of Britain) and re-erected at Great Baddow. The tower is of steel lattice construction and is about 360 feet (109m) tall and retains all three of its original platforms. It is believed to be to be one of only five original Chain Home transmitter towers surviving to its full height in the country, and is the only tower that retains all its platforms. Others survive at Stenigot, Lincolnshire; Dunkirk, Dover; two at Swingate, Kent; and a sole listed example at Bawdsey, Suffolk (1281/12/10008). The latter has, however, been condemned as unsafe and is to be demolished. Immediately to the north of the Chain Home tower is a small steel-framed radar gantry. The increased affluence and numbers of the workforce is reflected in a new car park built on a greenfield site to the north of the main building.

The major developments during the 1960s included the construction of an octagonal building immediately to the north of the main office block. To the rear the remaining space in the angles of the 'T' were infilled and to the south of the canteen a store was built. In the south-west corner of the southern field two tunnel-like structures were built. The car park was increased in size by about one third (HSL Essex 26 Sept 1970 Run 73 frames 2766-7). During the next decade the only major alteration appears to be the construction of a new square shaped building in the south-west angle of the 'T'-shaped assembly block (Meridian Essex 5 May 1981, frames 191-93). This was the last alteration to the fabric of the centre.



10 ENGLISH ELECTRIC VALVE COMPANY, WATERHOUSE LANE, CHELMSFORD

The English Electric valve Company site (TL 6970 0640) is thought to have been established on Waterhouse Lane in about 1942 and was developed to manufacture electrical valves and magnetrons for use in radar equipment. The site is largely concealed from public view by the remaining buildings of Waterhouse Farm, a courtyard steading which was absorbed by the site at an unknown – possibly early – date, and by a row of 1930s semi-detached houses present by 1939 (OS Essex NLIV.14, 1939). On the street front there is a gatehouse on the north side of the site entrance, and a barn, converted and extended for use as a social club, on the south side. The barn, timber-framed and partly weatherboarded, is dated to c.1600 and is listed grade II (No.106, Waterhouse Lane). Other elements of the steading appear to have been more drastically altered.



Figure 13 English Electric Valve Company, Waterhouse Lane from west (AA99/01822). (C) Crown Copyright.NMR

Aerial photographs from 1947 onwards give a fuller picture of the site in its early years. The earliest buildings were probably five utilitarian-looking corrugated iron sheds placed behind the farm complex. Two of these had been extended eastwards by 1947, on the evidence of variations in roof colour. A large machine shop with a pitched clerestory roof set at right-angles to these may be contemporary. To the rear of this a three-bay north lit range was in existence by 1947, but was rapidly extended to five bays and three times its original length between 1949 and 1950. The extension also included a flat-roofed block clasping the north-west angle. Between 1951 and 1955 the five north-lit bays were extended again (making them four times their original length), and in the same period a further substantial north-lit range was added to the rear of the corrugated iron sheds. The scale and rapidity of these additions, seen in the context of the still rationed post-war



economy, are perhaps indications of the priority given to Cold War related defence projects. A number of post-1955 additions to the rear of the site are shown on the 1974 Ordnance Survey map (OS 1:1250, TL 6906 NE & SE, 1974).



11 GUY'S FARM, ST JOHN'S ROAD, WRITTLE

Marconi Specialised Components Division occupied a small engineering works at Guy's farm Writtle until March 1965, when its production was moved to a new site at Billericay (Baker 1970, 396). The site has been cleared and it is now covered by a small housing estate.



12 BEDELL'S END, ROXWELL ROAD, WRITTLE

A Marconi Company brochure (Marconi, nd) indicates that there was a small experimental station at Bedell's End, Chelmsford (TL 6784 0762). Its site lies to the west of Chelmsford adjacent to a recently installed roundabout in open farmland with commanding views in all directions. The field in which it lay is under arable cultivation and except for a short length of tarmac path close to the hedgerow along Roxwell Road there is no surface indication of its site.

The site was probably established during the Second World War, or shortly afterwards, and operated until the late 1960s. Known test equipment installed on the site included an Air Ministry Experimental Station Type 7 radar; in service use this comprised an operations building and a sunken concrete well that housed the radar's transmitter and receiver equipment, and turning gear, above which was a rotating aerial. During the early 1950s, Marconi's was commissioned to develop an L-band (23cm wavelength) radar with a clutter rejection system for the RAF, and the first experimental model was installed at Bedell's End. But the site, situated in saucer shaped expression, topographically proved to be too good for testing the equipment against permanent echoes and from 1954 a new site was developed at Bushy Hill (TQ 89 NW 27), near South Woodham Ferrers. Bedell's End, nevertheless, continued in use, and in the mid-1950s was used for moving target indicator experiments (Gough 1993, 125-6).



