3 The markets affected by the merger

3.1. The United Kingdom output of electronic capital equipment was worth about £15 billion in 1987/88. GEC and Plessey and their joint subsidiary GPT supplied about 30 per cent by value of the United Kingdom output of this equipment. Siemens' share of the United Kingdom market is very small; however, its total output of electronics equipment, about DM 23 billion (equivalent to £7.2 billion[1]) in 1987, is larger than that of GEC and Plessey combined. Since our 1986 report Plessey and GEC have merged their telecommunications activities into a jointly-owned subsidiary, GPT. Plessey's other activities are defence electronics systems and equipment, electronic components and aerospace, engineering and traffic control equipment. GEC is active in defence electronics systems and equipment, electronic components, traffic control equipment and a range of other activities including medical equipment, power systems and consumer products. As well as electronics systems and equipment and traffic control equipment, Siemens' large businesses include energy and automation, medical engineering, power systems and lamps.

3.2. This chapter considers the four sectors which may be affected by the merger: defence electronics, telecommunications, electronic components and traffic control equipment. These sectors have United Kingdom sales of about £4.25 billion.

United Kingdom defence procurement

3.3. Total defence expenditure has increased in cash terms in each of the last five years but fell in real terms by about 3 per cent between 1985/86 and 1987/88 (see Table 3.1). Within the overall expenditure total, expenditure on equipment was estimated to be £8,539 million in 1987/88, a fall in real terms of about 3 per cent since 1985/86. It is projected to fall further, to £8.2 billion in 1988/89. Defence spending in the next few years is expected by the Ministry of Defence (MOD) to remain approximately constant in real terms. Expenditure on defence electronics was £1,874 million in 1986/87, a fall of about 7 per cent in real terms since 1985/86. It has been an important part of the total equipment budget, averaging almost a quarter over the past five years. The figures shown in Table 3.1 for defence electronics expenditure are direct MOD payments made to the electronics industrial groupings. The figures include some payments for non-electronic equipment but also exclude payments for systems that, although having a high electronic content, are not classified as electronic goods. The figures are not therefore a precise measurement of expenditure on defence electronics.

TABLE 3.1 **Defence expenditure, 1983/84 to 1987/88**

£ million

	Out-turn				*Estimate*
	1983/84	*1984/85*	*1985/86*	*1986/87*	*1987/88*
Total expenditure	15,487	17,122	17,943	18,163	18,782
Equipment expenditure	6,939	7,838	8,193	7,885	8,539
Expenditure on electronics equipment*	1,766	1,878	1,953	1,874	N/A
As % of all equipment expenditure	25%	24%	24%	24%	N/A

Source: MOD Statement on the Defence Estimates 1988 Volume II, Tables 2.2 and 2.5.

*The sum of MOD expenditure in the electronics, data processing equipment and other electrical engineering industrial categories. SIC(80) groups 330, 344, 345 and parts of 341 to 48.

[1] At £1 = DM 3.2.

DEFENCE ELECTRONICS

3.4. Another indicator of trends in defence electronics expenditure in the United Kingdom is the sum of payments to the major electronics companies by the MOD (see Table 3.2). These companies are, in order of value of sales to the MOD: GEC, Plessey, Ferranti, Thorn-EMI and Racal. The figure for payments to these companies was ,1,785 million in 1987/88 representing a fall in real terms of about 5 per cent since 1985/86. MOD payments to companies include payments for sub-contractors to the companies. The combined payments to GEC and Plessey in 1987/88 were ,1,340 million, 75 per cent of the total, compared with ,1,239 million, 71 per cent of the total, in 1985/86. In terms of MOD payments GEC is over three times larger than Plessey, which in turn is about 50 per cent larger than the next electronics company, Ferranti. The MOD also has a substantial amount of business with British Aerospace (BAe) which includes electronics equipment as part of the supply of aircraft and missile systems, although BAe's capability in electronics is limited in comparison with the major electronics companies. The annual payments made to BAe in 1987/88 were of the same order of magnitude as those made to GEC. Siemens' involvement in the United Kingdom defence market has been slight, averaging annual sales of ,1.5 million over the past five years, all as a sub-contractor. The MOD told us that Siemens' involvement was insignificant in terms of competition. Siemens' total defence sales world-wide have averaged about ,200 million a year over the past five years. The payments figures include some payments for non-electronic defence equipment and are for prime contracts only; they are therefore not strictly comparable with the figures for sales in the product markets shown in Tables 3.5 to 3.8, which came from the companies and include sub- contract sales. The figures in Table 3.2 also include payments for R & D projects but do not include payments made to the companies for work in international consortia. There are many smaller companies which supply defence equipment, but which are not major suppliers to the MOD. Much of their work is as sub-contractors to the major companies.

TABLE 3.2 **Defence expenditure with major electronics companies**

£ million

	1983/84	*1984/85*	*1985/86*	*1986/87*	*1987/88*
Total	1,468	1,707	1,744	1,679	1,785
GEC and Plessey combined	1,070	1,244	1,239	1,217	1,340
GEC and Plessey combined as % of total	73	73	71	72	75

Source: MOD.

Note: These figures are not directly comparable with those shown for expenditure on electronics equipment in Table 3.1.

Principles of MOD procurement policy

3.5. The MOD's stated objective in its procurement policy is to supply the armed forces with the equipment they need to the required quality and time-scale, while securing the best value for money for the taxpayer. A cornerstone of the policy is competition. Where competition is not possible at the prime contractor level the MOD promotes it at the sub-contract level. For all contracts valued in excess of ,1 million the prime contractor must submit a `make or buy' plan, which details plans for sub-contracting, for MOD approval. The MOD has also widened its competitive base through such initiatives as a fortnightly contracts bulletin, which publishes details of tenders being sought and prime contracts placed, and the New Supplier Service, which encourages new companies to enter the defence market. The MOD has moved away from cost plus contracting to fixed price and incentive procurement. The MOD argued that fixed prices and incentive contracts place a financial discipline on contractors to supply to specification and within time-scale.

3.6. There has also been some opening up of the international defence market. An arrangement has been reached with France for wider publication of procurement opportunities and reciprocal purchasing. An agreement between the European allies to extend procurement opportunities is being

sought through the Independent European Programme Group (IEPG). There has been an increase in international collaboration on major contracts which enables high development and production costs to be shared, although within international collaborative programmes the effects on competition of national work-sharing considerations are difficult to assess. Currently 75 per cent of total defence equipment spending goes directly to British firms, 15 per cent goes to collaborative projects and just under 10 per cent goes direct to foreign companies. At the time of our 1986 report, 80 per cent of spending went direct to British firms, 15 per cent to collaborative projects and 5 per cent direct to foreign firms.

