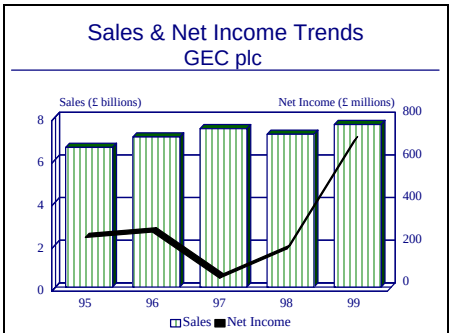
# Marconi plc - Archived 6/2001

## Outlook

- Following BAe's purchase of GEC's aerospace and defense units, GEC plc changed its name to Marconi plc
- The new Marconi is focusing on high growth communications markets and selective markets for high technology systems
- Since Marconi's defense work is now wholly owned by BAE SYSTEMS, this report will no longer be updated




## Headquarters

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United Kingdom
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The General Electric Company plc has origins stretching back over 100 years, when Hugo Hirst and Gustav Byng established an electrical goods wholesale business. In 1889, after three years of operation, the company was named the General Electric Company. One year later it became a public company. The firm began to manufacture its own electrical goods in 1889, and pushed into other heavy industry in 1900.

In late 1999, British Aerospace and GEC completed the merger between GEC's Marconi Electronic Systems and British Aerospace. This resulted in two businesses: **BAE SYSTEMS**, a combination of British Aerospace and GEC's aerospace and defense activities, forming a powerful new business with leading positions in the global aerospace and defense markets; and the newly renamed **Marconi**, a major international group focused on high growth communications markets and selective markets for high technology systems.

The new Marconi plc is a communications and IT company that employs 45,000 employees worldwide.

## Structure and Personnel

Sir Roger Hurn
Chairman
Lord Simpson
Chief Executive
R.E. Artus
Non-executive Director
W.M. Castell
Non-executive Director
The Rt. Hon. The Baroness Dunn
Non-executive Director
P.O. Gershon
Director
Sir Christopher Harding
Non-executive Director
M. Lester
Vice Chairman
Sir Charles Masefield
Vice Chairman
J.C. Mayo
Director
R.I. Meakin
Director

A.W. Rudge CBE
Non-Executive Director
Hon Raymond G.H. Seitz
Non-executive Director
N.J. Stapleton
Non-executive Director
N.C. Porter
Secretary

## Product Area

The new Marconi plc manages its operations in the following manner:

1. Marconi Communications
2. Marconi Services
3. Marconi Mobile
4. Marconi Systems
5. Marconi Capital

**Marconi Communications** is an international supplier of high-performance broadband solutions for the New Public Network and Modern Enterprise.

**Marconi Services** provides public and private network planning, building and operation.

**Marconi Mobile** supplies private mobile and strategic communications solutions.

**Marconi Systems** consist of three units Data Systems (formerly Videojet), Medical Systems (formerly Picker) and Commerce Systems (formerly Gilbarco).

**Marconi Capital** handles high-tech start-up companies under the Marconi umbrella.

## Facilities

Marconi Communications, 1000 FORE Drive, Warrendale, PA 15086-7502 USA. Telephone: (724) 742-4444.

Marconi Services, PO Box 146, New Century Park, Coventry, CV3 1LQ United Kingdom.

Marconi Mobile, Via Negrone 1A, 16153 Genova, Cornigliano, Italy.

Marconi Medical Systems, 595 Miner Road, Cleveland, OH 44143 USA.

Marconi Commerce Systems, 7300 W. Friendly Avenue, PO Box 22087, Greensboro, NC 27420 USA.

Marconi Data Systems, 1500 Mittel Boulevard, Wood Dale, IL 60191-1073 USA.

Marconi Applied Technologies, Waterhouse Lane, Chelmsford, Essex CM1 2QU United Kingdom.

## Corporate Overview

The new Marconi is focused on communications, data networking and related systems with a only a peripheral involvement in aerospace and defense.

Throughout the remainder of this report historical data concerning GEC plc have been left intact for reference purposes.

### New Products and Services

Following the merger of its Marconi Electronic Systems unit with Bae, the new Marconi plc has no specific aerospace and defense programs.

### Plant Expansion/Organization Update

GEC renamed Marconi plc. Following the separation and merger of its aerospace, naval shipbuilding, defense electronics and defense systems business, Marconi Electronic Systems, with British Aerospace, the GEC group was renamed Marconi plc.

Marconi plc consists of three businesses:

*Communications*. The Communications businesses are focused on the supply of communications and data networking equipment and solutions internationally. Marconi's strategy is to combine Marconi Communications' expertise in public networks with Fore Systems' experience with internet service providers and in private corporate networks to deliver solutions for the development of broadband networks which will offer internet, voice, video, multimedia and private data services.

*Systems.* The Systems businesses apply advanced electronic and information technology solutions in a range of industries with good growth prospects around the world. Marconi intends to bring new technologies

to market quickly and effectively by drawing upon the resources, knowledge and proprietary intellectual property available to it throughout the Marconi Group.

*Capital.* Capital will be used as a vehicle for the development of high technology start-up and early stage investments to support the Marconi growth objectives for the future. Capital's portfolio includes a number of businesses with attractive returns on capital that do not necessarily fit the high technology and high growth models that have been established in Communications and Systems.

Civil Business to be Spun off. In December 1998, GEC announced that it had decided to separate its civil businesses from its aerospace and defense activities. According to the company, the separation might take one of several forms and would enhance the ability of GEC to create value for its shareholders by leading the international defense industry consolidation.

## Mergers/Acquisitions/Divestitures

BAE SYSTEMS is Formed. In November 1999, British Aerospace (BAe) completed the purchase of General Electric Company's (GEC) Marconi Electronics unit in a stock deal valued at $12.7 billion. The move created the world's third largest aerospace and defense company, behind US giants, Boeing and Lockheed Martin. The new company, which is currently Europe's largest (pending the formation of EADS), employs almost 100,000 worldwide and is valued at $25.7 billion. The resultant company has been renamed BAE SYSTEMS.

"This merger represents an important step in the restructuring of the aerospace and defense industry in Europe. The combination of these businesses creates a company with unrivaled global reach, world leading technology and the strength to compete at all levels in the world markets," said Sir Richard Evans, chairman of British Aerospace.

BAe acquired the following unit and its subsidiaries in the deal: **Marconi Electronic Systems.** MES is responsible for all design, development and production of electronic systems for defense and aerospace, including systems for land and sea applications. Subsidiary companies under this division are as follows (wholly owned unless otherwise indicated by a share of GEC participation):

GEC-Marconi Ltd
- Marine
- Avionics
- Radar & Defence Systems
- Electro-Optics
- Marconi North America
- Underwater Systems
- Alenia Marconi Systems (50%)
- Matra Marconi Space NV, Holland (49%)
- Thomson Marconi Sonar NV, Holland (49.9%)

*Avionics* GEC offers a complete range of electronics including avionics, electronic warfare, targeting, fire control, command/control/communication/intelligence ($C^3I$), space, search and air traffic control systems. GEC involvement in the major military programs currently in development in the US and European nations includes the European Fighter Aircraft (EFA) and the Lockheed/Boeing/General Dynamics F-22 Advanced Tactical Fighter (ATF). GEC is also supplying avionics and flight control systems for the Boeing 747-400 and 777 large civil transport aircraft.

*Naval Systems* comprises NNC Limited, Vickers Shipbuilding and Engineering Limited (VSEL) and Yarrow Shipbuilding Limited. The company designs and builds all types of naval ships and submarines and provides through life support. GEC Marine also delivers military armaments and high-quality technical and project management services.

*Marconi North America Inc* is composed of electronics, avionics and communications capabilities based in the USA and Canada. The operation specializes in advanced systems such as tactical data links, data display systems, guidance and navigation aids, programmable digital radio and satellite communications. It also has capabilities in the design and implementation of $C^3I$ and $C^2$ applications. Major companies under this subsidiary include Tracor, Lear Astronics, Canadian Marconi Company and GEC-Marconi Hazeltine.

Kvaerner Shipyard Acquired. In July 1999, GEC-Marconi purchased Kvaerner's Govan shipyard in Clyde, Scotland for $3.5 million.

GEC Acquires FORE Systems. In April 1999, the GEC acquired FORE Systems Inc. for a total consideration of $4.5 billion (£2.8 billion). FORE Systems is a leading global supplier of integrated multiservice networking solutions, specializing in providing scalable, reliable, and high-capacity ATM and IP/Ethernet switching solutions to meet the demands of large enterprise businesses and service providers.