13 ELETTRA HOUSE , NEW LONDON ROAD, CHELMSFORD



Figure 14 Elettra House, Westway from the south (AA99/01817). (C) Crown copyright.NMR

Elettra House (TL 6950 0540) was built as the headquarters of Marconi International Marine Co Ltd in 1962. It consists of a three-storeyed office range fronted to Westway, behind which there are ranges of one and two storeys served by a goods entrance on New London Road.

The office range appears to be framed of ferroconcrete construction, with continuous fenestration on the south front, and a brick outer leaf on the return elevations. The front consists of 2+4+8 bays, the four-bay entrance section projecting and having panels of green glass beneath the windows, while elsewhere the panels are of pre-cast concrete with exposed aggregate. The glazed entrance appears to have been remodelled. To the rear there are two three-storeyed projecting wings. A seventeen-bay two storeyed range projects northwards from the east end of the office range. The construction is similar but the panels appear to be painted, and many are blind. In the re-entrant formed by this range and the office range there is a more complex series of structures, two-storeyed to the south, but single-storeyed and north-lit to the north. The varied accommodation suggests simple functional divisions: reception and office functions in the office range, perhaps design and research and functions in the south wing, and manufacturing or assembly in the north-lit ranges. A detached two-storeyed range to the west incorporates a gatehouse.



14 MARCONI, WATERHOUSE LANE, CHELMSFORD



Figure 15 Marconi, Waterhouse Lane from south west (AA99/1820). (C) Crown copyright.NMR

The Waterhouse Lane site (TL 6970 0640) is a greenfield development dating from the early 1960s. It consists of an L-plan building beside the road, and extensive sheds to the rear. The site is notable for the absence of a public entrance front.

The L-plan building is of ferrocrete framed construction with flat roofs, and consists of a long range of two-storey height, set parallel with the road, and a three-storeyed office block forming a return range at the south end. The office block, and the southern half of the street range, have continuous bands of fenestration set above dark blue glass panels, but the east and west ends only by a stair window. The main entrance is presumably concealed within the site, the public elevations being doorless and set back behind landscaped borders. The northern half of the street range has two distinct elements: to the south the elevation is of brick, incorporating small, irregularly spaced windows, while to the north the walling is of pressed steel sidings, and also irregularly fenestrated. All three elements of the street range are linked by a continuous fascia at eaves level, and appear to be contemporary.

To the rear a large single-storeyed shed of three units occupies the site, each with a shallow pitched roof topped by a clerestory. The walls have pressed asbestos sidings of a kind encountered on



buildings erected at RAF West Raynham, Norfolk in 1965. At the north-west corner there is a tall chimney. Further east there is a taller flat-roofed building with continuous fenestration to the west just below eaves level. A goods entrance on the north side of the site serves these buildings. South of the office block there is an electricity sub-station.



15 MARCONI SOCIAL CLUB, VICTORIA ROAD, CHELMSFORD



Figure 16 Marconi Social Club Victoria Road from south east (AA021639). (C) English Heritage

The Marconi Social Club (TL 7093 0717), occupies a former Victorian school building at the junction of Victoria Road and New Street. Outwardly there has been little change to the appearance of the building associated with its new role. Alterations that have taken place include the rebuilding of the western end of the building and a partial re-roofing in corrugated asbestos sheeting. Some minor outbuildings have also been added and a timber hut erected in its yard.



Figure 17 Marconi Social Club Victoria Road from south east (AA021639). (C) English Heritage



16 ONGAR RADIO STATION, NORTH WEALD BASSETT

Ongar Radio Station (TL 5064 0404), which occupies one of the highest points in Essex, at 106.59m, was established in 1919, in and around North Weald Redoubt, a late nineteenth century mobilisation centre (English Heritage, 2000). Most of the buildings specifically built for the radio station had been demolished shortly before the English Heritage investigation in 1999.

The Marconi Wireless Telegraphy Company acquired the North Weald Redoubt by auction in 1919. When the station was completed in 1922, with a receiver station at Brentwood, it was the ultimate in wireless communication, and held the world speed record of fifty-eight words per minute for many years (Baker 1970, 205). In 1929, the Imperial and International Communications Company took over the site and after 1934 continued operations under the new name Cable and Wireless. During the Second World War it was placed under direct government control, and its importance was reflected in the provision of local defence system including two Allen Williams turrets, both of which survive. German bombs hit the site on at least one occasion, which resulted in damage to the gorge casemates. Post-war, as a result of the Commonwealth Telegraph Act of 1949, which merged Cable and Wireless and UK Radio Services, the ownership of the radio station passed to the General Post Office (Newens 1985, 139). It was maintained by them, and later by British Telecom, until 1992/3, when the site was decommissioned and sold. The original radio masts had, however, been felled by about 1982.



