PART II: THE MANUFACTURERS

CHAPTER 3. JOSEPH LUCAS (INDUSTRIES) LIMITED

The Period to 1939

Foundation and early history

62. The Lucas business was founded in Birmingham in 1872 by Joseph Lucas, trading with his son Harry Lucas as Joseph Lucas & Son, for the manufacture of pressed metal goods, including ship, coach and carriage lamps. Later, the firm developed the manufacture of oil lamps, bells and other items for supply to the expanding cycle industry which was concentrated mainly in the West Midlands. In 1897 a public company, Joseph Lucas Ltd., was formed with a nominal share capital of £225,000 to take over the Lucas business. Supply by the company to the motor industry of non-electrical goods began about 1902, and was followed a few years later by the company's entry into the electrical field with the manufacture of car batteries and dynamos, and lighting sets for sale to car owners. Expansion in the manufacture of electrical equipment followed the company's acquisition in 1914, for the sum of £9,000, of the share capital and business of Thomson-Bennett Ltd. which made magnetos. From this early take-over of the Thomson-Bennett magneto business stemmed the paramount interest of Lucas in the supply of electrical equipment for the motor industry. During the 1914–18 war, the company was engaged principally in the manufacture of shells, fuses and electrical equipment for aircraft and military vehicles. In this period it also began the manufacture of starter motors which had by then been developed in America. From 1923 Mr. P. F. B. Bennett (later Lord Bennett of Edgbaston), one of the two former partners in the Thomson-Bennett business, and Mr. Oliver Lucas, a grandson of the founder of the Lucas business, were until Mr. Lucas's death in 1948 Joint Managing Directors of the company: they established close personal relations with the principal vehicle manufacturers and themselves became leading personalities in the motor industry. (Lord Bennett died in 1957.)

63. A notable feature of the early days of Lucas's supply of electrical equipment was the close relations which were established with Morris. We understand that Lucas's first bulk order was from Morris in 1914 for the Morris Cowley and that by 1923 over half its output of starting and lighting equipment was supplied to Morris. The value of the Morris business to Lucas is illustrated by the fact that in the four years from 1921 to 1925, Morris's sales of vehicles jumped from 3,000 a year to 55,000. At the same time, however, Lucas was selling in increasing quantities to other manufacturers, including Armstrong Siddeley, Rover, Standard and Triumph, with the result that by 1926 the proportion of Morris business to Lucas's total sales had dropped to about one-third. In 1926, Lucas obtained the contract for the following year for the whole of Austin's requirements of starting, lighting and ignition equipment (see paragraph 96). For the year 1925–26, Lucas's production of starting, lighting and ignition sets for supply as initial equipment averaged 2,000 a week.

64. Between 1920 and 1925 Lucas laid down the pattern of its present distribution and service arrangements. It established its own depots in London, Liverpool, Leeds, Edinburgh, Glasgow, Newcastle, Manchester,

Birmingham, Bristol, Dublin and Belfast for local distribution to wholesalers, traders and the public and for service and repairs. Between 1925 and 1929 a number of wholesale electrical stockists and repairers were appointed as Battery Service Agents to stock, supply and service not only Lucas batteries but also other Lucas motor vehicle goods, including spare parts for repairs. Lucas also established a number of its own trade and repair outlets which it operated through County Electrical Services Ltd., a company it formed for the purpose through nominee shareholders. Lucas did not publicly disclose its ownership of these outlets and has said that the reason was that it wished to test customers' reactions to its products and service, and that the information obtained through its own depots was always coloured to some extent and not sufficiently reliable.

Acquisitions

65. The development of the company in the inter-war years was marked not only by rapid internal growth due to the increased demands of the vehicle manufacturers but also by the acquisition of a number of other businesses and by certain important agreements made with other electrical equipment manufacturers, British and foreign. Lucas has said that amongst the reasons for its present dominant position in the motor electrical industry are (i) that its competitors got into financial difficulties with the collapse of the boom after the first world war, (ii) that competitors were in a relatively worse position than Lucas was when the American motor trade threatened to submerge the British motor trade even in the British market (before the introduction in 1915 of the McKenna duties) and (iii) that when the outlook was black it acquired certain competitors who were in financial trouble. Lucas attaches importance to the fact that among the businesses of which it acquired control were its two biggest competitors—C. A. Vandervell Ltd. and Rotax (Motor Accessories) Ltd.

66. The following businesses which were competitors in the manufacture or supply of the goods specified in the reference, or of component parts of such goods, or were potential competitors in this field, were acquired by Lucas in the inter-war period :

1924 Brolt Ltd.
1925 E.I.C. Co. Ltd.
1926 C. A. Vandervell Ltd.
1926 Rotax (Motor Accessories) Ltd.
1927 B.L.I.C. Ltd.
1929 A. Rist (1927) Ltd.
1929 Powell & Hanmer Ltd.
1930 M.L. Magneto Syndicate Ltd.
1930 North & Sons Ltd.
1937 Globe & Simpson Ltd.
1937 Bosch Ltd.
1939 Express Magneto (Repairs) & Electrical Co. Ltd.

67. *Brolt Ltd.* In 1924 Brolt Ltd. which had started in business in 1911 as a manufacturer and factor of motor electrical equipment, was in financial difficulties and offered its business to Lucas who purchased it for about

£50,000. This purchase enabled Lucas to extend its initial equipment business, particularly for commercial vehicles, as Brolt had initial equipment contracts with certain vehicle manufacturers, including Beardmore and Jowett. One of the reasons given to Lucas's shareholders for the purchase was that if Lucas did not take over the business someone else might, which could be to Lucas's disadvantage in the future.

68. In 1925, *E.I.C. Co. Ltd.* was manufacturing motor cycle magnetos and was about to start the manufacture of magnetos for cars. However, following the death of the majority shareholder the business was offered to Lucas who purchased it for about £35,000.

69. The next businesses to be taken over by Lucas, *C. A. Vandervell Ltd.* and *Rotax (Motor Accessories) Ltd.*, were at the time its principal competitors in the supply of electrical equipment to the motor industry. C. A. Vandervell Ltd. was formed in 1916 with a share capital of £350,000 to take over a business carried on by Mr. C. A. Vandervell at Acton. The products of the company included batteries, magnetos, dynamos, starters, lamps, horns and other motor goods. Mr. Vandervell was one of the pioneers in the manufacture of batteries and dynamos for motor vehicles, having started manufacture of these items well before the time when Lucas first began the manufacture of electrical goods, and he had made particular progress in the development of electrical equipment for the heavier commercial types of vehicles. By 1922, the supply of electrical equipment for commercial vehicles was largely in the hands of C. A. Vandervell Ltd. Rotax (Motor Accessories) Ltd. was formed in 1917 by the brothers Eugen and Hermann Aron with a nominal share capital of £175,000 to carry on business as a manufacturer of and dealer in all types of motor goods, including batteries and other electrical items. In 1917, Rotax acquired the business of H. T. Saunders & Co., Birmingham. In 1921 over one-third of the issued capital of Rotax was acquired by Kynoch Ltd. In the same year Rotax amalgamated with Newton Electrical Works Ltd., Taunton, a company in which the Aron brothers already had an interest. Lucas's records show that at about this time it was meeting keen competition from Rotax in the supply of electrical equipment for cars. Nobel Industries Ltd., through Kynoch Ltd., held a substantial interest in the re-formed Rotax (Motor Accessories) Ltd. and Sir Harry McGowan (later Lord McGowan) joined the Board. Sir Harry McGowan is understood to have offered the Rotax business to Lucas. There is evidence that in 1923 Lucas and Rotax established some sort of working arrangement. In 1925 the Arons suggested that Lucas and Rotax should jointly take over C. A. Vandervell, and in 1926 an offer to C. A. Vandervell was made by Sir Harry McGowan on behalf of Lucas. The offer was accepted for a consideration of £321,745 in cash. Lucas took the view that joint management of C. A. Vandervell by Lucas and Rotax would not be successful and it decided to take over Rotax also. The consideration of £707,217 for the purchase of Rotax was satisfied partly in cash but for the most part by the issue of Lucas £1 Ordinary shares*. Lucas decided to concentrate manufacture of equipment for the heavier types of vehicles in C. A. Vandervell and to develop Rotax for the manufacture of equipment for aircraft. In 1931, following a manufacturing and market sharing agreement made between Lucas and Robert Bosch A.G., Stuttgart

* It has been ascertained that I.C.I. (the successors of Nobels) now has no shares in Lucas.

(Bosch) the well known German manufacturer of electrical equipment for motor vehicles (see paragraphs 85 to 92), the name of C. A. Vandervell (in which Bosch had acquired a 49 per cent. interest from Lucas) was changed to C.A.V.-Bosch Ltd. In 1937 Lucas bought back for £294,000 Bosch's interest in C.A.V.-Bosch Ltd., which in 1939 changed its name to C.A.V. Ltd. This company is still concerned almost entirely with the production and supply of electrical and other equipment for heavy vehicles. Rotax Ltd. is now concerned principally with the production of equipment for aircraft.

70. In 1927, Lucas acquired *B.L.I.C. Ltd.*, a company whose principal product was magnetos but which had also developed a lighting and starting set. This latter project is said to have been unsuccessful and Lucas purchased the business for £9,000 on the general grounds that although there might be a loss on the realisation of the assets acquired it was desirable to keep other people from obtaining the trade name and developing competition to a small but irritating extent.

71. *A. Rist (1927) Ltd.* was formed in 1927 to take over a business originally founded in 1916 by the late Mr. D. A. Rist and in which Lucas had taken an increasing financial interest. Its products included ignition coils, horns, lamps and other electrical and non-electrical equipment for motor vehicles. By 1929, Lucas had acquired a controlling interest in the company, through nominees, and by 1934 complete ownership. In 1934, A. Rist (1927) Ltd. acquired Flexible Electric Cords Ltd., a small company manufacturing electric cable for motor vehicles and other uses; this company then changed its name to Rists Wires & Cables Ltd. Lucas has said that it financed this development in order to safeguard the supply of cable for use with its electrical equipment as it wanted to have a source of supply outside the cable manufacturers' "ring" that existed at that time. A. Rist (1927) Ltd. was wound up in 1936 and its business in ignition coils and other motor goods was taken over by Rists Wires & Cables. In 1931 Lucas had formed, through Rists, the Beacon Lamp Co. Ltd. for the manufacture of filament bulbs for motor vehicles. At that time Lucas was largely dependent for its requirements of such bulbs on members of the Electric Lamp Manufacturers Association (E.L.M.A.). When eventually E.L.M.A. learned of Lucas's ownership of the Beacon company, the latter was in production and Lucas was consequently in a better position to negotiate terms. In 1939, E.L.M.A. made a new 10 year agreement with Lucas under which Lucas obtained very favourable terms for its purchases of bulbs but agreed to dispose of the Beacon company to members of E.L.M.A. for the sum of £100,000 and to buy its requirements of bulbs exclusively from the members. Lucas's connection with the Rist companies, which has always been through nominees, was not publicly disclosed. (The later activities of Rists Wires & Cables Ltd. are dealt with in paragraph 165.)

72. *Powell & Hanmer Ltd.*, which Lucas acquired in 1929, was at that time its principal competitor in non-electrical equipment for cycles and motor cycles. When a director of that company joined the board of Austin, Lucas feared that he might encourage Powell & Hanmer to produce electrical equipment for supply to Austin and that the association might also affect Lucas's quotations to other large vehicle manufacturers. Lucas made an offer to Powell & Hanmer and purchased the business for £500,000.

73. *M.L. Magneto Syndicate Ltd.* was a lighting, starting and ignition business owned by Smiths. Its sale by Smiths to Lucas in 1930 for the sum of £116,250 was related to a general trading agreement made between Lucas and Smiths in 1930 which is dealt with fully in paragraphs 79 to 84.

74. *North & Sons Ltd.*, then one of the leading manufacturers of magnetos and also a manufacturer of speedometers and other instruments for motor vehicles, was purchased by Lucas in 1933 for £22,347. Lucas subsequently recovered half the purchase price from Smiths : Lucas took over the magneto side of the business and Smiths the instrument side.

75. *Globe & Simpson Ltd.*, a wholesaler, retailer and repairer of electrical and other motor goods, was formed in 1921 to acquire an existing business. In 1937, the whole of the share capital of the company, which was then a Lucas Battery Service Agent operating a number of outlets in Yorkshire and elsewhere, was purchased by Lucas, through nominees, for £64,708. According to Globe & Simpson's Board minutes, its Managing Director had understood from Lucas that all Lucas wanted was " sufficient control to be in the position to determine policy and prevent the operation of any policy detrimental to Lucas interests ". Shortly after this purchase, the shares in Lucas's subsidiary company, County Electrical Services Ltd. (see paragraph 64 above), were transferred to Globe & Simpson. In 1939, through Globe & Simpson, Lucas purchased *Express Magneto (Repairs) & Electrical Co. Ltd.*, for the sum of £2,542 : this company became a subsidiary of Globe & Simpson. Also in 1939, Lucas formed two new companies as subsidiaries of Globe & Simpson—*Express Electrical Services Ltd.* and *Irvine Electrical Services Ltd.* Each of these subsidiaries operated a number of outlets. The later history and activities of this group of subsidiary companies, whose ownership by Lucas has remained undisclosed, is dealt with in paragraphs 113, 433 and 436.