GEC Acquires RELTEC Corporation. In March 1999, GEC acquired Reletec for $2.1 billion (£1.3 billion), including assumed net debt of $361 million, at an agreed price of $29.50 per share in cash. Reltec, with revenues in excess of $1 billion, is a leader in the design, manufacture and sale of telecommunication network products, including the high growth market for Access products in the US. Access products offer

broadband solutions to telecommunication companies faced with network capacity constraints resulting from the dramatic growth in data, video and voice traffic over the local loop – the "last mile" connection to residential and business subscribers. RELTEC's key customers for Access products in the US market include a number of premier telecommunication companies.

Alstom Stake Sold. In June 1998, GEC's stake in Alstom was successfully floated on the stock exchanges of Paris (its primary listing), London and New York. The shares issued as part of the global offering were valued at FRF22.4 billion and Alstom's market capitalization was valued at more than FRF43 billion.

GEC Acquires Tracor. In June 1998, GEC-Marconi's North American Group completed the acquisition of Tracor for $1.4 billion (£0.8 billion). Tracor is a leading supplier of defense electronics and information technology systems and services. In 1997 Tracor had revenue and operating profit of $1,266 million and $102 million, respectively, and finished the year with a record order book of $3.2 billion (firm orders and options). Tracor's shareholders' funds at December 31, 1997, were $259 million. The company's operations are in three business segments:

*Tracor Information Systems* is a rapidly growing supplier of mission-critical information and imagery systems, mission planning and automatic test equipment hardware, software and services.

*Tracor Aerospace* is a leading producer of airborne electronic warfare systems and countermeasures, aerial targets and camouflage and signature management systems.

*Tracor Systems Technologies* is the leading provider of systems and software engineering, integration services and life-cycle support to the US Navy, providing design, testing, maintenance and upgrading of high-priority communications and combat systems.

Along with the acquisition, GEC Marconi North America announced a new name for the combined operations – Marconi North America Inc.

Marconi North America, with headquarters in Wayne, NJ, has combined annual sales of approximately $2.3 billion and a combined backlog of more than $3.4 billion. The company provides information systems, electronics, avionics, communications, and systems engineering to government and commercial customers worldwide. Following the acquisition, Marconi now employs more than 17,000 people throughout North America.

According to GEC, the acquisition of Tracor represents a further step in GEC's drive towards information technology and systems integration businesses.

GEC Plessey Semiconductors Sold. In February 1998, The General Electric Company plc completed the sale of GEC Plessey Semiconductors (GPS) to Mitel Corporation of Canada for $225 million in cash. The sale completes the series of disposals from GEC's UK Industrial Group announced in July 1997. The total consideration for the sales of Distribution & Trading divisions in Australia, New Zealand and Ireland; Magec Aviation; Marconi Instruments; and GPS was marginally over £300 million. For the financial year that ended on March 31, 1997, GPS achieved sales of £215.5 million and a before tax profit of £7.2 million.

Marconi Instruments Sold. In February 1998, GEC announced the sale of Marconi Instruments to US electronic test instrumentation manufacturer, IFR Systems Inc, for £65 million in cash, to be paid on completion. The sale includes UK-based Marconi Instruments Limited and subsidiaries in France, Spain and Germany, as well as Marconi Instruments Inc in the US. Marconi Instruments is headquartered in Stevenage. It designs, manufactures and distributes electronic test and measurement systems and equipment.

Hazeltine Acquired. In May 1996, GEC purchased the Hazeltine Corporation from ESCO of the US for $110 million in cash. Hazeltine's sales for CFY 1995 were $114 million. Hazeltine is a leading developer and manufacturer of navigation systems, anti-submarine warfare systems and $C^3I$ systems. Other Hazeltine systems and products include equipment for navigational aids and underwater devices such as sensors, transducers, sonar and communications for anti-submarine warfare. Hazeltine devotes considerable space and facilities to research activities associated with its product and technology base.

GEC-Alsthom Proposes Merger with DCN. In September 1995, GEC-Alsthom proposed merging its Chantier del' Atlantique shipyard with the state-owned Direction des Constructions Navales (DCN). The merger would create a company with sales estimated at over $1 billion, capable of building both civil and military vessels. Although the proposal has been made, no negotiations with the French government are under way.

GEC Acquires VSEL. In June 1995, after an eight-month battle, BAe dropped out of the bidding for VSEL, clearing the way for rival GEC to buy the UK

shipbuilder. The competition for VSEL began in October 1994, when BAe offered an estimated £500 million for the company, prompting a rival bid from GEC. The GEC bid was allowed to proceed only after the UK Government overruled recommendations of the Monopolies and Mergers Commission and complaints from British Aerospace. GEC already has a significant shipbuilding operation in the form of Yarrow Shipbuilders, now Britain's only yard specializing in the construction of frigates and destroyers. GEC has long regarded VSEL as an ideal complement to its existing naval-industry portfolio, since it would add large ship and submarine-building capability to its existing strengths.

GEC Takes Over 50 Percent of Ferranti-Thomson. In November 1994, GEC acquired a 50 percent holding in Ferranti Thomson Sonar Systems UK Ltd. Paris-based Thomson-CSF will continue to control the remaining 50 percent of the shares. GEC purchased the shares following Ferranti's financial collapse in December 1993. By acquiring half of Ferranti-Thomson Sonar Systems, GEC has bought itself back into the two major UK sonar programs lost to Ferranti-Thomson over the past years: the active dipping sonar for the EH 101 Merlin helicopter and the Sonar 2076 submarine sonar suite. According to published reports, GEC and Thomson have ambitions to create a pan-European sonar business that will eventually incorporate Atlas Electronik, Europe's other sonar maker. Terms of the overall deal were not revealed.

Matra Marconi Space Acquires BAe Unit. In July 1994, after almost two years of negotiations, Matra Marconi Space, the GEC-Matra joint venture, bought British Aerospace's (BAe) space systems business for £56 million. The purchase consolidates the position of Matra Marconi Space as Europe's leading space company with sales estimated at $1 billion and order book over $2 billion. According to Matra Marconi officials, the company now ranks as the third largest space concern in the world, behind Hughes and Lockheed Martin.

## Teaming/Competition/Joint Ventures

**TAC ONE.** In August 1999, British Aerospace, DaimlerChrysler Aerospace, ITT Industries, GEC-Marconi, and Thomson-CSF formed a new joint venture, TAC ONE. The new venture will bid on NATO's TACOMS post-2000 requirement to develop new NATO Standardization Agreements for tactical communications in 2005 and beyond.

**Euro Space Co.** In December 1998, Matra Marconi Space (51 percent owned by Lagardere, 49 percent by GEC) signed an agreement to integrate the space sector activities of DaimlerChrysler Aerospace and Alenia Spazio. The new company, formed in 1999, is one of only two in the world to offer the full range of space sector activities. Areas of expertise include: Commercial, navigation, civil and military observations and telecommunications satellites; The corresponding ground-based segments, as well as service and exploitation activities; Scientific satellites and probes; Launch vehicles and orbital infrastructures; and Space related equipment and technologies.

**Finmeccanica.** In July 1997, GEC and Finmeccanica agreed to pool portions of their defense operations into three new joint ventures that will cover missiles, radar, avionics, guns and armored vehicles. Under the agreement, the subsidiaries GEC-Marconi and Alenia Difesa will form three joint ventures. The first will be a 50/50 company focusing on missile systems, naval systems, ground-based radar and command and control systems, including air traffic control with annual sales of $1.5 billion. Under the second activity, GEC-Marconi will acquire a minority interest in the Alenia Difesa avionics unit. Combined avionics sales could total $1.2 billion. The third and final venture would have Alenia Difesa taking a minority share in GEC-Marconi's gun and armored vehicle business, originally acquired when GEC purchased VSEL. Sales for this unit would be in the $400 million range.

In December 1998, the companies successfully joined the activities of GEC-Marconi Radar and Defense Systems Ltd and Alenia Difesa SpA into a 50-50 joint venture, **Alenia Marconi Systems**. The new venture employs 9,500 and has annual sales estimated at $1.65 billion.

**Lancer Team.** In April 1997, United Defense teamed with Texas Instruments, GEC-Marconi and GKN Defence for the Future Scout and Cavalry System (FSCS). The FSCS is a replacement for the US Army's M3 Bradley and British Army's Scorpion family of scout vehicles. The Lancer team is competing against a rival offering from Lockheed Martin and its partners, British Aerospace, General Dynamics Land Systems, and Vickers plc. The development program began in 1998 with an Advanced Technology Demonstration. This phase will be followed by engineering and manufacturing development in 2002 through 2006. Tentative requirements are 1,700 vehicles for the US Army and 400 vehicles for Britain. The program is estimated to cost over $3 billion.

**Thomson Marconi Sonar NV.** In July 1996, Thomson-CSF and GEC formed a sonar venture called Thomson Marconi Sonar NV. Headquartered in the Netherlands for tax purposes, Thomson Marconi Sonar will control three operating companies: Thomson Marconi Sonar

SAS, Sophia Antipolis, France; Thomson Marconi Sonar Ltd, Templecombe; and Thomson Marconi Sonar Pty Ltd, Sydney, Australia. The joint venture is 50.1 percent owned by Thomson-CSF with GEC-Marconi owning the remaining 49.9 percent. The new operation employs an estimated 3,500.