Figure 18 Mast bases to the west of the Redoubt looking towards North Weald (AA00/8523). (C) English Heritage



An Ordnance Survey map published in 1923 (Essex) shows that the main part of the radio station was constructed outside of the redoubt's ramparts to the north east. Digital extracts from the Ordnance Survey Superplan in 1999 show that it had an irregular ground plan, with numerous projecting wings. Four small buildings had been built within its enclosure in the intervening seventy years, one of which has the appearance of a seven-bay garage. Along the south-west perimeter the redoubt's buildings were adapted to new uses. The two Caretakers' Quarters were probably used as offices and rest rooms, and to their east a small brick building, originally a tent and blanket store, was used to house a transformer. To its east were two single storey buildings built as Shell and Cartridge Stores, these were joined together and louvered clerestories added, suggesting that they were converted in to a generator building for the radio station (Figure 18). An extension was also added to the southern elevation of the building (which had been demolished by the time of investigation), this had been the generator test centre. To the south of these buildings was a swimming pool with a number of small buildings ranged around it.



Figure 19 Exterior of the radio workshop incorporating the 1903/4 Shell and Cartridge Stores (AA00/1085). (C) English Heritage

Within the redoubt a timber built rigging shop was placed on the roof slab of the gorge casemates, it has been demolished, but a concrete floor slab 30m (98ft 5ins) by 9m (29ft 6ins) survives. To the west of the rigging shop were smaller buildings, but they too have been demolished. Within the redoubt most of the rooms within the front casemate were used for storage, there is little evidence for later modifications except for the installation of more modern lighting. The only other building constructed within the redoubt was a garage with hinged doors, built at the rear of the marshalling yard against the side of an earlier concrete water tank. Scattered around the redoubt, sometimes in piles, are groups of earthenware insulators used by the radio station. A number of masts were also erected within the redoubt, their locations may be traced by the positions of their concrete feet and at least one felled mast remains in the undergrowth.

Surrounding the Radio Station was an extensive mast park, some lying over 1300m away. The three transmitting antennae originally consisted of two 4-wire cages suspended from two 300ft



(91.44m) lattice towers. The last of these was demolished in 1982. Concrete bases, and anchor blocks for guy wires mark their positions; most were mapped by the Ordnance Survey during the 1970s, subsequently a few have been grubbed up (Figure 17). At Brentwood, the Trans-Atlantic receiving antenna was supported in a square pattern on four 200ft (60.96m) towers. The antenna for the Continental circuits was supported on 96ft (29.26m) towers. Underground cables connected the two stations and the Central Telegraph Office in Wilson Street, London, later known as Radio House (Baker 1970, 205-6).



17 MARCONI, BUSHY HILL, SOUTH WOODHAM FERRERS

Bushy Hill Research Station (TL 813 986), was acquired about 1954 by the Marconi Wireless Telegraph Company in response to a contract to develop an L-band (23cm wavelength) radar with a clutter rejection system for the RAF. This was after their original site at Bedell's End, near Chelmsford, proved to be in such a good topographic position that it did not allow the equipment to be thoroughly tested. By 1955, the installation of a Type 80 radar and turning gear had commenced. Other work at this time undertaken at Bushy Hill included the development of a moving target indicator. In 1959, the Marconi Company was awarded a government development contract for a passive detection system known as Winkle and in conjunction with the government establishment at Malvern, Worcestershire, had produced an operational system by the end of 1962. The principal ground equipment installed at Bushy Hill for this work was a high speed receiving aerial. In the mid-1960s, Bushy Hill became the main demonstration site for Marconi's S600 series radar, a modular system which could be fitted together to meet a client's needs (Gough 1993, 125-6, 168, 194, 253-4).

Bushy Hill research Station is sited in a prominent position on of the east to west northern escarpment of the River Crouch, to the north of South Woodham Ferrers. It is approached from the north along a single track concrete road. The principal features of the site comprise two single storey buildings, four steel lattice radio masts, steel framed radar gantries, a tubular steel radar mast, and a number of timber huts and portakabins. The site remains in use a radar research station.



