



The Establishment and Decline

of

British Thomson-Houston

and

Metropolitan Vickers

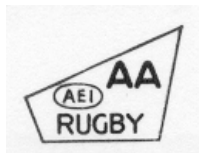
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INDUSTRIAL COMPANIES

The major two electrical power equipment manufacturers in early 20th century England comprised the companies of General Electric of America subsidiary British Thomson-Houston, (BT-H) at Rugby and, Westinghouse of America subsidiary British Westinghouse, at Trafford Park, Manchester. In 1928 Westinghouse, by then Metropolitan Vickers merged with BT-H under their mutual major shareholder G E of America with the holding company name of Associated Electrical Industries Ltd. (AEI)

Specific reference will be made to the following companies:

General Electric Inc of America (G E)
British Thomson-Houston Co Ltd (BT-H)
Westinghouse Inc of America
Metropolitan Vickers Co Ltd (MetVic)
Associated Electrical Industries Ltd (AEI)
General Electric Co Ltd. (GEC) [of England no relationship to G E]
English Electric Ltd (E E)

INDUSTRY ESTABLISHMENT

The establishment of an electrical engineering industry was enabled by the development to a usable and mass production standard of the electric lamp by Thomas A Edison in the USA in 1878 and Joseph W Swan in England during 1880. Basically they invented the procedure of winding a high resistance filament, enclosing it within a closed glass bowl (the bulb), drawing a vacuum within the bulb and refilling it with an inert gas, argon, thereby preventing oxidation of the enclosed wound filament.

Edison was in a position within the American finance and industrial institutions to be able to raise the capital to establish a lamp making facility, The Edison Electric Light Company, formed with a initial capital of US\$300,000 on October 17th 1878. From this company was to grow the General Electric Company of America founded upon the monopoly rights given to Edison under his patent 223,898¹ The advantage to any manufacturer of lamps is that the usage is determined by the industrial and domestic need for light. Unit lamp manufactured cost is low but due to the perceived need for lighting and the high volume demand a high profit ratio was easily obtained. Lamp makers formed a cartel within which they agreed sale prices maintaining the high profit margins across

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the USA and Europe. G E's management strategy was to obtain a major shareholding within all of the lamp makers and so to direct the market world-wide. The demand for lamps led to increasingly higher need for electric power generation and distribution and through this a need for the necessary equipment. The finance for the design and manufacture of the power plant was enabled by the profits from lamps. To detail this is in itself a project; it is therefore left to be accepted as fact at this point. Suffice only to say that by 1900 the British manufactures were way behind in electrical power development. Both industry and government were unwilling to invest in this new means of power preferring to stay with the then accepted energy source of steam power for machinery and gas for lamps. The 1882 Electric Lighting Act gave the Board of Trade power to grant licences for the establishment of electricity undertakings. But the private companies that did so had their assets subject to compulsory purchase orders by local authorities on the basis of a fair market value and no goodwill allowance initially after a seven year period then later after a 21 years period. Thereby inhibiting private industrialists, who were in any event complacent at this time due to their other successes throughout the Victorian period, from investing in the electrical power industry.

Edison consolidated the various companies that he'd founded into the Edison General Electric Company in 1889 and merged with the biggest rival Thomson-Houston of New England in 1892. The combined company was renamed the General Electric Company and was established with a commanding position in the electrical industry which it still maintains today

GE's main competitor was George Westinghouse in Pittsburgh. Each of these companies was not only competitive but also co-operated at the engineering level. Their rivalry and co-operation was effective in maintaining their profit margins whilst driving their competitors out of business or enabling them to be taken over by either G E or Westinghouse, thereby enlarging these two companies and increasing their market share.

Westinghouse and G E decided to invest in establishing British subsidiary companies and operate in England on similar basis to their operations in the USA.

British Thomson-Houston

G E had the advantage of being a major lamp maker (Ediswan) and a manufacturer of power plant and, quickly established itself in England in 1894 under the name British Thomson-Houston, firstly as a lamp supplier at 38 Parliament Street, London relocating to 83 Cannon Street in 1896. And a small works and store at Bankside. During the first five years BT-H supplied equipment for more than twenty tramway installations across the country and, the Central London Railway electrification in 1898. A meter facility was begun in 68 Victoria St., London in 1897 with meters sourced from the French associate, in Paris, French Thomson-Houston.²

In October 1901 the majority of the staff were relocated from London to Rugby. Apart from H N Sporborg who became Chief Engineer and then Chairman, C W Phipps, became works manager and C J Clarke the Managing Director. All of the other American staff returned home to the USA. Howard C Levis superseded Clarke as managing director in 1902.³

A production facility was established at Rugby by 1902⁴ primarily in lamp manufacture (Mazda) as shown in Appendix 1 - BT-H Works Layout 1902.⁵ First contracts for heavy plant were taken in 1902 with equipment supplied from G E. The first Rugby designed machine was a vertical 700kW single-phase turbo-alternator running at 1500rpm for Harrogate. A change was made to horizontal design with a 1000kW 3phase 3000rpm machine shown at the Manchester Exhibition of 1908. At this time the importance of developing electrical breakers to higher capacity was also realised and the first motor operated breaker was produced with a capacity of 150,000kVA. During the next ten years BT-H was involved with a lot of the pioneer work in electrical equipment development and production for all possible applications.⁶

Expansion in the heavy electrical side was initially slow until 1911 there was a rapid increase in business and the Rugby facilities building program couldn't cope with the increase in contracts. A solution was found In Coventry where a lease was taken on Progress Works in Stanton Road. Manufacture of meters and regulators commenced there in 1912, soon to be used for switchgear manufacture whilst the meter and regulator

² Price-Hughes B. T. H. *Reminiscences Sixty Years of Progress* pp9-13

³ Price-Hughes B. T. H. *Reminiscences Sixty Years of Progress* pp15-17

⁴ Jones & Marriott *Anatomy of a Merger* p44

⁵ Price-Hughes B. T. H. *Reminiscences Sixty Years of Progress* p inside front cover

