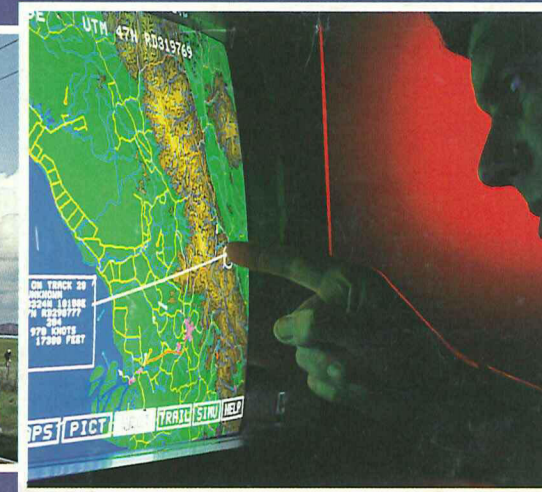


S&C

REVIEW OF OPERATIONS



1983

Highlights

HOW 1983 COMPARED WITH 1982

GROUP TURNOVER

EXPORTS FROM UK

EXPORT ORDERS BOOKED IN THE YEAR

PROFIT MADE BEFORE TAX

UK AND OVERSEAS TAX LIABILITY ON PROFITS

AVERAGE NUMBER OF EMPLOYEES

THEIR EMPLOYMENT COSTS

NUMBER OF SHAREHOLDERS

COST OF THEIR DIVIDENDS

EARNINGS PER SHARE

DIVIDEND PER SHARE

1983

£ million

5,456

1,142

1,463

670

270

178,061

1,545

159,984

82

14.2p

3.00p

1982

£ million

4,949

1,097

1,678

584

219

188,802

1,411

153,103

70

13.0p

2.55p

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Industrial
Electronics, Automation & Telecommunications
Components, Cables and Wire
Consumer

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Overseas Companies
Associated Companies
Research
Reporting to Shareholders and Employees
Encouraging our people ...
... and making the best of our technology

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A new Northampton landmark, visible for miles, is the test tower built by The Express Lift Company. At 420-feet it is one of the highest and most advanced in the world, enabling Express Lift to develop and prove sophisticated equipment. The new tower was opened by Her Majesty The Queen when she visited Express Lift's Abbey works.

Chairman's Statement



Lord Carrington

LORD NELSON became Chairman of GEC at the time of the merger with English Electric and has presided over the Company's affairs for the last fourteen years with great distinction. It has been a period of vigorous growth and outstanding success in the face of unhelpful economic conditions. The Company has been very lucky to have his wise leadership and calm presence over these years. It will not be an easy task for his successor to fill his place.

The day I was appointed Chairman by the Board I was in Asia visiting GEC Bangladesh and some of our important customers in that part of the world. Over the nine months I have worked in the Group, it has been a cheering experience to visit many GEC places of business, to get to know some of our people and their products, and, of course, to find out something about the customers on whom we depend.

GEC will be celebrating its centenary in the not too distant future, but there is no suggestion of old age in the attitude of those who work in the Company or of failing initiative or enthusiasm or energy; quite the contrary. The results show that we can take on the best of the competition at home and overseas. Coming from outside industry, I have been much impressed by the sense of realism of those in the Company and what is necessary for us all to do to maintain its place in the world.

Over the last two decades, GEC has played a major rôle in the reconstruction and rehabilitation of the British electrical industry. The results have been beneficial not just to the Company, but also to industry and the country. But success has in no way bred complacency, and it is particularly noticeable how the objective throughout is to do things better, more efficiently and more cheaply.

Rapid technological advances are being made in our industry; last year, GEC invested £206 million in new plant, equipment and buildings, and spent £530 million on research and development and engineering of new products. The Group also continued to make provision in recruitment and training for advancing the skills we require in the very sophisticated sectors in which we work; last year, £49 million was spent on education and training. Unemployment is a continuing national concern, particularly for the young and the educationally or otherwise disadvantaged, and for those who live in parts of Britain where technological change compounds the problem. We are supporting and encouraging a range of training and other projects to help those in the places most hard hit.

The Company's substantial cash reserves are there primarily to support our widespread operations and forward commitments. So far as acquisitions are concerned, I am sure that our policy to wait for the right opportunities for growth by this means is correct. Equally, we shall

have to continue to invest in the updating and expansion of our existing businesses.

Under the economic system of our country, it is the private sector of industry, and not the Government, to which we look to generate wealth and thereby to increase prosperity. The private sector can best do this when it is encouraged and not handicapped by Government action. For although governments cannot themselves create wealth, they can certainly frustrate its generation.

We must always remember that Britain depends to an exceptional degree on its overseas trade for the maintenance of living standards of all the people. We cannot maintain and increase our export business, and thereby the prosperity of our country, if we are placed at a disadvantage in relation to our competitors. It is a fact of life, whether we like it or not, that trade in capital goods is to a considerable extent financed by aid, soft loans and guarantees on favourable terms. Of course, GEC can, and does, compete with its rivals abroad and its success is a matter of satisfaction. But no company on its own can win an unequal battle against competitors heavily supported by governments; until such time as there is more effective international agreement and regulation in this field, the Government would be most unwise to allow British firms to be placed at a disadvantage in relation to their foreign competitors.

Besides assistance in financing, our major foreign competitors get indispensable help for their export business through secure and profitable sales to utilities and public authorities in their home markets. This is how major research and development costs are funded, and working models, "proven in service", are made available to give confidence to foreign buyers. We enjoy good relations with the UK nationalised industries, but some of them have been able to order little new plant in recent years, with fierce competition for the few

orders available. Now there are indications that our domestic markets are to be increasingly opened to more overseas firms who, enjoying stable conditions at home, will undoubtedly offer prices which they certainly would regard as uneconomic in their indigenous markets. No equivalent, nor near equivalent opportunities are available to UK suppliers to sell into the countries from which these imports are coming. We trust that in looking at purchasing policies, the Government and the national monopoly industries will take a long-term view about the benefit to the economy of maintaining healthy and sound domestic firms able to supply up-to-date products, which implies that they will play their rôle in providing a show place for "made in Britain" equipment which UK manufacturers can demonstrate to export buyers.

As a Group with important investments and business in other Common Market countries, we welcome the end of uncertainty about continued UK membership of the community. We intend to continue to develop the opportunities flowing from this in Europe and in overseas countries.

So we look forward with confidence to the future of the Group. Very tough decisions have had to be taken in the past, and world trading conditions are certain to remain very difficult for some time to come. GEC is in good heart, and I am greatly encouraged by the determination at all levels in the Group to tackle successfully whatever tasks lie ahead. In the year, we have said goodbye to J. W. H. Morgan and W. D. Morton; two directors with long and loyal service to the Company who played important rôles at the time of our mergers and subsequently. Sir Robert Clayton is not standing for re-election as a director after a life time of dedicated work for the Company in the technical field; but the benefit of his ability will not be completely lost to us, as he has accepted a consultancy arrangement.

Power Engineering

Turnover in turbine generators was little changed on the year. Higher sales of switchgear and power transformers more than offset a fall in the rate of deliveries of large gas turbines and completions of energy systems.

Although orders from overseas did not match the record intake of the previous year, the export order book was ten per cent higher at the year end; home orders outstanding rose only marginally.

Most units, and especially turbine generators and switchgear, produced better profits, which offset the downturn in large gas turbines and distribution transformers.

GEC Turbine Generators Ltd had another good year, obtaining several important orders and making good progress on existing contracts. At home, further units were commissioned at Littlebrook, Isle of Grain and Kilroot, and all have given high availability. The contract for the proposed Sizewell Nuclear Project was obtained; initially the contract is for design only, but providing the project is approved, the supply contract will become effective. Overseas, new units were commissioned in Hong Kong, South Africa, Korea and USA. During the year, the Electricity Supply Commission of South Africa entered into a contract for six 600/700MW turbine generators for the Majuba power station. A contract for the two 500MW turbine generators for the Rihand power station for the National Thermal Power Corporation in India was also recorded. The order book at year end exceeded £1,400 million, almost 90 per cent for export.

PERFORMANCE

	1983	1982
Turnover	£604m	£589m
Export Sales	£370m	£355m
Export Orders	£514m	£857m
Profits	£66m	£59m

A 3 MW packaged generating set for the Soviet Union's Urengoy gas pipeline almost ready for departure from Ruston Gas Turbines, Lincoln. It is one of 67 sets supplied by Ruston and they will operate at sub-zero temperatures down to -60°C. The set is being lifted by a new crane incorporating a light emitting diode display showing the weight, which is required for shipping purposes. This crane is part of the modern equipment in Ruston's new packaging facility.



The interior of the vacuum vessel of the Joint European Torus (JET), one of the world's largest fusion experiments. GEC Energy Systems of Whetstone, Leicester has been responsible for the main assembly of JET.

Situated at Culham in Oxfordshire, JET is the largest single project in the fusion research programme of the European Atomic Energy Community (EURATOM) and is directed towards establishing the feasibility of nuclear fusion as a new energy source. GEC Energy Systems was responsible for the assembly of components, which were manufactured throughout Europe, and the work was completed on time. Some components were built into larger units by GEC in an assembly area adjacent to the Torus hall. The seven-year EURATOM experiment began in June 1983 and GEC Energy Systems has been retained to provide additional services for this programme.

shipped, and more orders have been taken and production volume is being increased.

Napier Turbochargers Ltd again achieved higher export orders in a generally static market. Continued investment in product and process technology resulted in the release of high performance models suited to the new generation of fuel-efficient engines. These products have been evaluated favourably by the world's leading engine designers.

GEC High Voltage Switchgear Ltd obtained useful orders for its SF6 gas-insulated switchgear, being particularly successful in Africa, the Middle East and South America. Its competitive position has been aided by the encouragement and involvement of employees in contributing to cost saving ideas. Factory output has risen and unit costs have been lowered. At home, good progress was made in the manufacture of the 420kV gas-insulated switchgear for the substation to connect the 2000MW hvdc cross channel terminal with the UK supergrid.

GEC Distribution Switchgear Ltd had a better year due to the successful introduction of a new range of vacuum switchgear. This included 11kV vertically mounted gear which has been well received in both home and export markets, and 36kV vacuum equipment installed with many Area Boards. The new 11kV horizontally mounted vacuum switchgear is expected further to increase export market penetration.

GEC Gas Turbines Ltd's business suffered due to cut backs in the oil and gas industry and reduced worldwide demand for peak lopping generator sets. The first phase of the 90MW combined cycle power station in Bangladesh was successfully completed. An order was received for three 10,000 kW generating sets from Hyundai Heavy Industries of Korea for a water injection platform offshore Bombay, and another from Proctor and Gamble for a 21,000 kW combined heat and power unit for its plant in Sacramento, California.