3.7. The figures in Table 3.3 show an analysis of MOD contracts according to whether they were placed on a competitive basis, by reference to price lists quoted on the open market or on a non-competitive basis. The proportion of GEC contracts placed non-competitively fell between the years 1984/85 and 1986/87 and then increased in 1987/88. The proportion of non-competitive contracts placed with Plessey decreased between 1983/84 and 1987/88. As a total of contracts placed by the MOD those let non-competitively rose in 1986/87 and in 1987/88 after falling between 1983/84 and 1985/86. The MOD told us that a contributory factor to the recent rise in the placing of non-competitive contracts has been the incidence of very large contracts, such as for Trident submarines, where competition at the prime contract level was not feasible. The MOD does not expect the rise to continue, as illustrated by the figures up to end of December 1988 shown in Table 3.3. The figures do not include competition at the sub-contract level.

TABLE 3.3 **Value of MOD contracts placed**

	1983/84		*1984/85*		*1985/86*		*1986/87*		*1987/88*		*1988/89 (to 31.12.88)*	
	£m	*%*	*£m*	*%*	*£m*	*%*	*£m*	*%*	*£m*	*%*	*£m*	*%*
GEC												
Competition	37	7	31	2	217	30	235	27	40	7	-	
Market forces	107	20	284	19	155	21	156	18	90	17	-	
Non-competitive	381	73	1,147	79	352	49	474	55	418	76	-	
Total	525	100	1,462	100	724	100	865	100	548	100	569	
Plessey												
Competition	97	13	82	19	77	40	89	31	108	45	-	
Market forces	79	10	41	10	15	8	16	5	48	20	-	
Non-competitive	601	77	302	71	100	52	184	64	86	35	-	
Total	777	100	425	100	192	100	289	100	242	100	125	
Combined GEC and Plessey												
Competition	134	10	113	6	294	32	324	28	148	19	-	
Market forces	186	14	325	17	170	19	172	15	138	17	-	
Non-competitive	982	76	1,449	77	452	49	658	57	504	64	-	
Total	1,302	100	1,887	100	916	100	1,154	100	790	100	694	
Total MOD												
Competition	1,890	22	2,168	26	2,857	38	3,578	38	1,951	30	1,504	32
Market forces	1,403	16	1,517	19	1,914	25	1,307	14	1,229	19	1,019	22
Non-competitive	5,287	62	4,532	55	2,752	37	4,424	48	3,361	51	2,146	46
Total	8,580	100	8,217	100	7,523	100	9,309	100	6,541	100	4,669	100
GEC and Plessey % share of total MOD equipment contracts												
Competition	7.1		5.2		10.3		9.1		7.6		-	
Market forces	13.3		21.4		8.9		13.2		11.2		-	
Non-competitive	18.6		32.0		16.4		14.9		15.0		-	
Total	15.2		23.0		12.2		12.4		12.1		14.9	

Source: MOD.

3.8. The market for defence products has a number of special features which we mention below before considering specific product categories. First, the MOD is the sole United Kingdom purchaser of equipment, so that those suppliers with large market share face the countervailing power of a single purchaser. We have already touched on the conditions which the MOD builds into its contracts. Secondly, the products are often highly complex, requiring substantial R & D work to meet the MOD's requirements. Production of the more specialised systems often requires knowledge

of the operational environment and systems engineering and management skills which only a few companies possess. Thirdly, contracts may involve national security considerations so that suppliers have to meet special security requirements. These last two features of the market mean that entry to the market for new defence electronics suppliers can be difficult. Finally, competition occurs both in the development phase of a project, which may include initial production, and in the production phase which follows. Sometimes there are also subsequent production phases for which new competitions are held. The various stages of development and production can spread over several years. Thus market share figures in a particular year can be the result of earlier MOD competitions. As the defence market often involves the infrequent placement of large contracts, high market share figures are not necessarily an indicator that there are no potential competitors for new contracts in that product market.

Defence electronics product markets

3.9. In order to examine the markets for the different defence electronics products affected by the merger we have grouped them into four broad categories: radar, communications systems, avionics and underwater systems. These are the same categories used in the 1986 inquiry. The product market categories also largely coincide with Plessey's separate operating businesses. The revised bid proposes GEC ownership for Plessey Naval Systems and Plessey Avionics, whose products are mainly in the categories of underwater systems and avionics; and Siemens ownership for Plessey Radar and Plessey Defence Systems, whose products are largely in the categories of radar and communications. GEC's defence business is organised somewhat differently. Marconi Underwater Systems and GEC Avionics are involved in underwater systems (GEC Avionics through sonar data handling in aircraft). GEC Avionics, GEC Sensors and Marconi Defence Systems supply products in the avionics sector. Marconi Radar Systems, Marconi Command and Control Systems and Marconi Defence Systems are involved in radar, while in military communications GEC's involvement is through Marconi Communications Systems, Marconi Defence Systems, GEC Sensors and Marconi Space Systems. Siemens' capability in specific product areas, and its sales to the United Kingdom market, are mentioned under the appropriate product category. In a few cases projects can involve the integration of products from different market categories (eg the Joint Tactical Information Distribution System (JTIDS) project involves communications and avionics). Within each category there are groups of products which draw on common areas of technology. Where technology is similar, therefore, firms have some capability to move from the supply of one product to another. Because of the nature of demand for defence products, with large contracts awarded at intervals, a company may not at a particular time be engaged in supplying a product but may still have the capability to do so when a new contract arises. Other products, however, may need the considerable investment in development or production which makes entry of new firms less easy.

3.10. The MOD provided us with details of its current contracts with Plessey and GEC worth ,0.5 million or more, in the areas affected by the merger, as well as future contracts which were likely to involve one or both of the companies. The list of future contracts had a time horizon of ten years, although not all requirements can be foreseen currently. We undertook an analysis of the current contracts, the results of which are shown in Table 3.4. The contracts are analysed by the four broad categories mentioned in paragraph 3.9, ie radar, communications, avionics and underwater systems. The table shows the number and value of contracts won by either GEC or Plessey, how many involved competition and how many companies competed. It does not include contracts for which the two companies competed but which were won by others. Contracts vary in value from development projects worth less than ,1 million to full production contracts worth several hundred million pounds. Some of the contracts will be near completion and may have started ten or more years ago, whereas others will have just started. Major projects are discussed in the paragraphs dealing with product markets (paragraph 3.14 on). The MOD told us that its information on projects relates only to prime contracts; it does not know the full details of sub-contracts. Thus Plessey and GEC may have current work as sub- contractors which is not included in the analysis. Also, although some development contracts do not involve competition, in that the MOD does not invite bids from different companies, these contracts contain conditions that allow the MOD to seek competitive bids for subsequent phases of the project.

TABLE 3.4 **Analysis of current MOD contracts of over ,0.5 million won by GEC or Plessey**

Companies which competed for contract	*Radar*		*Military communications*		*Avionics*		*Underwater systems*	
	Number	*Value £m*	*Number*	*Value £m*	*Number*	*Value £m*	*Number*	*Value £m*
GEC alone	2	872	6	27	9	548	10	1,720
Plessey alone	1	1.5	4	985	5	41	9	650
GEC + Plessey	1*	0.7	-	-	-	-	-	-
GEC + one other	1	240	-	-	2	83	2**	442
GEC + two or more others	-	-	2	6	1	58	-	-
Plessey + one other	-	-	4	70	-	-	8**	151
Plessey + two or more others	-	-	-	-	-	-	1	4.3
GEC + Plessey + one other	-	-	1	28	-	-	-	-
GEC + Plessey + two or more others	3	141	2	24	-	-	-	-
	-	-	-	-	-	-	-	-

Source: MMC study of MOD data.