⁶ Price-Hughes B. T. H. *Reminiscences Sixty Years of Progress* pp20-28

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business was moved to Lower Ford Street, Coventry. At about this time also a new factory was built at Willesden for lamp manufacture additional to the lamp facility at Rugby. However by time of the factory completion advanced methods of lamp production enabled Rugby to produce the total requirement and Willesden was instead used for the increasing demand for switchgear production.⁷

During the 1920's rapid expansion was made with major extensions and new buildings at Rugby, Willesden, Coventry, Birmingham, Chesterfield and Lutterworth. Manufacture of domestic appliances also commenced in this period. £3million was raised for investment from G E and £1.5million from debenture issue in London. However all this investment resulted in no appreciable increase of profit although cash flow was much improved. The heavy production facility had expanded beyond the market demand so gave a problem of over production capability, whereas the lamp production was maintaining it's potential. This is shown by the lamp profit of £210,000 against the total BT-H profit for 1927 of only £167,000.⁸

1926 was a year notable by the passing of the Electricity Supply Act. The objective of this act being the standardisation of electricity supply across the UK, and facilitated the formation of the Central Electricity Generating Board (CEGB) in 1927 and, the design and construction of the national electricity supply grid. A by-product of the need for 'the grid' was an influx of contracts to BT-H for turbo-alternators, switchgear and power transformers.⁹ Large manufacturing companies such as Ford who ordered a 30megawatt turbo-alternator for their Dagenham plant from BT-H in 1929 were also now producing their own electrical power. Electrical ship propulsion was also being developed.¹⁰

1928 -1929 was a notable period when GE acquired the major shareholding of MetVic and in so doing realigned their ownership of B T-H through their interests in MetVic by loaning to MetVic sufficient funds for them to acquire the whole of B T-H. Thereby GE acquired more interest in MetVic whilst maintaining their 100% ownership of B T-H.¹¹ More detail of this event follows in the section below about MetVic.

Expansion, re-organisation and new buildings continued at Rugby as elsewhere and in 1937 to release 27,000 feet of space for manufacture a

⁷ Price-Hughes B. T. H. *Reminiscences Sixty Years of Progress* p31-32

⁸ Jones & Marriott *Anatomy of a Merger* p67

⁹ Price-Hughes B. T. H. *Reminiscences Sixty Years of Progress* p58

¹⁰ Price-Hughes B. T. H. *Reminiscences Sixty Years of Progress* p63

¹¹ BT-H Board Minutes 1896-1935 *Minute 3969 of 14 November 1928*

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new office block of 74,600 square feet was built to house the engineering and commercial offices.¹² This was later extended to include the apprentice administration Education Department; its front of ferro-concrete with brick facing is now in 2005 a grade II listed structure.

No record of BT-H can be complete without reference to the jet engine, which was initially designed and first built at Rugby. Power Jets Ltd was formed and under the supervision of Air Commodore Frank Whittle design production commenced within the BT-H Rugby works. The first jet engine was assembled there and tested in 1937. An experimental aircraft was built by Gloster Aircraft Co powered by the BT-H jet engine and successfully flown for the first time in 1941. By September 1941 a second engine was produced and sent to G E. Subsequently jet engine design and production with Frank Whittle moved to Rolls Royce at Derby. The end of WW2 coincided with major changes within BT-H, caused by the ageing problem of the company's management. Oliver Lyttleton, by then known as Lord Chandos, was offered and accepted the position of Chairman. At that time Chandos observed that "...in examining the figures they disclosed a large and successful company, of massive financial strength."¹³ The senior people had in a large number of instances been working with BT-H since its inception with the unfortunate result that many had to be replaced around 1946.¹⁴ This change of senior staff impacted upon the future of the company.

Metropolitan Vickers

Westinghouse did not establish itself with a UK lamp factory therefore had no readily available other income than power products, British Westinghouse was established on 100 acres of land in Trafford Park Manchester with an initial capital of £1.5million with £500.000 allotted to U S Westinghouse in 1899. The works comprising nine buildings covering thirty acres of the site were completed by 1901 and fitted out with the most modern to date tooling from the USA in 1902. Including one lathe so large it took 25trucks to bring it into the works. A steel foundry was also established on the site. By 1903 manufacture was under way and 3000 men were employed¹⁵. Unfortunately Westinghouse was brilliant at engineering but not so with finance. In 1906 the company went into receivership. it was rescued by financiers in the USA. The resultant being that British Westinghouse had to stand alone as a

¹² Price-Hughes B. T. H. *Reminiscences Sixty Years of Progress* p83 & Appendix 4

¹³ Chandos, *Memoirs of Lord Chandos* p332

¹⁴ Price-Hughes B. T. H. *Reminiscences Sixty Years of Progress* p155

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company, separate from the USA Westinghouse corporation. Growth and acceptance of the company in England was inhibited by anti American attitudes in industry and government and entry was refused into the Federation of British Industries due to the American connection. World War 1 exacerbated the problem. Philip Lange, M D of B W asked Frank Dudley Docker for help by merger with Dockers company the Metropolitan Carriage Wagon Co in 1917 with the additional concept of merging also with G E C but this part of the plan failed. With the failure of acquisition of G E C Docker sold Metropolitan Wagon including his share of B W to Vickers, the company name was then changed by the Vickers board to Metropolitan Vickers.¹⁶ Relationship was still maintained with Westinghouse and references are to be found in the Minute books to trading agreement with the 'American Company'.¹⁷ In 1919 to enable expansion and installation of new manufacturing equipment £1 million of ordinary shares were issued with the regulation that all plant procured was to be of British manufacture.¹⁸ A new trade mark was designed and approved by the Board in a meeting of 23 September 1919.¹⁹ Trade and design agreements were established between Brown Boveri Cie of Baden, Switzerland²⁰ and agreement was reached for the establishment of a London office part financed by MetVic, this becoming British Brown Boveri Ltd., as approved in the MetVic Minute of 10 May 1923. German trade was promoted by acquisition from Westinghouse of the Westinghouse building in Berlin.²¹ Adverse trading resulted in a loss for the year of £85,000 and reduction in staff levels during 1924 resulted in an effort to recoup these losses.²² The trading situation of the company enabled GE to renew their interest and procure more shares. With a majority shareholding GE also then loaned at Bank Rate plus ½% minimum 5% the capital for MetVic to procure all of the B T-H company shares. The MetVic Directors were unaware at the time that GE already owned B T-H and that this process maintained the GE holding of B T-H whilst simultaneously increasing their interest in MetVic. There then resulted in an agreement for exchange of technical information between MetVic and