Ruston Gas Turbines Ltd again increased sales. Further improvements were achieved in productivity as a result of cost reductions and the results were consequently satisfactory in spite of difficult market conditions. All gas turbines produced were for export or North Sea. Deliveries were made to 21 countries, including most of the 67 Ruston TB5000 generating sets with GEC generators for the Siberian gas pipeline and 10 compressor and generating sets for Australia, both new market penetrations. The first new Tornado 8500hp gas turbines were



GEC Transmission and Distribution Projects Ltd was formed during the year, bringing together the projects activities of the Power Transmission Division with the business of GEC Rectifiers Ltd. There has been an encouraging improvement in orders received, with two large orders from overseas for equipment for a zinc production plant and paper processing plant. Substation equipments for rapid transit systems are being commissioned in Boston, Chicago and Philadelphia. Recently, two further large orders for traction substations were received from USA and Brazil. Work has started on an order for 26 power conditioning units to be installed in Canadian-built light rail vehicles, and similar equipment is being commissioned for the Maglev people mover project at Birmingham Airport. Work is progressing satisfactorily on a substantial contract for the converter station being constructed at Sellindge for the cross channel hvdc link. Export orders were won for ac transmission system compensators for Paraguay and Western Australia.

GEC Installation Equipment Ltd was formed, integrating the businesses of GEC Fusegear Ltd and GEC Distribution Equipment Ltd. Its prospects are enhanced by the rationalisation of its manufacturing, technical and commercial resources. Product development has been stepped up in order to keep the company ahead internationally in the technology relating to control and protection of electrical installation systems. The combined trading results for the year showed an improvement over the separate figures for the previous year.

GEC Distribution Transformers Ltd had to contend with even more vigorous competition in depressed markets at home and abroad. Cost reductions were implemented, and by the year end the order book was more satisfactory.

GEC Power Transformers Ltd increased its sales and the order book is showing an upward trend. Home orders were received from the CEB for two of the largest 400kV series reactors in Europe. Included in orders from Electricity Boards was one from the EMEB for two 120MVA units, the highest ratings currently in use on the 132kV transmission network. Another important order was for four hvdc pulse transformers for neutral beam injection power supplies for the UKAEA fusion experiments at Culham. Export orders included 13 267MVA generator transformers for the Castle Peak 'B' Power Station in Hong Kong, an order from ESCOM South Africa for four 500MVA auto transformers, and orders for 35 locomotive transformers and 22 trackside transformers for Brazil.

GEC Energy Systems Ltd expanded its involvement in the energy market while maintaining interest in nuclear systems. Power raising commenced on the Heysham I and Hartlepool AGR stations and work continued on Heysham II and Torness. Construction contracts for the JET fusion project at Culham neared completion. Manufacture of the 250kV wind generator for the Orkneys was almost complete, and work started on a 3MW machine which will be the largest wind generator in the UK.

The Micanite & Insulators Company Ltd reduced its factory space by 40 per cent in the light of a severely depressed UK market for high voltage insulation. But sales of Midel dielectric fluids were expanded and licences concluded to manufacture this product in USA and West Germany.

GEC Reinforced Plastics Ltd had another successful year and commenced delivery, phased over two years, of structures and components for the cross channel hvdc link. The healthy order book benefited from work with defence applications.

PERFORMANCE

	1983	1982
Turnover	£393m	£359m
Export Sales	£201m	£156m
Export Orders	£184m	£194m
Profits	£31m	£44m

Four Valenta diesel engines built by Paxman Diesels at Colchester power this fast patrol boat, the Dhofar, operated by the Oman Navy. Paxman has supplied engines for three similar Omani patrol boats. Paxman made the Valenta engines which power Britain's high-speed, inter-city trains.

Higher export deliveries of the diesel businesses and traction accounted for the increase in turnover; sales in the UK were slightly down on the previous year.

The level of the order book was maintained.

Pressure on margins reduced profits in the diesel engine businesses, aggravated by losses on a major contract and expenses associated with reductions in capacity. Express Lift again improved its profitability, but several businesses in the Group were adversely affected by reorganisation costs.

Paxman Diesels Ltd reduced its capacity in the face of falling demand for engines in international markets. Prospects for increased business with the Royal Navy have now improved and development expenditure on uprating existing engines and on new models continues to broaden the company's base.

Ruston Diesels Ltd reported increased sales in the year; exports accounted for

over three-quarters of output. This was primarily due to the continuation of work on the Iraq contract taken in 1981 for the construction of 69 power stations valued at over £60 million, but the results for the year were adversely affected by delays in completing this work. The first orders were secured from the Ministry of Defence for the new Extra Deep Armed Team Sweep Trawlers (EDATS) and further export orders were secured in Iraq, Nigeria and Kenya. The overall level of order intake, however, declined in the year, and action was taken early in 1983 to reduce operating costs.

Dorman Diesels Ltd experienced a first half of declining orders leading to substantial restructuring to reduce operating costs. The second half showed an improvement, helped by a revival of demand in Iran. The year end order book was the highest for five years and, with the launch of three new cost competitive engines, the prospect is more encouraging.

Kelvin Diesels Ltd had a difficult year due to postponed boatbuilding and re-engining programmes. Following the long delay in finalising the EEC Fisheries Policy, the home market became more active and orders are beginning to pick up. Similarly, there are signs of improvement in the traditional export markets as



international funds become available and as territorial fishing limits are extended.

GEC Traction Ltd again increased sales over the previous year with a continuing high export content of 72 per cent. Deliveries were mainly for the Hong Kong Mass Transit and Kowloon Canton Systems and the extension orders for 50kV locomotives for South Africa. New stock was commissioned in New Zealand, and supply continued for established 3kV stock, both coaches and locomotives, in South Africa. Deliveries were also begun of equipment for the new electronically-controlled Dublin Suburban stock. A high level of orders was received in the year, including an extension from VicRail Australia for additional suburban stock for Melbourne; in Brazil an order was taken for trains for Recife, and clearance was received to proceed to build 35 heavy freight electric locomotives for the Steel Railway. A major order for the Korea Seoul Metro was received for the supply of 134 train sets for the new subway extension in collaboration with Daewoo. At home, deliveries commenced on new stock for British Rail Southern Region following completion of the electrical drives for the St. Pancras-Bedford stock. Development work included the design and testing of a new ac driven automatically-controlled car suitable for the Docklands Transit project and similar applications; two vehicles have been successfully operated on the company's test track. Substantial investment in modern manufacturing facilities continues.

GEC Small Machines Ltd's business continued to be adversely affected by the decline in economic activity. Further reorganisation and product rationalisation is necessary in order to match demand. Engineering efforts have been largely concentrated on cost reduction programmes, but development commenced on a range of induction machines for ac variable speed drive systems and an improved range of low voltage ac machines. Permanent magnet dc machines were introduced to offer lower cost drive solutions.

Witton Kramer Ltd continued to be affected by the recession in the steel

GEC Traction is supplying the propulsion and auxiliary equipment for 40 two-car trains to be used on the new electrified suburban routes in Dublin. The picture shows two of the trains in March, 1983, on commissioning trials. The equipment, which has thyristor-control and regenerative braking, operates at 1500 volts dc and is similar to that which GEC is supplying for 268 cars on the new Seoul Metro in South Korea.

GEC Large Machines Ltd suffered from difficult market conditions with little sign of improvement in the short term. Substantial changes in organisation were made, and all engineering and commercial activities are now located on one site. The major contracts to supply 67 gas turbine driven generators for the Siberian gas pipeline and 63 diesel driven generators for Iraq were completed successfully; the first 330MVA motor-generator unit at Dinorwic was formally taken over by the CEGB and two further units were completed. Major effort continues on technical development, and benefits from more competitive products are expected when demand revives.

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Witton Kramer Ltd continued to be affected by the recession in the steel



and crane industries, but sales of a newly developed range of brakes to American standards helped to produce an improvement over the previous year.

GEC Marine and Industrial Gears Ltd's results improved with a slightly increased turnover. High intake brought the order book to a record level, and included a major contract for the design and manufacture of the main propulsion gearboxes for the next generation of gas turbine driven warships for the Royal Navy.

GEC Foundries Ltd's results were poor, and further reductions in capacity were necessary to stabilise the situation. Strenuous sales efforts to widen the range of customers are expected to improve performance.

The Express Lift Company Ltd again improved its results. New orders included 12 external glass lifts, the first to be supplied in the UK, for Lloyds of London, 24 lifts for Home Ownership, Hong Kong, eight lifts for the Hyatt Hotel in Singapore and five lifts for the Karnak Hilton Hotel in Luxor, Egypt.

Her Majesty the Queen was graciously pleased to visit Northampton

in November 1982 to open the new 420 ft high lift test tower.

GEC Claudgen Ltd did not maintain the improved margins of the previous year. A new matrix display and scoreboard was supplied for the Murrayfield Rugby Football Ground.

Woods of Colchester Ltd had a difficult year due to the low level of activity in the civil engineering and construction industries. Management changes have been made to improve productivity and market share. Two new major products were successfully launched during the year, and development of new products will be intensified.

Keith Blackman Ltd continued to be affected by the low level of demand, but the introduction of new products and increased exports enabled the company to improve its performance. The move was completed to a new factory at Arbroath, where all manufacturing is now concentrated.

Parnall & Sons Ltd improved its results in continued depressed market conditions. New products, particularly in the Tansad furniture range, have been well received by its customers.

Electronics, Automation & Telecommunications

The higher turnover was due to the Marconi companies (other than Radar and International Marine) and the telecommunications businesses.

There was a marked increase in the order book; most prominent was transportation projects, with a high export order intake.

Most of the businesses recorded better profits; the figure shown is affected by Avionics'

PERFORMANCE

	1983	1982
Turnover	£1,541m	£1,419m
Export Sales	£439m	£440m
Export Orders	£632m	£482m
Profits	£224m	£210m

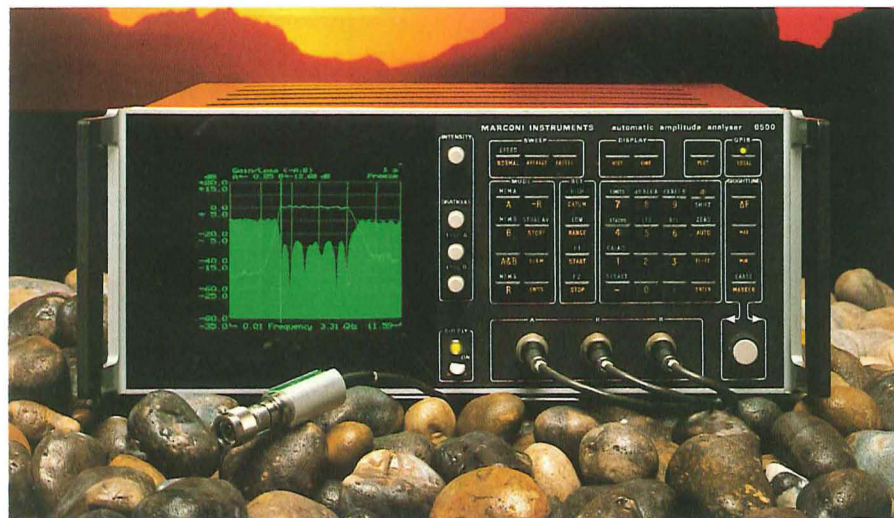
increase being taken in the results of its US subsidiary. Profits were lower from Marconi International Marine and GEC Computers. Reorganisation costs affected Picker International in the UK.

