



GEC AVIONICS

**into
'88**

...and still leading!

ANNUAL REVIEW OF ACTIVITIES

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Review of Activities "Into 1988"

Last year brought restructuring to emphasise our existing strengths, new colleagues in the US associates acquired by GEC, (diagram below) and fulfilment, from twice winning the coveted Queen's Award to Industry, breaking air data computer production records, the compliments paid to our total operation by the UK's Chief of Defence Procurement, our selection for the YF-22A and M1A1 programmes and outstanding achievements made for customers generally.

We announced our four-nation flight controls team for the European Fighter Aircraft; a new Boeing selection to bid for flight controls for the next airliner; an order to update Naval Sea King ASW systems; Fly by Light systems for the US Navy surveillance airship; the third SCADC production order, again won outright; Ron Howard's appointment as Managing Director and as a Director of the new powerful GEC-Marconi group; Bill Broyles' appointment as President of GEC Avionics Inc; the acquisition of Lear Astronics Corp and Developmental Sciences Corp; ATE for Japan Airlines, a new sonar stimulator for ships; CADC for Canadian CF-5; the 1,000th SCADC hand-over; ATE for SCADC support; a new Finance Director, Tim Venables; the opening of the Falcon holographics facility at Rochester and the order for Digital Colour Map Units for GR.7 Harriers.

If the year left any of us breathless, it certainly made all of us fulfilled!



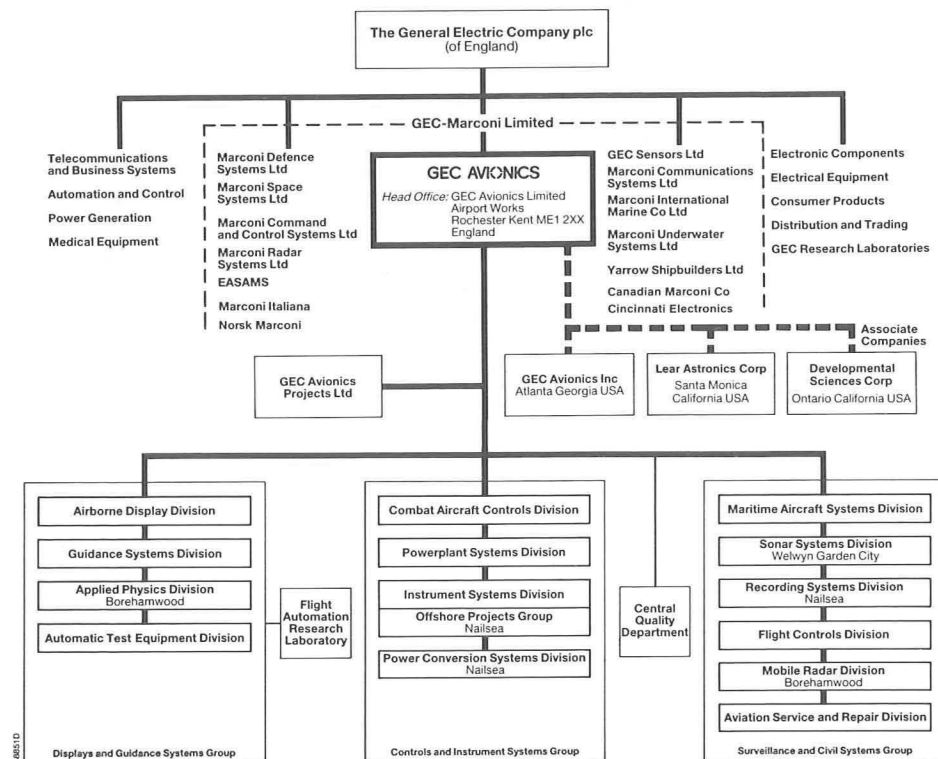
Martin Redfern, Don McNally, The Queen's Lord Lieutenant and our Chairman, Sir Michael Beetham, at the presentation of The Queen's Award for Export to Airborne Display Division.



Ron Howard with Elmar Klotz, talking to our new colleagues in Santa Monica.



UK Chief of Defence Procurement, Peter Levene, visited Rochester to open the Falcon Building, and praised the company's open approach to competition and success in the international market.



This schematic presentation should not be taken to represent the precise legal or trading relationship between the organisations shown.