76. In 1924 *Bosch Ltd.* was formed as a wholly owned subsidiary of Robert Bosch A.G. to distribute Bosch products in the United Kingdom. By the agreement made in 1931 between Lucas and Bosch (see paragraphs 69 and 85 to 92) the ownership of Bosch Ltd. was transferred to C.A.V.-Bosch Ltd. In 1937, therefore, when Lucas regained complete control of C.A.V.-Bosch, Bosch Ltd. became Lucas's wholly owned subsidiary. In 1954 Lucas sold Bosch Ltd. back to Bosch for the sum of £25,000.

Agreements

77. Between 1926 and 1939 Lucas entered into a number of agreements which were concerned with the manufacture and supply of one or more of the items of equipment specified in the reference. The following agreements related solely to batteries (class (i) of the reference) :

1926 Joseph Lucas Ltd. and Peto & Radford.

1926 Joseph Lucas Ltd. and Batteries Ltd.

1928 Joseph Lucas Ltd. and Batteries Ltd.

1929 Joseph Lucas Ltd., Svenska Ackumulator Aktiebolaget Jungner, Pritchett & Gold and E.P.S. Co. Ltd. and Batteries Ltd.

1933 Joseph Lucas Ltd., Chloride Electrical Storage Co. Ltd. and Oldham & Son Ltd.

The last named agreement governed the activities of the British Starter Battery Association (the B.S.B.A.), formed in 1933, and provided for the adoption of uniform trade terms and common prices for replacement batteries. It also regulated the distributive trade in replacement batteries and provided for the marketing by members of a cheap fighting brand, the "Jewel" battery, to meet competition by the smaller manufacturers of batteries that were cheaper than the standard ranges of the B.S.B.A. members. Lucas's Board minutes record that this competition was "intense" in 1933. The history and activities of the B.S.B.A. are dealt with in detail in Chapter 5 and Lucas's relations with Chloride over the years, including the other four agreements noted above, are dealt with in paragraphs 119 to 127.

78. The following three agreements, each covering a wide range of motor electrical equipment, which were entered into by Lucas in this period are described in paragraphs 79 to 94:

1930 Joseph Lucas Ltd. and S. Smith & Sons (Motor Accessories) Ltd.

1931 Joseph Lucas Ltd. and Robert Bosch A.G., Stuttgart.

1937 Joseph Lucas Ltd. and The Electric Auto-Lite Company, U.S.A.

By a number of other agreements entered into in the period, Lucas obtained rights in certain patents and designs and access to manufacturing knowledge relating to single items of equipment or to component parts. The other contracting parties included Delco-Remy & Hyatt Ltd. (General Motors), A. H. Hunt (Safetisigns) Ltd., Sparks-Withington Co., U.S.A., and Trico-Folberth Ltd., a subsidiary of Trico Products Corporation, U.S.A. The agreement with Delco-Remy & Hyatt Ltd. was concluded in 1932 and terminated in 1950. Delco-Remy granted Lucas rights to manufacture and supply in the United Kingdom vacuum control units (component parts of distributors) to a design owned by General Motors. Lucas agreed to pay Delco-Remy the sum of 3 cents each for the first 50,000 vacuum control units manufactured to General Motors' design, and 2 cents each for numbers exceeding 50,000. The arrangement was to continue for an initial period of three years and would then be reviewed. Delco-Remy agreed to supply Lucas with all the information it had on the design provided such information was not the subject of any new patent application. The agreement with A. H. Hunt (Safetisigns) Ltd. was concluded in 1932 and terminated in 1946. Hunt granted Lucas rights in the British Commonwealth in four patents relating to trafficators. Lucas undertook to pay Hunt royalties of 6d. for every pair of trafficators sold to vehicle manufacturers and, for a period of five years, 2s. 6d. for every pair sold for replacement or as accessories up to 10,000, with provision for varying the amounts after five years. The parties agreed to maintain the retail prices and the trade and factors' discounts fixed by agreement between them. Hunt undertook not to supply trafficators for initial equipment. A series of agreements with Sparks-Withington relating to electric horns, the first of which was concluded in 1934, is described in paragraph 130. The agreement with Trico-Folberth was concluded in 1937 and terminated in 1950. Trico granted Lucas rights for the United Kingdom in three patents relating to trafficators, for a consideration of £2,200. Trico and Lucas agreed not to undercut each other's prices to their respective initial equipment customers for goods embodying the patented inventions. Each party was to quote for and supply such goods

at prices which were exclusive of any other articles and were not to include any allowances, rebates or discounts other than the usual terms " which might be adjusted in consideration of the supply of other goods ". Lucas has told us that, in general, when it grants licences for patents or " know-how " to other manufacturers clauses are inserted in the agreements to prevent competition with Lucas, and that licences granted by foreign manufacturers contain similar provisions. Exclusive manufacturing rights for the United Kingdom and as many overseas countries as possible are generally obtained.

79. *Joseph Lucas Ltd. and S. Smith & Sons (Motor Accessories) Ltd.* Three agreements were concluded on 20th May, 1930—two sales agreements and one general trading agreement—which enabled Lucas and Smiths to concentrate their respective resources in separate fields of the motor electrical industry. At that time Smiths, in addition to its interests in instruments and sparking plugs, had a Lighting, Starting and Ignition Department which held contracts for the supply of initial equipment to some of the smaller vehicle manufacturers and for ten years had also been supplying, under its own trade name, automotive batteries which it obtained from Peto & Radford (see paragraph 120); it also owned the share capital of M.L. Magneto Syndicate Ltd. (see paragraph 73). By the first of the sales agreements with Lucas, Smiths sold to Lucas all the assets of its Lighting, Starting and Ignition Department, for a total of about £5,000 and undertook for a period of 20 years from the date of the agreement not to engage in the manufacture, supply or distribution of lighting, starting or ignition equipment (except sparking plugs) for mechanically propelled vehicles (whether for land, sea or air) or for stationary engines, except in so far as such equipment was manufactured by or purchased from Lucas. It was further provided that the two companies should enter into a trading agreement for the purpose of regulating their future working arrangements. The second sales agreement provided for the sale by Smiths to Lucas of the whole of the issued share capital of M.L. Magneto Syndicate Ltd. The consideration for the sale was £116,250 which was satisfied by the allocation to Smiths of 31,000 Lucas Ordinary shares of £1 each.*

80. The trading agreement between Lucas and Smiths was expressed to be for a term of 15 years and thereafter to continue until determined by either party at six months' notice. Three lists were appended to the agreement. List A, the " Smiths List ", comprised products then manufactured by Smiths; List B, the " Lucas List ", comprised products then manufactured by Lucas; List C, the " Outstanding List ", comprised products not included in Lists A or B. Lucas undertook that it would not during the existence of the agreement manufacture or supply any of the products in the Smiths List without the consent of Smiths, and Smiths gave a similar undertaking in respect of the Lucas List. The products in the Outstanding List were reserved for future consideration.

81. The items in the Lucas List were predominantly electrical and included starting, lighting and ignition equipment (but not sparking plugs), ammeters, batteries, electric windscreen-wipers, lamps and electric horns. Amongst the other goods were bulb horns, mirrors and instrument panels containing switchgear (in which provision would be made when required for the

* It has been ascertained that Smiths now has no shares in Lucas.

fitting of Smiths' instruments). The items in the Smiths List included clocks, petrol meters, pressure gauges, oil gauges, dashboard thermometers, sparking plugs and mechanical wipers, as well as a number of other items of car equipment and certain aviation instruments.* Smiths was to continue to obtain its requirements of bakelite mouldings from M.L. Magneto Syndicate Ltd. until such time as it decided to manufacture such mouldings for its own consumption only, and it agreed not to compete with M.L. Magneto. Car heaters, which in 1930 were practically unknown in this country except for very specialised uses, were not mentioned in any of the lists.

82. All products in the Lucas List dealt in by Smiths and manufactured by Lucas were to be obtained by Smiths only from Lucas and were to be resold by Smiths at prices fixed by Lucas. Lucas undertook to supply such products to Smiths at its best trade prices so as to enable Smiths to resell at the prices fixed by Lucas and make a reasonable profit. If Lucas was unable to meet Smiths' requirements of such products, Smiths was to be free to meet its orders from retailers or Service Agents by obtaining supplies from other sources.

83. There were special provisions enabling Smiths to make dashboard and spotlamps and a combination of clock and mirror. Lucas undertook to supply Smiths with batteries at such prices as would enable Smiths to resell them to garages, Service Agents, factors and for export (but not to vehicle or aircraft manufacturers) at the same prices and terms as Lucas and leave Smiths a reasonable margin of profit. Lucas's terms to Smiths for batteries were to be 62½ per cent. off Lucas's retail list prices.

84. Smiths has said that the intention of these arrangements was "admittedly to remove the competition between the two companies in connection with magnetos, lighting and starting". Certain of its Board minutes of the period confirm that it took this view of the arrangements. On the other hand, Lucas has told us that it considers the arrangements to have been of no particular importance: it bought a section of Smiths' business which Smiths wanted to sell and the agreements covered the conditions of the sale. The termination of the trading agreement in 1956 is dealt with in paragraph 152.

85. *Joseph Lucas Ltd. and Robert Bosch A.G., Stuttgart.* As stated in paragraph 76, Bosch Ltd., was formed in 1924 by Robert Bosch A.G. to distribute Bosch products imported from Germany and to act generally as Bosch's agent in the United Kingdom. The products imported included sparking plugs, starting, lighting and ignition equipment and spare parts for repairs. We understand that before 1931 some Bosch products were supplied to United Kingdom vehicle manufacturers for use as initial equipment, including tractor magnetos to Ford, magnetos to certain motor cycle manufacturers and some sparking plugs. In 1930 the shares in Bosch Ltd. were transferred to Bosch's associated company, Industria Kontor, Switzerland.

86. Lucas's Board minutes record that in 1928 Bosch told Lucas that it was considering manufacture outside Germany and had had a dozen

* The clocks and some of the instruments included in the Smiths List fall into class (vi) of the reference when electrically actuated. At the time of the agreement, however, those made by Smiths were mechanical.

offers to come to England: it recalled that Lucas had suggested that if Bosch had any new products for which a market could be found in England Lucas would be willing to go into it with Bosch in order to avoid unnecessary competition. Bosch proposed that the two companies should work together in supplying lighting, starting and ignition equipment for the heavier commercial vehicles and in heavy duty and aircraft magnetos and other items. It suggested that it should purchase from Lucas a half share in C. A. Vandervell Ltd. (see paragraph 69) and that there should thereafter be some form of demarcation between the products to be manufactured by Lucas and by C. A. Vandervell (which had by then begun the manufacture of fuel injection equipment for diesel engines).

87. The negotiations which followed Bosch's proposals resulted in the conclusion in October 1931 of three agreements which provided for the exchange of patents and technical information, for certain market sharing arrangements and for the sale to Bosch of 49 per cent. of the issued capital of C. A. Vandervell Ltd. The name of C. A. Vandervell Ltd. was changed to C.A.V.-Bosch Ltd. and Industria Kontor transferred to C.A.V.-Bosch its shareholding in Bosch Ltd.

88. The Principal Agreement was to operate from 1st April, 1931 until 31st March, 1946. It was provided that, subject to any statutory provisions affecting the respective parties, the agreement should not be terminated on account of war and that on restoration of commercial relations the period of suspension should be added to the remaining term. The arrangements applied to an Agreed Area defined as Great Britain and Ireland, the Dominions (except Canada and Newfoundland) and the British Empire and Mandates (except Palestine and Iraq), and to three schedules of products which included all the goods specified in the reference and other goods, including diesel engine fuel injection equipment, for vehicles and for other uses (e.g. for aircraft, marine and stationary engines). In terms of the reference goods only, the arrangements provided that in the Agreed Area the manufacture and sale of equipment for cars and the manufacture of all lamps, horns and batteries for commercial vehicles were to be exclusive to Lucas ; and the manufacture of other equipment for commercial vehicles and the sale of all equipment for commercial vehicles were to be exclusive to C.A.V.-Bosch*. Lucas undertook not to manufacture equipment for cars outside the Agreed Area (except in the U.S.A. and Canada) and not to sell equipment for cars and light commercial vehicles in Germany except for use as replacements for Lucas products, and not to sell in competition with Bosch in any part of the world outside the Agreed Area (except in the U.S.A. and Canada) beyond what was the ratio of its sales to Bosch's sales in 1930. C.A.V.-Bosch was not to manufacture or sell equipment for commercial vehicles outside the Agreed Area. Bosch undertook not to manufacture in the Agreed Area equipment for cars and light commercial vehicles (or any other goods except as might

* Sparking plugs for cars and commercial vehicles were included in the list of products the manufacture of which was to be exclusive to C.A.V.-Bosch but there is no evidence that such manufacture was, in fact, contemplated. In 1935 an agreement between Smiths and Bosch (see paragraph 259) was concluded which provided, *inter alia*, for the manufacture by Smiths (K.L.G.) of ceramic plugs to Bosch patents. Appended to this agreement are letters from Lucas and C.A.V.-Bosch waiving C.A.V.-Bosch's rights under the 1931 Lucas-Bosch agreement to manufacture and sell sparking plugs in the Agreed Area.

be agreed) and to ensure that United American Bosch and its Canadian subsidiary would not do so either. Bosch undertook not to sell any products in the Agreed Area except through Bosch Ltd. or direct to Ford, Cork. Bosch Ltd. undertook not to engage in any manufacture, and not to sell at prices less than the prices fixed by Lucas or by C.A.V.-Bosch for comparable items: the intention was that Bosch Ltd. should not compete for business which was intended by the agreement to be exclusive to Lucas or C.A.V.-Bosch. The agreement included comprehensive provisions for the exchange between Lucas and Bosch of patents and know-how.