Marconi Communication Systems Ltd increased its sales with British Telecom, the IBA and Cable & Wireless as major customers. The new Kilostream and Megastream digital data systems for BT continued to go well and brought the award of an important design and supply contract for network automation systems. The new fully digital telecine equipment won the Royal Television

Society's Geoffrey Parr award, and some of the first models were sold to the USA. Following the post-Falklands Defence Review, the Royal Navy reinstated the order for ICS3 ships communication equipment. The US Navy took delivery of a containerised ICS3 system for sea trials and further major orders are expected. The first export orders were received for the new tactical tropospheric scatter system, as well as the order for the first satellite ground station to be installed in London for Mercury.

Marconi Radar Systems Ltd achieved substantial improvements in its results,

A new product from Marconi Instruments is this automatic amplitude analyser. Used in the electronics and telecommunications industries, it tests radio frequency and microwave components and systems. Designed and made at the company's factory at Stevenage, it is one of the first analysers to use digital techniques bringing increased accuracy and stability and reduced maintenance costs to users. Early export successes have been scored in Europe and the United States.



although sales were affected by the major cancellations during the previous year on long-lead naval business. Increased orders were received for the supply of the new lightweight SEAWOLF tracking system for the Royal Navy and a further NATO order was obtained for the MARTELLO 3-D radar worth £20 million against competition from major US radar suppliers. The new airfield surveillance radar product line has been sold to the Civil Aviation Authority and there are good prospects of important home and overseas orders. The TEPIGEN image system has been sold to Finland for ship simulators and will shortly be launched in the US market in conjunction with Sperry. Full support was given to the Naval Task Force in the South Atlantic, including "round the clock" spares deliveries and the provision of engineers on several ships during hostilities.

Marconi Space & Defence Systems Ltd has maintained the expansion of its business with sales up by 25 per cent. The order book for communications satellites has increased to £140 million and includes the payload for the UK TV Direct Broadcast Satellite due for launch

in 1986. Orders for Blindfire radars for Rapier remain buoyant; over the next two years, 104 radar trackers are due for delivery, of which 90 per cent are for export. The performance of the SCOT shipborne satellite terminal during the Falkland Islands campaign was excellent. An enhanced version of SCOT will be undergoing ship trials in the current year and further production orders are expected.

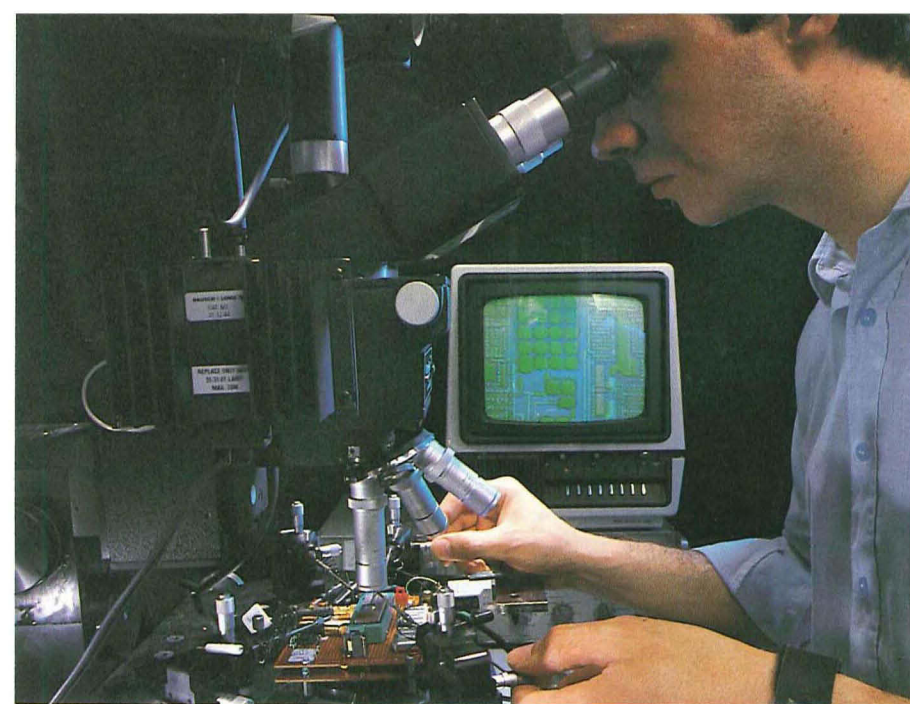
Marconi Underwater Systems Ltd was formed by the separation of the Underwater Weapons Division from Marconi Space & Defence Systems Ltd. Its main products are the TIGERFISH and SPEARFISH heavyweight torpedoes, and the STING RAY lightweight torpedo; new products in mines, countermeasures and mobile underwater vehicles are being developed. Acceptance trials of STING RAY were completed during the year with outstanding results, and production orders are now being negotiated. Development of SPEARFISH is well ahead of programme. The first ever UK torpedo export order, for TIGERFISH, was obtained, and prospects generally for the expansion of exports are encouraging.

Marconi Instruments Ltd's turnover more than doubled in the year, partly through taking over the Scottish Engineering Division of Marconi Space & Defence Systems Ltd and partly due to the continued increase in sales of commercial products which exceeded those of the previous year by more than 25 per cent. Many successful new products were launched, including the 6500 microwave scalar analyser, the 2305 modulation analyser, the System 80X in-circuit test system and the 8060 digital functional test system. The company now has four major business areas: communications measuring instruments, automatic test equipment for electronics manufacture, turnkey ATE projects (mainly for defence

applications) and trainers and simulators. The organisation is being enlarged to meet the needs of the expected business expansion.

The Marconi International Marine Company Ltd had a difficult year with lower sales and margins, reflecting diminution of the world shipping fleet. The marine market is changing its structure and disposition; products and services are being developed to meet these new conditions and the requirements arising from changes in legislation affecting the carriage of additional shipboard equipment.

Marconi Avionics Ltd has maintained its record of innovation and of seeking export sales for high technology electronic systems. This policy, which has progressively lifted the share of the world avionics market over the past five years, also led this year to two Queen's Awards for Technological and Exports Achievement. In head-up displays, a new production record was set when the Secretary of State for Industry handed over the 1,000th equipment for the General Dynamics F-16 fighter programme; further orders worth \$73 million have since been announced. Contracts from Brazil brought to £10 million the total of orders received for the AD3400 secure-speech radio system, and also involved the first export of thermal imaging common modules, now in large-scale production for the UK Ministry of Defence. Other new contracts included the advanced "fly-by-wire" control system for the Italian/Brazilian AM-X aircraft and a study for the United Kingdom's Remotely-Piloted Vehicle Project. New products launched included acoustic processing and display systems for helicopters, low cost navigation aids for land vehicles, and electronics for the remote control of subsea wellheads. Investment in new facilities has led to BSI approval for hybrid microcircuit manufacture, the opening of a new



Testing the design for an integrated circuit at GEC Research Laboratories, Wembley, using micro-probe equipment. The devices are for an advanced telecommunications system being developed for both home and export markets by GEC Telecommunications, Coventry.

The production of integrated circuits to this design will be carried out by Marconi Electronic Devices, Lincoln.

hydraulics facility and the creation of Recording Systems Division.

Easams Ltd improved its margins, although at lower turnover. The company is in transition from the large contracts for Tornado, which have dominated the business in the past, into the new area of command and control systems. The market remains predominantly overseas, and exports, which currently account for over two-thirds of the business, are expected to increase. The order book has built up during the year to a record level.

McMichael Ltd achieved a further advance in sales, especially in export markets. Advanced technology contracts were won in defence communications, sonar systems, civil mobile radio and TV processing equipment.

GEC Traffic Automation Ltd fared slightly better than last year, notwithstanding a reduction in home

traffic signal maintenance contracts. Good home and export orders have been obtained for the new microprocessor traffic light controllers, and initial orders have been received for magnetically-encoded credit cards.

GEC-General Signal Ltd improved its performance although sales declined, reflecting lower investment by British Rail. The train describer for Anglia West was successfully commissioned. Export orders were received from Brazil and Bangladesh. A joint development project with BR for a new microprocessor-based signalling system progressed well, and an order was received to resignal the Leamington Spa area with this system. New control and supervisory techniques were developed for the driverless Maglev transit system.

Picker International Ltd completed the development of a cryogenic nuclear magnetic resonance scanner. During her State visit to Canada, Her Majesty the Queen attended the first

introduction into service of the unit at the University of British Columbia. A new digital X-ray system was launched, and extensive modernisation is under way at Wembley to prepare for the assembly and test of fourth generation CT scanners.

GEC Electrical Projects Ltd progressed satisfactorily in difficult conditions, with results ahead of last year. The company again received the Queen's Award for Export Achievement. The Airport Division established last year has consolidated its position as main contractor for the UK Airports Group and secured its first major contract from Brazil.

The robot activities of the company are now traded by GEC Robot Systems Ltd, and include a new electrically operated machine primarily for arc-welding applications to be manufactured under licence from Hitachi, Japan. To complete the arc-welding package, BOC Ltd's Automated Welding Products Division, suppliers of high power sources to the welding industry, was acquired.

The Factory Automation Systems Technology (FAST) Division continues to develop hardware and software packages required for flexible manufacturing systems and is currently participating in the setting up of a major automated factory for the manufacture of electronic products.

GEC Industrial Controls Ltd bettered its results and maintained the level of orders, with electronic products providing an increasing share of new business. The GEM 80 microprocessor-based control system made major inroads into the automotive and food processing industries, and the new range of ac variable speed drives made a major contribution to increased sales. Manufacturing facilities are being modernised for vacuum switches, used in high voltage motor starting equipment, and electronic products.

GEC Mechanical Handling Ltd improved its order intake, sales and

Electronics, Automation & Telecommunications

Easams of Camberley in Surrey is conducting trials on a new system concept, EAMACS, which enables radically different tasks to be performed on the same display screen. The operator has merely to touch the television monitor screen to either call up pictures or make changes. On a map display, for example, an operator touches the screen at points where he might wish to site radio masts. The screen displays these points at once and proceeds to give precise information about the nature of the intervening terrain. If high ground would interfere with signals, this is immediately apparent.