*GEC and Plessey in different consortia competing for project.
**One project involves GEC and Plessey in same consortium competing against others.

3.11. With regard to future contracts, the MOD does not know in all cases which companies will choose to tender. We mention in the section for each product market the major projects which the MOD considers are likely to involve GEC and Plessey in competition and the estimated overall value of future contracts. These estimates are very broad since the value of some contracts has not yet been estimated and the MOD cannot foresee all future requirements.

3.12. The market estimates set out in Tables 3.5 to 3.8 provide a summary of sales in the above product categories over the past five years. From these figures average annual sales and market shares have been calculated. The use of five-year averages avoids the unevenness in yearly figures caused by the placing of large contracts at irregular intervals. Recently- placed contracts will not yet be reflected in the figures but we discuss these in the sections on each product market below.

3.13. The sales figures are for sales made by the companies either as prime contractors or sub-contractors. The sales figures as prime contractors show the final value of the contract to the MOD, so that they include the value of sub-contracts fulfilled by other firms. The market share estimates are therefore biased upwards. The sales figures were provided by the companies. They include product development contracts but do not include all payments by the MOD for R & D. The figures are not therefore directly comparable with the figures for direct MOD payments to the companies shown in Table 3.2.

Avionics

3.14. Over the past five years total United Kingdom sales in the avionics market have averaged about ,430 million a year. GEC's sales in this market have averaged about ,130 million a year, and Plessey's have averaged about ,20 million a year. Plessey's sales are through Plessey Avionics while GEC's are through GEC Avionics, GEC Sensors and Marconi Defence Systems. Siemens supplies airborne communications and IFF (Identification Friend or Foe) products but has had no sales in the United Kingdom. GEC and Plessey have had their largest sales in different product areas (see Table 3.5). GEC has been the major supplier in the markets for airborne communications systems and aircraft defensive aids, having over 80 per cent of the market in these two product areas. GEC also supplies airborne weapons systems but other suppliers such as BAe and Thorn-EMI have made up about 80 per cent of the market. There are two product areas in which Plessey had greater sales than GEC; flight data systems and IFF products. In flight data systems Plessey has had an average 48 per cent of the market while GEC has had minimal sales. BAe and Smiths are other suppliers. GEC is not a supplier of IFF products while Plessey is a supplier along with Cossor and others.

TABLE 3.5 **The United Kingdom market* for avionics systems**

	£ million per annum			*per cent*		
	Total UK sales	*GEC's sales*	*Plessey's sales*	*GEC's share*	*Plessey's share*	*Combined share*
Airborne communications	22.60	15.00	4.74	66.4	21.0	87.4
Airborne navigation systems	80.0	10.54	1.40	13.2	1.8	15.0
Flight data systems	11.6	0.06	5.52	0.5	47.6	48.1
Aircraft defensive aids and ECM/ESM	68.0	57.80	0.00 (5.38)	85.0	0	85.0
Airborne weapons systems	233.0	43.72	1.74	18.8	0.7	19.5
Airborne IFF systems	16.0	0.00	2.48	0	15.5	15.5

Source: MMC from data supplied by GEC and Plessey.

*Average annual sales over period 1983/84 to 1987/88 including payments for product development contracts. Sub-contract sales between GEC and Plessey are shown in brackets. Siemens had no United Kingdom sales in this market.

3.15. Plessey provided us with an analysis of contracts awarded since 1986 (including overseas contracts) which shows that contracts in the avionics category to a value of ,81 million involved competition from both GEC and Plessey. Of the contracts for which the two companies competed 23 per cent by value were won by Plessey, 13 per cent by GEC and 64 per cent by other competitors (amongst which were Racal, Ferranti, Base 10 Systems and STC).

3.16. In the MOD's list of current avionics contracts worth ,0.5 million or over, none of the contracts awarded to GEC or Plessey involved competition between the two companies.

3.17. Both GEC and Plessey are involved in the JTIDS project. JTIDS is a communication system resistant to electronics counter-measures which has been developed in the United States and is now being adapted to meet United Kingdom requirements. [*] JTIDS was developed in the United States by the Electronic Systems Division of Singer which acted as prime contractor, with Rockwell Collins as sub-contractor in a `leader-follower' relationship. Singer is involved in the development of a United Kingdom variant [ * ] with GEC acting as the prime United Kingdom contractor and Plessey as sub-contractor. This `leader-follower' arrangement between GEC and Plessey was intended by the MOD to ensure that both companies would become familiar with the JTIDS system and be in a position to compete, along with Singer, for the production and support contracts. These contracts might, over a period of several years, be worth as much as ,400 million.

3.18. Plessey's take-over of the Electronic Systems Division of The Singer Company in 1988 (now PESC) has brought together two of the three companies involved in development of the United Kingdom JTIDS. The MOD told us that because of the system's complexity and the possible need for further refinements when brought into service, it is advantageous for the companies involved in the development of the system to be involved in its subsequent production. The MOD also expressed concern about the need for any potential competitors for production of the system to acquire access to proprietary technology and obtain production licences from PESC; so far only GEC and Plessey have this access for United Kingdom production. In addition the granting of wider access to this technology would be subject to the satisfactory meeting of security requirements.

3.19. Other major contracts yet to be awarded which the MOD told us are likely to involve competition between GEC and Plessey are the EFA (European Fighter Aircraft) Defence Aids and Avionics and possibly AWACS in-service support and parts of NAVSTAR GPS (a navigation system using satellites). These contracts would also involve competition from others. The MOD considers that in the avionics market generally there is adequate competition for GEC and Plessey from other companies. The MOD's list of these and other currently foreseen avionics projects has a highly provisional total estimated value of about ,600 million.

* Details omitted. See note on page iv.

Underwater systems

3.20. The principal underwater defence systems are torpedoes, mine warfare systems and sonar. Sonar involves in-water sensors and transmitters which feed information into a data handling and display unit in a ship, submarine or aircraft. For aircraft, the in-water equipment is carried in sonobuoys or in dipping units from helicopters. Plessey Naval Systems is a leading supplier of different types of sonar (surface ship, submarine and helicopter) and of minehunting systems. GEC's Marconi Underwater Systems is the only current United Kingdom supplier of torpedoes. GEC Avionics is a supplier of sonar data handling and display systems, sometimes collaborating with Plessey in sonar contracts. Siemens has no underwater system capability.