89. Briefly, the First Supplemental Agreement covered the transfer of 49 per cent. of C.A.V.-Bosch's issued capital to Industria Kontor, and the rights and obligations of the parties in the event of termination of the agreement including the winding-up of C.A.V.-Bosch. The Second Supplemental Agreement covered arrangements for the management and control of C.A.V.-Bosch and for the distribution of profits between Lucas and Bosch. The shares in C.A.V.-Bosch numbered 1 to 153,000 were "A" shares and were allotted to Lucas and the shares numbered 153,001 to 300,000 were "B" shares and allotted to Bosch. It was provided that the first charge on profits was to be a cumulative preferential sum of £12,000 a year payable to the "B" shares; the next £38,000 was to be allocated to the "A" and "B" shares in the ratio of 51:49; the next £50,000 to the "A" and "B" shares in the ratio of 31:19; and the balance of profits in the ratio of 51:49. The agreement also provided that any profits retained by way of reserve were to be placed to the credit of two special reserve funds, Reserve Fund "A" and Reserve Fund "B".

90. In 1937, after long negotiations, Lucas purchased Industria Kontor's 49 per cent. interest in C.A.V.-Bosch for a total consideration of £294,000. Lucas has said that it was the approach of the 1939 war which enabled it to do this. The purchase was dealt with in two agreements dated 26th May, 1937. The first of the 1937 agreements was between Lucas, Industria Kontor and an associate of Bosch in Holland, and was to operate until 31st March, 1946. It provided for the transfer to Lucas of the "B" shares in C.A.V.-Bosch and for their conversion into 147,000 10 per cent. Cumulative Preference shares of £1 each, without voting rights. Lucas was to receive the amount in Reserve Fund "A" (£45,000) and Industria Kontor the amount in Reserve Fund "B" (also £45,000). As from 1st April, 1937, Industria Kontor was to be remunerated by C.A.V.-Bosch out of the latter's profits for services to be rendered by Bosch in accordance with the provisions of the 1931 agreements. The second agreement dated 26th May, 1937, was described as supplementary to the three 1931 agreements and was to run from 1946 until 1966, unless otherwise terminated, and thereafter for periods of five years subject to notice of termination. Besides the remuneration provisions, it also covered the position on termination of the agreements and cancelled the Second Supplemental Agreement of 1931.

91. Lucas has said that all its agreements with Bosch were automatically cancelled when war broke out in 1939. In that year, the name of C.A.V.-Bosch Ltd. was changed to C.A.V. Ltd. which in the following year took over Bosch Ltd.'s trading activities, such as they were.

92. Lucas has said that its 1931 agreements with Bosch were of far greater importance than all its other agreements. " From this agreement we had complete access to Bosch's technical knowledge and experience. It could also be said that the agreement helped Bosch considerably as they had access to Lucas's technical knowledge in connection with electrical equipment. However, the most important point of all was that Bosch joined with Lucas in setting up a joint company—C.A.V.-Bosch—to whom they passed on the know-how for manufacturing diesel engine fuel injection equipment." Fuel injection equipment is not, however, within our terms of reference.

93. *Joseph Lucas Ltd. and The Electric Auto-Lite Company, U.S.A.* In the early 1930's Auto-Lite, one of the largest suppliers of motor electrical equipment in the world, was a major supplier to Ford and other motor manufacturers in the U.S.A. and also supplied a part of Ford's requirements in the United Kingdom. According to Lucas's records, in 1931 Auto-Lite was considering starting production in the United Kingdom and Lucas was apprehensive about the effects not only on its share of the Ford business but also on its business with General Motors (Vauxhall) and with the wholly British manufacturers. A working agreement between Lucas and Auto-Lite was negotiated which was intended to enable Lucas to secure, with Auto-Lite's full manufacturing assistance and its undertaking to stay out of the United Kingdom, the whole of the Ford business in the United Kingdom in return for minimum annual payments of £20,000. However, in 1932 before the agreement could be finally concluded, Auto-Lite lost the Ford contracts in the U.S.A.

94. In 1933 a further draft agreement was prepared. A Lucas Board minute of 20th June, 1933 recorded that this followed " the original lines, which were that the Autolite Company and ourselves have an interchange, as they bind themselves not to manufacture in England and we agree of course not to go into America: they place all their manufacturing experience at our disposal and we pay them, not the sum originally agreed, but £12,000 for the first year, £15,000 for the second year and £17,000 for the third year ". The minute goes on: " . . . The Auto-Lite Company are giving us the fullest information to enable us to hold the Ford business on this side on our own. The reasons which justified this agreement two years ago are equally applicable to-day. We have taken the figures out and this proves that if Auto-Lite came to England to manufacture for Ford only—which was what they were prepared to do—and we lost half our Ford business to them, it would cost us about two or three times as much as we are paying them under the agreement. It will be realised therefore that the bargain we have made is quite a good one on these grounds only, but when the effect which their presence would have on Vauxhall to commence with and the All-British group as time went on is understood, it will be seen that the Ford position is only one side of the question, and their presence here would force down the Ford prices on which the above calculations are based." However, the proposed agreement was not concluded and fresh terms were again discussed in 1934 and in 1935. Eventually, in 1937, an agreement was concluded for a term of three years whereby Lucas purchased for the sum of $50,000 per annum, payable in quarterly instalments during the life of the agreement, Auto-Lite's complete knowledge and

the exclusive right to use Auto-Lite's machines, processes, patents and designs relating to the manufacture of ignition coils, distributors, starter motors and current-voltage control units. Auto-Lite agreed to keep Lucas informed of all relevant research and development through drawings, visits, exchanges of engineers, etc., and there were reciprocal arrangements for use by Auto-Lite of Lucas designs. Lucas was debarred from manufacture of the goods in question in the U.S.A. and Canada and from supplying such goods in these territories except as parts of complete exported vehicles or as replacements for Lucas equipment. Auto-Lite was similarly debarred from manufacture and supply in the United Kingdom. Lucas has said that " at the time this agreement was made America undoubtedly dominated the automobile trade and their prices for components were lower than they were in this country in spite of their higher wage scale. This was due partly to volume and partly to their production engineering. Because they have high wages in America they had to put special efforts into devising labour saving machines. If, therefore, the British Motor Trade was to survive and progress in the world's markets it was necessary for us to be able to supply our components to the British motor manufacturers at lower prices than were current in America. We, therefore, wanted to have knowledge of the way they did it. Our materials would cost no more and labour would cost less. We wanted to know how to produce a smaller volume at equal prices or lower than were current in America. This agreement gave us access to Auto-Lite's production technique and was well worth the money."

Trading arrangements

95. *Initial equipment.* From the time shortly after the first world war when Lucas began to supply a range of starting, lighting and ignition equipment, its contract prices for these goods to the vehicle manufacturers for use as initial equipment were usually negotiated on the basis of a comprehensive price for the set of equipment to be supplied for a particular model of vehicle. Lucas has told us that the custom of pricing in sets was not introduced from America: there was no comparable situation there as both Ford and General Motors made many of their own components. In Germany, however, Bosch's arrangements were very similar to those of Lucas. The importance to Lucas of close liaison with vehicle manufacturers, from the drawing board stage onwards, is underlined by the statement of the then Managing Director in a report to the Board dated 21st September, 1921 that " once our models are designed into the car we can hold the business ". Wherever possible Lucas obtained orders for other items (such as switches, horns, cable, etc.) to be included in the sets and a Board minute of 18th February, 1925 records that " it is part of our principle to push wherever we can for any of the general lines as soon as we have fixed up the contract for Lighting and Starting, or Magnetos ". The initial equipment contracts were negotiated individually at the highest levels and were subject to hard bargaining on both sides. Lucas has told us that its negotiators might have indicated to the vehicle manufacturer that if he bought from Lucas an item which he was then obtaining from a competitor a favourable adjustment would be made to the comprehensive price of the set; or, to take another example, special reductions might have been offered in return for promises of increased volume of business. The vehicle manufacturer, on his side,

might have attempted to get lower prices from Lucas by offering more business, whether by numbers of sets or increased range of items purchased.

96. Shortly after Lucas's acquisition of C.A.V. and Rotax (see paragraph 69), a Lucas Board minute of 25th August, 1926, recorded, that " we have successfully arranged for the whole of next year's business with the Austin Co. for all their models. This is very gratifying, as it will be remembered that this was the one place where there was a possibility of our having difficulty, due to their attitude over amalgamations. We have completely changed this, and have shown them that we are able, by co-operative action, to put forward reduced prices for a composite Set, when C.A.V. alone would have been quite unable to meet them." Lucas has told us in explanation of this record that " the motor trade was very upset about the amalgamation of C.A.V. and Rotax with Lucas. It was a creation of a monopoly—it was not really of our seeking, which is also clear from the records. We did say to them we would be able to give them the benefits of the amalgamation, which were benefits of reduction. Mr. Lucas was able to go along and say that by reason of the amalgamation they would get better service than they would merely with C.A.V.: in other words, it would work to their advantage. Austins had been entirely C.A.V. customers before the amalgamation, and Austins were the most resistant and most awkward about it. Their bitterest enemies in those days, Morris, were entirely in the Lucas camp, and Austins did not welcome it at all. Sir Herbert Austin was a very bitter man about it." Lucas added that it brought its prices down very materially when it acquired C.A.V. and Rotax. We have quoted Lucas above as saying that the acquisition of C.A.V. and Rotax established its monopoly position. This was of course in its particular field in the motor electrical industry, namely in starting, lighting and ignition equipment. No other competitor of any significance existed in this field, particularly as regards initial equipment, from 1926 until after the end of the last war.

97. Lucas has told us that in the 1920's and 1930's initial equipment prices were a matter of " catch as catch can " between the negotiators, and that it tried to make each of its big customers feel that he was getting " favoured nation treatment ". Initially, a bargain was struck on a comprehensive price for the set of equipment for a particular model of vehicle. The set was never delivered as such but in its constituent parts. For the purpose of the invoicing of these various parts, the comprehensive contract price of the set was split up, more or less arbitrarily but with some relation to the cost of each item, and these invoices were stamped " nominal prices for invoicing purposes only ". Lucas has said that in the early days these pricing arrangements caused trouble on some occasions and that subsequently efforts were made to ensure that the nominal prices were more or less consistent as between one customer and another so that if invoices went astray or the details otherwise became known customers would not be alarmed at apparent discrepancies. In any case where the price details became known and a customer complained about apparent discrepancies, Lucas was able to reassure him by pointing out that the invoice prices were purely nominal and were only part of an overall arrangement.

98. It appears that after the bargain had been struck on a comprehensive price for a set of equipment, there was frequently some reduction in that

price which took the form of a confidential rebate or allowance. These rebates were allowed for a wide variety of reasons—e.g. because the vehicle manufacturer was offering increased volume of business, or to assist him in marketing a cheap car. From time to time a vehicle manufacturer would suggest that he should be allowed a special rebate on the basis of " 100 per cent. loyalty " (i.e. on condition that he placed all his business with Lucas) but Lucas says that it never granted rebates on this basis. Generally the rebates allowed were round sums off the price of each set but sometimes they took the form of a percentage reduction at the end of the year according to the number of sets purchased. Lucas has told us that the arrangement with each initial equipment customer was a matter of personal bargaining by individual directors. At that time Lucas's costs were decreasing rapidly due to the increased scale of production following the amalgamation with Rotax and C.A.V., and it had " money to give away at the end of the year " ; whether this was done by rebates or by overall cuts in prices was a matter of individual bargaining.

99. *Replacements and spare parts.* The early history of Lucas's arrangements for the distribution of replacements and spare parts for repairs has been described briefly in paragraph 64. In the late 1920's and the 1930's Lucas continued to build up its service arrangements, both by the appointment of additional wholesale distributors and by increasing the number of its own outlets which it operated first through its subsidiary, County Electrical Services Ltd. and, after 1937, through the Globe & Simpson group of subsidiaries (see paragraph 75). Lucas's wholesale distributors comprised (i) its appointed Battery Service Agents, who were generally stockists and repairers of electrical equipment and many of whom were distributors of motor vehicles, (ii) the factors of general motor goods and (iii) to a limited extent, certain of the vehicle manufacturers, notably Ford, who wished to distribute replacements and spare parts for their vehicles through their own vehicle distribution organisations.

100. Lucas, in common with most if not all concerns of any size in the motor industry generally, has always practised resale price maintenance at all stages of the supply of its products for the replacement and accessory trade. For enforcement, it relied largely on the collective sanctions which were provided by the machinery of the Motor Trade Association (later the British Motor Trade Association), which was the sole disciplinary body in the motor industry. These sanctions included fines, removal from approved lists and, in the last resort, stop-listing. Lucas also introduced agreements with certain individual wholesalers which required the wholesaler to undertake to maintain Lucas's approved prices and discounts (see paragraphs 101 and 102).