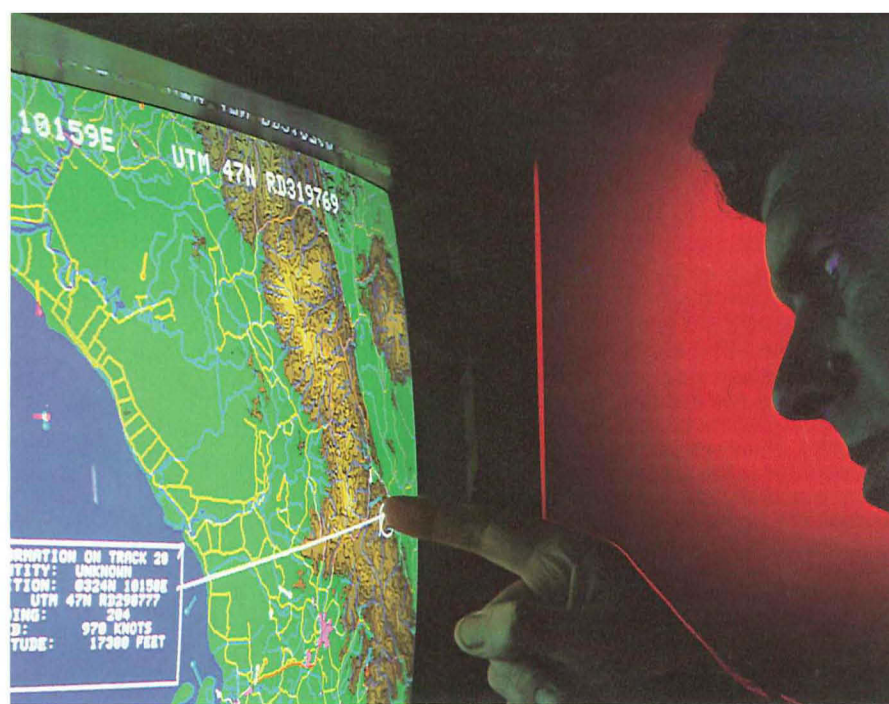
margins, and increased exports; a major order was obtained for 14 passenger loading and maintenance platforms for the Hong Kong-Macau hydrofoil ferry terminal. Automated equipments for the food industry and for retail banking services provide potential for wider market penetration.

GEC Transportation Projects Ltd maintained progress on the £150 million Steel Railway electrification project in Brazil and the new £195 million Seoul Metro contract in Korea with a large content of work for GEC Traction. Design work proceeded on the Recife (Brazil) suburban railway modernisation which will lead to manufacture during the current year. In Zimbabwe, project management and system engineering work neared completion on electrification between Harare and Dabuka. The Maglev project at Birmingham Airport is proceeding well, and passenger service is planned to commence in 1983.

GEC Telecommunications Ltd's sales showed a marked increase over the previous year. Major investment in the development of new products and modern facilities is proceeding to meet the accelerated plans of British Telecom to put System X into every trunk switching centre within five years, and to provide System X local exchanges for some 14 million lines over the next eight years. A new digital small exchange (UXD5) for rural areas has been developed, and orders for 176 units have been received from BT. The first export orders for both System X and UXD5 have been received and more are strenuously being sought. A large contract has been obtained from BT to develop and supply two field-trial call-logging systems which will provide itemised billing facilities for telephone

subscribers and statistical data for BT on existing analogue exchanges. Sales and order input of the Transmission Division achieved record levels. Orders included the largest BT have yet placed for PCM equipment for their expansion and modernisation programmes to lead to a fully digital transmission network in the 1990s. Further orders have been received from home and overseas for optical fibre communication systems employing fibre made in the UK by GEC Optical Fibres. The initial phase of the communications system for the National Railways of Zimbabwe was completed, and a major order for a railway communications system was received from Ethiopia. In the military communications field, Transmission Division was appointed prime contractor and system design authority for project UNITER which is expected to become the principal strategic communication system for the Armed Forces.

GEC Information Systems Ltd combines the activities of PABXs, computers, telephones and terminals to supply voice and data communications and systems for business users. The year saw the beginning of the progressive liberalisation of the telecommunications market in the UK. The company is basing its electronic office systems on the PABX as a combined voice and data network; a new facility was introduced in the form of data capability on the SL1 PABX, and a succession of developments are nearing completion which will, in due course, provide a comprehensive range of products and systems. Liberalisation of the market for telephones, key systems and PABXs brings a major change to the market and new suppliers, mainly from abroad with



already established home businesses, are being attracted to the UK.

Private Systems Division doubled its production of CDSS-1 systems during the year. Major orders were received from New Zealand and other overseas markets. SL1 continued to take a major share of the UK market, and is now being supplied through BT as well as Reliance Systems Ltd. A military version of SL1 is being developed for the UNITER defence network. Evolution of SL1 will continue with enhancement of facilities and cost reduction; this is the only established PABX made in the UK with the capability to meet the data requirements of the electronic office.

Telephone Division's sales rose considerably during the year based on the highly successful electronic key systems for BT, and the continued supply of new generation telephones, including the IXT inexpensive electronic model. A range of telephones for the retail market was launched through the sales organisation of GEC McMichael. Over the last two years, all the Division's earlier products have been replaced with new models, and an intensive development programme continues.

Reliance Systems Ltd faced changing market conditions but turnover rose by some 10 per cent. New products introduced included the successful "Restcall" system for nursing homes and a range of electronic time recording equipment. Orders for sound reproduction equipment were particularly encouraging.

GEC Computers Ltd maintained its sales volume during the year but not at higher margins. Major improvements were made to the entire product range with the announcement of the 4100 series, fully compatible upgrades of the 4000 series and offering 32-bit compatibility from the smallest (the 4150) to the largest (the 4190). The company continues its efforts overseas, mainly associated with BT's Prestel software, and obtained a major order from Malaysia. At home and overseas GEC computers used in X25 packet switched data networks continue as a major source of business. Further new hardware and software products will be introduced in the current year and will enhance the company's participation in the range of products available from GEC Information Systems.

PERFORMANCE

	1983	1982
Turnover	£464m	£441m
Export Sales	£113m	£125m
Export Orders	£114m	£125m
Profits	£52m	£43m

Most of the businesses contributed to the higher turnover. Order intake and the order book were slightly down on the previous year.

Profits generally improved markedly, with Measurements and W. & T. Avery making the largest contributions. Salford Electrical Instruments recorded a loss as a result of the cost of measures taken to reorganise its facilities. The Cable and Wire businesses maintained their profits on slightly lower sales.

English Electric Valve Company Ltd continued to make good progress despite a depressed market for electronic tubes. Overseas orders grew by more than 30 per cent, helped by much higher sales of hydrogen thyristors, sales of "third generation" magnetrons, and by the introduction of new high efficiency klystrons. Research

Components, Cables & Wire



The central control equipment of the BAS 700 building management system which Satchwell Control Systems of Slough manufactures and installs. This microprocessor-based equipment is linked to intelligent outstations in buildings such as hospitals, office blocks and factories and continuously monitors and controls functions including heating, ventilating, electric power, lighting, lifts, escalators, fire and security alarms, office and industrial machinery, effluent levels and gas supplies. Satchwell has sold more than 50 systems – some controlling several buildings which are miles apart – and orders continue to grow.

products and for cathode ray tubes and integrated circuit packages are expected to keep production at an acceptable level during the current year.

Marconi Electronic Devices Ltd's turnover increased by over 50 per cent compared with the previous year with all areas of activity showing growth. The capability of the company in the design of custom integrated circuits was strengthened by the establishment of external centres, and there was a substantial increase in the number of new designs. Facilities for the production of hybrid devices were enhanced by the acquisition of a highly automated factory at Swindon enabling the company to supply products for high volume applications, particularly in telecommunications. Demand for hybrid circuits for military use has continued to

grow in both Europe and the United States; the Hybrid Division and Circuit Technology Inc have substantially increased sales levels. The Microwave Division has been strengthened by the integration of the components activity at Billericay and is now exploiting its strong technical position. Work on major contracts for GEC Traction and GEC Transmission and Distribution Projects enabled the Power Division to improve its performance, despite the very poor demand from the general industrial market.

GEC Measurements Ltd achieved its best ever results with a substantial rise in export sales. The Relay and Instrument Division benefited from early successes following the launch of its MIDOS modular protective relays. This equipment has already been widely

accepted in overseas markets which account for over 80 per cent of the Division's sales. Major capital and product research and development expenditure continued to safeguard the Division's position as a leading supplier of protective equipment.

GEC Meters Ltd enjoyed considerable increases in orders and sales although the home market was stagnant. Several new energy management products were introduced, and the Division played a leading role in field trials of a radio controlled load management system for the UK electricity supply industry. A major expansion of research and development capabilities was completed during the year aimed at capitalising on market opportunities in lighting controls, mains switching and electronic metering.

Satchwell Control Systems Ltd experienced a difficult first half of the year with sales depressed by the recession in the construction industry. But trading improved in the second half with the introduction of new products and increased sales of the computerised building management system.

Satchwell Sunvic Ltd benefited from the cost reduction exercises completed in the previous year. Sales improved as higher energy costs stimulated the demand for energy saving heating controls. Investment is being directed to improve productivity and extend the product range to enhance competitiveness, particularly in overseas markets.

W. & T. Avery Ltd made steady progress despite the continuing low level of worldwide demand for weighing equipment. The successful introduction of a range of new technically advanced and competitive products enabled the company to increase its share of home and overseas markets. The Avery Commander retail electronic scale has become a market

leader, particularly in major multiple stores. Weights and Measures Authority approvals for new products were secured in many overseas territories. The introduction of new weighbridges with microprocessor-based instrumentation and printers has opened up markets in Europe, the Middle East and the Far East. The major rationalisation and reorganisation programme started in 1980 continued throughout the year, and manufacture of all weighing equipment is now carried out at the company's factories in the West Midlands at a considerably higher level of efficiency than was obtained in past years.

Avery-Denison Ltd continued to improve its performance against a background of low demand, following the introduction of new products and better utilisation of resources. More advanced new products will be brought to the market in the current year.

Driver Southall Ltd achieved better results from rationalisation measures in the previous year of its manufacturing facilities, and the strengthening of its management. Several new products were launched towards the end of the year, and a high level of development expenditure is continuing with a view to widening the range of special weighing equipment, particularly for the packaging industry.

Avery-Hardoll Ltd continued the improvement reported last year and achieved higher sales of which more than half were to overseas customers. The introduction of new products and new capital investment will provide a sound basis for continued growth.

Pump Maintenance Ltd had a good year in the face of difficult trading conditions in the petrol retail sector. A newly installed distributed computer network throughout the UK will help to increase productivity and improve service to customers. The range of

equipment serviced is being extended to include liquified petroleum gas and other industrial metering, which will give a broader spread of customers and better use of facilities.

Salford Electrical Instruments Ltd had a difficult year. Demand for electrical instrumentation was low and price competition in the electronic components business was severe. During the year a major reorganisation was undertaken; production of some components marked by declining demand was phased out, and production of some devices was transferred to other GEC companies. An accelerated new product development programme set up two years ago brought in new equipment for the mining, telecommunications and automotive industries.