**NDIL.** In September 1995, GEC-Marconi and a private Indian firm, Nippon Denro Ispat Ltd (NDIL), announced plans to form a joint venture. Under the agreement, NDIL will hold 51 percent, and the balance will be held by GEC-Marconi. GEC-Marconi's plan is to set up a defense electronics facility in India with NDIL.

**Kentron.** In July 1995, GEC-Marconi Dynamics teamed with Kentron of South Africa for its Pegasus bid for the UK's Conventionally Armed Stand-Off Missile (CASOM) requirement.

**Horizon IJVC.** In early 1995, GEC-Marconi, DCN International of France, and the Orrizonte subsidiary of Italian groups Fincantieri and Finmeccanica formed the Horizon international joint venture company to act as prime contractor for the Anglo-French-Italian common new-generation frigate (CNGF). Each of the three companies holds an equal share in the joint venture.

**Denel.** In September 1994, Marconi Radar and Control Systems and LIW, a division of Denel (Pty) Ltd, announced an agreement to integrate their anti-aircraft systems. Under the agreement, the two companies will jointly market the Marksman Anti-Aircraft Turret (on the G6 platform) and Nemesis, the combination of the LIW eGLaS anti-aircraft gun and Marconi Apache weapons control radar.

**ASTOR.** In mid-1994, a team consisting of GEC-Marconi, Thomson-CSF, Westinghouse, and EASAMS are reported to have bid for the Project definition phase of the ASTOR program. ASTOR is a technical demonstrator program for producing long-range battlefield surveillance radars, similar to the US JSTARS program, for the UK Army and Royal Air Force. ASTOR also includes the evaluation of Synthetic Aperture Radar (SAR) technology in this role.

**Aerospatiale.** Marconi Space Systems is producing, with cooperation from Aerospatiale, onboard software for the Ariane launcher system, and the team is also involved in the INMARSAT program.

**Alenia.** Cooperation with Alenia includes the joint development of a fly-by-wire flight control system for the AMX attack aircraft, as well as cooperation for the Eurofighter 2000 (EFA) flight control system. In addition, Marconi Radar Systems is also producing, in collaboration with Alenia, the EMPAR multifunction naval radar.

**BAe.** In June 1994, BAe and GEC-Marconi joined forces to offer a variant of the latter's Al Hakim family of precision-guided weapons to meet the Royal Air Force's requirement for a conventional stand-off missile (CASOM). The bid was to be led by BAe. However, in April 1995, the two companies parted ways in their joint development. Reports indicated that the deal fell apart because of the ongoing negotiations to merge France's Matra and BAe.

In October 1993, BAe's Dynamics Division and GEC-Marconi formed a joint venture company to manage and develop the naval Principal Anti-Air Missile System (PAAMS). The new company, UKAMS Ltd, will be equally owned and based in Bristol. PAAMS is intended to be the main armament of tri-national Common Next Generation Frigate program. Other teamings with BAe include the following: Marconi Radar Systems is participating with British Aerospace on the tracking radars for the Sapphire fire control system and the Rapier surface-to-air missile, in addition to the Alarm antiradiation missile. BAe is also teamed with GEC for the marketing of the TIALD targeting pod.

**Bell Helicopter-Textron.** GEC-Marconi and Bell Helicopter-Textron are cooperating on the development of an advanced variant of the AH-1W SuperCobra attack helicopter, called Cobra Venom, which is being offered to fulfill the British Army's requirement for such an aircraft. GEC-Marconi is acting as prime contractor in the effort to sell Cobra Venom to the British Army. GEC-Marconi is providing a "glass" cockpit and night attack avionics package for the AH-1. A contract award for the British Army attack helicopter requirement was expected in 1994. Competing firms were McDonnell Douglas with the AH-64D Longbow Apache, Eurocopter with the Tiger, and Agusta with the Mangusta.

**BGT Bodenseewerk Gerätetechnik.** Bodenseewerk Gerätetechnik is teamed with MDS for the flight control system of the Panavia Tornado strike aircraft, and with GEC Avionics for the supply of the flight control system for the EFA/Jf90. GEC Avionics production of the flight control computer for the EFA/Jf90 also involves the cooperation of Bodenseewerk Gerätetechnik and Inisel. GEC Avionics is, in addition, the supplier of the EFA/Jf90 air data transducer with cooperation from Bavaria Avionik Technologie GmbH (a subsidiary of Rogerson Aircraft Corp of the US) and Eurotronica of Italy. Finally, GEC Avionics, in cooperation with Teldix GmbH of Germany, will provide the aircraft with its fuel flowmeter.

**Boeing.** GEC-Marconi and The Boeing Company, of Seattle, Washington, have entered into an agreement to engage in marketing and business development. The current agreement covers airborne ASW systems and flight control componentry. The two firms are already closely involved in the integration of GEC systems for Boeing aircraft, including the advanced 777 twin-engine widebody commercial transport and the Lockheed/ Boeing/General Dynamics F-22 fighter.

**CAE.** CAE of Canada is teamed with Marconi Command and Control Systems (MCCS) for the development of a Harrier GR.5 simulator system.

**CIM.** Marconi Radar Systems (MRS), licenses CIM of France for the manufacturing of isolator shelters. MRS is also teamed with Thomson-CSF for the development of the EMPAR multifunction naval radar system.

**DASA/BAe.** Marconi Defense Systems (MDS), DASA, and British Aerospace are cooperating on the Advanced Medium Range Air-Air-Missile (AMRAAM), for European production and support of the program. Marconi Defense Systems is teamed with Messerschmitt-Bölkow-Blohm (now part of DASA) for the production of the KDAR anti-radar drone systems.

**EuroDASS.** MDS is a participant, along with Telefunken Systemtechnik and ENASA, INISEL, and Elettronica of Italy, in the EuroDASS (Euro-Defense Aids Sub-System) consortium for work on the electronic warfare suite for the EFA/Jf90.

**EURONAV.** GEC Avionics is a participant in EURONAV, a consortium established to develop the military NAVSTAR GPS systems.

**European Space Agency.** Marconi Space Systems is involved with the European Space Agency for the production of components for Exosat, METEOSAT, and Marecs, and design of the L-SAT.

**General Electric USA.** Ruston Gas Turbines manufactures components for the GE38 series of aero-engines. The cooperation between General Electric USA and Ruston's aero-engine operation will take place through the European Gas Turbine Company (EGTC). In early 1990, GEC Alsthom and General Electric Company USA formed the European Gas Turbine Company NV (EGTC). This joint venture company is to service the market for gas turbine power generation. EGTC, headquartered in Amsterdam, combines the turbomachinery business and technologies of Ruston Gas Turbines Ltd, Alsthom Turbines à Gaz SA, and Napier Turbochargers Ltd (the latter of which serves the diesel engine turbocharger market). GE of the USA has a 10 percent stake in the venture.

**Honeywell.** In August 1995, Honeywell and GEC-Marconi teamed to pursue the US Joint Helmet Mounted Cueing System program. The program will develop a fully integrated look and shoot helmet mounted cueing system. The system was shown on Lockheed Martin's two-seat F-16 demonstrator in 1996.

In addition, GEC Avionics is licensing Honeywell for the production of the LINS system. In addition, GEC Avionics is cooperating with McDonnell Douglas for the development of a helmet mounted display system. Rockwell has licensed GEC Avionics to undertake the marketing and license production of the GPS system for the UK. The two firms will also cooperate on the RLG navigation system, which is part of the NATO Ships Inertial Navigation System (SINS) program.

**Matra Marconi Space.** In 1990, GEC and Matra SA formed a joint space systems company, Matra Marconi Space Systems. The operation is held jointly by Matra Défense-Espace (51 percent) and Marconi Space Systems (49 percent). In 1994, Matra Marconi Space took over the space sector operations of British Aerospace, further strengthening the venture.