101. *Battery Service Agency Agreement.* In 1926 Lucas introduced a form of agreement covering the appointment of its Battery Service Agents. These Agents were generally wholesale stockists and repairers of electrical equipment and many of them were distributors of motor vehicles. The individual agreements signed by the Battery Service Agents prohibited them from selling batteries or battery parts other than of Lucas manufacture and required them to supply the batteries and parts at the prices and discounts laid down by Lucas. They were also required to use only Lucas parts for the repair of Lucas batteries and to provide certain specified

services in connection with the supply and repair of batteries. A clause in the agreement relating to goods other than batteries was first introduced in 1932: this required the Agent " to stock and sell only genuine Electrical Spare Parts supplied by the Principals [Lucas], for equipment of the Principals' manufacture ". The agreement of 1933 between Lucas, Chloride and Oldham (see paragraph 77 and Chaper 5) which set up the B.S.B.A. laid down the discounts to be allowed to Service Agents who signed the " usual Battery Service Agents Agreement ". Lucas retained in its agreement the clause relating to goods other than batteries. The bulk of Lucas's supplies of replacement batteries, other electrical replacements and spare parts were distributed through this network of Battery Service Agents, whose sales were made mainly to local retailers (garages, repairers, etc.) but who themselves generally also had some retail trade.

102. *Preferential Spares Discount Agreement.* Lucas also made use of other classes of wholesalers—the factors of general motor goods, specialist stockists of electrical equipment and motor vehicle distributors. (The last two classes would have included Service Agents for other battery manufacturers.) For these classes of wholesalers, Lucas introduced about 1933 a form of agreement called the Preferential Spares Discount Agreement which provided that in consideration of the granting of terms in excess of the normal trade discounts on spares, the signatories undertook to buy, whether for resale or for use in repairs, only " genuine spare parts " for electrical equipment manufactured by Lucas and to send all armatures requiring rewinding to Lucas. The term " genuine spare parts " meant those spare parts originally supplied by Lucas. Lucas has said that its object in introducing this agreement was to ensure that its spares were actively sold by the signatories and used for the repair of Lucas products.

103. *The B.90 Factory Exchange Service.* Lucas has told us that up to 1935 or thereabouts it was customary in the motor trade for repairs undertaken by the manufacturers or electrical specialists to be assessed on a time and materials basis, and that traders were allowed a discount of 15 per cent. off these charges. Where Lucas units were sent to a specialist electrical repairer or were returned to the Lucas factory, the time taken in obtaining reports on the defects and estimates of the cost of repair caused much dissatisfaction both to traders and users, particularly when the users were transit customers or were operators of goods delivery vehicles. These difficulties led to considerable correspondence in motoring and trade journals. Flat rate repair charges were tried but were not a success.

104. Lucas has explained that in 1937 it received representations on these matters from the Motor Agents' Association and discussions followed on ways and means of improving the existing system to the benefit of all concerned—manufacturers, wholesalers, retailers and users. The discussions resulted in the introduction of a price formula covering fixed net prices at each stage of distribution of a range of factory rebuilt units to be supplied in exchange for worn or damaged units handed in by users. For the most part, wholesalers and retailers were to be allowed approximately the same cash profit margins. Lucas has said that this scheme, or the " B.90 Factory Exchange Service " as it came to be called, had the merit that traders and users alike knew precisely what the charges were going to be and disputes and contentious correspondence were

thereby avoided. The new system is said to have been well received by the trade press, and the new price list was introduced in January, 1938. The Motor Agents' Association has confirmed its part in the negotiations with Lucas, and has added that negotiations on these matters continued until early in 1939 and were resumed in 1940 when the discount to retailers represented by the net prices of the B.90 units was increased from 15 per cent. to 25 per cent. The B.90 Service applied to distributors, magnetos, dynamos, starter motors, current-voltage control units, horns, trafficators and armatures for dynamos and starter motors.

105. Lucas has also told us that some time between 1937 and 1939 the vehicle manufacturers introduced a fresh class of trade grading—fleet operators—and that this raised new problems not only for Lucas Agents but also for motor distributors handling this class of trade. Lucas ultimately conceded that it would be only equitable for the profit margin or differential to be shared on sales of its products to fleet operators and special discount rates were introduced. The B.90 units were permitted to be supplied to fleet operators at a discount of approximately 10 per cent. off the net retail list prices. Lucas considered that as sales to fleet operators were a relatively small part of the total trade, the fundamental principle of the supply of B.90 units at fixed net prices at each stage of supply was not invalidated. The alternative would have been to issue special lists of the prices of these units for fleet operators and this was considered impracticable.

106. In its earlier days, Lucas published a Master Parts catalogue covering large numbers of popular spare parts for repairs and also of complete replacement units, such as distributors, dynamos, starter motors, etc. In 1938, Lucas brought out a new form of catalogue—the Master Price List. This covered all the spares, replacements and accessories which it supplied to the trade, apart from B.90 units for which separate price lists were introduced. Included in the Master Price List were some new units of the same descriptions as units covered by the B.90 Service—that is, some windscreen-wiper motors, magnetos, trafficators, current-voltage control units and armatures—but the Master Price List did not include any new distributors, dynamos or starter motors.

Products

107. As we have mentioned in paragraph 41, the 1920's and, more particularly, the 1930's saw new and important developments in the range of electrical equipment for motor vehicles, including the introduction of coil ignition, electric horns, current-voltage control units and trafficators. Most of these innovations were first developed in the U.S.A. and these, and new developments in established items such as distributors, dynamos, starter motors and lamps, were the subject of patent licence and know-how arrangements between Lucas and certain American concerns (see paragraph 78).

108. As regards windscreen-wiper devices, Lucas has told us that mechanical suction wipers, using the suction of air to the engine by taking a connection to the air inlet manifold, were first developed and became almost universal in the U.S.A. Lucas developed a suction wiper using the same principle. There were constant difficulties over the American-owned patent and Lucas has said that it experimented with an electric motor and successfully developed this type of apparatus which was eventually adopted by most of but not all its initial equipment customers.

109. By 1939, Lucas was producing the following goods specified in the reference:

Class (i) batteries (lead acid automotive only);

Class (ii) ignition coils, magnetos, distributors;

Class (iii) dynamos, current-voltage control units, starter motors;

Class (iv) windscreen-wiper motors;

Class (vi) ammeters;

Class (vii) lamps of various kinds, trafficators, horns and relay units for horns.

Work on the standardisation of components for motor vehicles had begun in the early 1920's, but relatively little progress had been made by 1939 as regards the electrical equipment manufactured by Lucas (see paragraph 47). As has been already noted in paragraph 96, Lucas was virtually the sole supplier of dynamos, starter motors and distributors for initial equipment. For the year 1937–38, Lucas's production of starting, lighting and ignition sets for supply as initial equipment averaged 9,100 a week.

The Period from 1939

Wartime production

110. Throughout the war, Lucas produced electrical equipment for military and civil vehicles and for aircraft. Many of its standard products were adapted for war uses: for example, its windscreen-wiper motors were used to operate aerial cameras and its starter motors were adapted for the electrical control of tank gun turrets. Outside its normal fields, Lucas produced a wide variety of military requirements including gun turrets, aircraft wing sections, primers, fuses, anti-aircraft shells, bombs of various kinds, control and release mechanisms and metal pressings. It also undertook research work for the Government, including research and development work on jet propulsion in factories it took over specially for the purpose.

Acquisitions

111. The following is a list of the businesses concerned with the supply of goods specified in the reference which have been acquired by Lucas since 1939 with, in each case, the year of acquisition and the price paid:

		£
1943	David B. Irvine (Edinburgh) Ltd.	3,500
1944	Avon Electrical Services Ltd.	15,066
1945	Bon Accord Electrical Repairs Ltd.	28,957
1948	Butlers Ltd.	350,000
1949	Auto Services Electrical Co. (Falmouth) Ltd. ...	21,000
1953	The Wrexham Motor & Electrical Engineering Co. Ltd.	65,000
1954	Starting, Lighting & Ignition Services (Midlands) Ltd.	1,875
1954	Auto Electric Services (Stourbridge) Ltd. ...	11,000
1958	Cox & Co. (R.W.) Ltd.	250,000
1960	Harry Rawlings & Co. Ltd.	39,500
1962	Gravesend Car Electrical Co. Ltd.	12,500

In addition, Lucas acquired in 1957 a 50 per cent. interest in Siba Electric Ltd.

112. *Butlers Ltd.*, the only manufacturer of reference goods acquired since 1939, was formed in 1911 as a family business of brassfounders at Smallheath, Birmingham, and had developed as an important manufacturer and supplier of motor vehicle lamps. At the time of its acquisition by Lucas in 1948, 60 per cent. of its production was represented by its sales of lamps of various types to Ford and Vauxhall and to Simms (who resold the lamps to heavy vehicle manufacturers) for use as initial equipment. At this time, Butlers was supplying the whole of Ford's requirements of lamps for initial equipment. Butlers also had a substantial business in the supply to wholesalers of accessory lamps, mainly foglamps and spare tail-lamps of various sizes. Lucas has told us that although it knew that Ford, Vauxhall and Simms would not like the purchase and that it did not want to upset them, it nevertheless decided to accept the offer it received from Butlers on the general ground that it would be a mistake to refuse the additional capacity, particularly for short orders and obsolete types of lamps. The purchase of the share capital of Butlers was effected through nominees, and ownership by Lucas was not made public until 1952 when the company was listed as a subsidiary in Lucas's Annual Report. Lucas has told us that its directors had informed Ford, Vauxhall and Simms in 1948, and that its reason for keeping the purchase otherwise secret was that it did not want to disturb Butlers' wholesaler customers or upset its own wholesalers at home and abroad some of whom had territorial franchises: also Lucas did not want to bring the spares side of Butlers' business into the Lucas distribution and service network but wished to study it and find out how it worked. Lucas also said that it did not want to add to current press criticism of itself as a monopolistic giant which absorbed competitors.

113. *The other seven companies acquired between 1943 and 1954* (as listed in paragraph 111) were wholesale motor electrical businesses: all were Lucas Battery Service Agents and some operated a number of separate branches. By 1954, the shares in these companies, and in the Globe & Simpson company and its subsidiaries (see paragraph 75), were held by Lucas through a nominee holding company, *Robert Guthrie Ltd.*

114. *Cox & Co. (R.W.) Ltd.*, an old established family business distributing and repairing motor vehicle equipment and operating in 1958 from eight addresses mostly in the London area, had a long connection with Lucas as a Battery Service Agent. The original founder had been General Manager of Rotax when Lucas acquired that company in 1926, and when he wanted to start in business on his own account he took over from Lucas the C.A.V. Battery Service Station at Camden Town. Lucas has told us that it was clearly understood by all concerned that Mr. Cox's interest in this business was to be a life interest only, and that on his death it was to be sold back to Lucas on an asset basis. Mr. Cox's bad health and considerations of death duties prompted his family to press for early implementation of the understanding, and in 1958 Lucas purchased the shareholding through nominees. Lucas has said that it did this reluctantly as it had hoped it would not have been necessary to make the purchase during the course of our inquiry. An additional reason for keeping the purchase secret was that Lucas did not want the retail trade

or its other Service Agents to know that there was any change in ownership.

115. *Harry Rawlings & Co. Ltd.,* Catford, a Lucas Service Agent operating from two addresses, was acquired by Cox & Co. (R.W.) Ltd. (see paragraph 114) in February, 1960. Lucas has told us that Cox was already negotiating with Rawlings before Lucas took over Cox, and that it told Cox not to negotiate for any further businesses. In April, 1962, the principal shareholder of the *Gravesend Car Electrical Co. Ltd.,* a Lucas Service Agent, offered the business to Cox as he wished to retire and was anxious to secure continued employment for his staff. Lucas has told us that in the special circumstances it thought it best to let Cox take over the Gravesend business.

116. *Siba Electric Ltd.* This company, which was formed in 1954, supplies a combined starter generator unit for use on motor cycles, scooters and mopeds. The units were at first imported from Siba Elektrik G.m.b.H., which had a 50 per cent. interest in the company, but by 1957 the company was itself manufacturing a substantial number of the component parts and importing others from Robert Bosch A.G. Lucas has told us that in 1957 it was approached by the Chairman of Siba Electric (who owns the other 50 per cent. interest in the company) as Siba Elektrik had sold its business in Germany to Bosch who did not wish to have any interest in the small British company. Lucas has said that although at that time it was being asked to make a similar combined starter generator unit it had not considered that, for Lucas, the future for such units was sufficiently attractive. It decided, however, to take up the offer of a 50 per cent. interest in Siba Electric and purchased the shares, through a nominee, for a consideration of £8,578. It has since lent the company a total of £37,500.