3.21. Total United Kingdom sales in underwater systems have averaged about ,300 million a year over the past five years. The sales of the GEC companies have averaged about ,190 million a year while Plessey's sales have averaged about ,90 million a year. The figures for the past five years in the various product markets are shown in Table 3.6. Plessey had about 64 per cent of the total sonar market. Its share of helicopter sonar sales was considerably less than this; its share of surface ship and submarine sonars was higher. Ferranti has been a major competitor. Dowty Maritime Systems has successfully competed in the supply of sonobuoys. GEC has been a supplier of sonar data handling and display systems which are combined with the in-water equipment to make a complete system. Ferranti and Plessey are also suppliers of data handling and display systems. For airborne sonics the MOD informed us that GEC is currently its sole source although Plessey is expected to compete for future orders. The major supplier of mines has been BAe although Plessey has been a sub-contractor to BAe for this product. Plessey has had over 90 per cent of sales in minehunting equipment.

TABLE 3.6 **The United Kingdom market* for underwater defence electronics systems**

	£ million per annum					*per cent*
	Total UK sales	*GEC's sales*	*Plessey's sales*	*GEC's share*	*Plessey's share*	*Combined share*
Sonar (includes sonars for surface ships, submarines and helicopters, towed arrays and data handling and display equipment)	119.72	16.36 (4.52)	76.76 (1.16)	13.7	64.1	77.8
Mines	1.00	0.00	0.42	0	42.0	42.0
Minehunting	8.76	0.02	8.26	0.2	94.3	94.5
Torpedoes	171.20	168.94	0.86 (0.82)	98.7	0.5	99.2
Launching systems	2.20	0.00	2.08	0	94.6	94.6

Source: MMC from data supplied by GEC and Plessey.

*Average annual sales over period 1983/84 to 1987/88 including payments for product development contracts. Sub-contract sales between GEC and Plessey are shown in brackets. Siemens had no sales in this market.

3.22. In torpedoes GEC has been the sole design contractor and sole United Kingdom prime contractor for production over the last ten years. Plessey was involved in the design modification for United Kingdom use of an American lightweight torpedo and has been a major supplier of the launching systems for shipborne lightweight torpedoes.

3.23. None of the MOD's current contracts for underwater equipment of ,0.5 million or more with GEC and Plessey involved competition between the two firms. In the current sonar projects there is one in which Plessey Naval Systems and Marconi Underwater Systems are members of a consortium; in another GEC is a sub-contractor to Plessey; while in a third Plessey is a sub- contractor to GEC.

3.24. With regard to future work, there is an outstanding sonar contract to fit Upholder class submarines, for which Plessey, GEC and others have made bids. The MOD is likely to be seeking bids for an active dipping sonar for the EH101 for which a number of companies are expected to bid. On other future contracts for sonars GEC and Plessey amongst others are likely to bid, sometimes in competition with each other and sometimes in collaboration either with each other or with other suppliers. Currently anticipated future sonar contracts have a highly provisional total estimated value of about ,1,900 million.

3.25. The MOD told us that it considered Plessey and Marconi Underwater Systems generally not to be direct competitors in underwater systems. Each was strong in different product markets. A sign of their complementary capabilities was their collaboration on sonar system contracts. The MOD did not consider GEC a serious competitor as prime contractor to Plessey on sonar contracts, although Dowty, Ferranti and BAe were. In torpedoes Marconi Underwater Systems was the sole supplier in the major current contract for the heavyweight Spearfish torpedo, which Marconi Underwater Systems had developed and brought into production. The MOD had, however, set in hand plans for a competition for the next major contract for production of Spearfish. The MOD told us that only United Kingdom companies could act as prime contractor for this contract, although overseas sub-contractors could be used. Invitations to tender had been sent to a number of companies. Any successful competitor to Marconi Underwater Systems would have to make some investment but the MOD would make available production drawings and some production equipment. In addition certain facilities at the Royal Naval Armament Depot at Beith would be offered to competitors as a site for production and testing. Plessey had expressed its intention of tendering in co-operation with a European partner. The MOD considered that Plessey, with its work on sonars and torpedo launching and its experience of project management, was well suited to compete. We were told that there were other United Kingdom companies which had also expressed interest in submitting tenders, but the MOD argued that a merger would substantially reduce competition for Spearfish production. [

Details omitted. See note on page iv.

]

Radar

3.26. All three companies involved in the proposed merger supply radar products. Siemens produces short range two-dimensional (2D) surveillance radars for the detection of low-flying aircraft up to a range of 100 kms. It has also entered into a consortium to produce three- dimensional (3D) radars. It has, however, made no sales of radar equipment in the United Kingdom. Both GEC, through Marconi Radar, Marconi Defence Systems and Marconi Command and Control Systems, and Plessey, through Plessey Radar, are very active in the United Kingdom radar market. GEC supplies naval tracking radars, naval surveillance radars, airborne radar, both 2D and 3D ground-based radar and data display and handling equipment. Plessey supplies ground-based 2D and 3D radar, naval surveillance radar and data display and handling equipment.

3.27. Sales figures for the past five years are shown in Table 3.7. Total United Kingdom sales have averaged about ,330 million a year over this period. GEC's sales have averaged about ,190 million a year while Plessey's have averaged about ,50 million a year. GEC had substantial sales in military airborne radar with a market share of about 55 per cent. Plessey had no sales in this market and the MOD told us that Ferranti offered the only major competition to GEC. In army and naval tracking radar GEC dominated the market. Both GEC and Plessey had sales in military ground-based radar, both 2D and 3D, civilian primary radar, and naval surveillance radar. Plessey had a larger share than GEC in the ground-based systems while GEC's share was larger in naval surveillance radar. In every military radar product area the combined sales of the two companies made up at least 45 per cent of the market; in ground- based and naval radar the combined share was at least 85 per cent in every product area.

TABLE 3.7 **The United Kingdom market* for civil and defence radar**

	£ million per annum			per cent		
	Total UK sales	*GEC's sales*	*Plessey's sales*	*GEC's share*	*Plessey's share*	*Combined share*
Civil:						
Primary radar	6.40	1.44	1.52	22.5	23.8	46.3
Data handling and display	3.74	0.32	2.52	8.6	67.4	75.9
Military:						
Ground-based 3D radar	33.00	8.76	20.16	26.6	61.1	87.6
Ground-based 2D radar	10.58	3.74	6.84 (2.10)	35.3	64.7	100.0
Army tracking radar	16.50	16.50	0.00	100	0	100.0
Naval surveillance radar	24.71	14.52	10.19 (0.41)	58.8	41.2	100.0
Naval tracking radar	51.02	51.02	0.00	100.0	0	100.0
Airborne radar	150.00	85.40	0.00	57.0	0	57.0
Data display and handling, including UKADGE	30.40	10.24 (0.10)	9.28	33.7	30.5	64.2

Source: MMC from data supplied by GEC and Plessey.

*Average annual sales over period 1983/84 to 1987/88 including payments for product development contracts. Sub-contract sales between GEC and Plessey are shown in brackets. Siemens had no United Kingdom sales in this market.

3.28. Of the MOD's current radar contracts of over ,0.5 million with GEC and Plessey, the contracts for the Watchman, Weather and 996 radars were placed as the result of competition involving both GEC and Plessey.