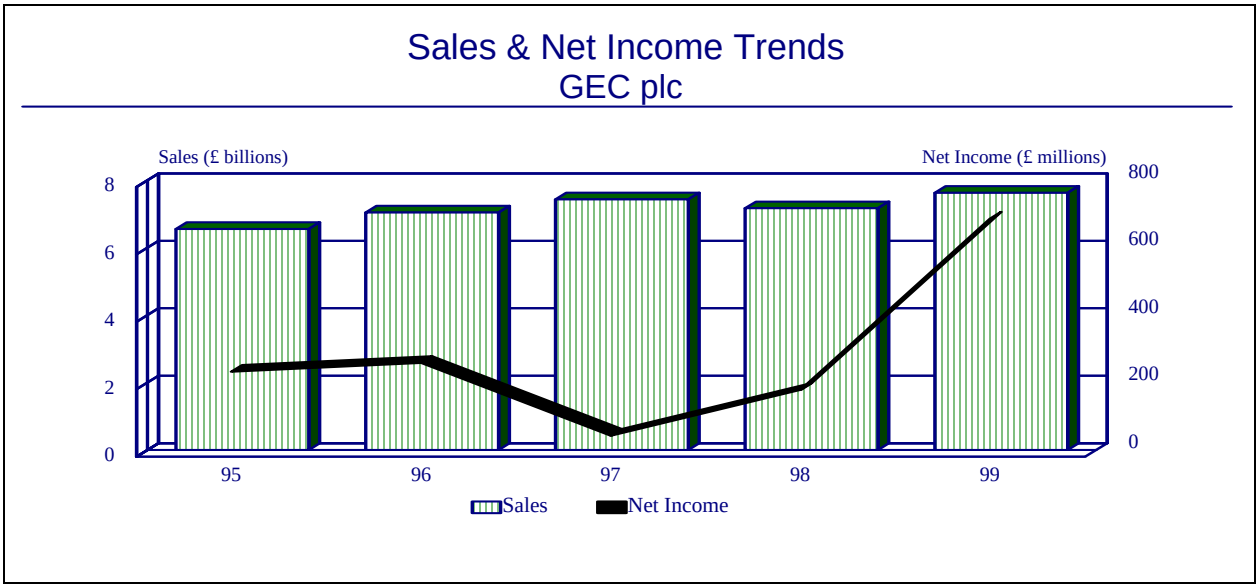
**MIDSCO Inc.** Canada, France, Germany, Italy, Norway, Spain, United Kingdom, and United States signed a Memorandum of Understanding (MoU) to undertake a Phase I study to establish program objectives and determine a potential division of labor upon approval for full-scale development of MIDS. MIDS is a multinational cooperative development program intended to produce a low-volume terminal (LVT) operationally similar to the Joint Tactical Information Distribution System Class 2 terminal. Project definition phase of the MIDS Class 2 terminal was completed by the end of FY89; it has been in demonstration and validation phase since October 1991. A consortium of electronics firms – Computing Devices International (Canada), Siemens (FRG), Thomson-CSF (France), Italtel (Italy), Inisel (Spain) and GEC's US subsidiary (then Plessey Electronics Systems) – was selected to form a new company called MIDSCO Inc to pursue full-scale development.

**RDM.** In September 1993, Vickers Shipbuilding and Engineering Ltd and RDM signed a collaborative agreement to jointly promote exports of the Upholder and Moray-class submarines to six prospective client nations. These are believed to include Canada, Chile, Malaysia and Saudi Arabia. Under the terms of this agreement, VSEL would build hull sections or other components of any Moray-class submarines sold to the target countries. The agreement also covers joint marketing of the two companies' air-independent propulsion technologies, fuel cells in the case of VSEL and CCD for RDM.

## Financial Results/Corporate Statistics

GEC's net sales for 1999 rose six percent to £7.6 billion. Net income rose to £706 million for 1999 compared to £198 million in 1998. The large rise is attributed to Alstom floatation. The lower 1997 net income figure was due to several charges taken during the year to cover the costs of restructuring. Figures below have been restated to conform to the company's latest presentation. The latest full-year statistics are given below. US dollar figure translated as a 1999 average, at the rate of £1=US$1.62.

| Y/E March 31 | 1995 | 1996 | 1997 | 1998 | 1999 | 1999 |
|---|---|---|---|---|---|---|
| (£ millions) | | | | | | **US$** |
| Sales | 6552 | 7040 | 7430 | 7165 | 7625 | 12352 |
| Net Income | 252 | 278 | 62 | 198 | 706 | 1144 |
| R&D Expenditures | 1050 | 1130 | 1100 | 1125 | 1036 | 1678 |

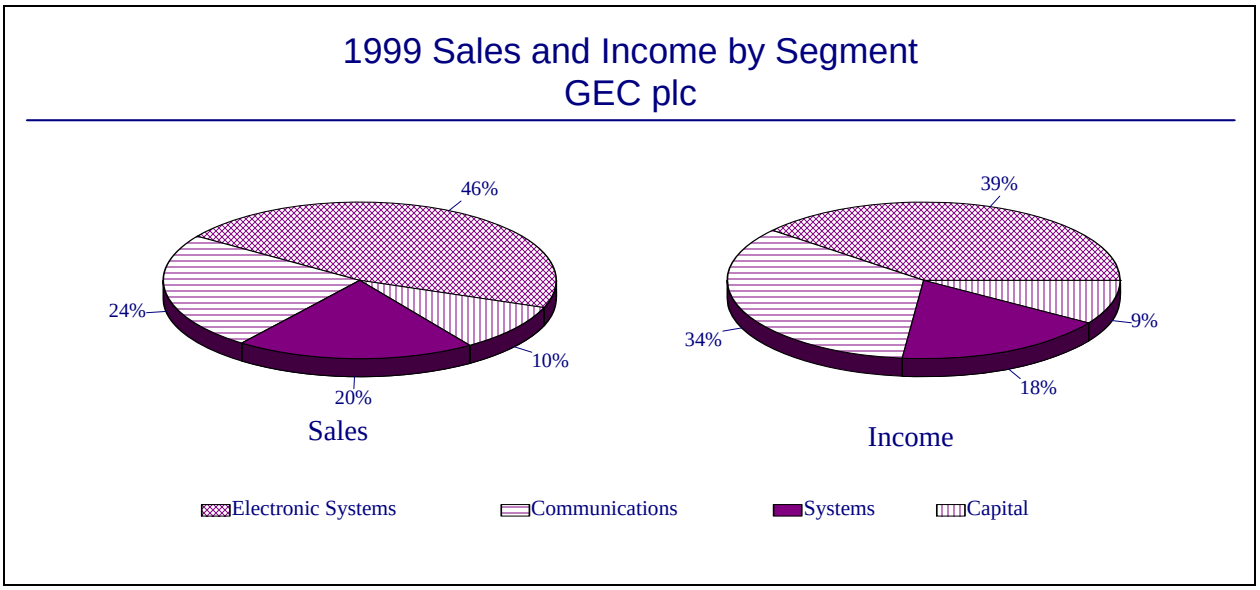



### Industry Segments

A breakdown of GEC's restated sales and profits by major market segment for the past two years is given below.

| SALES | 1998 | 1999 |
|---|---|---|
| (£ millions) | | |
| Electronic Systems | 3003 | 3535 |
| Communications | 1715 | 1858 |
| Systems | 1277 | 1501 |
| Capital | 826 | 772 |
| Other/Intersegment | -50 | -41 |

| OPERATING PROFIT | 1998 | 1999 |
|---|---|---|
| (£ millions) | | |
| Electronic Systems | 432 | 335 |
| Communications | 252 | 295 |
| Systems | 130 | 151 |
| Capital | 87 | 78 |
| Other/Intersegment | -30 | -16 |




## Strategic Outlook

In the past two years, GEC has undergone a radical transformation to become a major competitor in high growth communications markets and high technology.

During this period, a number of non-core assets have been divested and the stake in Alstom has been reduced to 24 percent through an international public offering.

The most critical move came in January 1999 when GEC announced that it would merge its aerospace and defense operations with British Aerospace (BAe). Under the $12.7 billion union, which was completed in late 1999, BAe added GEC's Marconi Electronic Systems to its current holdings, creating a defense giant that ranks third in the world, just behind Lockheed Martin and Boeing of the US, in terms of sales.

Dubbed BAE SYSTEMS, the new company's vast range of activities includes warship construction, ground and airborne radars, civil and military avionics, missile seekers, reconnaissance and targeting systems and flight computers. Perhaps most importantly, BAe gained GEC holdings in several key joint ventures, such as Alenia Marconi Systems, Matra Marconi Space, and Thomson Marconi Sonar. In addition, BAe also gained a strong foothold in the US, thanks to GEC's 1998 purchase of US-based Tracor. The addition of GEC's North American defense operations will make BAe the sixth largest defense electronics contractor in the US.

With the merger now completed, the new Marconi plc has emerged as communications and high technology group with only a negligible interest in defense. Since Marconi's defense work is now wholly owned by BAE SYSTEMS, this report will no longer be updated.

## Prime Award Summary

Information unavailable.

## Program Activity

**Business Interests.** Following the sale of Marconi Electronic Systems to BAe, GEC's aerospace and defense programs are now handled by BAE SYSTEMS. Please refer to that report for current details on former GEC programs. The following listing is for historical reference only.

## Electronic Programs

**(Airborne Electronics)**

### AAQ-13/AAQ-14 (LANTIRN)

The Low-Altitude Navigation Targeting Infrared for Night (LANTIRN) is a forward-looking infrared (FLIR) night navigation and fire control system consisting of a navigation pod (AAQ-13) and a targeting pod (AAQ-14). GEC-Marconi Avionics Inc produces heads-up displays for this system.