Agreements

117. Since the end of the war the position regarding certain of the agreements noted in paragraphs 77 and 78 has been as follows. The agreement of 1929 between *Joseph Lucas Ltd., Svenska Ackumulator Aktiebolaget Jungner, Pritchett & Gold and E.P.S. Co. Ltd. and Batteries Ltd.* (which we describe in paragraph 121) is still operative. The trading agreement of 1930 between *Joseph Lucas Ltd. and S. Smith & Sons (Motor Accessories) Ltd.* (see paragraphs 79 to 84) remained in effect until 1956. Until 1950 Smiths was debarred from making lighting, starting or ignition equipment (other than sparking plugs) not only by the mutual obligations in this trading agreement but also by the undertaking in the agreement for the sale to Lucas of its Lighting, Starting and Ignition Department. Smiths has told us that between 1950 and 1956 it considered more than once the possibility of terminating the trading agreement but took " no positive action which might have been regarded as 'hostile'" until 1956, when the agreement was terminated by common consent. This was done in a letter from Smiths to Lucas, endorsed by Lucas, which stated that Smiths felt the agreement had ceased to serve any useful purpose. The position regarding competition between the two companies since the end of the war is dealt with in paragraph 152 and also in Chapter 6. We understand that there has been no renewal of the pre-war agreement

between *Joseph Lucas Ltd. and Robert Bosch A.G.* (see paragraphs 85 to 92). Lucas has told us that there is no understanding with Bosch about spheres of influence for sales of initial equipment or replacements. A Board minute of 28th April, 1955, of the Lucas management company recorded that the Chairman reported " that the purpose of his visit to Bosch on 7th April was to re-establish the good relationship which existed pre-war and to emphasise that, notwithstanding the competitive situation to which the two Companies must now accustom themselves, there was no reason whatsoever why they should not collaborate in any way which would be of mutual advantage to their respective organisations. He reported that these sentiments were reciprocated by Bosch and a frank discussion on several matters of direct concern had taken place." As regards competition between the two companies since the end of the war, Lucas has told us that it hoped that if it did not irritate Bosch by attempting to obtain initial equipment business in Germany, Bosch in turn would not irritate Lucas in this country: however, the two companies compete keenly for initial equipment business elsewhere, for example, in Sweden. The agreement of 1937 between *Joseph Lucas Ltd. and The Electric Auto-Lite Co.* (see paragraph 93) terminated on 1st January, 1940, and Lucas has entered into no further agreements or patent licensing arrangements with Auto-Lite.

118. After 1939, Lucas entered into a number of agreements which were concerned with the manufacture or supply of one or more of the components specified in the reference. The more important of these are described in paragraphs 119 to 131 below:

1942 Joseph Lucas Ltd. and Chloride Electrical Storage Co. Ltd.

1948 Joseph Lucas Ltd. and Ducellier, France.

1949 Joseph Lucas Ltd. and Sparks-Withington Co., U.S.A.

1949 C.A.V. Ltd. and Ateliers de Construction Lavalette, France.

1953 and 1955 Joseph Lucas Ltd. and Ducellier, France.

1960 Joseph Lucas Ltd. and Chloride Electrical Storage Co. Ltd.

1962 Joseph Lucas Ltd. and Ducellier, France.

119. *Joseph Lucas Ltd. and Chloride Electrical Storage Co. Ltd.* Although this section deals specifically with the period from 1939, the history of the relations between Lucas and Chloride from 1914 to 1960, as ascertained from the documents available to us and from the evidence of the companies themselves, is traced in paragraphs 120 to 125 in order that the earlier agreements listed in paragraph 77 and the agreements of 1942 and 1960 mentioned above may be understood in their proper context.

120. By the early 1920's Lucas had become the principal supplier of lead acid storage batteries to vehicle manufacturers for initial equipment. Lucas has maintained this lead although Chloride has always held a proportion of the initial equipment market, principally as a supplier to Ford, Vauxhall, Rolls-Royce and some commercial vehicle manufacturers. Some measure of co-operation between Lucas and Chloride appears to have been established as early as 1914 when Chloride granted Lucas a licence to use patents relating to wood separators. In 1926 an agreement was made between Lucas and Peto & Radford (then controlled by Chloride through

Pritchett & Gold and E.P.S. Co., see paragraphs 175 and 177) relating to moulded battery boxes which provided for exchange of technical information and a pool and quota arrangement. The pooling arrangement went on until 1931 and the exchange of information until 1936. Lucas's Board minutes record its view that this arrangement avoided the suggestion of the formation of a jointly owned company and, also, that Lucas would be able to co-operate with a French concern, Société des Accumulateurs Electriques, which had a similar working arrangement with Peto & Radford. In the same year there were conversations between Lucas and Chloride about the prices of replacement batteries. Chloride's Board minutes of 16th September, 1927, record that co-operation had been obtained from the more important manufacturers of portable batteries on the regulation of discounts to be granted to the trade and that an agreement had been approved. This agreement appears to have been the forerunner of the B.S.B.A. agreement of 1933.

121. Since 1926, Lucas has had certain exclusive selling rights for automotive alkaline batteries manufactured by Batteries Ltd. This company had been set up by the Swedish company, Jungner, in 1919. Chloride obtained an interest in it in 1923 and control in 1933 (see paragraphs 182 to 184). In 1926 Batteries Ltd. gave Lucas sole selling rights in the United Kingdom and British Empire for its alkaline batteries for lighting purposes on commercial vehicles. This was followed in 1928 by an agreement which gave similar rights for motor cycles. In both, Lucas agreed not to trade in alkaline accumulators other than those of Batteries Ltd. In 1929, under an agreement between Lucas, Jungner, Pritchett & Gold and E.P.S., and Batteries Ltd., Lucas acquired shares in Batteries Ltd. with the right to appoint two directors. Lucas undertook, so long as it was a shareholder and the earlier agreements remained in force, not to have trade in other alkaline batteries, and, so long as it was a shareholder, not to acquire any interest in any other concern making them. In explaining its reasons for making those arrangements Lucas has said that "it was felt at the time that there was the danger of the Alkaline type of accumulator becoming the more popular type for use on road vehicles. This would be to the disadvantage of the lead acid battery business in which Lucas, Chloride, Oldham and other firms had invested money in plant and buildings and built up big business. Experience has shown that this danger did not really exist . . ."

122. Co-operation between Lucas and Chloride in the replacement market for lead acid automotive batteries was effected through the B.S.B.A. of which they were both members and which fixed common prices and discounts and regulated the distributive trade (see Chapter 5). As regards the B.S.B.A. arrangements for the manufacture and supply by members of a cheap fighting brand called the "Jewel" battery (see paragraph 77), Lucas has told us that it manufactured "Jewel" batteries from 1933 to 1942.

123. In 1942 the two companies made an agreement the object of which, Chloride says, was to reduce to the terms of a legal document the position which had been built up over the years whereby Lucas had concentrated on the supply of electrical equipment, including batteries, for motor vehicles and had established connections with a number of British car manufacturers while Chloride had concentrated on the supply of batteries for all purposes and had established connections with certain other car manufacturers, particularly those with foreign connections. The principal provisions of the

agreement, which are of some complexity, may be summarised as follows: (1) the position of each company in regard to its " exclusive clients " (i.e. those vehicle manufacturers to whom it had supplied all their automotive battery requirements for the previous two years) was safeguarded by requiring that sales by one company to the other company's exclusive clients should only be made at prices agreed between the companies ; these were to be no higher than was reasonably necessary to ensure the continuance of supply by the established supplier to that client. (2) Trade with non-exclusive clients (both in initial equipment and replacements) was to be shared, so far as possible, equally between the two companies—if necessary, by adjusting prices. (3) Lucas agreed (*a*) to supply secondary batteries other than automotive only for certain specified purposes (emergency lighting on underground trains, G.P.O. and military signalling purposes and radio reception) and subject to a restriction to 25 per cent. by value of its pre-war sales, and not to be interested in any concern supplying batteries for other purposes except Nife Batteries* ; (*b*) to refer all requests for traction batteries to Chloride. (4) Chloride agreed in respect of electrical equipment for road vehicles other than batteries—(*a*) to restrict its supplies of non-Lucas equipment to 25 per cent. by value of its pre-war sales ; (*b*) to obtain the requirements of those of its Service Agents who were also subsidiaries (the permitted quota apart) from Lucas and to try to persuade its other agents for " Exide " batteries to deal in Lucas equipment ; (*c*) not to become interested in any concerns manufacturing electrical equipment in competition with Lucas other than M.C.L. & Repetition and Rothermel (see paragraphs 178 and 180). Chloride says that the operation of the agreement was " academic rather than actual ". In September, 1944, it was cancelled by mutual consent ; according to Chloride, this was done " in view of a feeling of hostility " in Parliamentary quarters to trading agreements. Lucas has told us that, at various times, previous attempts had been made to conclude such a written agreement. It has pointed out that the agreement of 1942 was concluded during the war when there was, for all practical purposes, no opportunity for either party to attack the other's initial equipment customers as virtually all work was for the Government, and that the agreement was very soon torn up. It is clear that, in practice, the line of demarcation between Lucas's and Chloride's established customers for initial equipment was maintained during and after the term of the agreement.

124. A Sales Report made on 25th June, 1953, to the Board of Lucas's subsidiary company concerned with batteries recorded that Chloride wished " to clarify the trading arrangements with ourselves " and that a memorandum on the initial discussion would be available shortly. The memorandum in question, a copy of which we have seen, is an agreed record of an informal meeting which took place on 5th June, 1953, on questions of technical collaboration and regulation of trading in replacement business and initial equipment business. As regards the latter, the memorandum states:

> " So far as initial equipment business was concerned, it was thought that a useful clarification of the present-day understanding would be achieved by Chloride and Lucas respectively preparing and exchanging

* Formerly Batteries Ltd., see paragraph 121.

detailed lists of those customers whom they considered to be their particular interest, and each of them preparing and exchanging lists of those customers whom they considered to be outside the particular interest of either of them.

As soon as those lists were ready, it was thought that there should be a further meeting so that with the detailed data on the table a clear appreciation of the understanding between Lucas and Chloride could be achieved.

The hope was expressed that thereafter provision would be made for at least annual consultations with immediate reference the one to the other in case any difficulty might arise."

Chloride has told us that no further meetings were held to follow up these proposals because it was not prepared to proceed with the technical collaboration with Lucas which had been the primary object of the discussion. Lucas has told us that the policy discussed in the memorandum was not subsequently agreed as Lord Bennett had laid down that in no circumstances were there to be " any discussions with Chloride or anyone else about original equipment prices or any other arrangements affecting original equipment business. The only subjects we were prepared to talk over with them were the problems associated with replacement batteries and Resale Price Maintenance, etc., and the implications of the various Acts of Parliament on Monopolies, etc."

125. Nevertheless, Chloride has told us that in the post-war years there was a mutual desire on the part of itself and Lucas to maintain the *status quo* as regards initial equipment customers ; Chloride refrained from supplying Lucas's customers and it believed Lucas followed a similar policy. There had been from time to time discussions with Lucas, and subsequently with Lucas and Oldham, about the prices to be charged for initial equipment to certain customers, principally heavy vehicle manufacturers and the Ministry of Supply, but no formal agreements were reached. Chloride says that it was not clear how far the various understandings would have been registrable under the 1956 Act. Chloride decided to set at rest any doubts on the matter and on 21st February, 1957, a letter was sent to Lucas which the latter was asked to accept as the formal termination, the B.S.B.A. arrangement apart, of " all Agreements, arrangements and understandings express or implied which unless terminated would require to be registered under the [1956] Act. At the same time we would record that it is agreed that none of these Agreements, arrangements or understandings is or was attended by or gives or gave rise to any legal relationship at any time between our two companies." In a reply of 25th February, Lucas accepted the letter and expressed agreement with its terms.

126. In 1939 Chloride had granted Lucas non-exclusive rights in a patent relating to the manufacture of battery box lids in return for a royalty of 1d. for each lid embodying the patented invention and sold by Lucas. The agreement was terminated by common consent in 1958 as Chloride had decided that it was not worth while to continue to pay fees for the extension of the patent in question.

127. In 1957, Lucas approached Chloride with a view to making reciprocal arrangements whereby each company would manufacture certain

types of batteries for the other. Lucas has told us that it was prompted to initiate these discussions by its desire to supply its depots and Battery Service Agents with certain non-standard types of car and commercial vehicle batteries, many of which it does not supply for use as initial equipment and which because of the small quantities it would find uneconomic to produce. Arrangements for such reciprocal supply were duly concluded but no written undertakings were given and the discussions were not recorded or confirmed. Over the period 1957-60, Lucas purchased some 119,000 batteries from Chloride under these arrangements. Chloride's purchases from Lucas were made on one isolated occasion only and comprised approximately 500 batteries for use in a particular model of foreign car. Supplies are made from factory to factory by each company and the user could not normally identify the actual manufacturer.

128. An agreement concluded between Lucas and Chloride on 9th December, 1960, provided for the setting up of manufacturing companies in overseas countries to be controlled by British Batteries Overseas Ltd., a company formed for the purpose, the control and capital of which are divided equally between Lucas and Chloride. (See paragraph 914 for Chloride's further observations on this subject.)

129. *Joseph Lucas Ltd. and Ducellier, France.* For a number of years Lucas has had business dealings with Bendix Corporation, U.S.A. in connection with matters with which we are not concerned: it has also had business relations with Ducellier, the largest manufacturer of electrical equipment for motor vehicles in France, which for some years up to 1962 was a division of D.B.A. (Ducellier-Bendix-Air Equipment S.A.). In 1948, Lucas made an agreement with Ducellier, effective for three years, providing for exchange of information and patent licences relating to dynamos, starter motors, current-voltage control units, lamps and horns for use in cars. Each party was precluded from supplying in the other's home territory, except as replacements for its own initial equipment. Two agreements were concluded in 1953 and are still operative, by which Lucas granted Ducellier non-exclusive licences to make and supply flasher units and stop and tail-lamps in France and its Colonies in consideration of the payment of royalties and of an undertaking by Ducellier not to export devices manufactured under the agreement except for use as replacements for its initial equipment. In 1955, a further agreement was concluded between Lucas and Ducellier for a term of 20 years whereby Lucas undertook to give Ducellier technical assistance in battery manufacture. An agreement, with complementary working and patent licensing agreements, concluded in 1962 between Lucas and D.B.A. set up in France a joint undertaking, Ducellier et Cie., with capital contributed as to 40 per cent. by Lucas and as to 60 per cent. by D.B.A., to acquire D.B.A.'s Ducellier division. The agreements apply generally to electrical equipment of the descriptions manufactured by Lucas in this country. Lucas and Ducellier et Cie. are each precluded from supplying in the other's territory, without the other's consent, except as replacements for its own initial equipment. Lucas's territory is the United Kingdom, the Irish Republic, the Commonwealth and British Colonies.