¹⁵ Jones & Marriott *Anatomy of a Merger* pp48-50

¹⁶ Jones & Marriott *Anatomy of a Merger* pp58-61

¹⁷ MetVic Executive Committee minutes 1918-1925, *Minute 168 of 27 Feb. 1919*

¹⁸ MetVic Executive Committee minutes 1918-1925 *Minute 182 of 13 March 1919*

¹⁹ MetVic Executive Committee minutes 1918-1925 *Minute 2565 of 23 September 1919*

²⁰ MetVic Executive Committee minutes 1918-1925 *details of the agreements are to be found in Minutes of 1920, dates 19 January, 23 April, and 29 September*

²¹ MetVic Executive Committee minutes 1918-1925 *Minute of 22 March 1922*

²² MetVic Executive Committee minutes 1918-1925 *Minute of 13 August 1924*

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B T-H²³ and inter-company trading price agreements followed in June 1928.²⁴ The relationship with American Westinghouse was terminated in October 1928²⁵ and the company name, in common with B T-H, was changed to A E I Ltd in November 1928.²⁶ In August 1929 the Board of MetVic acknowledged the fact that GE was the parent company and, that A E I owned all of the MetVic assets and was the UK holding and controlling company. Individual company identity was maintained with the maintenance of the trading names of MetVic and B T-H.²⁷ This was followed in October with discussions in America with IGE and GE concerning patents, leases and company operating strategy.²⁸

General Electric Company

The origins of G E C are to be found in 1880 when Gustav Byng started his company G. Binswanger supplying small components to the engineering industry in London. Byng was a colleague of Hugo Hirst whom he employed to start and run a department selling lighting accessories. After about a year's successful operation the company name was changed to the General Electric Apparatus Company (G. Binswanger). In 1888 Byng and Hirst acquired the Manchester Gas Ignition Company and the whole company was incorporated as the General Electric Company, this fortuitously coincided with the passing of the Electric Lighting Act which encouraged the building of generating stations and the demand for electrical equipment. Next followed the decision for G E C to commence lamp manufacture in 1893, also the year in which the Swan and Edison patents expired. With C J Robertson they bought the lamp factory started and then closed down by the Brush Co in Hammersmith. In 1901 the G E C was floated on the London stock market with a capital of £30,000 and the business was valued at £500,000 with 3000 employees and branches in London, Birmingham, Glasgow, Newcastle and Dublin; at about this same time capital of £330,000 was assigned for business expansion. Forty-two acres of land was bought at Witton, Birmingham for the production of dynamos, motors and switchgear. Hirst great friend on the board of G E C was Max Railing, they married two sisters and, Max.'s brother Adolf (Harry) joined the company as engineer in 1905 at the time when G E C acquired the Osram Lamp Works in partnership with Auergesellschaft of

²³ MetVic Executive Committee minutes 1918-1925 Minute 352 of 22 May 1928

²⁴ MetVic Executive Committee minutes 1918-1925 Minute 05 June 1928

²⁵ MetVic Executive Committee minutes 1918-1925 Minute 5865 of 11 October 1928

²⁶ MetVic Executive Committee minutes 1918-1925 Minute 5894 of 08 November 1928

²⁷ MetVic Executive Committee minutes 1918-1925 Minute of 08 August 1929

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Germany. The Osram lamp became along with the B T H Mazda lamp and Siemens a big name in the European lamp industry and enabled G E C to join the lamp ring, G E C thereby also having a lucrative high demand product with a guarantee of huge profits. Byng died in 1910 and Hirst became chairman World War 1 gave G E C as other companies also, tremendous opportunity for expansion and gave G E C its place as a major electrical engineering concern. It also presented Hirst with the opportunity to buy out Auergesellschaft, which he did. He then invited others including Dudley Docker to join G E C. Hirst decided on growth by acquisition and amongst other companies in 1918 he bought Fraser and Chalmers thereby gaining entry into heavy machinery production and enabling G E C to compete with BT-H and MetVic. Hirst apparently had wanted to acquire MetVic but was at that time overruled by Railings and the Byng family. At this time G E C shares and debentures totalled £1.5million, by 1922 this had risen to £8.9million. Interestingly G E was considering taking over G E C. The directors of G E came to the conclusion that G E C was not suitable and not of the standing and class of BT-H. But recognition was given that G E C was the most aggressive and dynamic of the U K companies in this field of operation. Swope of G E maintained his interest in possible acquisition of G E C, making several approaches and acquiring G E C stock during the period 1927-33, but was unsuccessful²⁹ due to the terms of voting restriction on foreign holders of G E C stock. The company continued to grow under the directorship of Hirst until his death at age 79 in January 1943. The new chairman became Harry Railing,³⁰ followed in 1957 by Leslie Gamage. Neither of these chairmen had the leadership qualities of Hirst and their choice of management was limited by the corporate decision only to appoint from within the company. The business also lost the cushion of the cartels with the introduction of the Monopolies and Restrictive Practices Act of 1948. A measure of the poor performance of G E C is that the share price fell by 19% during the period 1943-61 whereas the Financial Times Industrial Index increased by 292%. Conversely G E C expanded by investment of £20million from 1947-55. Profits slumped further from £3.3million in 1954-5 to £1,5million in 1957-8 compared to A E I and E E increasing from about the same in 1954-5 to £4.2million and £2.9million respectively in 1957-8. The late 1950's marked the high