### ADDS

The Army Data Distribution System (ADDS) is a hybrid of the Enhanced Position Location Reporting System (EPLRS) and the Joint Tactical Information Distribution System (JTIDS). ADDS will support US Army data communications requirements in the five tactical battlefield functional areas: maneuver control, fire support, air defense, intelligence/electronic warfare, and combat service support. ADDS will also provide an automatic capability for relative navigation, identification and position reporting, and for data communications interoperability with other services and allies. GEC-Marconi Electronic Systems Corp (USA) is the prime contractor for the JTIDS Class 2M terminal.

### AMSAR

The X-band AMSAR (Airborne Multi-role Steerable Array Radar) is a next-generation, steerable, phased-array system being developed by and for the European tactical fighter market. The system is being developed by a new company GTAR (GEC-Thomson Airborne Radar). While both GEC-Marconi and Thomson-CSF had the technical expertise to develop AMSAR on their own, neither had the funding necessary for the venture. With the formation of GTAR, the developmental contract has finally been awarded by the French government, which will also oversee and administer developmental work.

### APA-172

This is an airborne command and control display system for E-2C. The APA-172's function onboard the E-2C aircraft is to provide a vital man/machine interface system. The situation display, tabular display and controls of the APA-172 allow operators to employ the entire resources of the aircraft's central digital computer. GEC-Marconi Hazeltine is the prime contractor.

### APX-111

This is an airborne combination IFF (Identification Friend or Foe) interrogator/transponder. The APX-111 is ideally suited for the F-16 or F/A-18, as limited avionics spaces on both these fighters requires the fitting of a single system to combine both interrogator and transponder capabilities. A combination transponder/interrogator is important for the air-to-air mission, as fighter pilots require positive, cooperative identification in order to engage hostile aircraft beyond visual range. GEC-Marconi Hazeltine is the prime contractor.

### ARR-78(V)

The ARR-78(V) radio receiving set, also known as the Advanced Sonobuoy Communications Link (ASCL), is designed for the operation and management of anti-submarine sonobuoys by the crew of ASW aircraft. GEC-Marconi Hazeltine is the prime contractor. Production is winding down.

### ASN-128

This is a Doppler navigation processor/display unit. The ASN-128 is the standard US Army lightweight airborne Doppler navigator. The system was designed specifically to fulfill an Army requirement as part of the Lightweight Doppler Navigational System (LDNS) competition to replace the aging ASN-64A. Production of the ASN-128, begun in 1974, is still continuing. GEC-Marconi recently introduced an updated ASN-128/G that combines the classic display, modified to incorporate Doppler and GPS navigation.

### AWARE

AWARE is a lightweight radar warning receiver intended primarily for deployment on helicopters but also suitable for marine and ground-based applications. It is tasked with providing the platform with advanced warning and unambiguous indication of hostile radar scans. GEC-Marconi Radar & Defense Systems is the prime.

### ICNIA

The Integrated Communication, Navigation, Identification Avionics (ICNIA) system is a joint services development program. Most military aircraft have numerous individual communications, navigation, and identification (CNI) equipment that, when aggregated, are becoming size, weight and cost-prohibitive. To solve these problems, the Air Force, Army and Navy are jointly developing a technology called Integrated Communication, Navigation, Identification Avionics to integrate these functions into one system. GEC-Marconi Electronic Systems Corp (USA) is a member of the TRW prime contractor team.

### Joint Tactical Information Distribution System (JTIDS) (URC-107(V)/GSQ-239)

The Joint Tactical Information Distribution System (JTIDS) is a high-capacity communications system designed to provide secure jam-resistant transfer of digital information (voice or data), position determination, and identification of units to suitably equipped terminals. GEC-Marconi Electronic Systems Corp (USA) handles production of Class 2/2H/2M terminals.

### MLS Avionics

This program covers Microwave Landing System receivers, antennas, control and display instruments. GEC-Marconi Electronic Systems Corp (USA) is the Multi-Mode Receiver (MMR) prime. The company is also teamed with AlliedSignal on Military MLS Avionics (MMLSA) Phase II development.

### Multifunctional Information Distribution System (MIDS)

MIDS is a multinational cooperative development program intended to produce a low-volume terminal (LVT) operationally similar to the Joint Tactical Information Distribution System Class 2 terminal (JTIDS, see above). It is intended to provide secure, digital, anti-jam voice communications (in real time), and can communicate beyond the line-of-sight through automatic relay techniques. MIDS is intended for use on the F/A-18 Hornet (and the European Fighter Aircraft and French Rafale). The program is designed to grow to encompass applications on helicopters, ships, and ground sites. GEC-Marconi Electronic Systems Corp (USA) is the lead contractor and member of the MIDSCO Inc consortium.

### Sky Guardian

Radar warning receiver for helicopters and fixed-wing aircraft designed to provide warning scanning and locked-on pulsed and CW radars with octantal indication of the threat direction. GEC-Marconi Radar & Defense System is the prime.

#### (ASW)

### Acoustic Search Sensors

This technology area develops improved acoustic sensors, software, and hardware for the detection of hostile submarines – both nuclear and diesel-electric – by anti-submarine warfare (ASW) platforms, with a primary focus on airborne ASW platforms. GEC-Marconi Hazeltine develops ASW Sonobuoy receivers under this program.

### GEC Acoustic Processing System

This program encompasses lightweight airborne acoustic processing equipment for airborne anti-submarine warfare. The AQS-900 series comprises receivers, advanced digital processors, and tactical displays. The AQS-901 is deployed on the BAe Nimrod MR.2 and Lockheed P-3C Orion. The AQS-902 is fitted to the Westland Sea King HAS.5, the Westland Sea King Mk.42B, the Fokker F-27 Enforcer, the Grumman S-2 Tracker, and the Atlantique ATL1. The AQS-903 is being developed for Merlin HAS.1. GEC-Marconi Avionics is the prime contractor.

### Kariwara

This is a passive towed array tasked with the detection and tracking of hostile submarines. GEC-Marconi Systems (Australia) is the prime contractor for the Full Scale Engineering development (FSED) of the Kariwara array. One prototype and two baseline trial units have been produced. The Royal Australian Navy plans to order six to eight systems for the Type 471 Collins class submarines and eight systems for the ANZAC frigates. The production run is not likely to exceed 30 Kariwara towed array sonars.

### NAUTIS

NAUTIS is a modular family of integrated naval command and control systems based upon the MUSL Nautic autonomous intelligent console. The system utilizes distributed processing with a replicated system database in each workstation updated via international-standard databus or command system highway. NAUTIS is tasked with providing a comprehensive, distributed command, control, and navigation facility for radar surveillance, target tracking, tactical navigation, and weapons assignment using a fully integrated multiprocessing system. GEC-Marconi Naval Systems is the prime contractor.

### Spearfish

Submarine-launched acoustic homing torpedo tasked with the destruction of surface ships and submarines. Spearfish is intended to supplement the Mk.24 torpedo (Tigerfish) as the Royal Navy's standard heavy torpedo for submarine launch. Primarily a sub-killer, it also has a designed capability for one-hit lethality against surface vessels up to 50,000 tons, and two-hit lethality against all targets. An initial production batch of 100 Spearfish torpedoes is now in Royal Navy service. Under the terms of the main production agreement signed with GEC-Marconi Naval Systems, some 300 production torpedoes will be supplied.

### SQQ-14(IT)

The SQQ-14(IT) is a high-frequency variable-depth sonar (VDS) used for minehunting. FIAR is prime contractor for this program. GEC-Marconi supplies the

Type 2048 route scanning sonar. The SQQ-14(IT) is a minehunting VDS with search, classification, and route survey capabilities ordered for Italy's Lerici- and Gaeta-class minehunter/sweepers. The main missions are search and classification of ground mines, with the system providing the means to deal with current and envisaged threats in waters down to 150 m in depth.

### SSQ-53

The AN/SSQ-53(V) is a passive Directional Frequency Analysis and Recording (DIFAR) sonobuoy. The SSQ-53A is manufactured under license in the UK by GEC-Marconi.

### SSQ-801 Barra

The Barra is an air-launched directional passive sonobuoy used to the detect and localize hostile submarines. The SSQ-801 Barra sonobuoy is a passive directional air-launched sonobuoy. It is designed to provide range and bearing data on submarine targets. Using two SSQ-801 Barra sonobuoys, it is possible to obtain sufficient data for the prosecution of an attack without resorting to active sonar techniques. GEC Thomson Marconi Sonar Systems produces the acoustic processor and telemetry/datalink for the system.

### SSQ-906/907

SSQ-904s (F-size) are a range of omni-directional, passive air-launched sonobuoys designed to detect and transmit underwater noise. GEC-Marconi Thomson Sonar is responsible for the manufacture of the SSQ-904 and SSQ-906/7.