130. *Joseph Lucas Ltd. and Sparks-Withington Co., U.S.A.* Sparks-Withington is an old established manufacturer of horns for motor vehicles,

and Lucas's association with this concern dates from an agreement of 1934 whereby Sparks-Withington undertook to supply Lucas with its complete know-how, including patent licences, on electric horn manufacture for a consideration of $25,000. Lucas undertook to supply horns manufactured to Sparks-Withington's designs only in the United Kingdom and Ireland and Sparks-Withington undertook not to supply its horns in the United Kingdom and Ireland except as already fitted to American-made vehicles. By an exchange of letters in 1940, Lucas agreed to pay Sparks-Withington a nominal sum for continuation of the rights granted in 1934 which had expired in 1939. In 1949, an agreement similar in effect to the 1934 agreement was concluded between the parties, to be retrospective to 1945. Lucas agreed to make Sparks-Withington an annual payment of $5,000 during the term of the agreement. Lucas has told us that when the agreement terminated in 1955, it offered to renew it but Sparks-Withington was willing to co-operate without any further agreement or payment.

131. *C.A.V. Ltd. and Ateliers de Construction Lavalette, S.A., France.* An agreement concluded in 1949 between C.A.V. and Lavalette provided for the exchange of non-exclusive patent licences and of designs and technical information relating to electrical and fuel injection equipment for heavy commercial vehicles and other applications. The arrangement precluded competition by either concern in the other's home territory.

Standardisation

132. We have referred in paragraph 109 to the fact that up to 1939, there was relatively little standardisation of electrical equipment of the descriptions manufactured by Lucas. In 1945, Lucas prepared a long term plan "for more than doubling direct operator productivity through further standardisation of product design" and it then estimated that the improvements planned would permit of an average reduction of 20 per cent. in cost. In 1946 the Ministry of Supply invited the National Advisory Council for the Motor Manufacturing Industry to address itself to the concentration of the industry on a limited number of models of vehicles and, as a means to that end, to greater standardisation of components. In 1949, the Big Six set up a Standardisation Committee of their own: Lucas attended those meetings at which its products were being discussed. We have already noted in paragraphs 56 to 58 some of the results of these various efforts to increase standardisation.

133. Another outcome of the meetings of the Big Six Standardisation Committee was the introduction by Lucas of a standardisation rebate. Lucas has told us that the Big Six had suggested that to encourage standardisation a rebate should be given off the prices of standard equipment and/or prices should be raised for non-standard equipment. Lucas's Board minutes of 20th July, 1950, record that "to provide manufacturers with a tangible incentive, we announced a rebate of 4 per cent. on the value of Standard equipment taken over the past year. This was particularly well received as the first saving in cost recorded by the Committee and arising out of its Standardisation programme." The rebate, which did not apply to batteries, was later extended to certain other vehicle manufacturers. Lucas has said that in the following year, 1950–51, when costs rose considerably, it decided in consultation with its principal customers to keep its standard equipment

prices stabilised but warned them that there would be no standardisation rebate at the end of that year. An exception was made for one customer who had not taken much standard equipment in 1949–50 but whose efforts to do so became more pronounced from 1950–51 onwards. This customer was accordingly given a special rebate which amounted to about 5 per cent. of the value of standard equipment supplied in 1950–51, and two further special rebates for 1951–52 and 1952–53 in consideration of its continued progress in adopting standard equipment. This particular form of standardisation rebate then ceased. (Information about subsequent rebate arrangements, which in some cases related to standard items, is given in paragraph 138 and in the case of current arrangements in paragraphs 424 to 426.)

134. Lucas's efforts to introduce a greater degree of standardisation of initial equipment appear to have met with considerable success as its Board minutes record that by July, 1950, 55 per cent. of total direct operator time was occupied in making standard products and that by July, 1951, the figure had risen to 60 per cent. Its Board minutes of 28th October, 1954, record " an outstanding example of productivity success which can attend thoroughgoing rationalisation of product design. An old type set of car lamps with five lamps to a set and pre-war type separate headlamps occupied 205 direct operator minutes to make. A seven lamp set including flush fitting headlamps now requires 30 minutes. The gain is nearly sevenfold." However, on 25th October, 1956, it was recorded that " against an objective of 82 per cent. for the proportion of direct labour engaged on standard products the present figure is 60 per cent. and this has worsened progressively since 1953*. It is due to some extent to the motor car stylist's insistence on more individuality in his creation but all of the deterioration cannot be ascribed to this cause. With reduced outputs, this lack of standardisation becomes an even greater handicap as manufacturing lines have to be run at output rates which are too low to make economic the applications of known and proved manufacturing techniques."

135. Lucas has told us that in 1957 it created a comprehensive combined Standards Organisation covering all its activities, and that in addition to the standardisation of particular items of equipment it has had a general standardisation programme for materials and components aimed at reducing, for instance, the number of different thicknesses of metals purchased and the number of moulding powders used.

136. Since 1949 Lucas has issued for the use of the vehicle manufacturers a book of " Electrical Equipment Standards " giving the specifications of its standard items of electrical equipment for cars, tractors and light commercial vehicles. Items are classified either as (i) Standard Models or (ii) models not in the standard range which for brevity are called Additional Models. A Standard Model complies with the following conditions:

(*a*) It has been, or is likely to be, accepted for use by most of the large volume vehicle manufacturers.

(*b*) It is manufactured, or is likely to be manufactured, by full flow production methods.

* The peak was stated to have been 70 per cent. in 1953. The figure for 1960 was 58 per cent.

(c) It is stocked as a Standard Unit by type and not for any specific customers.

It is stated that models complying with these conditions will have economic advantage over all others, and that the prices of models in the additional range, which fall short of one or more of the conditions, will be strictly related to their quantities and methods of production. Details of the present ranges of Standard Models and Additional Models of reference equipment with an indication of the current production ratios of standard to non-standard are given in paragraphs 166 to 171.

137. C.A.V. has issued for the use of heavy commercial vehicle manufacturers a " Sales Engineering Manual " of electrical equipment, containing technical information about items defined as " standard models with, when available, alternative mounting, direction of rotation etc. These models are in relatively large quantity production and should be regarded as ' preferred types '."

Trading arrangements

138. *Initial equipment.* Lucas has told us that the pre-war form of negotiation of set prices and the nominal split up of set prices between the items included was abandoned after the war and that, in general, it gave up using the rubber stamp " nominal prices " on the invoices*. It has explained that it had decided to clear up the involved position which had developed by 1939 by meticulously quoting the actual price for each individual item and that this new procedure was closely linked with its standardisation programme. It remains the normal practice, however, to settle in one negotiation the prices of all the items the vehicle manufacturer proposes to buy from Lucas for a particular model. The practice of making rebates to vehicle manufacturers has continued. From time to time, the company has also made round sum payments to certain vehicle manufacturers who bought exclusively or almost exclusively from it. Apart from the standardisation rebates described in paragraph 133, the confidential rebates and other special payments made to car, heavy vehicle and motor cycle manufacturers over approximately the 15 years to July, 1959, amounted to over £3½ million†. Except for the round sum payments, nearly all the rebates were calculated on the basis of a given sum per set delivered, or per car or machine sold (either in relation to particular models or to all the customer's vehicles). Two customers in recent years, however, have been allowed volume rebates which, though deemed to be a concession on initial equipment generally, are calculated on selected standard items (dynamos, starters, distributors, coils, current-voltage control units, headlamps and wipers in one case, and dynamos, starters, distributors and headlamps in the other). A third customer was allowed a straight turnover rebate from 1958 until 1961. Current arrangements are described in Chapter 9.

139. *Replacements and spare parts.* No great changes were made by Lucas in the post-war years in its arrangements for the supply of electrical equipment for the replacement market, and it has said that it has not,

* The " nominal prices " rubber stamp continued to be used for certain sets supplied for motor cycles, where the invoice prices of individual items represented a splitting up of an agreed price for the set.

† Lucas claims that this figure represents less than 1 per cent. of the total value of its initial equipment sales over the period in question (see paragraph 831).

in fact, varied its discounts significantly since 1937–38. The current discounts and other terms allowed to its different classes of customers are dealt with in detail in Chapter 9. After the war Lucas continued to make Battery Service Agency Agreements and Preferential Spares Discount Agreements with its wholesalers.* Certain provisions in the first named agreement were varied from time to time in accordance with changes in the B.S.B.A. arrangements (see Chapter 5), most of which were made as a consequence of the Restrictive Trade Practices Act, 1956. In 1956 the British Motor Trade Association (B.M.T.A.), the disciplinary body in the motor trade charged with the prevention of price-cutting, revised its arrangements so as to obviate the necessity of registration under the Restrictive Trade Practices Act: it thereafter provided a service to individual manufacturers to assist them to secure the observance of their respective conditions of sale, including those as to price. Lucas has told us that in July, 1957, in order to indicate to the trade its belief in resale price maintenance and to be in a position to enforce its prices, it issued, on the advice of the B.M.T.A., a letter to all its known wholesalers and traders together with a form of agreement for signature and return which set out Lucas's Conditions of Sale.† We understand that the majority of the wholesalers and traders signed and returned the agreement to Lucas but that no follow up letters were sent to those who did not sign it. Lucas has said that the continued supply of its products was not conditional on signature of the agreement.

140. Since the war Lucas has increased the number of its depots from 11 to 16. Between 1957 and April, 1960, the B.S.B.A. arrangements limited the number of Lucas Battery Service Agents to 400 (see Chapter 5), and Lucas has told us that throughout the period since the formation of the B.S.B.A. in 1933 it has not materially added to the number of its Agents. Since the war it has acquired a number of wholesale motor electrical businesses which at the time of acquisition were already Lucas Battery Service Agents (see paragraph 113). By 1959 or thereabouts, 94 separate outlets owned through the nominee holding company, Robert Guthrie Ltd. (including Globe & Simpson) were designated as Lucas Battery Service Agents. Taking these with Cox & Co. acquired in 1958, and Harry Rawlings and the Gravesend Car Electrical Co. acquired in 1960 and 1962, respectively, it follows that 105 of the 400 appointed Lucas Battery Service Agents are, in fact, owned by Lucas. This is not known in the trade. Lucas has told us that it has kept Globe & Simpson " entirely independent: we have merely been shareholders and treated them as Agents. There is no organisational control of Globe & Simpson whatever by the Lucas organisation ", although there are occasional meetings at director level. Globe & Simpson and the other companies owned through Robert Guthrie Ltd. are subject to Lucas's central financial control and obtain supplies of Lucas products on special terms which are set out in Chapter 9. Lucas has also told us that it thinks that Chloride and possibly other members of the B.S.B.A. were, at some stage, made aware of its ownership of a number of its Battery Service Agents.

* These agreements in their current form are reproduced in Appendices 7 and 8 respectively.

† See Appendix 6.

141. A development in the replacement market that was not welcomed by Lucas was the increasing tendency of the larger manufacturers of vehicles to distribute replacements and spare parts for their vehicles through their own dealer organisations. We have indicated in paragraphs 60 and 99 that Ford was the leader in this development before the war: in its case the practice originated in the early days when the great majority of components for Ford vehicles were made to Ford's own specification and their supply for use as spare parts and replacements was exclusive to Ford. From the time when Ford began to make more use of Lucas's standard equipment it increasingly purchased such equipment and spare parts for resale through its dealer organisation which had been trained to distribute Ford parts. Lucas has told us that exclusive items now represent only about " 10 per cent. of our present business with Ford. The remainder, which is a growing proportion, is standard in the true sense, and is everywhere available including B.90 replacements." However, although Lucas has for some considerable time published specifications of the initial equipment it supplies for the vehicles of other initial equipment customers, it is only now beginning to do so for Ford vehicles* ; this former exception, made by arrangement with Ford, dates from the early exclusive arrangements referred to above. Lucas has told us that the other larger manufacturers of vehicles, principally B.M.C. and Vauxhall, followed Ford's lead in the distribution of spare parts for their vehicles, but that commercial vehicle manufacturers did not show any tendency to adopt the practice. Lucas dislikes the practice mainly because the replacement market is a profitable part of its business and the vehicle manufacturers are in a position to drive hard bargains on terms: in fact, they receive better terms from Lucas than any of Lucas's other wholesalers. The current terms and other details of supply of replacements to these customers are dealt with in paragraphs 442 and 443. Lucas has also had to face complaints from its other wholesalers, particularly from the factors, about the diversion of trade from the established trade channels. By 1959, Lucas's total home sales of replacements and spare parts of all descriptions (including non-reference goods) for motor vehicles amounted to over £10½ million, of which sales to vehicle manufacturers for resale amounted to about £1¼ million.