3.29. Plessey won the last major contract for naval surveillance radar, the 996 radar. The MOD foresees no significant requirements for naval surveillance radar in the near future, although there is a large potential market with other navies. In naval tracking radars GEC has historically dominated the United Kingdom market. The major future project in this area is likely to be the multi-function radar for the Self-Defence Missile System (SDMS). Both GEC and Plessey are likely to compete for the project either as members of competing consortia or as sub-contractors. Plessey's equipment is based on its MESAR technology (Multi-function Electronically Scanned Adaptive Radar) while GEC's uses an alternative approach.

3.30. The sales for ground-based radars include those for the Rapier project. Plessey defeated STC/Racal to win the sub-contract for the surveillance radar for the current phase, Rapier Field Standard C, while Marconi won the sub-contract for the tracker radar. BAe is the prime contractor for both. The next production tranche of the project is likely to involve GEC and Plessey in competition. In data handling Marconi and Plessey are one-third partners in a consortium with Hughes which has supplied more than half of the market. The MOD told us that MDS is the prime contractor for development and production of the AI24 radar (Foxhunter) for ADV Tornado but that Plessey and Ferranti are likely to compete for future phases of the project. A very provisional estimate for the total value of future MOD radar contracts is ,2.1 billion.

3.31. The MOD told us that it considered GEC and Plessey major competitors in many radar products and that this competition would be lost if the two companies were to merge.

Military radio and communications systems

3.32. The markets in this area include all aspects of both tactical and strategic army communications, naval ship communications, surveillance and electronic warfare and command and control information systems. Plessey and GEC are major suppliers to the United Kingdom markets in most of the product markets with a joint market share for land and airborne communications estimated by the MOD at 66 per cent. Siemens is a supplier of tactical trunk radio, electronic and

communication intelligence systems, air command and control systems and close-in weapons systems. Siemens' sales to the United Kingdom market have involved supplying GEC Marconi with microwave transmission equipment for the Triffid battlefield communications project. This amounted to equipment to a value of about ,20 million over ten years. Siemens is not considered by the MOD to play a significant role in competition for its contracts. Plessey's supply is through Plessey Defence Systems with involvement of Plessey Avionics on some projects. GEC's supply is through Marconi Communications Systems, Marconi Defence Systems, GEC Sensors and Marconi Space Systems.

3.33. Total United Kingdom sales in the radio and military communications market have averaged about ,300 million a year over the past five years. Plessey's sales have averaged about ,150 million a year, while GEC's sales have averaged about ,65 million a year. Over the past five years the major product market in terms of value of sales (see Table 3.8) has been army strategic radio where Plessey's role as prime contractor in Phase 2 and Phase 3 tranches I and II of the Ptarmigan project has given it sales averaging about ,110 million a year, a few per cent of which has been supplied by GEC as a sub-contractor. Together the two companies have supplied about 75 per cent of the strategic communications market. For army tactical radio both companies have had substantial parts of the market, supplying equipment for the Clansman series of combat net radio. Racal is also a major supplier of tactical radios. GEC and Plessey have also had substantial shares of the market for army command and control systems including the Wavell project developed by Plessey with GEC input through sub- contracts. Both have supplied naval ship systems, with about 20 per cent each of the market. Both have been involved in United Kingdom strategic communications systems, Plessey in the Oakhanger satellite ground station and both in a consortium with Hughes of the United States for the UKADGE project (United Kingdom Air Defence Ground Environment). This last project also involved radar.

TABLE 3.8 **The United Kingdom market* for radio systems and military communications**

	£ million per annum			*per cent*		
	Total UK sales	*GEC's sales*	*Plessey's sales*	*GEC's share*	*Plessey's share*	*Combined share*
Army radiostrategic	154.00	9.00 (2.80)	109.32	5.8	71.0	76.8
Army radiotactical	38.0	6.40	10.94	16.8	28.8	45.6
Army command and control systems	33.0	18.78	12.90	56.9	39.1	96.0
Battlefield surveillance systems	3.0	0.00	0.68	0	22.7	22.7
Defence strategic radio	5.0	3.56	0.62	71.2	12.4	83.6
Naval ship systems	26.0	5.44	6.08	20.9	23.4	44.3
Shore stations	3.0	2.44	0.00	81.3	0	81.3
Satellite communications systems and terminals	25.0	16.36	6.42	65.4	25.7	91.1
HF surveillance systems	11.6	0.00	3.82	0	32.9	32.9

Source: MMC from data supplied by GEC and Plessey.

*Average annual sales over period 1983/84 to 1987/88 including payments for product development contracts. Subcontract sales between GEC and Plessey are shown in brackets. No separately identifiable sales figures for Siemens were available.

3.34. In shore stations GEC has had sales but Plessey none. Both companies have had sales in satellite communications systems and terminals and HF surveillance systems. They are the two major United Kingdom suppliers of satellite ground stations. Some work which was previously handled by the two companies has been transferred to GPT (eg work on the Uniter project). Other suppliers from the United Kingdom have been Ferranti, Racal and BAe. The MOD told us that there was also some competition from a number of non-United Kingdom European companies.

3.35. The MOD told us that, of current radio and communications contracts of over ,0.5 million with GEC and Plessey, two satellite communications projects and the initial Triffid contract involved competition between the two companies.

3.36. On future projects, GEC and Plessey are expected to be major competitors. The JTIDS project has already been described in the section on avionics (see paragraphs 3.17 and 3.18). BOWMAN is a major project for army tactical radio to replace the Clansman system in the mid-1990s. The value is likely to be about ,1.5 billion; the project has just entered the concept elaboration phase. Plessey, GEC and Siemens are among the companies interested in the project. GEC and Plessey are also likely to compete for further development and production contracts in the Ptarmigan strategic communications project. They are also likely competitors for further satellite communications projects where, although other companies such as Ferranti operate, the MOD considers the market to be dominated by GEC and Plessey. The MOD estimates provisionally that there are future contracts worth at least ,2.1 billion in communications (not including JTIDS which is included in the avionics figures). GEC and Plessey are probable contenders for almost all of these contracts along with other United Kingdom and foreign suppliers.

3.37. Both GEC and Plessey supply cryptographic equipment to the MOD. Plessey is also involved in the commercial market for secure communications. It has developed the security aspects of the EFTPOS scheme (Electronic Funds Transfer at Point of Sale) and is well placed to compete for more work in this market (estimated to be worth ,3,500 million world-wide in 1988/89).

3.38. The MOD told us that it considered that a merger of GEC and Plessey businesses markets would adversely affect competition in the military communications market, in some product areas eliminating all competition for the prime contractor role.

TELECOMMUNICATIONS EQUIPMENT

3.39. The United Kingdom market for telecommunications equipment is estimated to be about ,1.6 billion per annum. The formation of GEC Plessey Telecommunications Ltd (GPT) by the merging of the separate GEC and Plessey telecommunications businesses in April 1988 has brought a major change in the structure of the United Kingdom telecommunications industry since our previous report. GPT is the major supplier in the United Kingdom with domestic sales in 1987/88 of nearly ,800 million.