Londex Ltd's own problems were aggravated by the difficulties encountered in absorbing into its factory a range of equipment

transferred from Associated Automation Ltd. These problems had not been satisfactorily resolved at the year end.

Telephone Cables Ltd made progress with a further increase in cable sales, and orders continued at a high level, 35 per cent from overseas; another large order was received from Malaysia for paper insulated cable. Further extensions of mechanical handling and robot operations have resulted in appreciable cost savings and higher productivity. New designs of optical fibre cables have been developed to exploit the potential of monomode fibres for long distance trunk networks, and optical fibre and coaxial cables have been developed for cable TV.

Salplex Ltd continued the development of its multiplex wiring system for the automotive industry, and extensive field tests were satisfactorily completed on prototype systems. Other applications of the system are being explored, including the control of lighting for large buildings.



In the laboratories of universities and industry there is a need for reliable and accurate fine balances. This new balance designed and made by the Oertling Division of W & T Avery, Birmingham is one of 22 new products which Avery produced within 12 months. Oertling is the leading British manufacturer of fine balances and exports a quarter of its output.

Additional cables for power supplies and telephone signalling have been supplied by AEI Cables of Birtley, County Durham to the Tyne and Wear Metro system.

AEI supplied substantial quantities of cable before the Metro went into operation whilst GEC Traction supplied equipment to power 90 trains.

Picture: Tyne and Wear Metro.

Redring Electric of Peterborough, a fertile source of new products, is now successfully selling two new coffee makers which it designed and manufactures in Britain. The electronic version, shown below, includes a digital alarm clock, which if set before you go to bed, has a hot cup of coffee ready when you wake up.

With these new models, Redring is combating a tidal wave of over one million coffee makers imported into Britain each year.



AEI Cables Ltd's results were marginally better despite intense competition, particularly in the second half of the year. This was achieved through sales of products for special applications, such as a 44 Km length of 33 kV submarine cable for the North of Scotland Hydro-Electric Board laid successfully during the year to supply power from the mainland to the Orkney Islands. New materials have been developed for improved cable performance under fire conditions. Besides this use in its own cable production, these materials are being sold to other cable manufacturers throughout Europe. Results in the wiring cable sector were affected in the second half by more intense price

competition. Further progress was made in extending the range of fire-retardant cables for use in shipbuilding and on oil-rigs. Mineral insulated cable sales improved steadily as they were stocked at all the branches.

GEC-Henley Ltd achieved better home orders and sales as new products gained acceptance by Area Electricity Board customers, but exports suffered as a result of the reduced purchasing power of the OPEC countries. The level of export orders has recently improved, giving better prospects for the current year.

Frederick Smith and Company had a poor year and the future of the Trafford Park factory is being considered.

Rodco Ltd, owned jointly with



Pirelli General plc, commissioned the new copper rod caster and rolling mill at Skelmersdale, and in its first year 40,000 tonnes of copper rod of high quality was produced.

GEC Optical Fibres was affected by low demand but orders improved in the second half, particularly for the new monomode fibre which is now in full production. Intensive investment in research, development and new manufacturing techniques continues.

F. D. Sims Ltd and Kent Electric Wire Ltd continued to yield bad results despite measures taken to reduce costs and improve efficiency, but the introduction of new products enabled Kents to achieve some improvement in margins.

Vactite Ltd benefited from increased orders for overhead line conductors, including some containing optical fibres. Several new products for high performance cable applications were introduced, and a Ministry of Defence standard approval was obtained for a product range having low toxicity under fire conditions.

Redring Electric Ltd failed to maintain the growth in sales and margins of recent years, but firm action taken to reduce costs and improve the quality of products is expected to restore the position. Three new products were launched: a coffee maker, a small size Autoboil kettle and an electric barbecue.

Walsall Conduits Ltd increased its sales and maintained its margins although the UK building and construction industries continued in recession for most of the year.

A. G. Hackney & Company Ltd again improved its sales, maintaining margins through further improvements in manufacturing efficiency. Competition at home and in export markets remains intense.

Consumer Products

PERFORMANCE

	1983	1982
Turnover	£280m	£277m
Export Sales	£18m	£20m
Export Orders	£19m	£19m
Profits	£19m	£11m

Hotpoint's new front loading washing machine, the Microtronic De Luxe, contains a microprocessor replacing many of the conventional electro-mechanical items. Advantages include low energy consumption, greater reliability and more flexibility in use.



high level of imports into the UK of white goods.

Schreiber Industries Ltd continued its programme to refine its manufacturing capacity and bring it more in line with demand. After the removal of credit restrictions in July 1982, there was some slight revival of consumer demand, and positive margins were then achieved.

GEC Schreiber Ltd the holding company of Hotpoint Ltd and Schreiber Industries Ltd has since the year end been the subject of capital reconstruction in a manner whereby GEC now wholly owns Hotpoint Ltd, and the Schreiber family wholly own Schreiber Industries Ltd which ceases to be a GEC subsidiary.

Lower turnover of Schreiber furniture was offset by increased sales in the other businesses.

The higher profit was due to recovery at Osram, advances in Xpelair and Cannon, and a materially lower loss from Schreiber furniture.

Osram (GEC) Ltd benefited from the restructuring carried out over the previous two years, and, with a slight improvement in home demand, recorded much improved results. Emphasis continued to be placed on cost reduction programmes whilst introducing new products, particularly in lighting fittings.

GEC McMichael Ltd was formed during the year to prepare for the advent of satellite and cable television by combining the consumer electronics activities of GEC (Radio & Television) Ltd with the professional video activities of McMichael Ltd. The first order for cable television equipment was received. Sales of colour television receivers were higher than in the previous year although below what could have been achieved had adequate supplies been forthcoming

from GEC-Hitachi Television Ltd when demand rose during the summer of 1982. Through its sales force and outlets, turnover is being progressively built up as telephone instruments and other telecommunications products are channelled through to the retail trade.

Cannon Industries Ltd again improved its results, further increasing its sales of gas built-in cookers. It acquired some products of the Carron Company's appliance division, and production of these models commenced at the Bilston factory.

GEC-Xpelair Ltd had another successful year despite keener competition from foreign manufacturers. Continued investment in modern equipment helped to minimise increases in unit costs. Manufacture was started of three new fans for worldwide distribution replacing models which were previously imported for limited distribution in the UK.

Hotpoint Ltd increased its sales but at somewhat lower margins. The commissioning of the new home laundry plant at Rhyl, North Wales, was started in May 1982. With modern equipment in all its factories, and with well designed merchandise, Hotpoint is playing an important rôle in the effort to reduce the

Overseas Companies

PERFORMANCE

	1983	1982
Turnover	£1,539m	£1,333m
Profits	£90m	£86m

The figures shown for the overseas subsidiaries have been converted into sterling at the exchange rates ruling at 31st March. Sterling was 20 per cent weaker against the US dollar at the end of the year than at the end of the previous year, and the results for North America are affected accordingly. The commentaries on the individual subsidiaries are based on the results in their respective local currencies.

In North America, Picker International and Canadian Marconi showed considerable improvements in sales, orders and profits. Alco Power did much less well than in the previous year due to scarcity of orders, and A.B. Dick recorded a substantial loss due to recessionary conditions and costs associated with a streamlining of its product range and facilities. In Europe, Marconi Italiana achieved higher sales and profits, ending the year with a strong order book including a substantial export content. Improvements were shown in Australasia and Asia despite difficult trading conditions.

EUROPE

	1983	1982
TURNOVER	£230m	£212m
PROFITS	£17m	£12m

Vynckier NV of Belgium increased its sales and profitability, largely due to increased exports. The development of a complete range of modular installation equipment has been completed including miniature and earth leakage circuit breakers. Sales of phenolic moulding powders recovered as a result of a new range of materials specially developed for components for the car and truck industry.

GEC Composants SA of France continued to diversify its product range and reported substantial growth in the fluid control and electrical protection fields. Trading was affected by the weakness of the franc which increased the cost of its imported equipment.

Société des Moteurs Baudouin SA of France achieved sales of diesel engines in line with the previous year, but lower margins affected the year's results. The FII engine was selected by the French Army for its wheeled tank programme, and work started on a high powered version for patrol boat and land based military applications.

Marconi Italiana SpA's results attained a new record in spite of the difficult economic situation in Italy and strong

competition in export markets. Orders received, of which over 50 per cent were for export, almost doubled compared to the previous year. The results were influenced by the conclusion of an important contract for mobile radio stations to Iraq worth approximately £37 million. The volume of orders received from the Italian home market was satisfactory, and prospects for the current year are encouraging; in the export field a substantial first order has been received for PCM systems under the open contract recently signed with the Malaysian Post Office.

Norsk Marconi A/S improved its results in depressed trading conditions in Norway. Higher sales were derived from ground avionics products and processing equipment. The systems engineering activity for the North Sea oilfields made a reduced contribution.

GEC Distributors (Ireland) Ltd had a difficult year with lower sales and deteriorating margins.

THE AMERICAS

	1983	1982
TURNOVER	£892m	£768m
PROFITS	£38m	£40m

A. B. Dick Company's results were bad, being affected by the necessity to dispose of slow moving office equipment in a market which continued in a depressed state in the USA. The strength of the dollar lessened margins in export markets. Substantial rationalisation of facilities at a progressive rate is being undertaken to reflect changing market demands. These changes did not hinder the introduction, by the end of the year, of a new range of copiers which have been

well received. Improved designs of the offset printing range of machines, the mainstay of the business, were completed and the new models are expected to lead to a marked improvement in margins.

Videojet Systems International enjoyed continuing growth in the industrial coding and graphic markets. A large character coder, complementing the highly successful ink jet coder line, and a laser coder were introduced for the industrial market which is being favoured by existing and pending legislation for consumer readable date codes. In the graphics market, the VIP systems, an advanced on-line bindery addressing/personalising system, was announced and has been well accepted by major publishers of catalogues and magazines. A major order for postal bar coding equipment was received from the US Postal Service; nearly every postal bar coder in the world is a Videojet product. With these new products, Videojet Systems International has become the world's most complete source for coding and addressing equipment and related supplies.

Scriptomatic Inc of Philadelphia had a difficult year but with better earnings than in the previous year. This was accomplished while coping with rapid technological change in the industry and a very depressed business climate. A new line of labelling machines geared to the new small business computer has met with success throughout the world.

Alco Power Inc's business was very badly affected by lower sales and reduced order intake compared with last year. This was caused by the recession in USA, lack of finance in Central and South America, and delayed diesel traction projects in third world countries. Capacity and operating costs were reduced during the year

Overseas Companies

with short time working to match current demand.

Cincinnati Electronics Corporation recorded further sales growth in the US and international markets for defence equipment. New investment in improved production resources has complemented a powerful development engineering facility to give the company a modern defence electronics capability unsurpassed in its field.

Circuit Technology Inc continued to expand its penetration of the custom hybrid circuit market. The device supplied for satellite communication systems was especially important, and demand is strong for power hybrid circuits and data bus standard products. The company now has full capability for custom design of monolithic digital circuits using the Marconi Iso-Cmos process.