Managing Director's Report



RW Howard
Managing Director
GEC Avionics Limited

I am very glad of this opportunity to extend Christmas greetings to you all and to tell you that our company is in excellent shape for 1988. Total sales are set to exceed last year's by over 20% and the order book is close to £600 million.

During the year, major initiatives have been made to meet ever-increasing international competition. These include GEC's acquisition of Lear Astronics and Developmental Sciences Corporations in California and we welcome them as associate companies along with GEC Avionics Inc at Atlanta. We thus have a great capability for the future, as already evidenced by the Fly by Wire system we are developing with Astronics for the YF-22A Advanced Tactical Fighter and the laser rangefinders, with Atlanta, for the US main battle tank.

The new organisation of GEC Avionics now comprises three groups each under an Assistant Managing Director. The Surveillance and Civil Systems Group reports to David Clews, Ray Reese looks after the Controls and Instrument Systems Group and John Spinks the Displays and Guidance Systems Group. Their corresponding Group General Managers are Bob Wilkinson, John Colston and Robin Sleight.

The Basildon operation is now a separate company, GEC Sensors Limited, with Wally Paterson as Managing Director. We look forward to maintaining close ties and friendships in the future.

I have been appointed to the Board of GEC-Marconi and am thus working closely with my former Rochester colleagues, Bill Alexander, Peter Hearne, David Rickard and John Shepherd, who have moved to GEC-Marconi Headquarters.

At Rochester, Tim Venables has joined us as Finance Director to replace David Rickard and two new directorships have been set up, Jerry Fisher for Marketing and John Clover for Production.

By these measures we aim to combine our experience and apply it synergistically across the whole group, which is now Europe's leader in electronic and defence systems.

Whilst these organisational developments are vital to our future well-being, the main interface with our customers remains the Divisions, whose initiative, skill and energy, backed by Establishment staff, are the main driving force of our business. This is why it has been 'business as usual' for our customers during the recent period of changes and I want to congratulate everyone concerned, whatever his or her job function, on the many fine accomplishments of the past year. I cannot mention them all here, but Airborne Display Division which won us two Queen's Awards to Industry, and Instrument Systems Division's delivery of 1,000 SCADC units in under a year from starting production, are shining examples.

We can face the coming year with confidence that our hard work and commitment will provide us with continuing success.

Controls and Instrument Systems Group



Foreword by

C R Reese
Assistant Managing Director

The current year has seen a substantial growth in the Group's sales, particularly of Air Data Computers. Our order book is increasing but the market is changing. In order to secure our future we have to invest more of the profits generated today into company funded development on such programmes as the Boeing 7J7, the Lockheed Advanced Tactical Fighter and the Modular Stores Management System.

Notable milestones achieved during the year include delivery of the 1,000th SCADC by ISD assisted by PCSD, first flight of the electronic engine control system produced by PSD for Phoenix and selection by Lockheed of the CACD team to work with Lear Astronics on the ATF Flight Control System.

CQD continues to give support and advice to all the Rochester Divisions and in addition has developed a substantial external business of its own.

With these recent achievements behind us and our current investment for the future, we confidently expect steady profitable growth.

Combat Aircraft Controls Division has continued to develop new business areas. In the US the major contract award of the YF-22A Advanced Tactical Fighter FCC, a joint award with Lear Astronics, is complemented by the highly successful US Navy T-45A Yaw Damper programme.

Advanced Pilot's Controllers have excited worldwide interest, and promising Terrain Following and Missile Guidance opportunities have been generated jointly with GSD.

Enhanced carefree handling software for the EAP provided spectacular displays at Paris, consolidating our four-nation consortium position for the EFA Flight Control System.

Major activity, with FCD, on Boeing 7J7 Flight Controls has achieved new standards in fault tolerant FCS architecture, software, and Application Specific Integrated Circuit (ASIC) design.

Instrument Systems Division has over the last few years grown from around 350 people to 600 and has more than trebled its production output and annual turnover. Much of this growth has been due to the Standard Central Air Data Computer (SCADC) programme, with current orders numbering around 4,000 units and over 1,200 units already delivered at record-breaking production rates of 140 computers per month. The Division also has significant Stores Management System business with continuing Tornado production, and modification projects for the RAF and Royal Saudi Air Force. Modular Stores Management Systems and other new products such as Ejection Seat Sequencers are being added to the existing worldwide customer and product base. ISD are also entering the electronic component world with their Thick Film Microsystems Department providing a

hybrid prototype and production facility for Rochester Divisions and outside customers.