3.40. GPT's largest area of sales is public switching equipment with sales of its System X equipment valued at ,357 million in 1987/88 and sales of other public switching equipment at ,18.5 million. Its share of the total United Kingdom market for public switching equipment is about 65 per cent. Sales of transmission equipment by GPT amounted in total in 1987/88 to ,153.3 million. Multiplex equipment represented the largest category of transmission equipment with 1987/88 sales of ,63.9 million representing a 67 per cent share of the market. The next largest sector of GPT sales is PABX (private switching) equipment valued in 1987/88 at ,171.4 million, representing market shares by size of equipmentlarge, medium and small/key systems of 76 per cent, 50 per cent and 42 per cent respectively. GPT's sales of telephones had a value of ,29.4 million, representing about 26 per cent of the total market, and sales of intelligent payphones of ,36.7 million representing 53 per cent of the market. GPT sales of data communications equipment included sales of data network products of a value in 1987/88 of ,22.1 million and telex switching equipment of a value of ,5 million. Table 3.9 gives figures for 1987/88 for the various market sectors covered by the telecommunications industry, GPT's and Siemens' United Kingdom sales in these markets and estimates of their market shares.

TABLE 3.9 **Telecommunications equipment markets in the United Kingdom, 1987/88**

	Estimated size of United Kingdom market		*Sales*		*Estimated market shares*		
			GPT	*Siemens*	*GPT*	*Siemens*	*Combined*
	£m		*£m*	*£m*	*%*	*%*	*%*
Public switching							
System X*/Y	397		357	-	90	-	90
Other	184		18.5	-	10	-	10
Transmission equipment (excluding cable)							
Multiplex equipment	90		63.9	0.8	67	0.9	67.9
Subscriber modem equipment	N/A		1.7	-	N/A	-	N/A
Copper transmission systems equipment	7.4		5.8	-	77	-	77
Optical transmission systems equipment	61.0		28.5	-	51	-	51
Network management systems	23.4		22.4	-	87	-	87
Microwave radio systems	50.0		31.0	9.9	62	19.8	81.8
Private switching							
PABX equipment	162.0***	Large	124.9	}	76**	2	78
		Medium	35.6	}	50**	11	61
		Small/key systems		} 30			
			10.9	}	42**	3	45
Apparatus							
Telephones	113.0		29.4	-	26	-	26
Intelligent payphones	65.0		36.7	-	53	-	53
Data communications							
Telex switching equipment	5		5	-	100	-	100
Data network products	N/A		22.1	-	N/A	-	N/A

Source: MMC study.

*Includes contract development of System X for British Telecommunications (BT).

**Market shares are estimated with reference to the volume of equipment supplied and are not therefore directly comparable with the sales figures quoted which include some cost of distribution.

***Estimated market size is at manufacturers' prices, which excludes the value of wiring and installation; terminal equipment supplied as part of the contract; any provision for networking; and any additional hardware or software features.

3.41. Siemens had total United Kingdom sales of telecommunications equipment in 1987/88 of about ,40 million. These were through its own distribution company, Norton. Its principal United Kingdom business is in private exchange equipment and key systems with sales in 1987/88 of ,30.0 million. When broken down into large, medium and small categories, Siemens' market shares for PABXs and key systems in 1987/88 were 2 per cent, 11 per cent and 3 per cent respectively. Siemens also had United Kingdom sales of transmission equipment, amounting in total to ,10.7 million in 1987/88. The majority of these sales, ,9.9 million, were for microwave radio equipment supplied under a contract with Mercury. Within the area of transmission equipment Siemens has a small proportion of sales in the United Kingdom of multiplex equipment.

3.42. In terms of the effect of Siemens' involvement in GPT on their combined United Kingdom market shares for telecommunications equipment, it is only in the markets for PABX equipment and key systems and microwave radio systems that there would be any significant market overlap. There is considerable competition in the United Kingdom market for PABXs and key systems from a number of companies including Philips, Mitel, TIE, NTS and STC.

3.43. Whilst having a relatively small involvement in the United Kingdom telecommunications market Siemens is an important international manufacturer of telecommunications equipment. Its principal activities in this field are in public switching with its EWSD public switching system installed, or ordered for installation, in 33 countries throughout the world. The EWSD is manufactured in 11 plants around the world. 55 per cent of production is outside West Germany and this is expected to increase to 70 per cent. The second main area of its telecommunications manufacturing is transmission equipment including optical fibre cable and requisite opto-electronic components. It also manufactures satellites and satellite earth stations and cellular telephone network

equipment. It is currently working with L M Ericsson on the development of the radio sub-system and the components for possible use in an all- digital cellular telephone system to a unified European standard. Siemens has also acquired an 80 per cent stake in the international switching business of the United States electronic company GTE, enabling it to supply equipment satisfying both European and US standards.

Developments in the telecommunications market

3.44. Since our previous inquiry in 1986 there have been important developments in telecommunications besides the formation of GPT. Of most significance is a change in the balance between switching, transmission and network processing functions as a result of, for example, the increasing competitiveness of optical fibre systems, changing product capabilities and the pressure for new telecommunications services. The relative importance of public switching is reducing as its functions are taken over by, or integrated with, other network elements, such as transmission systems and data processing. This interlinking or `convergence' of previously separate elements of networks is also taking place in the private switching and business system markets. The use of private networks by large organisations to bypass the public carriers requires provision of a mix of PABX and transmission equipment.

3.45. Another development has been the licensing and rapid growth of new mobile communications networks, including cellular radio, private mobile radio, national paging systems and telepoint cordless telephone services.

3.46. The privatisation of BT and the licensing of Mercury as a competitor in common carrier services opened the door to the possibility of greater competition in future public network operation. It is possible that after 1990 additional licences will be granted which will allow competition from other operators.

3.47. The argument was put to us in evidence from several parties that future requirements in the world telecommunications market will necessitate higher R & D expenditure. It will require greater collaboration between different telecommunications manufacturers, both to share these development costs and to give access to wider technology than is available to a single manufacturer. GEC and Siemens commented in their submissions on the fragmented nature of the European telecommunications industry with five full-line telecommunications companies compared with North America which only has two and Japan also with two.

3.48. One argument fuelling moves to alliances between manufacturers in different countries is that the next generation of digital public switching systems designed to offer a wider range of facilities will cost ,1 billion or more to develop: mergers and alliances between telecommunications manufacturers would be necessary to enable such costs to be spread over a larger volume of sales than could be achieved by a single manufacturer. An alternative argument is that national telecommunications systems could evolve progressively without the development of a completely new generation of public switch. System X, for example, is modular in the structure of both its hardware and software, so that it can be gradually enhanced to provide new facilities and services. Hence, although the total investment needed would be substantial, it would not be as substantial as the sum required to develop a new product.

3.49. BT has made a considerable investment in System X which is its principal digital public switching system. Continued development and updating of System X is, however, required. System X presently lacks several key features which are of importance in meeting current and future customer needs. BT considers it important for it to be able to offer facilities which are at least the equal of the best available to customers in other countries. BT expressed the view to us that GPT needs collaboration with a manufacturer with experience of and access to North American technology. Without GPT forming an alliance with another manufacturer it has been suggested that it would be very difficult if not impossible to maintain a significant British presence in public switching in the 1990s.