²⁸ MetVic Executive Committee minutes 1918-1925 *Minute of 03 October 1929*

²⁹ Jones & Marriott *Anatomy of a Merger* pp110-123

³⁰ Jones & Marriott *Anatomy of a Merger* pp68-89

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point in British production and sale of electrical goods and equipment for all the manufacturers. In 1961 Gamage retired from GEC at the age of 73 years and was succeeded by Lindley who had become Managing Director in 1960. Lindley reorganised the company into Product Groups but left the branch office and distribution centres separate from production. The City and in particular Prudential which had a major shareholding in G E C was not impressed by the poor performance of G E C and Urwick Orr were brought in to assess the G E C organisation. During late 1960 both E E and E M I considered a take-over of G E C, at first G E C were receptive to E E but then the G E C directors realising that they would be subordinate to the E E directors and the move was rejected.³¹

1961 was the turning point for G E C. It was decided that diversification by acquisition was needed and they acquired Radio and Allied, (R&A) a small company that was very dynamic and profitable in the production in particular of television sets -Sobell - with the managing director Arnold Weinstock, son-in-law of Michael Sobell. R&A boosted the profits of G E C by 73% in 1960-61. Weinstock and Sobell acquired 14% of G E C with this deal. Weinstock became immediately part of a six-man management committee. By 1962 it was realised that a major reorganisation had to be carried out and from the intrigue that undoubtedly went on during this period Weinstock emerged as Managing Director of G E C on 01 January 1963.³² Kenneth Bond from R&A was Weinstocks deputy and management by committee immediately ceased. The branch system dissolved and managers were made responsible for their products. Inefficient managers either toed the line or were dismissed. Weinstock was a man of determination, with an eye for detail and achieved his objectives by personnel changes where he considered it necessary. By this means G E C was transformed into a progressive and profitable enterprise.

English Electric

English Electric was established in 1919 with a capital of £5million by the merger of a number of companies that were involved in one way or another with production of electrical and allied equipment. Mainly they were Dick-Kerr of Kilmarnock incorporating tramway and railway electric's, hydro and power generation equipment and, a lamp factory at Preston (Britannia lamps). Willans and Robinson at Rugby making steam

³¹ Jones & Marriott *Anatomy of a Merger* pp197-207

³² Jones & Marriott *Anatomy of a Merger* pp212-223

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turbines and diesel engines, British A E G of Germany acquired by Dick-Kerr from the Custodian of Enemy Properties due to WW1 and, the Phoenix Dynamo Works of Bradford.

The other major part of this conglomerate was the Coventry Ordnance Works of shipbuilders John Brown, Cammel Laird and Fairfield.³³

Shortly after the establishment of E E the Siemens Dynamo Works of Stafford was bought off the British Government's compulsorily acquired stock. This factory made heavy electrical plant remained as a mainstay of E E and later G EC. Siemens smaller product factories including lamp making were left with Siemens. Due to cash shortage in 1927 E E sold their Britannia Lamp Works to Siemens, this was not a good move for E E as they then became deprived of a secure and steady source of high profit income. It appears that the transformation from a group of only loosely connected companies E E never became properly structured and managed. Finance dogged E E with incompetent product costing and failure to transform from making war industry product to a good range of electrical power products. The Coventry factory was badly run and it closed in 1928 and the premises were sold in 1930. The American company Lazards came to the rescue with a finance package in June 1930 and through them George Nelson. was appointed managing director. Nelson had been a student apprentice with Brush at Loughborough and from there went to Westinghouse at Trafford Park. It also seems probable that at this time merger talks at least were progressing with Westinghouse of America for in 1930 Westinghouse acquired 100,000 of E E shares. Refer to the previous reference within MetVic that G E had acquired a majority of their shares and that G E was also acquiring G E C shares. Westinghouse therefore would have wanted to regain some of the British power products market. The Westinghouse move had some success as George Nelson and his chairman Sir Holberry Mensforth had been employed by Westinghouse at Trafford Park. This reconstruction of E E gave Westinghouse and the others in the syndicate, Lazards, Chase Bank; similar to that with MetVic, with The Utilities Power and Light Co., and Greater London and Counties Trust- all being American! - the major shareholding although that was not disclosed due to an anti American feeling towards governance of British companies. Significant is the interest of the subsidiary of Utilities Light and Power, of Chicago, the Greater London and Counties Trust which had controlling interests in Edmundsons

³³ Jones & Marriott *Anatomy of a Merger* pp128-129
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Date: August 2005

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Electricity Corporation in turn having a number of British electrical power generation companies in England. Edmundsons was the major and vital customer of E E. The Americans issued 850,000 new £1 ordinary shares bringing the total ordinary capital to £1,443,511 with an excess of 50% being in American hands. From this point Nelson established himself alongside Hirst and Swope as one of the three most dominant people in the British electrical industry during the 1930's. He relocated the headquarters of E E from London to the Stafford works, Preston was closed and turbo-generators transferred to Stafford whilst the turbines went to Willans Works at Rugby and traction to Bradford. Final agreement on the reorganisation was signed with Westinghouse in 1931.³⁴

Nelson took the lead in founding of the cartel agreements for production of heavy electrical equipment in the U K for supply both here and in overseas markets with E E,

G E C, A E I and C A Parsons. The cartel was maintained until the latter 1950's and unofficially into the 1960's. when the Monopolies and Restrictive Practices Court abolished them, an action fiercely opposed at the time by Nelson.³⁵

Nelson won the contract for the electrification of the first phase of the Southern Region rail network in 1936. This ten year contract was a major part of the salvation of E E. The next opportunity that opened up for E E was the move into aircraft manufacture at Preston as a result of WW2. This move aided E E into recording record profits. They took over the Napier works in 1942, supplying a total of £155million of war related product and increasing the assets of E E from £7million in 1939 to £16.5million in 1945 and employing 30,000 people making it then one of the largest companies of it's sector.³⁶