0 to 1,000 in one year and then onwards—the reality of SCADC Production

Offshore Projects Group based at Nailsea continues bidding for both Wellhead Control Systems and Remotely Operated Undersea Vehicles (ROV). Application of the Dragonfly ROV has proved successful on the two commercial requirements this year. Development work is continuing on a number of undersea control systems that apply high reliability avionics technology to this most important area of business including the North Sea.

ISD has the firm financial, product, customer and skill base to look forward to 1988 with some confidence but no complacency.

Power Conversion Systems Division (Nailsea) progressively increased its output during the year on all main production programmes. Notable achievements for the division include the delivery of the 1,000th SCADC power supply, and successful completion of development of both the Harpoon missile power converter and the Phoenix Flight Control Computer power supply.

New development programmes commenced during the year include power supplies for the Common

Waveform Generator for ADD and the 7J7 Primary Flight Control Computer for FCD.

Active marketing continued throughout the year both in the UK and the US to attract further business.

Powerplant Systems Division has completed a number of successful products. Our Powerplant Testing projects have installed, on time, the ETTAS development sets at USAF bases, qualified the system and completed acceptance of test software for the TF41 and TF34 engines. Further RB199 and Adour installations were completed in places as varied as Dharan (Nepal) and Coltishall. The Fuel Flow Transmitters for the V2500 engine and Transall aircraft completed development and join the Tornado, AV-8B and Harrier systems in regular production. The Engine Management System on Phoenix successfully embarked on flight and qualification testing, and the business in Engine Control was maintained by steady deliveries of the RB211-535 Supervisory System.



PSD's Haskett Trophy winners with ETTAS sub unit.

Displays and Guidance Systems Group



Foreword by

J C Spinks
Assistant Managing Director

The Group achieved major market penetration with new products as well as maintaining output on existing programmes. Co-operative engineering and marketing effort between GSD, ADD and APHD of stealth avionic concepts led to intensive flight trials in the USA and several new opportunities.

ADD won us the Queen's Award once again for export of the F-16 Head Up Display, and in conjunction with Basildon and RAE(F), the technology award for night attack systems.

Despite difficult market conditions, GSD's order book has increased significantly with new contracts for the

Warrior AFV APES, supplementing existing backlog for torpedo RSU's and the MLRS programme. Our digital map has now been selected for the RAF Harrier GR.7.

ATED has absorbed the effects of the rundown of the Tornado programme, with sales of ORION to airlines and military customers, including a new modular ATE for SCADC depots.

APHD were welcomed into the Group bringing exciting prospects for the exploitation of laser and other tube technology, confirmed by a subcontract from GEC Avionics Inc. Atlanta for the US Army M1A1 main battle tank laser rangefinder tube.

The Group enters 1988 with a solid order book everywhere and a range of emerging products to sustain future growth.

Airborne Display Division continues quantity production of Head Up and Head Down Display systems for a number of new aircraft programmes, notably the F-16 and Tornado, and for retrofit to in-service aircraft such as the F-5.

Development of the C-17 HUD is progressing on schedule; this innovative programme will incorporate a twin channel system using surface mount technology. Helmet mounted devices and integrated helmet systems are an increasing element of the Division's work. Night Vision Goggles are either in-service or under final acceptance with nine military services, and the 'Falcon Eye' helmet display system is under evaluation by General Dynamics for proof of concept.

Applied Physics Division (Borehamwood) is to supply approximately 60 CO₂ TEA Lasers to GEC Avionics Inc. in Atlanta as part of the development of a new, eyesafe laser rangefinder for the US Army. A \$10 million full scale engineering development contract awarded by General Dynamics will provide the M1A1 tank with the world's first CO₂ laser rangefinder which can indicate the range to targets viewed through fog, smoke and dust. Initial production is scheduled to start in mid-1988 and production options are based on planned rates in excess of 600 units per year. Neutron Generator work continues at a significant level with encouraging signs of growth in new business areas such as specialist test equipment.