18 ALENAI MARCONI SYSTEMS, RIVENHALL AIRFIELD, BRAINTREE

Rivenhall Airfield (TL 820 208), a wartime construction, was used in the post-war period for housing displaced persons, but in 1956 it was acquired by Marconi's for field testing radar systems (Bowyer 1979, 175-6). The fixed ground facilities for the test work were modest; two wartime hangars were retained and sections of the concrete runway. A small laboratory and office area was added to the west side of the airfield, comprising four timber huts, a breeze block shed and a prefabricated building, these buildings are now derelict. A sign by the gate recorded that Alenai Marconi Systems were last occupiers of this complex. At the northern end of the airfield a steel pillar, used to support a radar head, was constructed and adjacent to it a small timber hut; the radar has been removed and the hut appeared to be derelict. The airfield is still used for testing mobile radar equipment, but the ground facilities consist of nothing more than tracks connecting the test sites and temporary hutting for the technicians.



19 ENGLISH ELECTRIC VALVE COMPANY, FREEBOURNES ROAD, WITHAM



Figure 20 Taveloc House, Freebournes Road from south east (AA0021636). (C) English Heritage

Taveloc House (TL 8285 1525), is a purpose-built 1960s electronics factory situated at the northern end of a post-war industrial estate placed parallel to the A12 trunk road. The factory is set back in its plot, separated from the road by a small green border, including six unidentified trees along Freebournes Road. It was originally built for English Electric Valves, the shadow of whose initials 'EEV' may be discerned on the front and rear of the building, it was last occupied by Marconi Applied Technologies, Microwave Division.



Figure 21 Taveloc House, Freebournes Road from east (AA0021636). (C) English Heritage

The factory comprises four inter-connected blocks of buildings; all appear to be of similar construction, on either a steel or reinforced concrete frame, with flat roofs. Their walls are clad in white panels (probably of asbestos cement), each measures approximately 1.5m (5ft) in height by 0.91m (3ft) in width. The glazing panels are generally set in square metal frames.



The main office building, which occupies the south-eastern corner of the site, is a double-storey structure fronting on to Freebournes Road. The main entrance to the site was off Freebournes Road and led to a small security office to the south of the main building, and controlled access to the rear yard. On the southern elevation of the main building is a covered porch giving access to the building. The eastern, and roadside, elevation consists of a lower strip of plain panels above which is a continuous row of square windows set in metal frames, this is separated from an identical upper band of windows by a double row of flat panels, above the upper windows is another row of plain panels. On the northern side of this range is a single-storey corridor which links this building to the northern range, another double-storey structure. At the centre of the corridor is a set of double doors with the building name 'Taveloc House' above, suggesting this may have been the main entrance. The northern range is occupied by the works' canteen and along its northern elevation are glazed panels the full height of the ground floor.

The main factory plant room was probably housed in a three-storey block to the rear of the canteen, this is largely windowless and has large exhaust or extraction fans on its roof. To its rear is a large, freestanding, circular liquid nitrogen tank. The main production area of the factory is located in its south-west corner and comprises a large three-storey unit with few windows. Its elevations are generally plain except for three steel escape-ways along its rear, and a row of louvered vents and extraction fans along its first floor – probably to maintain a clean, dust free working environment within the building.

At the time of investigation the factory appeared to be empty and its grounds were being relandscaped.



20 MARCONI COMMERCE SYSTEMS, COMPTON CLOSE, BASILDON



Figure 22 Marconi Commerce Systems, Compton Close from the south (AA021632). (C) English Heritage

Marconi Commerce Services Ltd (TQ 696 894), occupies a 1960s industrial unit fronting on to Compton Close. Its frontage comprises an asymmetrical double-storey office range, rising to three storeys at the rear. At its centre is a projecting entrance lobby with stairs leading to the first floor. To its south are eight bays and to the north eleven. The building is probably of reinforced concrete frame construction, its outer walls are of light grey brick separated by glazed panels, the spaces beneath the windows are filled with dark grey bricks, which may suggest less robust panels have been replaced.

Set perpendicular to this range are seven production bays, these are formed from reinforced concrete frames with brick infill and are covered by asbestos sheet roofs. To the rear, along Luckyn Lane is a loading yard.



21 MARCONI SPECIALISED COMPONENTS DIVISION, BILLERICAY



Figure 23 Former Marconi Communications Systems, Radford Crescent, from south east (AA021631). (C) English Heritage

Marconi Specialised Components Division (TQ 670 953), moved to this purpose-built 8,000 sq ft (743 sq m) factory in March 1965 from their previous home at Guy's Farm, Writtle. Its function was to manufacture specialised components unobtainable from external manufacturers. The factory remained in operation until at least the late 1970s when the factory was taken over by a shirt manufacturer (GEC Marconi 1977; Baker 1970, 396).