CONSOLIDATION AND A E I

G E's president Gerard Swope had the vision of controlling the whole of the British lamp and heavy engineering industry, BT-H, MetVic, E E and G E C.. Shares were acquired in British Westinghouse with the aid of Dudley Docker who was paid by G E to hold shares in MetVic which were bought in Dockers name by a loan from G E who then bought the same shares off Docker, rewarding him for his assistance in the deal. This ploy hid the name of the true purchaser of MetVic from both the London

³⁴ Jones & Marriott *Anatomy of a Merger* pp130-139

³⁵ Jones & Marriott *Anatomy of a Merger* p142

³⁶ Jones & Marriott *Anatomy of a Merger* pp143-144

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market and Westinghouse and the board of MetVic. G E then had the controlling shares of this company but agreed to reduce the share holding to 40% however this was not immediately effected nor, were the board and personnel of MetVic advised that G E had controlling rights of their company.³⁷ Assuming Jones and Marriott to be correct it is also notable that ignorance of any G E involvement in the amalgamation of these companies is also expressed by BT-H. Note of the event is recorded as "At this time rationalisation was being much discussed in the industrial world. During 1928 some of the leading electrical manufacturing companies pooled their resources by associating themselves in a group, named Associated Electrical Industries Ltd..The objectives were co-operation among members eliminating unnecessary duplication of effort and expenditure" Then in 1930 "an interchange authority for the BT-H Co was instituted at Rugby. This was to be the medium for co-ordinating the interchange of technical information between the AEI group companies and the associated company's abroad, including the General Electric Co of Schenectady. Design engineer Mr C A Martin, from the Rugby Main Drawing Office fulfilled this position.³⁸ - apparently not a high profile position but more a means of filling a management political need, and a first reference to any relationship to G E..

INDUSTRIAL GROWTH

The CEGB with the National Grid electrical power distribution system was of great benefit to the equipment supply industry. It required higher electrical ratings and bigger plant than previously needed for local power generation and distribution. Consequently more complex equipment needed to be designed and a lot of it was required. This gave an edge on design and development to the British manufacturers. Spare plant for standby purposes became a feature of CEGB needs. Because the electrical supply industry became nation-wide it was imperative that the whole system should continuously operate, therefore a stock of large heavy equipment that can be called upon for immediate use in the event of failure of operating plant also has been manufactured. Their market place also developed with electrical power needs throughout the British Commonwealth, a further extension of a captive market and one in which the British cartels thrived.

³⁷ Jones & Marriott *Anatomy of a Merger* pp95-99

³⁸ Price-Hughes *B. T. H. Reminiscences Sixty Years of Progress* pp57 & 64

FOREIGN COMPETITION AND DECLINE

Due to the structure of the UK electrical power generation and distribution industry there was no competition for the supply of power equipment and, the cartels ensured that all of the British manufacturers had their share of the market at prices that gave sufficient profit. This was not the case in Europe where electrical power was supplied from a large number of companies and a substantial amount of West German industry generated it's own electricity instead of taking it from the national supply. In 1960 35.7% of W German electricity was generated by industrial users for their own use.[reference to *Volkswirt*, 14(1960)] Therefore in W Germany Siemens and A EG with Brown Boveri of Baden Switzerland and Mannheim were exposed to competition and so had to become more efficient and competitive in the supply and efficiency of their equipment. Cookers, refrigerators and television were also a major part of the portfolio of Siemens and A EG. Except for the Hotpoint domestic products division of A E I and lamp making by A E I and G E C this was not practised In the UK. The W German manufacturers had a broader product base, competitive tendering and a large home market to sustain them through periods of depression in any one market sector. Josef Reindle makes a point that the British heavy electrical manufacturers were all smaller than the German contemporaries and quotes their gross figure in USD³⁹:-

year	1959	1961	1963	1965	1967
A E I	583628	598324	595454	712468	727972
E E	487200	544247	585281	685549	1131774
G E C	302585	332066	369516	472360	523444
Total British	1373413	1474637	1550251	1870377	2383190
A E G	512619	704250	846668	1033639	1138832
Siemens	866190	1194750	1462500	1794750	1984250
Total W Germany	1378809	1899000	2309168	2828389	3123082

These figures though are not truly comparative of heavy electrical plant production between the two countries. The W German figures include for a large contribution from domestic appliances and electronic measurement and control, whereas this is not the case for Britain.

British manufacturers concentrated upon the UK and Commonwealth where they had control of pricing and market share with their cartel. The

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European manufacturers had larger home countries as a market base but had to compete internationally with everyone else. Following the abolition of cartels in Britain the door was opened for foreign competition and, by 1967 Siemens had 147 sales engineers operating in Britain whilst in comparison there were only 4 E E sales engineers in W Germany.⁴⁰

The major British manufacturers never reacted positively to foreign competition having been for too long cosseted with the UK market and cartels. Nor did they lead in the opportunity for standardised designs that the national power distribution system allowed for. Cries of alarm and foul were expressed when Brush of Loughborough produced a standard distribution transformer for the local Area Electricity Boards. A E I was aggrieved at this comparatively small company encroaching upon their product range with standardised equipment produced cheaper and quicker than A E I individually designed transformers for the same job.

During the early 1960's the CEGB ordered the construction of new power generation and distribution stations to fulfil the need for an anticipated rise in electrical power demand. The projected power requirement was in the event over optimistic and future equipment contracts were severely reduced. This had a drastic effect upon the manufacturing industry that had expanded to meet the projected equipment requirements. For instance A E I had built a new transformer design and production facility at Wythenshawe, Manchester, There was then a problem as to where to obtain the contracts to fill the suddenly excess manufacturing capacity. The Labour government under Harold Wilson saw this as a need for Government intervention.