### Stingray

Aircraft- or surface vessel-launched lightweight acoustic homing torpedo tasked with the destruction of submarines. GEC-Marconi Naval Systems is the prime.

### Surface Ship Torpedo Defense

The Surface Ship Torpedo Defense program develops soft and hard kill anti-torpedo weapons and counter-measures systems. This is a joint effort run by the US Navy and the UK Royal Navy. Thomson Marconi Sonar Systems is the consortium leader for US/UK SSTD Sonar 2087. This program recently completed its Demonstration and Validation phase. However, the US Navy has requested no further funding for 1998 and onward.

### Tigerfish

Submarine-launched electrically powered acoustic homing torpedo tasked with the destruction of submarines and surface ships. The Mk.24 Mod 2 Tigerfish torpedo is intended to form the basis of the Royal Navy's warstock of heavy torpedoes until the Spearfish torpedo fully enters inventory. Mk.24 Mod 2 provides submarines with a means of destroying both surface and underwater targets. GEC-Marconi Underwater Weapons is the prime.

### Torpedo 2000

Launched from submarines and fast attack craft, this heavyweight acoustic homing torpedo is tasked with the destruction of enemy surface ships and submarines. Initially, it will be deployed on the A-19 class submarines. Trials have been completed and the first order is being filled. Bofors AB and GEC-Marconi Sonar Systems are the contractors for this system.

### TSM-26XX Series Sonars

A modular range of sonar systems capable of covering all applications from patrol and fast attack craft to frigates and destroyers. The TSM-2633 was designed for deployment on small frigates and corvettes. The TSM-2640 Salmon is designed to enable fast attack craft, corvettes, and large patrol boats to detect, localize and track hostile submarines. Thomson Marconi Sonar is the prime.

### Type 195/2069

This is a helicopter-borne sonar tasked with the detection and localization of hostile submarines. Thomson Marconi Sonar Systems is the prime contractor.

### Type 2031

This is a passive towed array sonar systems designed to detect and track submarine targets. Ultra Marine Systems is prime contractor for the Type 2031(Z). Logica produces the tracking system for Type 2031(Z). GEC-Marconi Sonar Systems produced the towed array Type 2031(I) and, in conjunction with DBE Technology, the towed array Type 2031(Z). NEI Clarke Chapman produces the winch for the Type 2031(Z). The Type 2031(I) was designed for the Batch 2TA Leander frigates. The Type 2031(Z) was installed on Type 22 Batch 2 and Batch 3 frigates and is in the process of being installed on the Type 23.

### Type 2050

The Type 2050 is a hull-mounted active/passive panoramic surveillance and attack sonar with automatic detection and tracking facilities. It features classification and multiple target tracking facilities. The Type 2050 system has been installed on the Leander-class frigates (Batch 3A conversion) HMS *Jupiter* and HMS *Scylla* for trials. It is installed as new equipment on Type 23 frigates. The Type 2050 is being retrofitted on Type 22 Batch 3 frigates. Thomson Marconi Sonar is the prime.

### Type 2051

The Type 2051 active/passive sonar was retrofitted to the nine Oberon-class patrol submarines of the Royal Navy and three serving with the Canadian Navy.

### Type 2054

This is a submarine passive/active sonar system tasked with detection and tracking of hostile submarines and surface ships. The Type 2054 has been designed as an integrated multifunction sonar system for the Royal Navy's Vanguard class ballistic missile submarines. The systems will be critical to the tactical weapons suite of the Vanguard-class Trident boats, enabling them to carry out their mission undetected, and, if called upon to do so, make full and effective use of long-range ASW torpedoes. Ferranti-Thomson Sonar Systems provides the data processing and display functions, the former Ameeco Hydrospace provides the towed array wet end, STC the cabling and handling gear. Thomson Marconi Sonar has the passive suite/signal processing, the active sonar and its associated signal processing. The system is in production.

### Type 2087

This is a new integrated sonar suite for surface ships. The Type 2087 sonar suite will equip the Type 23 frigate and, in modified form, Project Horizon, the Anglo-Italian-French Common Next Generation Frigate. Three teams are competing for the program. A team led by Thomson-Marconi Sonar Systems will be prime contractor and system design authority responsible for inboard systems design. This team also incorporates Thomson-Sintra ASM and will supply the outboard systems design work previously assigned to that entity. Yarrow Shipbuilders will undertake ship fitting, and environmental and safety aspects, while GECO Defense will undertake the data processing side.

### Type 2093

These are hull-mounted and variable depth minehunting and classification sonars. The Type 2093 was developed to detect and classify all forms of underwater mines, including self-propelled mines, which are often located at greater depths and defeat detection by hull-mounted systems such as Type 193 and 193M. Thomson Marconi Sonar is the prime contractor on Types 2093, 193M and 193.

## (C³I)

### Bowman

This is a man-portable and vehicle-mounted combat-net radio, which will provide a replacement for the existing Clansman combat net radio used by the British Army. GEC-Marconi Radar and Control Systems is a member of the Crossbow consortium which is competing for this program. GEC-Marconi will provide the User Data Terminal for the overall system package.

### FAADS C²I

This is the Forward Area Air Defense System Command, Control and Intelligence system. The FAADS program will result in automation of the Army's (currently) manual control Division Air Defense capability; the program is specifically aimed at countering the low-altitude air threat over and beyond divisional areas of operation. The $C^2I$ portion will be a computerized system that automatically detects and identifies aircraft entering Army division sectors, then supplies aircraft tracking and targeting data to FAAD battalions and their fire units. GEC-Marconi Electronic Systems (USA) is working on the $C^2I$ test-bed program, including JTIDS Ada system, Host Interface Unit, display computer, and graphics display.

### Global Broadcasting Service (GBS)

The Global Broadcasting Service (GBS) will provide a high-speed, one-way information flow of high-volume data to commanders in the field (including aircraft cockpits, ships and manned/unmanned vehicles) of all US services, using a commercial 18-inch satellite dish. GEC-Marconi Communications is working on the GBS testbed and RF communications portions of this system.

### Ptarmigan/MRS

Ptarmigan is a second-generation battlefield automated tactical communications system intended to replace the existing Bruin tactical communications system and improve battlefield communications dependability, capacity and interoperability. Prime contractor and system design is the responsibility of Plessey Defense Systems. Triffid radio relay equipment is being built by GEC-Marconi Communications Systems. The static subset equipment and SHF radio relay is produced by STC Defense Systems. UHF radio relay combat net radio interface and cryptographic equipment is the responsibility of GEC-Marconi Communications Systems. SD has received development and production contracts for FAME and CNRMIS. Airtech Ltd is responsible for vehicle fitment program; BICC General Cables Ltd for cables and cable accessories; C&S Antennas Ltd for radio relay antennas; Marshall of

Cambridge (Engineering) Ltd for vehicular shelters for Ptarmigan; and Membrain Ltd for automatic test equipment.

### RTADS

The Royal Thai Air Defense System (RTADS) is an integrated air-defense command and control system designed to provide early warning of possibly hostile aircraft intruding into Thai airspace. It can order interceptors to meet such intruders within a reaction time of four minutes. Unisys is prime contractor. Contel-Federal Systems provides long-haul communications, Hazeltine the displays, Eaton AIL the radar data extraction, Metcalf and Eddy architectural engineering, and Yip In Tsoi in-country services. Westinghouse produces the TPS-43 and TPS-70 radars, General Electric the FPS-117, and Sanders Associates the LLADS. Denro Inc was subcontracted to provide the communications switching equipment for the operations consoles. GEC Marconi produces the Marconi Martello radars, and CEIEC the JY8 radars.

### Scimitar

Scimitar is a man-portable and vehicle-mounted HF/VHF frequency agile combat-net radio. The Scimitar family of radio communications equipment was designed to provide a secure combat net communications system, including a frequency-agile option for use in ECM-intensive environments. Variants of the basic system are suitable for vehicle installations or as man-portable units. The three members of the Scimitar family are: Scimitar H (HF radio); Scimitar M (VHF pocket-sized radio); and Scimitar V (VHF man-pack or vehicle radio). GEC-Marconi Communications Systems is the prime.

#### (Electronic Warfare)

### Apollo

This is an internally mounted, conformal or pod-mounted airborne electronic countermeasures system/ support measures system. The system provides an internal, conformal or pod-mounted modular ECM system for suitable strike aircraft capable of intercepting, identifying, and jamming a variety of threats including search, fire control, gun control and airborne intercept radars. GEC-Marconi Radar & Defense Systems is the prime.

### Hermes

Hermes is an airborne electronic support measures system tasked with gathering information on electronic emissions, analyzing that data to isolate hostile systems and passing the appropriate information to weapons systems control. The system is designed to meet a wide variety of ESM requirements and can be made available in naval or land-based configurations. GEC-Marconi Radar & Defense Systems is the prime.