Electric Machinery Industrial Controls Corporation withstood the downturn in the US economy and completed its first profitable year of operation since it started production at the Georgia factory in 1980. EMICC supplies ac variable speed drives to industry, particularly for paper making. The product range is being extended by the addition of the GEM 80 family of microprocessor-based industrial controllers available from GEC Industrial Controls Ltd; local production is planned in due course.

EEV Inc and EEV Canada Ltd. Sales in the United States of hydrogen thyratrons doubled, and leddicon colour television camera tube sales showed a good increase. In Canada, however, turnover was generally lower, except for much increased sales of UHF TV klystrons.

The English Electric Corporation is the marketing and project management arm of those GEC units not otherwise represented in the USA. As such it was active in winning orders for further

traction sub-station equipment, more particularly for the metro system for Washington DC, a cogeneration unit, and marine propulsion gears for US Naval and Coast Guard vessels. Organisational changes have been made in search of a more vigorous approach to sell into the United States.

Marconi Avionics Inc again increased the manufacture and support of head-up display equipment for three types of American military aircraft. Other activities included the design and supply of avionics test equipment; the CO₂ laser manufacturing capability has continued to develop.

Picker International Inc strengthened its position as a leading world supplier of medical diagnostic equipment. Concentrating on expanding sales of its own manufactures improved trading margins. Good progress has been made with the development of the nuclear magnetic resonance scanners; two clinical research units are operating in the USA, three in the UK and one in Canada. Orders received for CT scanners and conventional X-ray products were at a high level.

Ruston Gas Turbines Inc had a reasonably good year although capacity was reduced because of the lack of domestic business; sales were made to Alaska, Australia, Ecuador, Malaysia and Venezuela.

AEI Telecommunications (Canada) Ltd was unable to achieve a satisfactory volume of business, but managed to maintain its level of earnings by increasing the proportion of sales of its own manufactured products and making higher export shipments.

Canadian Marconi Company's sales, earnings and orders continued to improve. Nearly 75 per cent of the year's deliveries were to markets outside Canada, and the company expanded its range of products sold to

international customers for communications and avionics equipment. A major new order was received from the US Army for the supply of AN/GRC-103 tactical radios, and export orders for commercial products showed encouraging growth, including sales of Omega navigation systems to leading world airlines. In June 1982, the company acquired a facility in Florida for the manufacture of high quality printed circuit boards in a long-term plan to broaden its range of specialised electronic components for the US market.

GEC Canada Ltd was badly affected in the first half of the year by the 20 per cent fall in the level of Canada's industrial activity. Cost savings and product development have improved the outlook, aided by success in winning a large order for power transistor traction drives, the greater part of which will be built in the new plant in Toronto.

GEC Diesels Inc's sales and order input were substantially down, although operating economies ensured continued profitability at a reduced level. Commissioning was completed of the machinery system on the multi-purpose ice-breaking ferry M. V. ABEGWEIT with over 2700hp of GEC Diesels' plant on board, and a turnkey contract for a 2000kW generating plant was completed for Amok Mines Ltd.

AUSTRALASIA		
	1983	1982
TURNOVER	£205m	£176m
PROFITS	£15m	£15m

GEC Australia Ltd was able to increase its total business and profit in the face of unusually difficult circumstances. The Projects Division was especially busy on turbine repair and rehabilitation contracts. Heavy Engineering Division finished the year with a healthier order book despite the problems of cheap transformer imports. Automation & Control Division improved

results from the previously unprofitable electro-medical and control systems departments; the first sale of a Picker CT scanner in Australia was made. Action was taken to reduce overheads in the Lighting and Wholesale Division, and the range of lighting equipment has been updated. Industrial Products had a poor year, and management changes have been made.

Avery Australia Ltd did poorly, incurring losses in respect of complex integrated weighing systems contracts. New products recently introduced are being well received and give grounds to expect a measure of recovery.

GEC Diesels Australia Ltd had a good year. The introduction of the Australian version of the BR High Speed Train, powered by the Paxman Valenta, has been successful and further orders are expected from the State Authorities. Dorman engine sales were maintained through new applications such as amphibious lighthouses and narrow gauge shunting locomotives.

GEC (New Zealand) Ltd continued its steady growth, and from 1983 the new UK stored programme control digital equipment will be supplied, with a sizeable local content, to the New Zealand Post Office to meet a substantial part of its requirements for private branch exchanges. A good level of orders was received for the supply of switchgear and other electrical equipment for major projects in pursuit of official policy to conserve foreign exchange and to reduce the dependence of New Zealand on imported fuels.

Avery New Zealand Ltd had a reasonable year but sales yielded reduced profits due to the effect on margins of severe price competition.

ASIA		
	1983	1982
TURNOVER	£178m	£149m
PROFITS	£17m	£15m



A multi-channel tactical radio system made by Canadian Marconi Company. The system, housed in a container, is easily transportable and has been successfully exported from Canada to the United States and a number of other countries.

The General Electric Company of India Ltd has maintained its market position generally but demand for many of its products has been depressed and is unlikely to get much better in the short term. The improvement in productivity continued, particularly in Transformer and Switchgear Division where HT Switchgear is now making an important contribution to profits. The level of activity is affected however by the liquidity problems of the State Electricity Boards. Demand for electric motors, particularly in the agricultural sector, remains very low. Furnace

Division was less affected by the recession, and is consolidating its position as the market leader. The company is negotiating collaboration agreements for the manufacture of an extended range of motors, transformers and furnaces and is making strong efforts to enter the process control systems market. Air pollution control equipment is also seen as offering growth potential.

The English Electric Company of India Ltd had the benefit of the new fusegear factory at Bangalore, and the improved production lay-out at the Madras factory also contributed towards a better performance. The company made substantial progress in the development of a new range of moulded case circuit breakers and

miniaturised control panels. The cancellation and deferment in India of capital spending on new projects has reduced the order book in some traditional sectors of the business.

The General Electric Company of Bangladesh Ltd had another successful year. The Chittagong factory increased production and obtained its largest-ever order, for electric motors and starters for use with irrigation pumps. Plans for a new factory to be situated near Dhaka are proceeding. The first phase of the Ashuganj combined cycle power station was successfully commissioned; the final phase is well advanced. A turnkey contract for the supply and installation of relay interlocking railway signalling equipment for the Dhaka-Chittagong main line was negotiated.

Johnson & Phillips (Pakistan) Ltd was adversely affected by labour problems and shortage of orders. Agreement has been reached to reduce the GEC's holding in this company to 3.5 per cent.

The General Electric Company of Hong Kong Ltd had a good year during which it secured a further major contract for work on the Mass Transit System. However, general trading became less active following the decline of the property market and the economic consequences of uncertainty over the future status of the territory.

The General Electric Company of Malaysia Sdn Bhd continued to expand despite the recession which arrived in Malaysia later than in most countries. An important success was achieved in collaboration with Marconi Italiana in winning a large contract for digital multiplex equipment for the Malaysian Telecommunications Authority, and another for the supply of a Videotex (Prestel) system. Local manufacturing activities were extended to include kettle elements and a range of energy saving control equipment for lighting systems.

The General Electric Company of Singapore Pte Ltd completed the closure of its labour intensive manufacturing activities, the cost of which depressed the year's results. The projects activity continued to develop

but electrical consumer goods were adversely affected by a sharp fall in demand and more competition in the hire purchase sector.

AFRICA		
	1983	1982
TURNOVER	£34m	£28m
PROFITS	£3m	£4m

L. H. Marthinusen Ltd underwent extensive management changes, and in the last few months of the year reversed the adverse trading trend. A similar electrical repair business of Delta SA (Pty) Ltd was acquired in exchange for shares in L. H. Martinusen in a transaction which leaves GEC with a minority shareholding which may be disposed of under an option arrangement.

South Africa Scale Co (Pty) Ltd recorded results similar to the previous year. Anticipated increases in orders and sales were not forthcoming due to the slowdown in the South African economy.

GEC Zambia Ltd continued to suffer the consequences of Zambia's persistent shortage of foreign exchange and limitations on imports. Careful planning made possible the achievement of reasonable results, but the outlook is uncertain.

GEC Zimbabwe (Pvt) Ltd operated at higher levels of production and sales, completing work for the first stage of the electrification programme for the national railway system. Business development was curtailed by a shortage of foreign exchange, but important contracts were secured for telecommunications equipment and switchgear.

Associated Companies

The figures given show the GEC share calculated by reference to the GEC interest in the equity of the Associated Companies.

GEC-Hitachi Television Ltd had a very bad year and made a substantial loss. It did not react quickly enough either to the downturn in demand in late 1981 or to the upturn in mid 1982. Streamlining is taking place which will improve productivity and raise the operating efficiency to facilitate a more adequate supply of merchandise to Hitachi and GEC.

National Nuclear Corporation Ltd. The first unit at Dungeness 'B' Advanced Gas Cooled Reactor (AGR) Power Station has produced electricity for the National Grid. The power-raising process has begun on the first unit at Heysham I, to be followed at Hartlepool. Construction of the new AGR stations at Heysham II and Torness continues to programme, and work is in hand in connection with the design of the Pressurised Water Reactor (PWR) for Sizewell 'B'.

Ruston Bucyrus Ltd's sales declined further, and despite economies achieved in overheads and short-time working, a loss was incurred. The depressed market in construction, quarrying and mining machinery is expected to continue in the short term.

Lamp Component Companies, benefiting from both the improvement in UK demand and from cost savings, produced much smaller losses than last year.

SRA Communications AB of Sweden ceased on 1st January 1983 to be an associated company on the sale to L M Ericsson of the Company's minority shareholding. During 1982 sales rose substantially to match the higher order intake of the previous year. Margins improved despite increasingly heavy investments in research and development and marketing activities.

PERFORMANCE

	1983	1982
Turnover	£606m	£501m
Profits	£37m	£40m

Technical and commercial collaboration will continue with this business, now re-named Ericsson Radio Systems.

Fisher Controls International Inc reported lower sales and margins although satisfactory orders were received for "Provox", the new microprocessor distributed systems product. Since the end of the financial year, an agreement has been announced of the sale of the GEC's minority interest.

Cable Makers Australia (Pty) Ltd was affected by falling demand and the resultant excess capacity in the cable industry. Margins reduced sharply and these adverse conditions have not yet changed.

GEC South Africa (Pty) Ltd operated in a declining economy and order intake fell during the year. There were signs by the year end of some levelling out of the economy, but the worst drought in the century has aggravated the situation. Sales increased slightly but margins were substantially lower. New product developments during the year included the UNIBOX range of high voltage motors and the CIPAK range of cast iron low voltage machines. The Power Group introduced the Galahad low voltage distribution motor control centre switchboard, and from the Measurements Company came the MIDOS static and modular range of relays. AEI Henley introduced the CDSS-1 mini digital electronic PABX which is now performing well after some initial teething problems. The

GEC South Africa's new multi-racial training centre at Benoni, Transvaal, which opened in January, 1983.