GOVERNMENTAL INTERVENTION AND G E C

Technology was also aided by the British Governments decision to have home designed nuclear power rather than being reliant upon American designs. However this decision had financial affects not only upon governmental expenditure but also on industrial costs. Both A E I and E E invested in nuclear plant research and development where although the generating and power distribution equipment is the same as for fossil fired plant the nuclear reactor needed specialised equipment. For instance the main blowers for Dungeness built about 1960 were not only of specialised design but some 30years later still employed G E C - A E

³⁹ Reindle: *The Electrical Engineering Industry in the UK & FRG 1945 to late 1960's* p3

⁴⁰ Reindle: *The Electrical Engineering Industry in the UK & FRG 1945 to late 1960's* p8

Associated Electrical Industries Ltd.

I Rugby personnel on operation and maintenance. The move to nuclear power initially seemed to be of benefit to the British manufacturers. Plans were made for the construction of 19 nuclear plants to give about 65percent of the total UK electrical power requirement⁴¹ and prospects of overseas contracts. This plan not only didn't materialise to completion in the UK but the Government encouraged E E and A E I to proceed with their own different versions of plant design. The nuclear program was therefore an unnecessary drain upon company resources.

This situation was exacerbated by the revision of the equipment needs of the CEGB and the previously mentioned resultant manufacturing over capacity.

In 1967 the Labour Government proposed that the solution would be to amalgamate

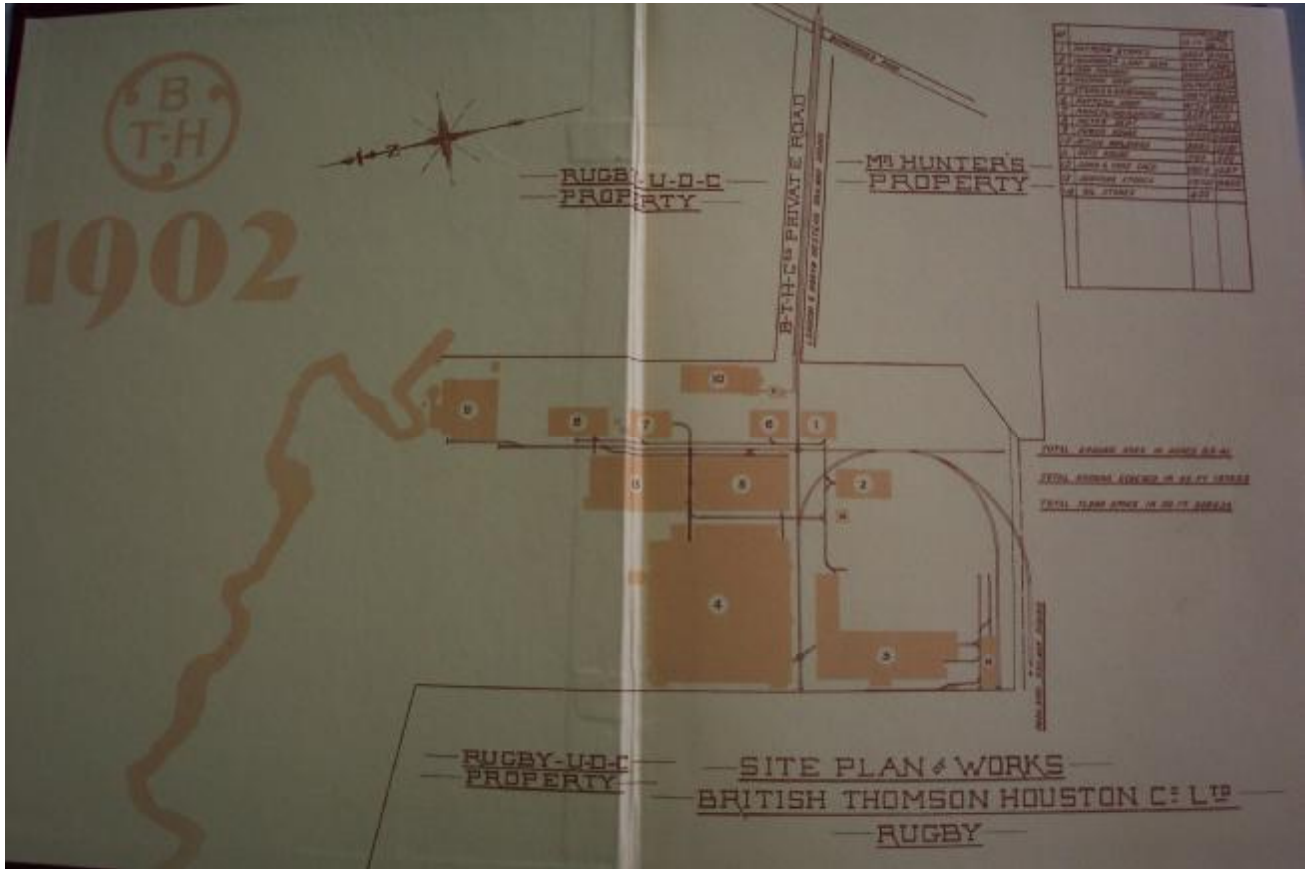
A E I, E E and G E C to establish a large design and manufacturing base for British heavy equipment to compete in the world electrical power market. Possibly a laudable decision and, maybe it had some relationship to the similar early ambition of Swope and G E.

The proposal was incongruously implemented by the promotion of G E C and Weinstock to head up the new company.

Weinstock, had recently disposed of the G E C heavy plant interests as being of long term contracts with high risk and relatively poor profit, was appointed Chairman. He applied the same logic to the new conglomerate. Then, instead of the anticipated growth and expansion into international markets, began the process of product retrenchment and plant closures within the heavy equipment centres in favour of electronic equipment.