22 BAE SYSTEMS, CHRISTOPHER MARTIN ROAD, BASILDON



Figure 24 BAE Systems, Christopher Martin Road, from north east (AA021644). (C) English Heritage

The BAE Systems factory (TQ 73 91) was formerly occupied by Marconi Airadio Division of the Marconi Avionics Group, which was acquired by BAE Systems in 1999. Its main activities are the design and manufacture of radio and navigation products for the military and civil aviation markets. The factory occupies a prestigious corner plot of a small 1960s industrial estate fronting on to Christopher Martin Road. At its junction with East Mayne, is a modern, probably built during the 1990s, double-storey grey coloured double-glazed office building. To its west, and separated from it by an internal factory road, is a 1960s double-storey office building, it is six and a half bays in length and is reinforced concrete frame construction, with brick corners, a flat roof, and is glazed with Crittall windows. To its rear is a reinforced concrete framed, with brick infill panel, north-lit workshop.

The main manufacturing areas are to the south, and rear, of the modern office building, running parallel to East Mayne. The main production shop is ten bays by twelve bays and is of reinforced concrete frame construction with brick panel infill. Light is let into the building by a central glazed strip running the length of the building, although this has been partly blocked by the insertion of fume and dust extraction units. To its rear is a slightly shorter production shop is eight bays in length, but of identical construction. The production shops are entered through projecting double-doors, to help to maintain the controlled environment within the buildings.

The rear of the factory backs on to Paycocke Road and its boundary is lined with low box hedges and ornamental trees. The building in the south-west corner of the site is probably the works' canteen.



Figure 25 BAE Systems, view of rear in Paycocke Road from south west, note ornamental planting (AA021647). (C) English Heritage



SOURCES

National Monuments Record Centre, Swindon

English Heritage ground photography

- 1 The Anchor Works (Crompton's Arc Works), Anchor Street
AA99/01810 Exterior. Northeast elevation from east
AA99/01827 Exterior. House associated with works, from north east in Moulsham Street

- 2 Old Silk Mill (formerly Marconi's Wireless Telegraph Co Ltd), Hall Street
AA99/01807 Exterior. View from north east in Mildmay Road
AA99/01808 Exterior. View from south east in Mildmay Road
AA99/01826 Exterior. Building to rear of works (?power House) from south east in Hall Street, Alfred Cottage, Hall Street
AA99/01809 Exterior. View from south west with former Marconi's Wireless Telegraph Works beyond

- 3 Marconi Radar (Crompton's Second Arc Works), Writtle Road
AA99/01811 Exterior. View from south east
AA99/01812 Exterior. Writtle Road elevation, view from south east
AA99/01813 Exterior. Writtle Road, entrance gates & works beyond from south
AA99/01814 Exterior. Writtle Road elevation, main entrance
AA99/01815 Exterior. Writtle Road view from south west
AA99/01816 Exterior. Crompton Road elevation, view from south west

- 5 Marconi Communications, New Street
AA99/01802 Exterior. View from north east in New Street
AA99/01803 Exterior. View from north east in New Street
AA99/01804 Exterior. View from north east in New Street showing north range



AA99/01805 Exterior. View from south west in Townfield Street multi-storey car park

AA99/01806 Exterior. View from west in Glebe Road

7 Marconi College, Arbour Lane

AA021640 Exterior. View from north west showing remains of teaching blocks

AA021641 Exterior. View from south west showing remains of former student accommodation

AA021642 Exterior. View from west showing remains of former student accommodation

9 Marconi Research Centre in Great Baddow

AA99/01823 Exterior. View from south east in West Hanningfield Road

AA99/01824 Exterior. Former Chain Home tower from RAF Canewdon, Essex: view from north west looking up

AA99/018 Exterior. Former Chain Home tower from RAF Canewdon, Essex: view from west

10 English Electric Valve Co., Waterhouse Lane

AA99/01822 Exterior. View from west

13 Elettra House, Westways/New London Road

AA99/01817 Exterior. View from south

AA99/01818 Exterior. View from south south west

AA99/01819 Exterior. View from south west

14 Marconi, Waterhouse Lane

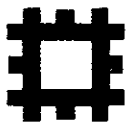
AA99/01820 Exterior. View from south west