3.50. In addition to the above considerations the completion of the EC's internal market should lead to the adoption of EC-wide standards for telecommunications equipment and the removal of

individual national standards operating as trade barriers. This is expected to provide enhanced opportunities for the sale of equipment within the Community.

3.51. Table 3.10 gives details of the leading world manufacturers of telecommunications equipment with their sales figures for 1987.

TABLE 3.10 **Leading world manufacturers of telecommunications equipment**

Company	*Telecommunications sales 1987 £ billion*
AT & T (USA) (including APT)	6.85
Alcatel NV (France)	4.15
Siemens (West Germany)	3.74
NEC (Japan)	3.12
Northern Telecom (Canada)	2.80
L M Ericsson (Sweden)	1.87
Fujitsu (Japan)	1.37
GPT* (United Kingdom)	1.33

Source: Siemens.

*Combined Plessey and GEC figures.

ELECTRONIC COMPONENTS

3.52. Table 3.11 gives details of Plessey's United Kingdom sales of electronic components in 1987/88 together with estimates of its share of these market sectors.

TABLE 3.11 **Plessey sales of electronic components in 1987/88**

Product	*Value of UK sales £m*	*Estimated share of United Kingdom market %*
Integrated circuits	33.0	5
- of which ASICs	24.0	18
Microwave components	4.4	4
Fibre optic transmitters and receivers	3.0	19
Microwave materials	2.4	29
Surface acoustic wave devices	1.4	20
LED displays	1.3	46
Gallium arsenide devices	0.5	10
Optical fibre connectors	0.2	3

Source: MMC using Plessey data.

3.53. Of these sectors of Plessey's sales of electronic components in the United Kingdom there are three where either GEC or Siemens are also competitors in the market. These are integrated circuits (ICs), microwave components and surface acoustic wave devices.

Integrated circuits

3.54. The part of the electronic components market which the proposed merger would most affect is the supply of semiconductors and in particular the supply of ICs, the largest area of semiconductors. Of world sales of semiconductors in 1988, estimated to be ,29 billion, sales of ICs amounted to ,24 billion. The value of United Kingdom sales of ICs in 1987/88 was nearly ,700 million. Competition in semiconductors and especially that for ICs is international, with Japan and the United States as the leading producers. The European semiconductor industry has fallen behind

Japan and the USA in its development of commodity ICs but not of Application Specific Integrated Circuits (ASICs). There is now a greater commitment to catching up and there is financial support to do so from the EC under the ESPRIT programme. ICs form a significant element in the manufacture of electronic equipment and systems and are therefore seen as an enabling technology for the wider electronics industry. It has been argued by Plessey that as such it is essential to maintain a strategic United Kingdom capability in ASICs.

3.55. Of total United Kingdom sales of semiconductors by Plessey in 1987/88 of about ,50 million, ,33 million was accounted for by ICs. Siemens had United Kingdom IC sales in 1987/88 of ,11.8 million and Marconi Electronic Devices Ltd (part of GEC) had sales of ,9.3 million. Taking ICs as a whole the respective United Kingdom market shares of Plessey, Siemens and GEC in 1987/88 were about 5 per cent, 2 per cent and 1 per cent. In the main, however, these were not of the same types of ICs. There are three basic types of ICs meeting different requirements and therefore not generally competing directlycommodity ICs, application specific standard products (ASSPs) and application specific integrated circuits (ASICs):

(a) *Commodity ICs* are produced for use in a wide range of products and particularly computers, consumer electronic products and household goods. They are not tailored to meet specific requirements. Commodity ICs include random access memory chips, read-only memory chips, and central processors for computers. The market for these types of ICs is currently dominated by Japanese and US producers. Siemens, however, told us of measures being taken to increase its involvement in commodity ICs (see paragraph 3.61).

(b) *ASSPs* are standard ICs designed for a specific application but sold to a number of customers.

(c) *ASICs* are non-standard logic ICs designed and produced to meet specific applications or a specific requirement of an individual customer. They are more complex and costly than commodity ICs.

3.56. Plessey concentrates primarily on ASICs, selling both to other Plessey businesses and outside the company. Of Plessey's United Kingdom sales of ICs in 1987/88 of ,33 million, sales of ASICs were valued at ,24 million (73 per cent of Plessey's total IC sales) and represented 18 per cent of the United Kingdom ASICs market of about ,135 million. Future Plessey development in ICs will be concentrated on further growth in the ASICs market and the company forecasts an increase in its share in 1988/89 to 23 per cent out of a total United Kingdom market for ASICs of ,145 million. As part of its commitment to further growth in ASICs Plessey acquired Ferranti Semiconductors in March 1988. Siemens does not recognise the same distinction as Plessey between ASICs and some other types of IC but has indicated the value of its sales of `non-standard' ICs in 1987/88 to have been ,4.9 million.

3.57. Plessey manufactures ICs using both bi-polar technology (which permits very high speeds of operation though at lower levels of integration) and metal-oxide silicon (MOS) semiconductor technology (which permits high levels of integration with a lower power requirement, though at lower speeds of operation). Bi-polar integrated circuits are used where their higher speed is sufficiently important to justify their cost, which is generally higher than that of complementary metal-oxide silicon (CMOS) integrated circuits. Siemens and Plessey are the leading European-owned companies in ASICs, and of the two Plessey is the most advanced in bi-polar ICs.

3.58. In addition to its strong involvement in ASICs Plessey has also continued to develop ASSPs.

3.59. Marconi Electronic Devices is the GEC company which manufactures electronic components including ICs. Marconi Electronic Devices is primarily a manufacturer of specialised circuits for space, defence and telecommunications systems. One specialist type of IC manufactured by Marconi

Electronic Devices uses silicon on sapphire technology designed to withstand the high radiation levels in satellite applications both in Europe and the USA.

3.60. Major suppliers in the United Kingdom market of commodity ICs include Texas Instruments, Philips, Motorola, National Semiconductors, Intel, NEC and Toshiba. Competitors in the ASICs market include LSI Logic, AMD, Philips, NEC, Fujitsu and National Semiconductor.

3.61. Siemens' total world sales of ICs in 1987/88 were valued at ,229 million. The company told us of its commitment to improving its competitive position in the world market for ICs and has embarked upon a substantial programme of R & D and major investment in state-of-the- art ICs intended to improve its position across the broad range of types of IC and particularly to increase its presence in commodity MOS memory chips, a market currently dominated by the Japanese. This has involved recent investment by Siemens with Philips of ,700 million in what is described as the `Megaproject' for development of 1 megabit and 4 megabit DRAM ICs.

Microwave components

3.62. Microwave components are used in radar, radar detection and telecommunications equipment. Both Plessey and Marconi Electronic Devices (GEC) have businesses producing microwave components and Siemens has some production and sales of these products but negligible sales in the United Kingdom. The total market for microwave components is estimated by GEC at about ,110 million for 1987/88. Marconi Electronic Devices is estimated to have a market share of approximately 11 per cent and Plessey a share of approximately 4 per cent. Other suppliers to the United Kingdom market include Microwave Associates, Racal and Avantek.