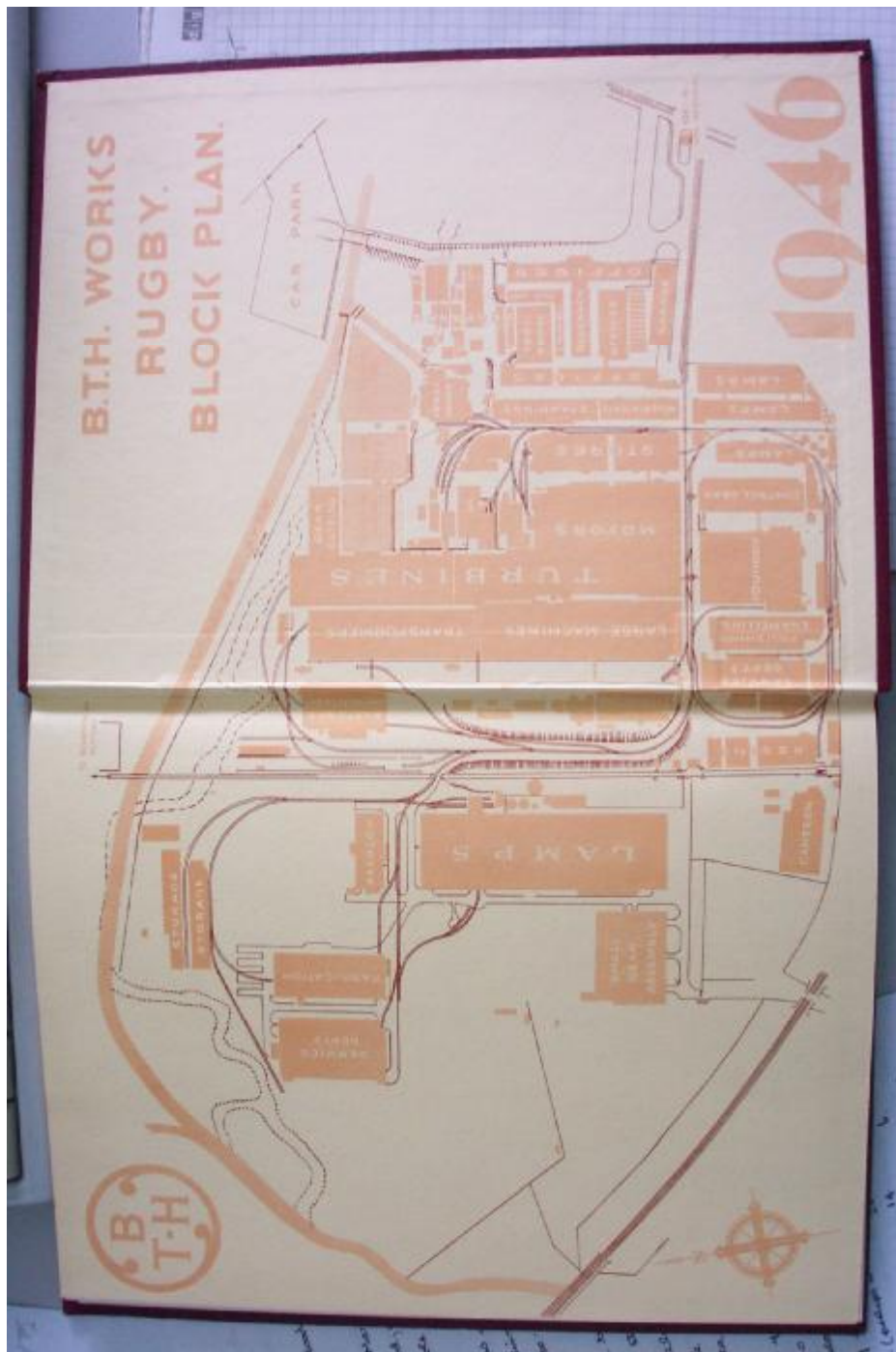
⁴¹ Reindle: *The Electrical Engineering Industry in the UK & FRG 1945 to late 1960's* p7
Author: David J Wilson
Date: August 2005

Appendix 1



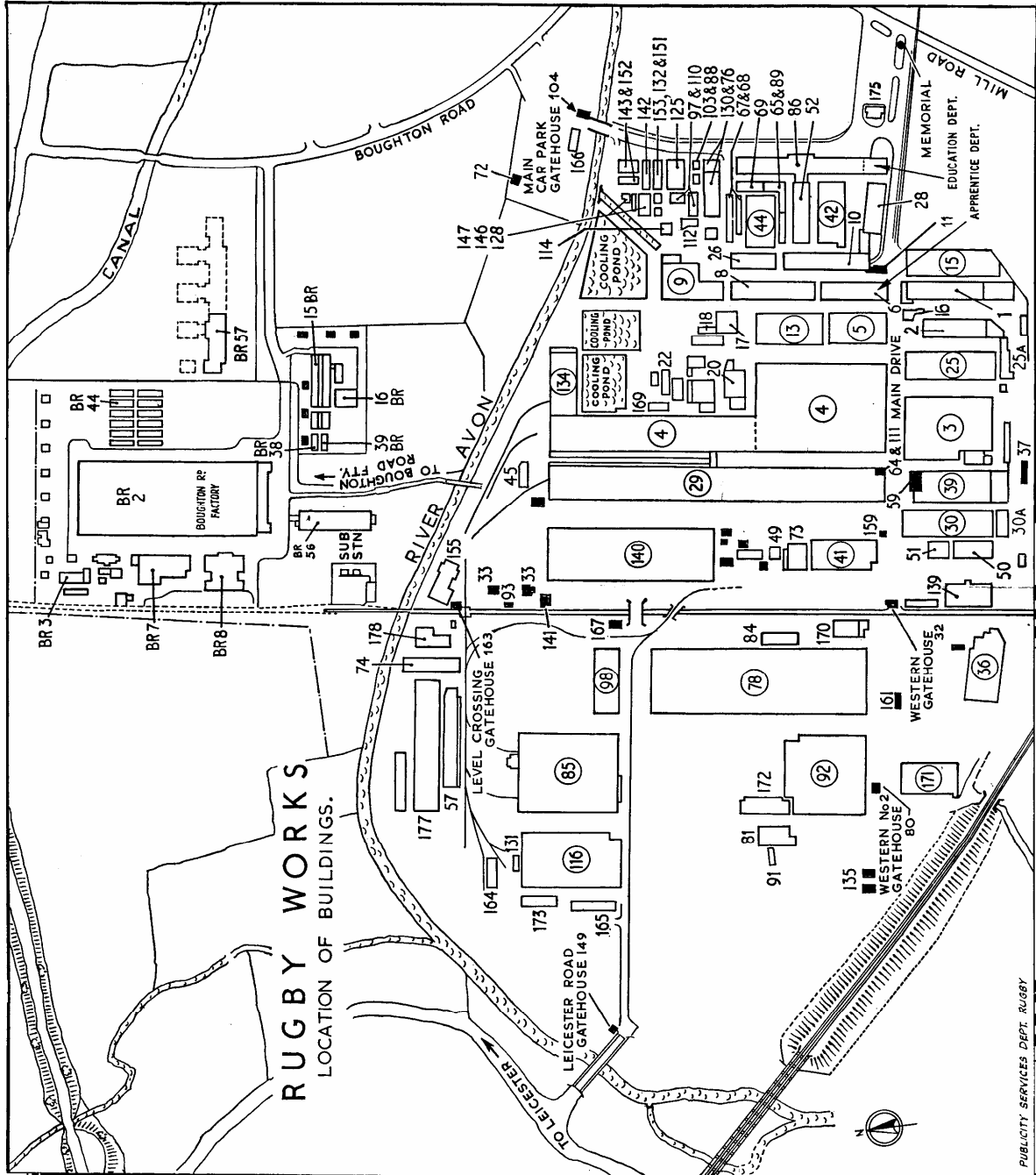
British Thomson-Houston, Rugby,
Works Layout, 1902