142. Demand for the B.90 Service factory rebuilt exchange units (see paragraph 103) increased rapidly after the end of the war, and in 1947 Lucas's Board minutes recorded that the scheme was a strong counter to the sale of what were generally known in the trade as " pattern " spares. These are spare parts manufactured by other suppliers and designed and supplied specifically for the repair of equipment made by Lucas and other manufacturers. This trade had increased substantially as a result of the post-war shortages of replacement units and of spare parts for repairs. Lucas has described these pattern spares as " non-genuine " or " spurious " parts and the manufacturer of pattern spares as a " gyp " manufacturer " who deliberately lives by trying to get replacement business for some other people's products ". In 1949, Lucas's Board minutes recorded that

* Wholesalers, retailers and repairers (for whose convenience the published specifications were designed) who are not Ford Dealers have not hitherto been in a position to identify Lucas standard replacements and spare parts for Ford vehicles except from their own observation and knowledge of the trade.

the turnover in B.90 units was below expectation partly because of the resistance of Agents who preferred to do their own repairs; but by 1955 it was being noted that the scarcity of skilled electricians and the difficulty of Agents and traders in competing with other trades in wages and hours were factors favourable to the B.90 Service, which was described as one of Lucas's "best mediums for restricting the spares business" of its competitors. In the following year, it was recorded in the Board minutes that competition in ignition spares "appeared to have been checked by our discounts and the B.90 Scheme".

143. Lucas has told us that the intention is that all the units supplied under the B.90 Service should be repaired or rebuilt units, and that in order to make the scheme economic the greatest possible use is made of any material in the returned units that is up to specification. It has also explained, however, that there are occasions when new units from the main assembly lines are fed into the scheme, e.g. to create a float of stock or where new stocks are not likely to be required for initial equipment because of a modification in design or because of recession in the motor trade. Another factor is said to be the difficulty in obtaining skilled and semi-skilled labour at the company's central repair shops in Birmingham. No price or other distinction is made under the B.90 Service between any new units fed into the Scheme and the rebuilt units: both are supplied under the designation "factory rebuilt exchange units". Details of prices, terms and conditions of supply, and of the proportions of new units fed into the Scheme in recent years, are given in Chapter 9.

Research and development

144. It was not until 1953 that a co-ordinating secretariat was set up and the practice was instituted of making an Annual Report on Research and Development to the Board of the management company for the group. The Second Research and Development Annual Report presented on 25th February, 1954, reported that expenditure on fundamental research for the group for 1952–53 had been £466,000 of which £25,000 related to work for the motor electrical division and £21,000 for C.A.V. Development work undertaken in agreement with customers had cost a total of £752,000 (excluding work on aircraft and for the Ministry of Supply) of which £214,000 related to work at the motor electrical division and £195,000 to work at C.A.V. Lucas has told us that by May, 1958, a total of 536 employees were concerned with research and design relating to goods specified in the reference. In 1959, the company set up a central research establishment which was additional to the separate research departments operated by certain of the subsidiary companies or divisions. The estimated total gross expenditure on research, design and development, covering work at the major subsidiaries in the United Kingdom and in Canada and Australia, averaged £4,108,000 or 4·6 per cent.* of total turnover over the four years 1954–55 to 1957–58. Over the same period, net estimated expenditure in the United Kingdom on research and development on reference goods averaged about £481,000 or 1·7 per cent. of turnover in reference goods.

* Lucas has pointed out that after allowing for recoveries, mainly from the Government in connection with aircraft development, this figure would be reduced to 3·1 per cent. net.

145. Lucas has told us that its expenditure on research on electrical equipment has been made with the aim of achieving leadership in the development of better and cheaper products. The company accepts that in the past, when the U.S.A. and Germany were the leaders in this field, it obtained through its various agreements with foreign concerns more technical know-how than it gave, but it claims that in the last five years the position has changed. It considers that it is now ahead of Germany technically and of both Germany and the U.S.A. in producing an equivalent article at lower cost. It has told us that it is in constant negotiation with all the major motor electrical manufacturers in the U.S.A., Germany and elsewhere and that the kind of information it is able to give or sell to the Americans or Germans generally relates to manufacturing know-how and not to product design. The tendency is for details of design to be freely exchanged without being the subject of formal agreements.

Patents

146. Lucas owns a number of patents relating to reference goods or details of reference goods. It has told us that nowadays there are few patents of major importance in electrical equipment. It has patents on various details and sometimes these are infringed by the manufacturers who copy its products: from time to time Lucas draws attention to such infringements but the patents do not restrain copying, they only make it more difficult because slight alterations have to be made in order to avoid infringement.

Sealed-beam light units

147. We understand that all-glass sealed-beam light units have been in general use by vehicle manufacturers in the U.S.A. for over 20 years. The pre-focus headlamp which has been in general use here since the war contains a separate detachable filament bulb. The all-glass sealed-beam unit does not contain a separate filament bulb; it is itself of the nature of a bulb, and cannot be repaired.

148. A minute of a meeting of the Management Policy Committee of the Lucas Electrical company held on 18th September, 1951, records that Lucas had decided, at least for the time being, not to take up manufacture of sealed-beam units and that this decision had been influenced by three considerations. The first was the high cost of manufacture of sealed-beam units. The second was the fear that if the lamp bulb manufacturers were faced with a reduction in their replacement business in bulbs they might retaliate by themselves manufacturing sealed-beam units. Finally, Lucas had understood that the American manufacturers had had a difficult time in introducing sealed-beam units to the American market and had been forced to offer them at low retail prices with low margins. By 1957, however, Lucas realised that the technical advantages of the sealed-beam units might lead to a demand for them in this country and that other companies might be planning to make them; already there were rumours that General Motors had such plans in mind, and there was also the possibility of manufacture by continental manufacturers and by the Japanese. The patents for sealed-beam units were controlled by the International General Electric Co., U.S.A. and Associated Electrical Industries Ltd. had the use of these and had established a small plant. A.E.I.

appears to have expressed the hope that it would eventually be able to sell sealed-beam units to Lucas, but Lucas explained that since the light unit was a vital part of its headlamp business it might insist on making this new type of unit itself. A.E.I. then proposed the formation of a joint company, and the project was also discussed with the General Electric Co. Ltd.

149. In May, 1959, a new company, British Sealed Beam Ltd., was formed by A.E.I., Lucas and G.E.C.; the share capital owned as to two-fifths, two-fifths and one-fifth respectively. Lucas now obtains sealed-beam units from British Sealed Beam for incorporation in headlamps. Vauxhall was the first of the vehicle manufacturers here to fit the all-glass sealed-beam lamp on some of its models, and was soon followed by Ford and B.M.C. At the present time about 50 per cent. of headlamps fitted as initial equipment in this country are of this type. Lucas has told us that even in quantity the all-glass unit is very much more expensive to manufacture than previous types, mainly because of the very high capital cost of the plant.

Competition

150. As we have mentioned in paragraph 65, one of the reasons given by Lucas for its present dominant position in the motor electrical industry is its acquisition in the 1920's and 1930's of a number of its competitors. Lucas has told us that although it has received take-over approaches from competitors in recent years, its policy is to refrain from acquiring any further businesses concerned with motor electrical equipment. Apart from any political considerations and the practical difficulty of absorbing smaller concerns into its organisation, the tendency of its present policy is towards further diversification of its interests and to "consider buying businesses in other fields with a view to spreading its base".

151. In a Board minute of the Lucas Electrical Company, dated 19th July, 1955, the Chairman of the Board is recorded as having stated that it was not the company's intention "to drive out competitors by making and selling cheap and inferior products. . . . The aim should be to confine competitors to the part of the business which we did not desire to hold." Lucas has told us that this statement represents a continuing policy: that is, the policy is to hold on to its own initial equipment contracts once it has got them and not to provoke competitors by seeking to disturb their contracts. Lucas has said it would be difficult to define the part of the business it did not want: it could mean the business already held by competitors; it could also include business, such as that in roof lamps, which Lucas would prefer to lose rather than supply an inferior product. Lucas would consider the loss of an initial equipment contract as a major disaster not least because of the consequent disturbance to the essential service organisation at home and overseas. In considering these statements of policy in relation to the classes of reference goods which Lucas supplies and its attitude to its principal competitors, past and present, the matters in the following paragraphs, 152 to 156, are relevant.

152. *Smiths* has not been in competition with Lucas in any field within our terms of reference since the trading agreement of 1930 (see paragraph 80) which reserved to Lucas starting, lighting and ignition equipment

and to Smiths clocks, instruments* and sparking plugs. Lucas has told us that it never had any intention of attacking Smiths' lines; it made the agreement principally to secure Smiths as a powerful ally in the component industry. Since 1956, when the agreement terminated, the line of demarcation between the two companies has persisted. Lucas has told us that for its part, it would not, as a matter of policy, wish to disturb the position though there has been no understanding or discussion with Smiths on the subject. Smiths' comments on these matters are dealt with in Chapter 6.

153. *Chloride.* We have referred in paragraph 125 to Chloride's view that there was a mutual desire on the part of itself and Lucas to maintain the *status quo* as regards initial equipment customers. For its part, Lucas has said that it made no secret of the fact that it did not consider it good policy to try to take Chloride's initial equipment contracts and that it hoped Chloride reciprocated: its only weapon was Chloride's certain knowledge that Lucas could and would retaliate. Lucas has agreed that there is no real competition between it and Chloride on initial equipment. As far as competition in replacement batteries is concerned, prices were regulated by the B.S.B.A. from 1933 until 1956 and discounts and trading arrangements from 1933 until 1960 (see Chapter 5). Current retail prices of standard batteries for replacement are identical or almost identical but there is said to be competition in quality, service and guarantee terms.

154. *General Motors Ltd., AC-Delco Division* (AC-Delco) (see paragraphs 6 and 8) is now Lucas's chief competitor in ignition coils and distributors in class (ii) and windscreen-wiper motors in class (iv) and one of its competitors in horns in class (vii). Although it produced a few coils before the war, it has taken up the manufacture of all these products in quantity only in the last ten years, and the reactions of Lucas (as ascertained from its records and evidence) to this developing competition in the case of ignition coils are described below. AC-Delco laid down plant for the quantity production of an oil-filled ignition coil of American design in 1951. Lucas has acknowledged that this type of coil, which had not previously been produced on a large scale in this country, was an improvement on the existing bitumen type in as much as it could be made more cheaply and was reasonably efficient for its purpose. By December, 1952, Lucas knew that AC-Delco was quoting prices for oil-filled coils which were a few pence below Lucas's prices for bitumen type coils. In April, 1953, Lucas reduced its price for the latter type to Vauxhall but did not succeed in retaining the contract. At various subsequent dates during 1953 and the early part of 1954 it reduced its prices to its other principal initial equipment customers by varying amounts, and at the same time it was preparing to market its own oil-filled coil. By December, 1953, these reduced prices were, in Lucas's view, uneconomic for the existing bitumen type but sufficient to earn a small margin when the new type came into production. Lucas's first deliveries of the new type were made in April, 1954. The company retained the greater part of its initial equipment contracts for coils, apart from that of Vauxhall. The company's explanation of its price reductions is that, having regard to the fact that vehicle manufacturers were aware that a new and cheaper coil was available, it

* Since the war, the small ignition warning lights and oil pressure warning lights have largely taken the place of ammeters and oil pressure dials. Lucas and Smiths have both taken up manufacture of warning lights.

adjusted its prices for the old type to the price it would eventually charge for the new type. Lucas's records show, however, that its prices were reduced because AC-Delco's activities were regarded as a " threat " to its business. As we show in paragraph 676, Lucas incurred losses on its sales of coils for initial equipment from 1954 to 1957 inclusive. We give the Company's explanation of these losses in paragraph 869, but in the company's Board minutes we find it recorded in 1955 that " the loss on coils was due to the low selling prices agreed as a policy in order to keep Delco-Remy [AC-Delco] out of the field ". AC-Delco's comments on its efforts to obtain initial equipment business in coils are recorded in paragraph 351.

155. *Simms Motor & Electronics Corporation Ltd.* (Simms) (see paragraphs 6 and 8) is the only other supplier of any significance of dynamos, starter motors and current-voltage control units in class (iii). Simms manufactures this equipment only for buses and other heavy vehicles, and in comparison with Lucas is a very small supplier (it was responsible for only 3½ per cent. of total supplies in class (iii) in 1960 as compared with Lucas's 95 per cent.). Simms also has a little business in magnetos in class (ii) and lamps in class (vii). Simms has complained to us about Lucas's trading methods: these complaints are dealt with in paragraph 363 and Lucas's comments on them in paragraphs 364 to 366. At one time Lucas had a minority shareholding in Simms (see paragraph 360).

156. *Wipac Properties Ltd.* (Wipac) (see paragraphs 6 and 8) which at one time had a connection with the American Wico Electric Company, took up after the last war the manufacture of electrical equipment for the motor industry. Wipac's principal business is the supply of initial equipment in classes (ii) and (vii) to certain motor cycle manufacturers and Lucas's records indicate that by 1952 it was making its presence felt in this field of competition. Wipac has complained to us about Lucas's trading methods: these complaints are dealt with in paragraph 374 and Lucas's comments on them in paragraph 375.