AA99/01821 Exterior. View from west, detail

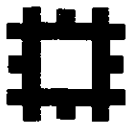
15 Marconi Social Club

AA021638 Exterior. View from south west in Victoria Road

AA021639 Exterior. View from south east in Victoria Road



- 16 **Ongar Radio Station**
- AA00/1068 Dismantled radio mast located on east side of the glacis
- AA00/1085 View looking west along the south face of the radio station workshop incorporating the earlier 1903/1904 shell and cartridge stores. In the background there is the structure located on the site of the 1904 proposed tent and blanket store which is later known to have been used as a boiler room and 1892 caretaker's quarters.
- AA00/1086 View of the interior of the radio station workshop which incorporates the earlier 1903/1904 shell and cartridge stores.
- AA00/1087 Detail of original 1903-1904 shell/cartridge store window, incorporated into the later radio station workshop.
- AA00/1090 View looking along north face of radio station workshop, which incorporates the earlier 1903/1904 shell and cartridge stores
- AA00/1094 View looking east along the south side of the external buildings range, showing 1892 caretakers quarters, a structure on the site of the 1904 proposed tent and blanket store, later used as a boiler room; and the radio station workshop which incorporates the earlier 1903/1904 shell and cartridge stores.
- AA00/8523 Mast bases to the west of the North Weald Redoubt looking towards North Weald Bassett
- AA00/8524 Mast base to the west of North Weald Redoubt
- 19 **Taveloc House, Freebournes Road, Witham**
- AA0021633 Exterior. View from north
- AA0021634 Exterior. View from north east
- AA0021635 Exterior. View from east
- AA0021636 Exterior. View from south east
- 20 **Maconi Commerce Services, Billericay**
- AA0021632 Exterior. View from south west
- 21 **Marconi Communications, Basildon**
- AA0021631 Exterior. View from north
- 22 **BAE Systems, Christopher Martin Road, Basildon**
- AA0021643 Exterior. View from north west in Christopher Martin Road



AA0021644 Exterior. View from north east in Christopher Martin Road

AA0021645 Exterior. View from south east in East Mayne showing elevation to Paycocke Road

AA0021646 Exterior. View from south in Paycocke Road

AA0021647 Exterior. View from south west in Paycocke Road

Aerial photography

016G/UK 1496 10 May 1946, F20 541 Sqdn, frames 4068-4070

CPE/UK/2221 14 Aug 1947 F20 58 Sqdn, frames 5077-5080

58/673 12 May 1951 F10 Mag M16 Essex, frames 5162-5163

F96, F43 58/RAF/4648 29 Aug 61, frames 0283-6

HSL Essex 26 Sep 1970 Run 73, frames 2766-7

Meridian Essex 5 May 1981, frames 191-93

Essex Record Office, Chelmsford

Borough of Chelmsford Building Control Plans, 1900-14 (Class: D/B7 Pb1-799)

Note: Plans dating from after 1914 are not currently available. Owing to relocation of the Records Office some plans dating from 1900-14 were also unavailable temporarily. All available plans were consulted. Those marked with an asterisk were not seen. Submission dates are given; approval followed within a matter of days in nearly all cases.

Old Silk Mill, Hall Street

- Pb 39 Packing Shed (timber & corrugated iron, 36ft by 13ft) for Marconi Telegraph Co Ltd, to stand in yard to west of Old Silk Mill: submitted August 1902.
- Pb 282 Packing Shed (timber and corrugated iron) for Marconi 'on the same foundation' as that referred to by Pb39: submitted August 1908.
- Pb 323 Temporary Workshops & Test Room (timber & corrugated iron, 90ft by 32ft) for Marconi, to stand on south side of hall Street, at right-angles to the road: submitted July 1909.
- Pb 383 Testing Room & Designers' Office (timber & corrugated iron, 40ft by 20ft) for Marconi, to stand in field behind maltings fronting Mildmay Street: submitted June 1910.
- Pb 422 North-lit shed, comprising packing & Advising Shed, Manufactured & Purchased Stores Shed, Rough Woodwork, Polishing & Varnishing Shop, Office, Test Room, Print Room and drawing Office (timber & (?) Corrugate iron) for Marconi, to stand in field behind maltings: submitted



February 1911. Plans (by Johnson & Hawkes) also show proposed extension to Testing Room & Designers' Office (Pb 383) and 'Wood & Oil Stores – present removable hut'.

Crompton's Arc Works, Anchor Street

Pb 120 Wrought-iron boiler-house chimney (65ft high and 2ft 10ins diameter) for Chelmsford Electric Lighting Co Ltd: Submitted Mat 1904.