The company has not cut back its training programme despite recession and there are over 200 apprentices at the school. When GEC South Africa opened a training centre in 1973, it catered for 51 apprentices. The new centre has a full-time staff of six people and achieves an average trade test pass rate of 72 per cent, higher than the industry average.

small appliance business was closed down and the unviable Express Lift maintenance activity was disposed of. The traction and signalling company performed satisfactorily. The traction business is facing a shortage of orders but prospects for the railway signalling business are improving.

Telephone Manufacturers of South Africa (Pty) Ltd achieved a record level of sales including the first of a new electronic digital public switching system. First deliveries were made to the South African Post Office of the new standard electronic telephone instrument.

African Cables Ltd commissioned the first aluminium sheathed 132kV cross-linked polythene cables produced in Africa. The demand for lower voltage cables was poor and the results were depressed as a consequence.

ATC (Pty) Ltd opened a new facility for the production of optical fibre cables.

Winding Wires (Pty) Ltd experienced increased competition which affected its margins.



Avery Nigeria Ltd had a good year with increased orders and sales. Towards the end of the year, however, restrictive import controls were beginning to frustrate opportunities for new business.

Avery India Ltd achieved record orders and sales. Manufacturing facilities are being expanded to meet demand for new products.

Genelec Ltd became an associated company with the dilution of GEC India's interest to 33 per cent. The company which manufactures lamps and lighting equipment as well as carrying on a business of electrical contractors maintained its good growth record despite the difficult market conditions. The construction of the new factory for the manufacture of high pressure sodium vapour lamps has been completed.

Research

Innovation is a prime responsibility of the GEC product units – not only in new products and processes, but also in terms of new approaches to the market place and to all aspects of business management. The Research Laboratories support the product units by providing four important services, viz. specialist technical support of current work; a source of first-class personnel experienced in the new, leading edge, technologies; kernel activities in important and pervasive fields such as microelectronics, optoelectronics, computer-aided design, robotics and computer science; and exploratory research to ensure a continuing flow of new product and process opportunities. These latter two categories are illustrated in the following selection from the past year's research programme.

Materials are fundamental to every piece of hardware GEC makes. Its research in materials science includes the study of ultra-thin molecular films (which might provide the basis for a future generation of memory technology); work on amorphous (glass-like) metal films for such diverse applications as power transformers and solid-state microwave devices; epitaxial growth of materials like silicon, gallium arsenide and cadmium mercury telluride; laser-beam annealing of semiconductor materials; and the preparation of piezoelectric plastic film for a variety of ultra-sound applications.

Very Large Scale Integration of Microcircuits (VLSI) is at the heart of much of GEC's present and future business and is well represented in its research programme. Projects in this field include:

VLSI DEVICE PHYSICS. Computer modelling and the study of device behaviour at very low temperature are used to help engineers explore the ultimate limitations of silicon technology at very small dimensions; experimental verification of the computer simulation, for example, has yielded sub-micron silicon metal oxide semiconductor (MOS) circuits with stage delay times of about 250 picoseconds (one picosecond is a million millionth of a second).

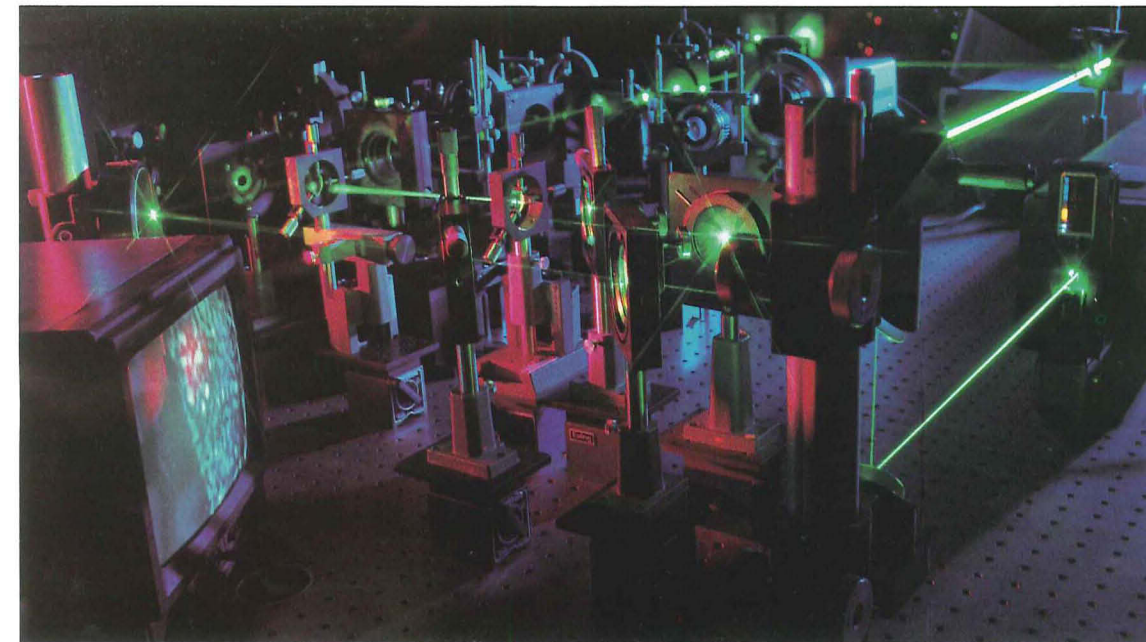
COMPUTER-AIDED DESIGN FOR VLSI. Improved design software is being developed to help system and circuit designers cope with the challenge of VLSI complexity. The research covers such tasks as system specification, system and circuit simulation, silicon chip layout and test program generation. One important project in the past year was the

collaborative programme "UK 5000" in which GEC's contribution was the automatic tracking program for gate array chips containing up to 5000 logic gates.

VLSI TECHNOLOGY. The programme includes the development of an advanced two micron CMOS process with a two-layer metallisation capability, a process which is being thoroughly evaluated in the laboratories prior to transfer to the Marconi Electronic Devices' factory later this year. Other research includes work on silicon-on-sapphire technology, a very high performance silicon bipolar process and a gallium arsenide integrated circuit process for even higher frequency operation. There is supporting research on novel processing steps such as laser photolysis, laser annealing and electron beam microfabrication.

Sensors are of importance throughout GEC and it has a broadly based research programme covering the measurement of pressure, humidity, temperature, gas and liquid flow, and the detection of particular gases. One objective is to integrate on to silicon chips some new devices which will contain the necessary amplification and logic circuitry to provide what are becoming known as "smart" sensors.

Image and Speech Processing. The sensing of three-dimensional spatial information is important in a wide variety of applications such as industrial automation and surveillance. In stereovision, this three-dimensional structure is derived from taking two slightly different views of the scene and using the resulting disparity to obtain depth by triangulation. The successful implementation of real-time image processing depends critically on the creation of computer programs which can operate with parallel algorithms and special purpose hardware. Special



Lasers in use at GEC Research Laboratory, Wembley, for research on data image processing systems operating entirely at light frequencies as an alternative to conventional electronics.

attention is being given to research on algorithms and programs which can operate on the advanced VLSI parallel array processor GRID, (GEC Rectangular Imaging Device) which is currently under development.

Research continues on speech synthesis, with work on special software to allow the user to edit and store the required digitised speech. Computer programs have been written to perform various types of speech recognition, including isolated word recognition, connected word recognition (where the number of words in the unknown phrase is known to within certain limits) and continuous speech recognition.

Research on perception is being carried out to improve understanding of just how the eye and brain work together to give, for example, 3-D vision. This work should enable GEC to apply modern electronic technology to improve the quality of images displayed on TV screens in such applications as medical diagnostics and industrial inspection.

Software Engineering and Computer Science. Very few GEC units are unaffected by developments in computing – not only in their actual products, but also in how they design, make and test them. Current research includes work on the design of a powerful new processor and its associated software. This machine, GRID, is a fifth generation, non-Von Neumann computer based on VLSI technology. The first working system is planned for the end of 1983.

New approaches to computer programming are emerging from academia and GEC research is intended to evaluate and develop such new ideas as expert systems, logic programming and natural language programming. GEC is already evaluating the use of expert systems in diverse areas like the testing of high voltage transformers, the configuration

of GEC 4000 computers and fault diagnosis on complex systems.

Power Engineering. The Company's involvement in turbomachinery is supported inter alia by research on improved computer programs which enable design engineers to calculate three dimensional transonic gas flow through realistic rows of turbine blades containing twist and taper.

Vibration can often be the primary cause of unacceptable operating characteristics in a wide range of equipment. Problems associated with this phenomenon can vary from excess noise to catastrophic failure in service. Research is carried out on the accurate prediction of the vibration characteristics of products as diverse as electric motors, with an output of a few watts, to complete power generating sets weighing many hundreds of tons. Computational techniques are being developed which, in conjunction with experimental research on scaled models, are aimed at achieving the required accurate prediction of vibration behaviour at the design stage.

The design of electrical machines is being helped by research on improved ways of computing electric and magnetic field distribution to take transients into account.

Communications and Digital Networks. In addition to research on digital microwave radio and fibre-optic transmission systems, GEC has participated in the highly successful UNIVERSE project, demonstrating high speed data communications via satellite links and Local Area Networks (LANs). Apart from its technical success, this project is intrinsically important as a proving ground for successful collaboration between industry and academia, which augurs well for the recently announced Alvey programme on Advanced Information Technology.



A view of part of the ultra-clean area of GEC Research Laboratories, Wembley, where advanced work on silicon processing for Very Large Scale Integration (VLSI) and Very High Performance Integrated Circuits (VHPIC) devices is done.

A prime aim of the world semiconductor industry is to obtain even more functions on a single semiconductor chip. The traditional techniques of wet chemical etching, chemical vapour phase doping and photolithography by contact printing are no longer adequate for this task. Dry etching by plasma discharge or by reactive ions, doping by ion implantation and both mirror projection and direct step on wafer photolithography techniques are being introduced. More advanced techniques such as electron beam lithography are also being explored.

The GEC Research Laboratories, Wembley also produce small quantities of highly specialised devices for electronics and telecommunications companies within GEC.

Demonstrators. The achievement of a particular research milestone can often be marked by the production of a small number of "demonstrators" which can then be used in real, non-laboratory conditions, to show their paces. Current examples include an award-winning optical fibre cleaving tool; microprocessor controlled laser energy meters; an optical system for measuring the stopping characteristics of industrial machines; GADFLY, a novel industrial robot; and an industrial vision work station for use on inspection and

robotics control.

Research Environment. GEC research staff collaborate closely with their colleagues in the product units, and also with many leading university groups both in the UK and abroad. The GEC Research Laboratories plan to participate fully in the EEC's ESPRIT programme and the Department of Industry's Alvey programme, both of which have information technology and pre-competitive collaborative research as common themes.