Present Organisation

The structure of the company

157. Since the last war the company has increasingly diversified its interests both in the manufacture of equipment for the motor industry and in other directions with which we are not concerned. In 1951, the structure of the Lucas group of companies was reorganised and the present position, in terms of the goods specified in the reference, is set out below. The supply arrangements, including prices, terms and conditions of supply are considered in Chapter 9. Some of the subsidiary companies referred to below are also concerned with goods outside the reference, such as fuel injection equipment for diesel engines and a range of electrical and non-electrical goods for motor vehicles and spare parts for repairs. Lucas has a number of manufacturing subsidiaries in the United Kingdom whose activities lie wholly in fields outside the reference, such as in brakes, cycle equipment, aircraft equipment, gas turbine equipment and electronics. Overseas subsidiaries concerned with motor goods are registered in Australia, New Zealand, India, Pakistan, Canada, U.S.A., Switzerland, Western Germany, South Africa, Brazil, Southern Rhodesia, Panama and Malaya ; some of these are manufacturing companies, notably those in Australia, New Zealand, India, Pakistan,

South Africa, Brazil and Southern Rhodesia, and the activities of others relate solely to the distribution and servicing of Lucas equipment.

158. *Joseph Lucas (Industries) Ltd.* (Lucas), the parent company of the group, has an authorised capital of £15 million of which £14 million has been issued. It is organised into divisions which trade in certain types of equipment in the names of subsidiary companies which are themselves non-trading.* The principal subsidiaries concerned, actually or nominally, with reference equipment are Joseph Lucas Ltd., Joseph Lucas (Electrical) Ltd., Joseph Lucas (Sales & Service) Ltd., Joseph Lucas (Batteries) Ltd., C.A.V. Ltd. and Butlers Ltd. The number of factories controlled by these companies and those mentioned in paragraph 165 is 13. Lucas has announced its acquisition of premises at Liverpool to provide additional manufacturing capacity.

159. *Joseph Lucas Ltd.* acts as management company for the whole group. The Board of five comprises the Chairman, who is also the Chairman and Managing Director of the parent company; the Deputy Chairman, who is also Deputy Managing Director of the parent company; the Sales Director, who is Chairman of four of the subsidiary companies and Deputy Chairman of two others, and there are two other directors each of whom is Vice-Chairman and General Manager of two of the principal manufacturing subsidiaries and is on the Boards of other subsidiaries.

160. *Joseph Lucas (Electrical) Ltd.* (the Electrical company) is a non-trading company whose name is used by the division of the parent company responsible for the manufacture of electrical equipment, including practically all the reference equipment produced by the group except that made by C.A.V. Ltd. and Butlers Ltd. The division sells initial equipment, including batteries, for cars, light commercial vehicles and motor cycles direct to the vehicle manufacturers; the rest of its production is sold by the Sales & Service division or is transferred to C.A.V. Ltd. It controls the main electrical equipment factories at Shaftsmoor Lane, Birmingham (which produces dynamos, starter motors and various descriptions of lamps) and at Great King Street, Birmingham (which produces ignition coils, distributors, current-voltage control units, windscreen-wiper motors, horns and horn and flasher relay units). It also controls a number of other smaller factories at Cannock, Sutton Coldfield, Burnley, Kingstanding and London, some of which are "service" factories only (in that they are used for the production of component parts for items of electrical equipment) while others are used for the production of complete items. Reference equipment accounts for about three-quarters of the sales, excluding any inter-company sales,† made in the name of the Electrical company. Lucas's production of starting, lighting and ignition sets in 1959–60 averaged 46,775 a week. This figure may be compared with the figures of average weekly production of sets in 1925–26 (2,000) and in 1937–38 (9,100).

161. *Joseph Lucas (Sales & Service) Ltd.* (the Sales & Service company) is a non-trading company whose name is used by the division which sells all equipment for the replacement market other than that sold by the Battery

* Following the company's practice, the names of the non-trading subsidiaries are used elsewhere in this report in describing the activities of the relevant divisions of the parent company.

† Sales to the Sales & Service company for resale as replacements, and sales to C.A.V. for resale as initial equipment and replacements.

company, C.A.V. and Butlers. It manages a central warehouse and a factory at Great Hampton Street, Birmingham, a smaller factory at Hednesford and 16 depots in different parts of the country. Sales from the central warehouse or from the depots are made to vehicle manufacturers for resale through their dealer organisations, to Battery Service Agents and other wholesalers, to retail traders and to certain large users including Government Departments, Nationalised Industries, local authorities and commercial fleet operators, and also to a small extent direct to the public. It also operates the B.90 Service (see paragraphs 103 to 106); most of the rebuilding of the worn or damaged units handed in by users is carried out at Great Hampton Street. Reference equipment accounts for from one-third to one-half of the sales, excluding any inter-company sales,* made in the name of the Sales & Service company. A substantial part of the rest of the sales consists of spare parts for repairs.

162. *Joseph Lucas (Batteries) Ltd.* (the Battery company) manages the battery factory at Formans Road, Birmingham though the Electrical company has an over-riding responsibility. The batteries bearing the "Lucas" trade name are sold by the Electrical company for initial equipment or by the Battery company for replacement; those bearing the "C.A.V." trade name are sold for initial equipment by C.A.V. Ltd. or for replacement by the Battery company.† Relatively small quantities bear the "Smiths" trade name and are sold to Smiths for resale as replacements (see paragraph 83).

163. *C.A.V. Ltd.* (C.A.V.) is an operating company which makes equipment in class (iii) (dynamos, starter motors and current-voltage control units) and class (vii) (trafficators, flasher units and relay units only) for heavy commercial vehicles. It operates a factory at Warple Way, Acton, W.3. It sells its own products and those made by the parent company for heavy commercial vehicles, both for initial equipment and (except in the case of batteries) for replacements. (Until 1956–57 it also made windscreen-wiper motors (class (iv).) Reference equipment accounts for about one-quarter of the sales, excluding any inter-company sales,‡ of C.A.V.

164. *Butlers Ltd.* (Butlers) is an operating company which makes and sells ammeters and certain types of lamps for initial equipment and for replacements and accessories. It operates a factory at Grange Road, Birmingham. Reference equipment accounts for about nine-tenths of the sales, excluding any inter-company sales,§ of Butlers.

165. Other subsidiaries (see paragraphs 71, 75, 111, and 113 to 115) which have some concern with reference equipment are:

The Robert Guthrie group and *Cox & Co.* and its subsidiaries *Harry Rawlings* and the *Gravesend Car Electrical Co.*, which wholesale and retail electrical equipment principally of Lucas manufacture;

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* e.g. sales to overseas subsidiaries and to home subsidiaries for own consumption.

† Until August 1962 "Lucas" and "C.A.V." replacement batteries were sold by the Sales & Service company.

‡ e.g. sales to the Electrical company for resale as initial equipment and to the Sales & Service company for resale as replacements.

§ e.g. sales to home subsidiaries for own consumption and to the Sales & Service company for resale as replacements.

Rists Wires & Cables Ltd., with a factory at Newcastle-under-Lyme, which until 1962 manufactured ignition coils but whose principal product is cable harness which is used in conjunction with reference equipment;

K.X. Lamps Ltd., formed by Lucas in 1949 as a subsidiary of Rists, with a factory at Middlesbrough, and which manufactures filament bulbs which are component parts of equipment in class (vi) (oil and ignition warning lights) and class (vii) (lamps).

Production

166. *Class (i), Batteries.* As has already been stated, Lucas manufactures lead acid automotive batteries principally for cars and light commercial vehicles but also for heavier vehicles for supply under the "C.A.V." trade name. The great majority of batteries produced are 12-volt, the capacity being varied by altering either the size of the plates or the number of them in each cell. A number of semi-automatic machines used in the manufacture and assembly of the component parts are of Lucas's own design. The raw materials used include lead, lead oxide and red lead, pitch, asbestos, china clay and plastic and rubber moulding materials. Lucas purchases some of its requirements of separators and moulded containers from outside sources, including Chloride. After the end of the last war, Lucas started the manufacture of a micro-porous rubber separator (which it had developed under an American patent) to take the place of wood separators. In 1956 it started the manufacture of a new type of separator made from glass fibre and kieselguhr, and this is the type it now uses. Lucas's standard model 12-volt battery for use in cars and light commercial vehicles is made in three types, of different capacities and in varying shapes, to fit different models of vehicles. The majority of replacement batteries have a new type of cover which is not fitted to batteries supplied for initial equipment: otherwise the standard batteries supplied to both markets are identical, model for model. Lucas has told us that 85 per cent. of its production of batteries for initial equipment is made up of standard types. It also manufactures a wide range of non-standard types for the replacement market.

167. *Class (ii), ignition coils, magnetos, distributors, ignition suppressors.* Since 1954 Lucas's ignition coils have been of the oil-filled type. (The oil-filled coil was a development first introduced in this country by Runbaken Electrical Products and in 1951, on a larger scale, by General Motors (AC-Delco) (see paragraph 154).) Special types of coils are produced for use on motor cycles as well as for racing cars and other specialised vehicles. Two main types of magnetos are produced—one with stationary magnets and a rotating coil for use on motor cycles and one with a rotating magnet and a stationary coil for other uses. While the bulk of production of distributors consists of standard types there are wide variations in the non-standard types to suit particular engine requirements. A range of miniature distributors is produced for use on motor cycles and small cars. Lucas has told us that nearly all its production of ignition coils for cars is covered by two standard types, of which one accounts for 85 per cent. of production. In the case of distributors, 76 per cent. of production is covered by two standard types. Raw and semi-manufactured materials used in the production of the equipment in this class and in classes (iii), (iv), (vi) and (vii) include brass, iron, steel, copper, aluminium, phosphor bronze and tungsten in various forms (rod,

strip, wire, castings, stampings, forgings and sections) and moulding materials. For the production of class (ii) equipment, parts which are purchased in manufactured form include springs, ball bearings, carbon brushes, bearing bushes, lubricators and carbon resistors.

168. *Class (iii), dynamos, starter motors, current-voltage control units.* Sub-assembly and main assembly of the items in this class are carried out on continuous flow production lines. In the case of dynamos there is no appreciable non-standard production; in the case of starter motors a pre-engaged type of drive is made for high compression and diesel engines; and in the case of current-voltage control units there are minor variations which nevertheless permit of continuous flow production. Lucas has told us that about 95 per cent. of production of dynamos is covered by two standard types and one of these covers 90 per cent. of the whole; 80 per cent. of production of starter motors is covered by three standard types; and the bulk of production of current-voltage control units is in two types, of which one accounts for 80 per cent. Manufactured parts purchased include springs, screws, washers, rivets, ball bearings, carbon brushes, insulating parts and carbon resistors.

169. *Class (iv), windscreen-wiper motors.* The main assembly is carried out on continuous flow production lines. Variations from the standard type are governed by the requirements of individual vehicle manufacturers—for example, some require centre windscreen mounting and others the two-speed self-parking type. Lucas has told us that about 90 per cent. of production of windscreen-wiper motors is covered by one basic type. Manufactured parts purchased include needle rollers, thermostats, bearing bushes, carbon brushes and Bundy tubes.

170. *Class (vi), ammeters and ignition and oil warning lights.* Sub-assembly and main assembly of ammeter movements are carried out on continuous flow production lines. Apart from the movement itself, there is little standardisation of parts such as dials, back plates, type and allocation of terminals, etc., as variations of these are required for different models of vehicles. Lucas has told us that for almost the whole of its production of ammeters only two basic types of movement are used and for the greater part only one of these two. Manufactured parts purchased include spindles, magnets and filament bulbs.

171. *Class (vii), headlamps, sidelamps, stoplamps, tail-lamps, foglamps, spotlamps, number plate illumination lamps, flasher indicator lamps, reversing lamps, horns, trafficators, relay units for lamps or horns, flasher units for indicator lamps or trafficators.* Having regard to the number of lamps required for initial equipment for a modern car—seven or more—and to the degree of standardisation of the main components, this is a field which lends itself to mass production. Lucas's main assembly of standard lamps is carried out on synchronised continuous conveyors, with overhead conveyors for line feeding of light units, rims and bodies. Sidelamps and flasher lamps are identical in manufacture apart from the colour of the lens, and spotlamps and foglamps are identical in manufacture apart from the different types of lenses. For non-standard models required in smaller quantities, tooling is of simpler design and function but continuous flow conveyors can nevertheless be used for most of these types. Standard wind-tone horns are designed for 12-volt systems with variations for 6-volt and 24-volt types, the voltage

variations being achieved by differing numbers of turns and gauges of wire on the coils. The bulk of non-standard production is of the high-frequency type of horn. In general, assembly of horns, trafficators, relay units and flasher units is carried out on continuous flow production lines. Lucas has told us that although the headlamp rim (which lends itself to "styling"—see paragraph 134) is only standardised for a limited range of vehicles, the mounting and the mechanical form of the optical unit are standard for the bulk of production: as regards other types of lamps, apart from certain common parts standardisation cannot be carried far as the vehicle manufacturers wish to make distinctive features of some of these items. Lucas has said that the whole of its production of horns is in two types and the whole of its production of relay units and flasher units in one type for each. Manufactured parts purchased include all requirements of glass lenses and glasses, the great bulk of filament bulbs* and also some rubber parts, screws, washers, rivets, bulb holders and resistors.

* Lucas's subsidiary, K.X. Lamps Ltd., produces only a very small proportion (about 7½ per cent.) of Lucas's total requirements of filament bulbs.