Crompton's Second Arc Works, Writtle Road

Pb 71* Temporary corrugated iron shed (1903)

Pb 151* Offices (1904)

Pb 164* Extension to Lamp Shop (1905)

Pb 206* Ditto (1906)

Pb 212* Varnishing Shop (1906)

Pb 243* Experimental Department, Offices and Latrines (1907)

Pb 388* Lavatories (1910)

Pb 464* Galvanised corrugated iron building for Crompton's & Batcheller Pneumatic Tube Co (1911)

Pb 740* Stable buildings, etc (1914)

Pb 746* Shed (1914)

Pb 766* Addition to foundry (office) (1914)

Marconi, New Street (plans by Marconi's architects, Dunn & Watson: Dunn & Curtis-Green from 1913)

PB 507 Boiler House, Turbine Room and Well House (brick and slate) alongside what is now Marconi Road:
submitted 1912

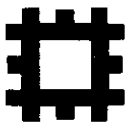
Pb 516 Gatekeeper's House, Mess Rooms, Club Room, etc. (brick and slate) fronting New Street south of Office range: submitted March 1912.

Pb 520 Drainage (foul drains) for New Street factory: submitted March 1912

Pb 521 Drainage (surface water) for same: submitted March 1912

Pb 530 Pair of cottages, Weigh House & Pay House (brick & slate) fronting New Street to north of office range, except Pay House (to rear of entrance between Office range and Gatekeeper's house, etc): submitted May 1912

Pb 551* Transport Shed & Coal Bunker (brick & slate) alongside Marconi Road, west of Engine House: submitted 1912



Pb 665 New packing Shed & extension to transport House (brick & Slate), alongside Marconi Road: submitted June 1913.

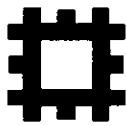
Spalding Collection

Marconi, New Street, Chelmsford

- 754 Front view of Marconi (reversed)
- 756 Women working in Marconi's Wireless Telegraph Works (a couple of belt drives are visible)
- 757 Marconi's Wireless Telegraph Works, carpenters' shop
- 758 as 757
- 759 Marconi's Wireless Telegraph Machine Shop (belt drives to small lathes)
- 760 as 759
- 761 Laboratory
- 762 ?Assembly Shop
- 763 Test Room
- 764 Marconi's mast, steel 450 ft tall
- 765 Marconi Wireless telegraph truck
- 766 Portable wireless
- 767 Wireless
- 768 Synchronising signal
- 769 Synchronising signal
- 770 Synchronising signal
- 771 Magnetic drum recorder
- 772 Ruins of building
- 773 As 772
- 775 As 773
- 776 13 men and women in grounds of the college taken for Marconi School of Wireless Communications in Arbour Lane
- 777 as 776
- 778 Marconi, Great Baddow
- 779 Marconi Road (showing ?Power House)



780	Houses ?Marconi Road
781	Marconi Road (chimney of Power House, nb also shows maltings in New Street)
	Marconi (formerly Crompton Parkinson), Writtle Road
1151	Air view
1152	Air view
1153	Air view
1154	Air view
1155	Air view
1156	Crompton's Arc Works
1157	Steel framed shed under construction, 90ft bay – Machine Packing & Dispatch Department
1158	As 1157
1159	As 1157
1160	Shed under construction
1161	Machine assembly
1162	As 1161
1163	Women using machine – automatic cutting machine
1164	As 1163
1165	2 women using machines
1166	Welding
1167	Assembly Shop
1168	As 1167
1169	Machine detail
1170	As 1169
1171	As 1169
1172	As 1169
1173	As 1169
1174	As 1169
1175	Assembled generator
1176	As 1175



- 1177 Rotary converter and booster
- 1178 Switch gear
- 1179 Frequency charger set
- 1180 AC motor driving pm condenser
- 1181 Machine
- 1182 Generators
- 1183 As 1182
- 1184 Dynamo
- 1185 900 kw 150/180 volt geared turbo-generator
- 1186 Generator
- 1187 As 1186
- 1188 As 1186
- 1189 60-inch projectors with controllers and flashing shutters (searchlights)
- 1190 3 phase alternator and exciter
- 1191 Group photograph 1928
- 1192 Group photograph
- 1193 Group photograph sports team
- 1194 Children's party
- 1195 Air photograph of Chelmsford

Anglia Polytechnic University, The Library, Queens Building, New Road, Chelmsford
The Fred Roberts Collection., Room A32

This is a private collection of material bequeathed to the Anglia Polytechnic University on the death of a local industrial archaeologist, Fred Roberts. The collection comprises a library of general books dealing with the history of technology and industrial archaeology; additionally there is smaller number of specialised books on the electronics and radio industries. The collection also contains some historic photographs, trade brochures and catalogues issued by local companies and type manuscript notes on key sites.