Automatic Test Equipment Division has continued to support its existing customers around the world and has achieved two major successes during the year which will provide long term work and extend the division's product range. Our successful bid to supply Modular Automatic Test Equipment to the United

States Air Force and Navy has also established us as suppliers of ATE to the world's leading airlines. We are also firmly entrenched in the MIL-STD-1553B test market and anticipate major sales of the ORION 9000. Development of diverse products is under way aimed at military and civil markets.

Guidance Systems Division has been awarded a production contract to supply the Digital Colour Map Unit for the Harrier GR.7 and a development contract for the laser gyro Azimuth Position Elevation System (APES) navigation system for the Warrior Observation Post Vehicle. Development of Total Terrain Avionic (T²A) Systems has continued with successful demonstrations on the Tornado and US Navy A-6 aircraft. START Gyro development has accelerated with sales for application to Formula One racing cars and Precision Guided Munitions. The production of gyros and rate packs has continued with attendant customer interest leading to follow-on orders. Tooling up for production of MLRS inertial platforms is continuing on schedule.

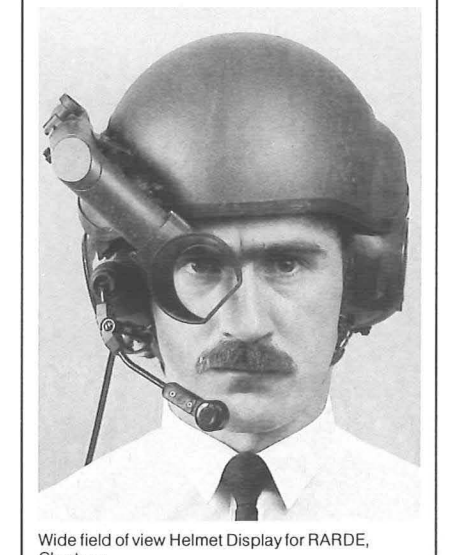


The DCMU system selected for the RAF's latest Harrier

Flight Automation Research Laboratory's future external projects include Helmet Displays, Hybrid Navigation and IKBS studies; in addition a collaborative Alvey programme, Trailblazer, began this year to research VLSI system design.

Product Division support has been continued in several areas notably the Redundancy Management Demonstrator for FCD, VLSI chips for CACD and MASD, Holographic HUD optical design, Displays and Eye Position Sensing for ADD, and Magnetics for MASD.

Progress has been maintained in Software Engineering techniques and High Speed Data Bus and Fibre Optic Data Transmission. Studies continue in Nuclear Hardening/EMP design and Modular Avionic Packaging. New work includes Virtual Cockpit Displays.



Wide field of view Helmet Display for RARDE, Chertsey.

Surveillance and Civil Systems Group



Foreword by

D G Clews
Assistant Managing Director

First of all let me welcome Mobile Radar Division and Sonar Systems Division to the Rochester family of Divisions; although physically located in the Borehamwood area, I hope they feel fully integrated in the team.

The Group can now offer wide-ranging products, from small unmanned aircraft to large towed array systems, and I anticipate that using the Group's advanced technology base and systems expertise we will innovate to enhance the range.

MASD and SSD, supported by RSD, form a powerful Anti Submarine Warfare capability for customers both

in the UK and abroad up to the turn of the century; the acoustic processor for the EH101 helicopter is just one example.

FCD continued its work on Airbus Fly by Wire and is actively pursuing the next generation of systems for a new range of Boeing Aircraft. AS&RD is doing excellent work in maintenance support and training.

Amongst many milestones Phoenix has had its first B model flight this year and MRD are receiving worldwide attention for their ground based surveillance equipment.

I look forward to working with the team to bring this enormous potential to fruition.

Aviation Service and Repair Division is actively bidding for depot support for the USAF F-16C/D HUD in Europe, which it hopes to add to other current major programmes in operation, such as that for Tornado Systems. The Division has contributed in support matters related to new projects and is active in the demanding requirements that will form part of all equipment proposals for EFA. Spares orders are already in-house for A320 launch in March 1988 and our representation in Toulouse has been expanded. Category 3 retrofit programmes for British Airways and British Caledonian's BAC 1-11 have been successfully completed.