3.63. Since our 1986 report Plessey has started manufacturing and marketing a range of radio-frequency digital signal processing components. Hatfield Components which developed these products was acquired by Plessey in 1987.

Surface acoustic wave devices (SAWs)

3.64. SAWs are passive devices which use the physical characteristics of materials such as lithium niobate, lithium tantalate and quartz to create analogue signal processing elements such as filters, convolvers, resonators and delay lines. They are used in processing the incoming signal to a television or to a receiver of a direct broadcast by satellite, in radar and other military equipment and in telecommunications applications. SAWs used in televisions and for similar types of consumer products are of a simpler low-cost type and those used in radar applications are more complex and relatively high in cost.

3.65. The total value of the United Kingdom market for SAWs in 1987/88 is estimated to have been ,7 million and is forecast to have increased to ,8 million in 1988/89. Both Plessey and Siemens are suppliers to the United Kingdom market with sales in 1987/88 of ,1.4 million and nearly ,1 million respectively. Plessey had a market share of approximately 20 per cent and Siemens 14 per cent. Marconi Electronic Devices is also a supplier of SAWs for specialised military purposes, most of which are incorporated by Marconi Electronic Devices into complex components. Marconi Electronic Devices' total sales of SAWs are about ,0.5 million but the majority of sales are in-house.

3.66. Plessey supplies SAWs for use both in military equipment and in televisions whilst the great majority of Siemens' sales are for use in televisions and other consumer products. Plessey referred to the recent rapid expansion of the DBS (direct broadcast by satellite) and mobile communications markets which has opened up new applications for SAW devices operating at higher frequencies.

3.67. Sanyo and Toshiba are both competitors to Plessey and Siemens in the United Kingdom market each with an estimated market share in 1987/88 of 3 per cent. Plessey forecast that each company will increase its share to 7 per cent in 1988/89.

TRAFFIC CONTROL EQUIPMENT AND TRAFFIC SYSTEMS

3.68. The market for traffic control equipment and traffic systems covers broadly the supply, installation and maintenance of road traffic products and systems for intersection control, pelican crossings, wide area urban traffic management and control systems and motorway systems. Market sub-categories also include parking and toll systems and data communications which can be applied to moving vehicles for purposes such as identification, bus priority, route guidance and road pricing. In the United Kingdom local authorities are the major purchasers, both on their own behalf and as agents for the Department of Transport (DTp) for roads over which it has responsibility. The DTp purchases some equipment directly from suppliers for motorway communications.

3.69. The value of the United Kingdom market for traffic control equipment and traffic systems is estimated at about ,35 million for 1987/88. Both Plessey and GEC (GEC Elliott Traffic Automation Ltd) are significant suppliers in this market. Their combined market share is about 75 per cent. Table 3.12 gives details of Plessey and GEC sales of traffic control equipment and traffic systems and their estimated market shares in 1987/88.

TABLE 3.12 **United Kingdom sales of traffic control equipment and traffic systems in 1987/88**

	Sales £m	*Market share* %
Plessey	17.5	50
GEC	8.6	25
Others	8.9	25
Total	35.0	100

Source: MMC study.

3.70. Amongst other suppliers in this market Ferranti is the most significant with an estimated market share of up to 20 per cent. There has also been the recent entry to the market of two smaller companies, Microsense Systems and Elequip, which manufacture certain types of traffic control equipment and by Serco, Keyearl and Velvetwardfirms involved in the installation and maintenance of equipment. The entry of these firms has increased the degree of competition in the market since our previous report. We have been told by the DTp that increased competition from a larger number of firms has had a particular impact on the maintenance of traffic control equipment, by achieving more competitive pricing and an improvement in performance. It referred to nine different companies that are active in at least some part of the United Kingdom traffic control maintenance market.

3.71. Siemens is a major manufacturer and supplier of traffic control equipment with 1987/88 sales in West Germany of some ,78 million and with additional sales of some ,22 million in other countries. It is not, however, a supplier of traffic control equipment in the United Kingdom where its only present involvement in the United Kingdom as regards traffic control is as part of a development consortium for the Autoguide scheme (see paragraph 3.73).

3.72. More advanced technology, especially in the area of computerised traffic control, is changing the nature of the market for traffic control equipment. One example is a co-operative project, SCOOT (Split Cycle Offset Optimisation Technique), for urban traffic control systems. This is a system which sets the most appropriate traffic signalling timings by reference to traffic conditions obtained from loops placed in the surface of the road. SCOOT has been developed jointly by Plessey, Ferranti and GEC in conjunction with the Transport and Road Research Laboratory (TRRL) and the DTp. Financial assistance for this project has also been given by the Department of Trade and Industry (DTI) most recently in the form of research back-up. TRRL also provides training for local authority engineers. SCOOT is sold under licence by the DTI and there are agreements between the Secretary of State for Defence, for and on behalf of the Secretary of State for Trade and Industry, and each of the three companies involved, specifying their rights as licensees. These agreements state that the rights granted `are and shall be personal to the licensee, who shall not assign, mortgage or change such rights without the prior consent in writing of the Authority'. This is the Secretary of State for Defence. In addition there is a clause which gives the authority the ability to revoke the

right if the licensee becomes a subsidiary of a third party already controlled directly or indirectly from abroad.

3.73. Future advances are expected in the area of traffic guidance systems. The first interactive system – Autoguide – is an on-board motor vehicle computer traffic information system to provide drivers with route guidance derived from information about changing traffic conditions. Roadside beacons transmit information between vehicles and a central computer system. In April 1988 the Secretary of State for Transport launched a consultative document seeking views on proposals for a pilot Autoguide scheme in London to be promoted and financed by the private sector. The Road Traffic (Driver Licensing and Information Systems) Bill, part II of which would regulate new systems for giving drivers information about routes and traffic conditions and provide for the installation of any necessary equipment on highways, was introduced in Parliament on 1 December 1988. In January 1989 the Secretary of State invited detailed proposals for such a pilot scheme, capable of being upgraded subsequently to a full commercial London system, to be submitted by 21 April 1989. Prospective promoters of a pilot scheme had to advise the Department of their intention to make proposals by 24 February 1989. Consortia including Plessey Traffic Controls Ltd, GEC Traffic Automation Ltd and one other firm have notified their intention to submit proposals. Plessey Controls is leading a consortium whose members include Siemens and the Automobile Association, which is submitting proposals for developing the system. GEC is in a consortium with the Royal Automobile Club.

3.74. The DTp has told us that Siemens originally developed much of the Autoguide infra-red technology on which the United Kingdom has drawn in developing proposals for this country. The West German and United Kingdom Governments, as the two countries most advanced in the development of Autoguide, have agreed a draft technical standard. The intention is to establish a working standard throughout Europe using infra-red to enable systems to be operated by drivers on journeys through different countries. Autoguide-equipped British vehicles have already been operated successfully in a pilot network in Berlin.

3.75. The installation of a London pilot scheme is planned to take place in 1990/91. If the pilot phase proves successful, it is hoped that upgrading to a fully commercial operation would be expected to take place in 1992/93.