Historic Industrial Sites in Essex

- 1 Monograph No.4 Lowford Lane, Chelmsford



- 2 Monograph No.6 New Street, Chelmsford
- 3 Monograph No.11 New Street, Chelmsford
- 4 Monograph No.16 Waterhouse Lane, Chelmsford

Ordnance Survey maps

Chelmsford District

General town maps

OS Sheet TL 60 NE 1:10,000 1990

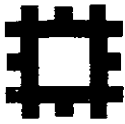
OS Sheet TL 70 NW, 1:10 000, 1990

OS Sheet TL 70 SW, 1:10 000, 1990

- 1 Anchor Works, Anchor Street, Chelmsford
OS Sheet LII.8, 1:2500, 1897 Annotated as 'Arc Works'
OS Sheet LIV.15, 1:2500, 1921 Annotated as 'Motor Works' and Electricity Works'
OS Sheet LIV.15, 1:2500, 1940 Annotated as 'Motor Works'
OS Plan TL 7006 SE, 1:1250, 1976 Shows plan of Anchor Works prior to redevelopment

- 2 Marconi's Wireless Telegraph Company, Hall Street, Chelmsford
OS Sheet LII.8, 1:2500, 1897 No function shown
OS Sheet LIV.15, 1:2500, 1921 Annotated as 'Marconi Signal Sta.'
OS Sheet LIV.15, 1:2500, 1940 Annotated as 'Marconi Signal Sta.'
OS Plan TL 7106 SW, 1:1250, 1973

- 3 Crompton's Second Arc Works, Writtle Road, Chelmsford
OS Sheet LII.7, 1:2500, 1896 Site shown as greenfields with a clay pit
OS Sheet LIV.15, 1:2500, 1921 Annotated as 'Arc Works (Electrical Engineering)'
OS Sheet LIV.15, 1:2500, 1947 Annotated as 'Arc Works (Electrical Engineering)'
OS Plan TL 6905 NE, 1:1250, 1974
OS Plan TL 6906 SE, 1:1250, 1975 Wireless Station, Pottery Lane, Broomfield, Chelmsford
OS Sheet XLIII.16, 1:2500, 1896 Annotated as 'Broomfield Pottery'
OS Sheet LIV.10, 1:2500, 1947 Marconi Works, New Street, Chelmsford



- OS Sheet LIV.11, 1:2500, 1921 Marconi works as built in 1912, also shows positions of masts erected for first public radio broadcasts
OS Sheet LIV.11, 1:2500, 1947 Shows immediate post-war layout of the works
OS Plan TL 7007 SE, 1:1250, 1966 Depicts post-war layout of the works prior to redevelopment
- 6 ?Radio Station, Rochford Road, Chelmsford

 OS Sheet (NS) LIV.15, 1:2500, 1921 Annotated as 'Mast'
 OS Sheet (NS) LIV.15, 1:2500, 1940 Annotated as 'Mast'
- 7 Radio Station, Lowford Lane , Writtle

 OS Sheet LIV.14, 1:2500, 1921
 OS Sheet LIV.14, 1:2500, 1947
 OS Plan TL 60 NE, 1:10,000, 1990 Annotated as 'WT Sta'
- 8 Marconi School of Wireless Communications, Arbour Lane, Chelmsford

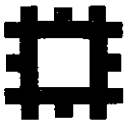
 OS Sheet LIV.4, 1:2500, 1873
 OS Sheet LIV.4, 1:2500, 1897
 OS Sheet TL 70 NW, 1:10,000, 1990 Annotated as 'College'
- 9 Marconi Research Centre, Great Baddow

 OS Plan TL 7203-7303, 1:2500, 1970 Annotated as 'Electronic Research Laboratories'
- 10 English Electric Valve Company Limited, Waterhouse Lane, Chelmsford

 OS Sheet LIV.14, 1:2500, 1947 Factory not shown, although air photographs confirm that it was built by this date.
 OS Plan TL 6906 SE, 1:1250, 1975
- 13 Elettra House, New London Road, Chelmsford

 OS Plans TL 6905 SW and TL 6905 SE, 1:1250, 1972
- 14 Marconi, Waterhouse Lane, Chelmsford

 OS Plan TL 6906 SE, 1:1250, 1975



- 15 Marconi Social Club, Victoria Road, Chelmsford
OS Plan TL 7007 NE, 1:1250, 1966 Annotated as 'Marconi Athletic and Social Club'
- 16 Ongar Radio Station, North Weald
OS sheet 61 NW 6-inch (new series), 1923
OS Sheet 52/50 6-inch, 1947 Annotated as 'Wireless Telegraph Station'
OS Plans TL 5003, TL 5103, TL 5004, TL 5104, 1:2500, 1972 Annotated as 'Ongar Radio Station'
OS Sheet TL 50 SW, 1:10,000, 1974 Annotated as 'Ongar Radio Station'

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