### Monarch

This is an electronic warfare system for deployment on battlefield reconnaissance drones. GEC-Marconi Radar and Defence Systems is the prime.

### Outfit DLH

Expendable radiating decoy system tasked with providing platform protection by seducing inbound radar homing missiles using a lightweight, low-power expendable jammer. Also known as Siren, this is a naval offboard decoy system, developed to counter threats from anti-ship missiles. It is a point defense last-ditch system intended to seduce inbound missiles on a one missile/one decoy basis. GEC-Marconi Radar & Defense Systems is the prime.

### Sea Gnat

A family of standardized NATO anti-ship missile defense decoys, which use reflective radar and emissive infrared. GEC-Marconi is producing chaff rockets under this program.

### Shield

This is an anti-ship missile decoy dispenser system providing a layered defense against IR and radar homing missiles. Shield is a multipurpose missile decoy system using both chaff and infrared flares to provide attractive decoys to counter IR, radar or hybrid seeker missiles. GEC-Marconi Radar & Defense Systems is the prime.

### Sky Guardian

This is a radar warning receiver for helicopters and fixed-wing aircraft designed to provide warning scanning, locked-on pulse and CW radars with octantal indication of the threat direction. GEC-Marconi Defence Systems is the prime. Sky Guardian is suitable for installation on any fixed-wing aircraft or helicopter.

### Sky Shadow

This is a pod-mounted modular jamming system providing defensive jamming against sophisticated threat environments. The Sky Shadow ECM pod was developed during the early-1970s to provide an up-to-date ECM capability for the Tornado GR.1 strike aircraft of the British Royal Air Force. GEC-Marconi Radar & Defense Systems is the prime.

### Zeus

This is a fully integrated internal ECM system comprising radar warner and multimode jammer. Zeus was designed to provide an internal modularized ECM system for Harrier and other suitable aircraft capable of intercepting, identifying, and jamming a variety of

threats, including search, fire control, gun control, and airborne intercept radars. It is also capable of initiating and controlling decoy release. Zeus was developed as a concept by GEC-Marconi Radar & Defense Systems with some aspects of engineering undertaken in cooperation with Northrop in the USA. This system is in production and service.

**(Land & Sea-Based Electronics)**

### TPN-30

This is a transportable, all weather instrument landing system. The TPN-30 is also called the Marine Remote Area Approach and Landing System (MRAALS). GEC-Marconi Electronic Systems (USA) is responsible for TPN-30 development/production/mod kits.

**(Radar)**

### ASTOR

The Airborne Stand-Off Radar (ASTOR) is a technical demonstrator program for producing long-range battlefield-surveillance radars for the UK Army and Royal Air Force. It is also tasked with the evaluation of Synthetic Aperture Radar (SAR) technology in this role. Two teams have received parallel contracts for project definition studies. GEC Marconi Avionics is a member of the Raytheon E-Systems team working as a subcontractor to Hughes Radar Systems The ASTOR program is intended to provide Corps Commanders with primary intelligence in and beyond the immediate battle area. The primary tactical role of ASTOR will be to deny surprise to an enemy and to assist in the organization of effective defenses in threatened areas.

### Blue Kestrel

This is a multimode, I-band, medium-weight naval helicopter surface surveillance radar for anti-surface vessels, anti-submarine warfare, over-the-horizon targeting of surface-to-surface missiles, search and rescue work, and for general navigation. It is intended to act as part of an autonomous weapons system rather than as a remote sensor for shipborne ASW weapons. GEC-Marconi Avionics is responsible for this program which is in advanced development.

### Blue Vixen

This is a Pulse Doppler airborne radar for maritime fighter, reconnaissance, and strike aircraft. The Blue Vixen radar will be the prime sensor aboard Royal Navy F/A.2 (Fighter/Attack) Sea Harrier. It is a multimode radar intended to provide air-to-air and air-to-surface surveillance, target acquisition, and engagement facilities. GEC-Marconi Avionics Ltd is the prime contractor, with Ericsson Radio Systems AB as subcontractor. Ericsson's involvement with Blue Vixen is restricted to certain subsystem development, including parts of the antenna and the electronics systems.

### ECR-90C

This is a multimode pulse Doppler radar tasked with air-to-air and air-to-ground combat. The ECR (European Common Radar) -90 radar will be the primary sensor aboard EFA and will be especially tailored to air defense. It will also be compatible with the secondary mission of air-to-surface attack. GEC-Marconi is responsible for the antenna, receiver and data processor.

### EMPAR

EMPAR is a multimode phased-array naval radar intended to provide future air defense ships with air surveillance, target indication, target illumination and missile tracking functions combined within a single mast-head sensor. EMPAR will equip future air defense warships of the Royal Navy, French Navy and Italian Navy. A total of at least 22 radars would be required to equip 12 British, four French and six Italian Project Horizon Common New Generation Frigates. GEC-Marconi Radar is involved in this program.

### Jindalee

This is a strategic over-the-horizon backscatter (OTH-B) radar designed to provide the Australian mainland with early warning of hostile air movements, particularly from the north, and to provide control of air defenses in that region. GEC-Marconi Communications Systems is one of several contractors involved with this project.

### Martello

This is a NATO class I 3-D D-band radar tasked with long-range Air Defense Ground Environment (ADGE). surveillance. Martello S-713 is a long-range 3-D ADGE surveillance radar. It was specifically tailored to RAF requirements as an element within the IUKADGE system. Martello S-723 is a long-range 3-D ADGE surveillance radar of the NATO class I type. The radars can be installed in transportable or static modes. GEC-Marconi Radar Systems is the prime.

### S 1800 Series

Lightweight naval radars designed to act as dedicated weapons system trackers (ST1802, 1802SW) and lightweight surveillance radars (S1810, S1820, S1821, S1822) for small to medium warship applications. Production of S1820 is by Marconi Radar & Defense Systems Ltd and Canadian Marconi Co. Production of twisted cassegrain antenna for ST1802 and 1802SW radars is by Ericsson Radar Electronics AB.

### Seaspray

Seaspray is an I-band multimode, lightweight naval helicopter radar system. Seaspray Mk.1 was designed to detect and track surface targets and provide continuous wave (CW) guidance for air-to-surface missiles. Seaspray has also been designed to provide Over-The-Horizon Targeting (OTH-T) facilities. Seaspray Mk.2/3 has similar capabilities and enhanced performance. GEC-Marconi Avionics is the prime.

### Skyranger

This is an I-band airborne ranging radar designed to provide high-accuracy range and range rate information for both gun and missile armaments. Approximately 284 Skyranger radars were produced in the UK before main production switched to China in 1991. GEC-Marconi Avionics was the prime.

## Missile Programs

### ASTER 15/ASTER 30 (SA-90/SAN-90, SAAM/SAMP, SYRINX, FAAMS, FSAF)

These are multiplatform, surface-to-air missile systems. The United Kingdom joined the FSAF, represented by British Aerospace Dynamics and GEC Marconi Radar Systems, and has formed UKAMS Limited to manage its part of the PAAMS project. PAAMS will be developed by the joint firm EuroPAAMS, which includes Eurosam.

### Blowpipe/Javelin

These are portable anti-aircraft missiles developed and manufactured by Short Brothers Ltd. Blowpipe is in service with at least eight customers, but production has been concluded. The system is said to be available for production to fill export orders. The serial production of the Javelin has also been completed. The missile has been replaced in operational service with the United Kingdom by the Starburst. However, the Javelin remains in service with at least two overseas nations. Javelin entered service with the British Army in the winter of 1984-85. GEC-Marconi Avionics provided the system's TV tracking equipment.

### MICA

MICA is a configurable short-, medium- and long-range air-to-air missile, under development by Matra-Hachette SA, France, prime contractor on the MICA program. Matra and GEC-Marconi have asked former Matra-Marconi Espace to market the MICASRAAM to the United Kingdom. MICA is transitioning to full-scale production.

### PARS-3/TRIGAT (ATGW3/MR, ATGW3/LR, AC3G)

This is a third-generation, anti-tank missile system for medium- and long-range applications on helicopter and land vehicles. The two missiles are designated TRIGAT-MR (Medium-Range) and TRIGAT-LR (Long-Range). The system is also known in Germany as the PARS-3 (Panzerabwehr Raketensystem 3 or anti-tank, rocket weapon system - third generation), in the United Kingdom as ATGW3, and in France as AC3G. Missiles are being developed by the Euromissile Dynamics Group (EMDG), composed of Aerospatiale S.N.I., Paris, France; British Aerospace, London, England; and DaimlerChrysler Aerospace, Munich, Federal Republic of Germany. France is responsible for the development of the medium-range system, while the United Kingdom and the Federal Republic are working on the long-range variant. The laser beam-riding guidance subsystem in the MR missile is being developed by the TGZ consortium (TRT, GEC Avionics and Zeiss), with the laser itself provided by SFENA and Ferranti Industrial Electronics.