Reporting to Shareholders & Employees

The necessity in Company Reports and Accounts, to comply with legislation, accounting conventions and financial market requirements, make them unavoidably stereotyped. They have to include some details which are dull and uninteresting to many readers.

In 1976, GEC made a change from the conventional reports. In his annual statement, Lord Nelson of Stafford, the then Chairman, said that "GEC Year 1976" had been prepared to present a broader picture of the Company's activities and progress, and he hoped

employees and shareholders would find it more interesting and help towards a fuller understanding of their Company. Included as special features were a simplified summary of the year's results and articles on exports, investment and GEC people.

This idea of a more popular and readable version of information about GEC was developed in the ensuing years. Issues of various designs were published.

In 1977 "GEC in Action" included articles and pictures about:

Exports to the World; Hardware plus skills for the Third World; Face to Face with the Competition; Fighting back for the British Consumer; The Frontiers of Science; People at Work.

In "GEC in 78" the contents covered: GEC at Home; GEC in Industry; Where you will find GEC; The Ups and Downs of doing business; An invitation to ask questions to know more about GEC.

In "GEC 79" discussions included such items as:

Who we are up against; News of the Year; Training and Industrial Relations; Your Questions Answered; Did you know?

"GEC into the 80s" was about: Products for the 80s; The Innovators; Your Questions Answered.

"GEC 81" was not dissimilar, but touched on still more of the Company's activities:

Another year of success; Train for your Career, Working Together; Film Survey GEC; The Community and how GEC Works; Managing in GEC; News of the Year; What's New from GEC; Your Letters.

"GEC 82" kept up the same topical themes:

GEC is Working; Recession & GEC; New Ideas in GEC; Communications in GEC; Productivity and Prosperity.

Each year the results were included as simply and graphically as possible.

Experience suggests it is important to ensure that each year's report has a degree of novelty; without it even the popular reports become uninteresting, even if not quite so dull in popular terms as the conventional statutory publications.

This year, GEC is putting the emphasis of its reporting on to the provision of information to its employees at their various places of work. It is essential to improve communications between management and other workpeople and to develop sensible procedures for participation of all workpeople in the affairs of the business for which they work. The objective is to achieve a process of mutuality by which all employees identify themselves as contributors to the success of their business. In this respect, GEC must not be behind its competitors in world markets whose workforces are dedicated to do the best they can for their own company and their country's industries.

For 1983, each GEC unit will for its own workpeople produce information and feature articles suitable for its own needs, and employees will receive through the GEC newspaper "Topic" a summary of the year's results and other appropriate information.

There will not be for GEC as a whole a separate report in popular form, although this Review of Operations contains a simplified version of the year's results. Shareholders may, if they wish, obtain a copy of "Topic" from the Secretary, GEC, 1 Stanhope Gate, London W1A 1EH.

The Secretary will also be glad, at the above address, to receive questions from shareholders and employees.



Encouraging our people....and making the best of our technology

In GEC, we are constantly striving to find better ways of doing things. This applies to all aspects of our operations – products, methods of production, selling techniques, and so on. And not the least important part of this never-ending drive towards the always elusive standard of perfection is the development of the skills of our own people. Certainly we have a long way to go before we can say that our use of human resources is at the level we would like or yet enables our people to make the best of their abilities.

The belief that we have a lot to do and a lot to learn does not mean our GEC units do not take a great deal of trouble to encourage, to help and to provide opportunities for our employees to advance their careers. On the contrary, much of GEC's continuing success is due to our ability to have identified up-and-coming managers, and to having given them their chance.

GEC favours a system of decentralisation, leaving to local management the responsibility for conducting its own affairs but having access to the central services which GEC is able to offer. But, in the case of the career development of our own people, GEC took the view that a measure of co-ordination could reap useful benefits.

In 1981, Admiral Sir Richard Clayton was asked to join GEC from the Royal Navy, where he had previously been Controller of the Navy and then Commander-in-Chief, Naval Home Command.

Thus, from having been responsible for ensuring that the Navy got the equipment it needs, he moved to the task of finding ways to ensure that GEC makes the most of and for its people, as the Navy does.

Sir Richard, who wrote a book on

leadership whilst in the Navy, spent a year visiting GEC businesses and meeting many of its people. Now he is actively fostering new initiatives aimed at ensuring that the Company encourages and utilises leadership talent wherever it is to be found in the Company.

Part, but only a part, of his work concerns satisfying the need for senior managers. This means that there has to be a system of identifying and developing those with management potential. First steps are encouraging that maximum use and minimum waste of talent at all levels is a goal not beyond GEC's grasp.

Sir Richard, is also co-ordinating the work of a small team of individuals, each of whom can bring special interests to the task. They have been brought together in Dunchurch, near Rugby, to form a new unit called Dunchurch Lodge Services. One of them is Derek Webb, who as development training officer has this to say about what is being done. "Particular emphasis is on the younger workers, particularly the 16-25 age group. There are several reasons for this.

"Firstly, because many thousands of pounds are spent in attracting, recruiting and training young people, many of whom leave the Company long before they have contributed anything of their real potential to the business, we have to indicate to these young people that we not only care about them as individuals but their personal development matters to us.

"Secondly, our young employees are our Company's long-term investment. The contribution they make is dependent on how quickly they commit themselves to the work they are given and to the interests of the Company.

"The preparation of young employees for adult working life involves much more than the acquisition of job skills and knowledge. It embraces their growth as people, so that they mature more quickly and are able to cope positively and confidently with new responsibilities, and to contribute effectively as their careers progress.

"The development of young people begins when they join us and is a structured and continuing process. A once-off course at a residential centre is not the answer, although it may well be a useful component of a wider training programme.

"Other desirable ingredients of training programmes we expect to include are skills in the arts of communication and leadership, and taking part in community service projects. We also expect in our development training courses to include a mix of all our young employees, whether university graduates, craft apprentices, clerks or youngsters.

"In fact, a number of our units have successfully run courses which include managers, supervisors, shop floor workers and young trainees on the same course. An increasing number of Apprentice Associations and Youth Forums have been set up or revived, and young employees in GEC are becoming increasingly aware of the need to help people less fortunate than themselves, such as the older citizens and the mentally and physically handicapped.

"This year, we are

– organising a national weekend competition for all GEC Associations and Youth Forums;

– arranging for apprentices in GEC companies to run a camp for deprived children;

– setting up a GEC young people's expedition abroad.

"These are some of the seeds which have been and are being sown. If even half flourish in terms of understanding, tolerance, good communications and leadership, we will have broken through old established barriers which in the past impeded the ready absorption of new and young people into our organisation, and laid the foundation for a better future for them and all who work in the GEC."



GEC's Marconi companies, which are responsible for the design and manufacture of some of the world's most advanced electronic systems for avionics, communications, radar, satellites and guidance, supply defence equipment to H.M. Government. In doing so they are painstaking in seeing how the technology can be applied for other purposes.

Here are some examples:

Off-shore oil operations

Marconi Avionics has been so successful in developing new products for the off-shore oil and gas industries that a new factory was opened at Nailsea, near Bristol to handle this business. Over 200 people are now employed at Nailsea.

Their engineers study, design and implement fail-safe systems for subsea wellhead control, with colour graphics to replace conventional mimic control and display panels, underwater vehicle systems and television for offshore applications. Total system reliability is just as important underwater as in the air, and the work is based on Marconi Avionics' experience in the design, development and supply of airborne electronic systems for the world's civil and military aircraft.

The experience of Marconi Space and Defence in the difficult environment under the sea in work for the Royal Navy has led to many equipments for the oil industry including small sonars for surveying the sea bed, or for surveillance, systems for positioning oil rigs and special communications to translate the gobbledegook speech of divers working in an oxy-helium environment, with a consequent increase of safety in diving operations.

Space

Marconi Space and Defence developed and built Europe's first military communications satellite, as well as several of the U.K.'s scientific satellites. Drawing on this experience, it has provided equipment for the Meteosat weather satellite and the complete communication payloads for the European Space Agency's MARECS satellites, providing reliable, round the clock communications with ships at sea.

A new British company, United Satellites Ltd. of which GEC is a one-third shareholder, will provide direct broadcast television and business communications in the late 1980s using Marconi equipment in a British Aerospace satellite.

Coal

Marconi Space and Defence and National Coal Board engineers have worked together to provide equipment for aligning coal cutting machinery, increasing productivity (and production bonuses!), using systems relying on the knowledge and experience of infra-red technology and on-line computer control gained by Marconi in its military business.

Marconi Avionics' experience in battlefield radars has also found

application in a special kind of radar, purchased by the NCB for evaluation in coal mines. It gives a remote indication of the level of coal in underground storage bunkers, enabling them to be used more efficiently.

Law and order

Military commanders have long talked about the need for C³ – Command, Control and Communications. Civil authorities have similar problems. The police in North Yorkshire, in Hertfordshire and in Suffolk all use Marconi Space and Defence systems to keep in touch and to control their manpower and other resources in the most efficient way.

A similar system, also based on Marconi's military experience, is now being built for one of the country's most important public service units – the London Fire Brigade. Their system will allow minute-to-minute knowledge of manpower, fire fighting and support appliances as well as incidents, to ensure instant response with the right resources and consequent saving in lives.

Safety in the air

Marconi Radar has long been a supplier of the radars which keep aircraft under constant surveillance in airport approaches and flight lanes. It also provides the secondary surveillance radars which receive responses from aircraft to identify them individually on the screen. One of the more recent products of Marconi Space and Defence is VOLMET, now in use at London Airport, giving a constant read out to pilots of their en route and approach weather. This is done entirely automatically from reports fed in by teleprinter from the weather stations and translated instantly to natural speech.

A further development is the speech recogniser, now under trial in civil aircraft to allow the pilot literally to ask the computer for information and to receive a displayed response. This development will reduce the workload in the cockpit, with less fatigue and greater safety.

Marconi Avionics, which pioneered the use of microprocessors in aircraft equipment for export for US Army helicopters, has now applied this technology to Europe's new Airbus, the A310. The company's "intelligent" electronics give ultra-safe control of the airliner's powerful landing flaps and leading-edge slats.

Helping to train people in industry

Simulation has come a long way from the early pilot training machines. A huge simulator for a nuclear power station is being built for the South of Scotland Electricity Board, by Marconi Instruments so that engineers and technicians can learn all the operating and emergency procedures in a lifelike setting without even getting near any radioactive materials. This grew out of work done by Marconi for the Royal Navy's submarines.

Merchant Navy officers now train on realistic bridge simulators which give a complete picture of a harbour with all its channels and obstructions and allow the navigator to manoeuvre his ship just as he would at sea.

This was developed from Marconi Radar's "Tepigen" (Television Picture Generation Equipment) originally designed for aiming missiles.

The list of such equipments and techniques is growing every year, all based on the advanced technology fostered in the defence field and now being put to work for peaceful purposes.