Flight Controls Division can look on 1987 as being an 'On Target' year. The Phoenix surveillance system continues on schedule with the success of the B model air vehicle and automotive trials. A320 made its first flight in February with our slat/flap control computers. Development of pre-production Primary Flight Control Computers for the Boeing 7J7 continues and the Division has also been selected as one of three potential suppliers for the Actuator Control Electronics. Our Fly by Light system is the subject of a development contract from Airship Industries for the US Navy Airship programme, and the Advanced Ground Station has been successfully integrated at RAE Llanbedr.

Maritime Aircraft Systems Division's home and export programmes are proceeding well. First AQS 902 deliveries for the Italian AF Atlantics have been made and further orders are expected. Deliveries of the Indian Navy Sea King systems, which incorporate the Division's Tactical Processing System, are in full delivery. The first production models of the Advanced AQS 902, which includes dipping sonar

processing for the first time, have been delivered for the RN Sea King 6. AQS 902 is being evaluated for the USN LAMPS 1 Update. Trials of the AQS 903, in development for the RN's EH101, are successfully demonstrating the capabilities of this acoustic processor.



Royal Navy Sea King 6 to be fitted with AQS 902 Acoustic Processing Equipment

Mobile Radar Division (Borehamwood) has been actively promoting HERMES Remote Ground Sensor systems, and FASTAR Surveillance Radar, both at home and abroad.

Sales achieved with HERMES include systems to France and a repeat order to Pakistan.

FASTAR has attracted enthusiastic reactions wherever demonstrated, for example, in Jordan, the USA and at the STANOC exhibition attended by many overseas representatives.

A unique feature, the interlinking of the two systems whereby HERMES autocues the radar, excited particular interest.

The Civil Security product line has been completely up-dated and is attracting increased sales as distributor networks are created.

Additionally, the Division has made a significant contribution to Milton Keynes' MADS-7 programme with the manufacture of radars and test equipment.

Recording Systems Division has continued its expansion on the Nailsea site, and saw another successful order for a new version of its Torpedo Test Recorders. This is expected to form the basis of further orders early in the New Year. The installation of office automation and desk-top publishing systems is realising benefits in productivity, and a CAE-based design and dynamic simulation programme has generated confidence in a new high-density digital magnetic tape recorder design. Self-funded developments in new recorder technologies will form the basis of a number of important competitive tenders due to occur in 1988 for both domestic and export aircraft and industrial users.

Sonar Systems Division's (Welwyn Garden City) market direction is making a swing from established products towards the major UK sonar suite procurement planned for the 1990's. SSD is already firmly involved in 5 of the 6 UK main sonar projects.

Three new PV products were launched in 1987 of which Sonar Stimulator has already achieved significant UK sales and substantial export interest. A new low cost mission replay Sonar - 2104, which featured SSD's new 1990 technology sonar display (independently available) was launched at RNEE 87 causing considerable interest. Further PV Sonar developments for the 1990's are in progress for test and possible launch in 1988.

The Audio Visual Unit continues to respond to a variety of requirements.

Exhibition videos were shot in Germany, Spain and on board ships in Devonport, and coverage of divisional ceremonies included a video-wall to support ISD's 1,000th SCADC Presentation.

Rapid video editing for ADD's Queen's Award Ceremony ensured additional visitors saw the event the same day!

Current projects include proposal and Corporate programmes.

Central Manufacturing Services has updated its machining facilities with the acquisition of three Mori-Seiki machining centres. The Redux bonding requirements continue to grow with an increase in the load from Borehamwood and Basildon. The 902 equipment rack being produced for MASD provides an interesting divergence from the normal work pattern. The conformal coating facility processed more than 70,000 printed circuit boards for customer divisions.

Central Quality Department continues to provide a service, approved by NATLAS, for product certification in the areas of both Environmental and EMC testing. Electrical, mechanical and environmental calibration to the requirements of National and International Specifications is also provided.

The department is currently expanding the Electro Magnetic Compatibility (EMC) facility at Gads Hill in order to increase its penetration of external markets which now provide over 80% of the laboratory's business.

Advice and assistance in Quality Assurance disciplines is now being extended to the three Divisions of GEC Avionics at Borehamwood and Welwyn Garden City.