### Rapier/Tracked Rapier

Rapier is a surface-to-air, platform, towed or vehicle-based, low-level, anti-aircraft missile, developed by British Aerospace Guided Weapons Division in conjunction with Marconi Space and Defense Systems. GEC Avionics provides Class II common modules for the system. Rapier is in production to meet both domestic and export sales.

### Seawolf (GWS 25/26/27)/Landwolf

This a quick-reaction, short-range, supersonic, anti-missile and anti-aircraft missile developed by British Aerospace Dynamics Group and Marconi Radar Systems. The missile's electro-optic system is produced by Marconi-Elliott and GEC Avionics Ltd.

### UK Medium Surface-to-Air Missile

This is a medium-range surface-to-air missile system. No specific contractor has been selected. The competitive UK MSAM teams are lead by: British Aerospace Dynamics and Raytheon Company; Hughes Aircraft Company, Siemens-Plessey, and NFT; and GEC-Marconi Dynamics Ltd and Eurosam GIE. The winner of this competition will also be required to integrate it with the Improved UK Air Defence Ground Environment (IUKADGE) command and control system. Bidders are being examined, although the United Kingdom has decided to defer the MSAM program. The program is likely to be revived in the future but with a greater emphasis on anti-tactical ballistic missile operations.

## Ordnance Programs

### Artillery System 90

In 1984, VSEL's market research indicated that a specially built chassis, optimized for the 155mm self-

propelled gun role and integrated with an enhanced variant of the GBT 155 turret, had a good deal of potential through the turn of the century: in fact, the study showed a potential of 3,500 units, a good deal of them replacements for the M109. The Artillery System 90 is a modular system, designed to be easily upgraded with new technology as needed; artillery systems tend to remain in operational service somewhat longer than other weapons. The Artillery System 90 was also designed for ease of manufacture, maintenance and operation; standard off-the-shelf components are widely used. The initial prototype testing and evaluation has been completed; production for the British Army has ended.

### FH 155-1 (FH-70) 155 mm Howitzer

During the early 1960s, the Federal Republic of Germany, United Kingdom and United States agreed that a requirement existed for a new 155 millimeter field howitzer for the 1970s and beyond. Germany and the United States wanted to replace their operational M114 howitzers, and the British, their 5.5 inch guns. The Germans and British agreed to jointly develop a weapon – originally designated FH-70 (Field Howitzer 1970) – with an auxiliary power unit. Because of a United States Army doctrine demanding air-portability of towed artillery, the United States decided to pursue the development of its indigenous M198 155-millimeter piece. In Western Europe, due to the extensive European road network and the number of towing vehicles available, the doctrine was considered unnecessary.

Vickers Shipbuilding and Engineering has developed a new ammunition hoist system that greatly eases the handling of the 155 millimeter projectiles. The hoist system is suspended from a steel joist gantry that is mounted on the right side of the carriage, forward of the breech mechanism. This device is offered as an option to new-production FH 155-1 systems or as a retrofit to existing pieces. Production is currently dormant.

### Lightweight Indirect Fire Support Weapon

### British Light 155 Requirement

This is an enhanced-design artillery system. In March 1997, VSEL was awarded a contract for production of its lightweight 155mm howitzer as part of a joint requirement for the US Army and Marines. The potential total program value is in excess of $1 billion.

## Space System Programs

GEC's involvement in Space System Programs is carried out through Matra Marconi Space Systems, which is 49 percent owned by GEC and 51 percent owned by Matra Hachette. Details on this joint venture's programs are detailed in the Lagardere report located elsewhere in this binder.

## Unmanned Vehicle Programs

### Phoenix

Phoenix is a tactical reconnaissance remotely piloted vehicle system designed for target acquisition and designation in any weather, out to 50 kilometer (26.99 nautical mile) range. Phoenix will be produced by GEC Avionics Ltd and Flight Refuelling Ltd, and will replace the Canadair CL-89 reconnaissance drone. GEC-Marconi Command and Control Systems is also involved in this development program. Though Phoenix full-scale development has been completed, initial operating capability has been delayed. Air vehicle development is essentially complete, with testing focusing on the integration of the ground control station. Performance problems persist, especially with the datalink and the amount of damage the air vehicle sustains upon recovery. Though it considered cancellation, the UK government decided to give Phoenix one last chance. The Phoenix could have entered service with the UK military in 1998, some nine years behind original estimates. The Phoenix was accepted in 1994, but was not placed in operational service. GEC Avionics has completed development of a new UAV design concept called Frigate Bird.

### Skyeye R4e

Multiple mission remotely piloted vehicle designed for technology demonstration and research, although the US Army and several other unspecified US agencies use the R4 for surveillance or reconnaissance missions. Other classified "high tech" missions are also probable. The vehicles exported are being used for tactical reconnaissance and surveillance. Skyeye was developed and is being produced by GEC Avionics Ltd.

## Warship Programs

### Albion Class LPD

Landing platform dock for the transport of heavy armored vehicles and personnel in amphibious operations. The two ships will replace the existing pair of British Navy LPDs: HMS *Fearless* and HMS *Intrepid*. Effectively anglicized versions of the US Navy's Raleigh class LPDs, they are tasked with transporting personnel and heavy equipment and with landing that equipment into contested beachheads.

### Project Horizon (CNGF)

The Common New Generation Frigate (CNGF) is a large multirole destroyer which will have an AAW orientation, but will also have full ASW and ASuW capabilities. Contractors to oversee the design of the

new frigate were appointed in early 1994. In France and Italy, because only Fincantieri and DCN International had the required expertise, these appointments were a foregone conclusion. In the UK, in a competition for prime contractor, teams led by GEC-Marconi and VSEL entered bids. In February 1994, GEC-Marconi Naval Systems was appointed as prime for the British side of the Project Horizon program. This consortium then joined with DCN International and Fincantieri to form the International Joint Venture Company (IJVC) which would manage the program under contract from the Joint Project Office. The CNGF (Project Horizon) is currently in the project definition study phase.

## Ocean Class LPH

This is an air-capable ship tasked with supporting amphibious operations. On May 11, 1993, VSEL plc was awarded a US$245 million order for the new Royal Navy LPH. The contract was awarded to VSEL in partnership with Kvaerner Govan, after a tightly fought contest with the rival Swan Hunter Shipyards. The deciding factor for awarding the contract to VSEL was that its bid was some US$75 million lower than Swan Hunter's. The difference was so marked that the time allowed for bid evaluation could be drastically reduced and the ship was ordered six months earlier than originally intended. The VSEL/Kvaerner Govan bid was also more compliant with Royal Navy specifications. Although its design uses the basic hull form of the Invincible class carriers, it will be built to merchant-ship standards and will effectively be a large merchant ship with a flight deck and naval features added on. The Swan Hunter proposal was to be built to warship standards and would, thus, have had much more limited internal capacity, although the ship would have been substantially more battleworthy. The ship entered service in 1998.

## Trafalgar Class

This submarine class is part of the Royal Navy's buildup of its nuclear-powered attack-submarine forces. They are an outgrowth of the preceding Swiftsure class, but with greater speed and endurance, improved sensors, and anechoic tile coating. To date, VSEL has delivered seven submarines. Following the completion of these boats, the UK and France initiated a joint submarine design. This new class, the Batch 2 Trafalgar, will enter service in the next decade. To ensure that the SSN fleet remains at complement, the RN will build approximately four to six more of this class, in a new and enlarged design. Modernization of the Trafalgar class was begun in the early 1990s, and includes the retrofit of the Type 1007 radar and the Type 2046 processing system (as well as the Type 2046 towed array in some cases). In addition, the command and control system are expected to be upgraded.

## Vanguard Class SSBN

Like the earlier Polaris program, this program is a smaller copy of the United States' submarine-launched ballistic missile program. The Vanguard class provides the United Kingdom with its strategic deterrent force. Four submarines of this class have been ordered – all of which will be produced by VSEL. In April 1986, the MoD placed an order with VSEL for HMS *Vanguard*, the first Trident submarine. The US$1 billion contract would give VSEL up to 125 percent of the costs of a canceled submarine, depending on the company's assessed liability at the time. The keel of HMS *Vanguard* was laid down on September 3, 1986. The order for the second Vanguard class submarine, HMS *Victorious*, was placed in July 1987, and its keel was laid down on December 3, 1987. In November 1990, the third submarine of the class, HMS *Vigilant,* was ordered, followed, in November 1992, by the fourth and final Trident submarine, HMS *Vengeance*. Work had already started on this boat in anticipation of the order, some estimates indicating that up to 25 percent of the hull steelwork had been fabricated. HMS *Vengrance* is entering service in 1999.

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