Appendix 2



British Thomson-Houston, Rugby,
Works Layout, 1946

Appendix 3



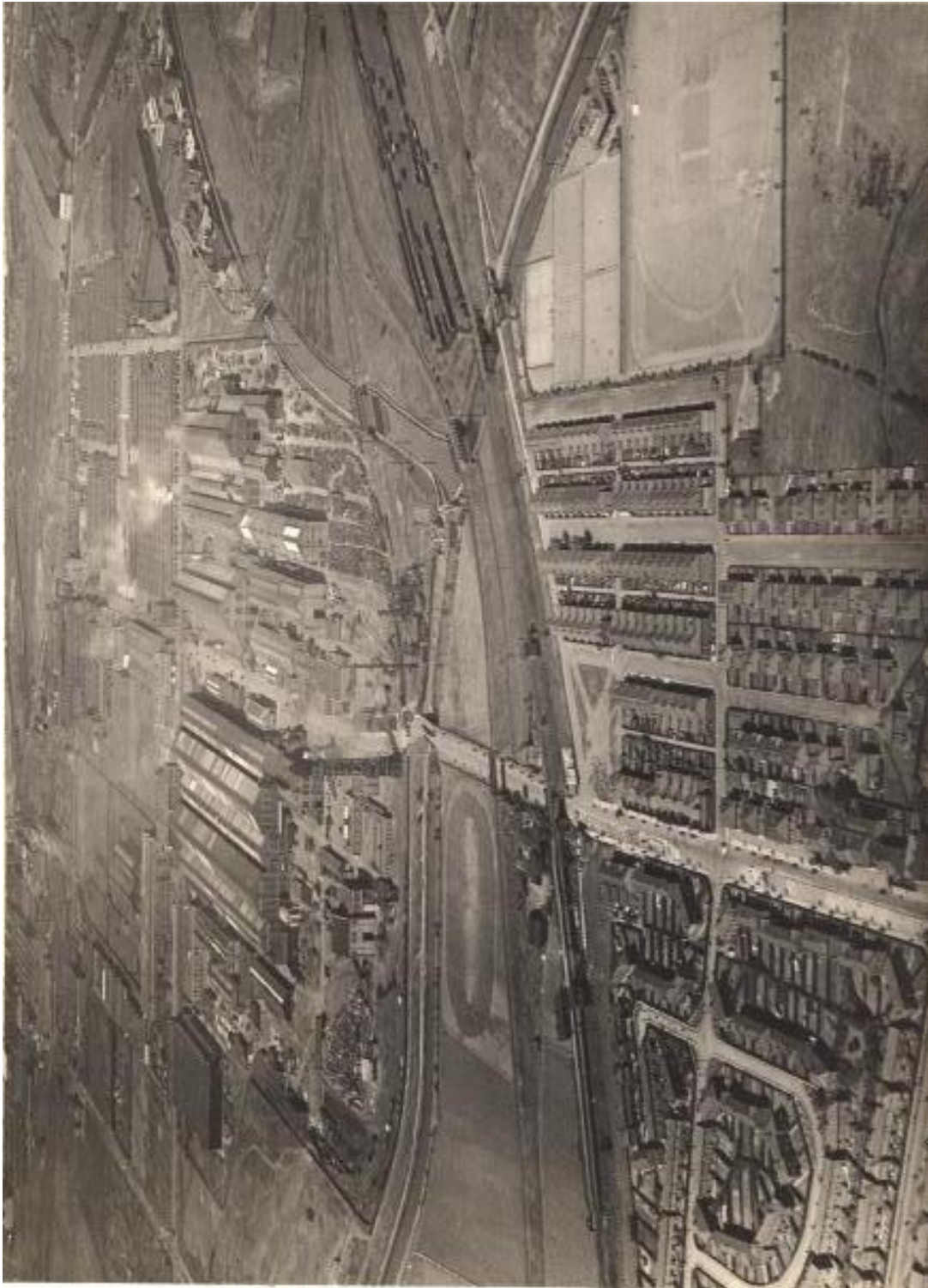
British Thomson-Houston, Rugby,
Works Layout, 1960

Appendix 4



Turbine Factory in 1908
British Thomson-Houston, Rugby,

Appendix 5



Metropolitan Vickers, Trafford Park.

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