Exhibitions Department workload increased due to the expanding activities of the Divisions which was reflected in the increased number of exhibitions last year. We attended 32 exhibitions in 1987, of which 16 were overseas. An even busier programme lies ahead. Aiming at improved visual appeal of our stands, and to keep pace with the changing fashions in modern presentation of products, updating of the display system is envisaged in the near future.



GEC Avionics display at RNEE '87 Exhibition

GEC Avionics Research Laboratory, Great Baddow, undertakes Company research in holography, infra-red (IR) systems and related optical display and imaging techniques. Advanced signal processing research is carried out in support of digital high resolution radar and communication systems. There are current programmes on magnetic anomaly and sea clutter measurements, analysis and signal extraction methods.

Research in stabilisation and control techniques is featured.

The laboratory also supports long-term avionics related university research.

Personnel Department's recruiting activity increased, primarily in the Production area. 900 additional people joined the Rochester site during the year.

The Appraisal Scheme is now running successfully in most Divisions.

The canteen continued to give an excellent service; it provided for over 700 people at the Long Service Dinner.

Training provision was demonstrated to managers visiting the Training Department's first Open Day. 11 young adults assisted in the induction of 250 trainees and graduates. CAD, Commercial and PC Training commenced on the new IBM network and hardware training included attendance by 90 engineers at in-plant Modern Electronic Packaging Seminars.

Site Services. Projects undertaken by Works Engineering Services include an extension to the second storey in the main hangar, an extension to the canteen and the continuing refurbishment programme for the older parts of the Rochester site.

Computing Services have installed a new ICL Computer giving a 163% increase in processing power which is enabling them to provide additional services, particularly to production departments.

Company Aircraft Services carried 480 passengers to European and UK destinations during the first year of operation of the new Beechcraft King Air.

Reprographic Services continue to satisfy the ever increasing demands for stationery and printing services for the site.

Security, Reception, Technical Library, Travel Office and Company Standards Departments have all continued to make their individual contributions to the operation of the site.

Reports from USA

GEC Avionics Inc. became the first US Company awarded a full scale production contract for a CO₂ Laser Rangefinder. The system, with laser tubes provided by Applied Physics Division, will be installed in the M1A1 Abrams Main Battle Tank. Significant additions to the order book for 1988 include C-130 HUD, F-5 HUD, ARBS OPTS and MAPADS. Adding to that the ongoing production of A-4, A-7, and F-16A/B HUDS, and the co-production of the F-16C/D HUD, means 1988 will be a record breaking year.

Lear Astronics Corp. and Developmental Sciences Corp. of California joined the GEC Avionics family in September 1987. Products include flight controls for military and commercial aircraft, unmanned aircraft avionics, small tactical radars for artillery and air defence, remotely piloted vehicles, aviation ground power units, and advanced composite structures.

Together CACD and Astronics supply more flight controls than anyone else in the world. We are also the leaders in Fly by Wire technology.

Our Skyeeye RPV with its high payload and endurance along with the Phoenix RPV makes us world leaders in mini RPVs.

Lear Astronics Corp. - In 1986 both the F-15E and Lavi aircraft accomplished first flight with our digital flight controls performing flawlessly. Contracts awarded in 1987 included the F-111 Digital Flight Control Computer. Together with CACD we won the ATF DFLCC. The ATF with its state-of-the-art flight critical architecture will assure us continued leadership position for future aircraft.

Our radar product line introduced an improved (Mk V) Artillery Muzzle Velocity Radar, and established the Tactical Alert Radar with an initial sale to the US Navy.

Developmental Sciences Corp. - Last year the RPV product line was expanded to include manned aircraft systems integration. The preproduction R4E-50 Skyeeye RPV was demonstrated. The production R4E-50 tooling was completed and volume manufacture began. We won a R4E-40 contract from an international customer and production continued on a Mid-East reconnaissance system R4E-50 contract. We will shortly compete for the US Army's Intelligence Electronic Warfare Unmanned Aerial Vehicle.

The 200th Aviation Ground Power Unit (AGPU) was delivered to the US Army, and supports its entire helicopter fleet.

We also made and delivered composite structures.

Company Sites:
(Clockwise)

- Rochester
- Borehamwood
- Nailsea
- Welwyn Garden City
- Yeovil
- Gillingham (Gads Hill)
- Chatham (New Road)
- Santa Monica
- Atlanta



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