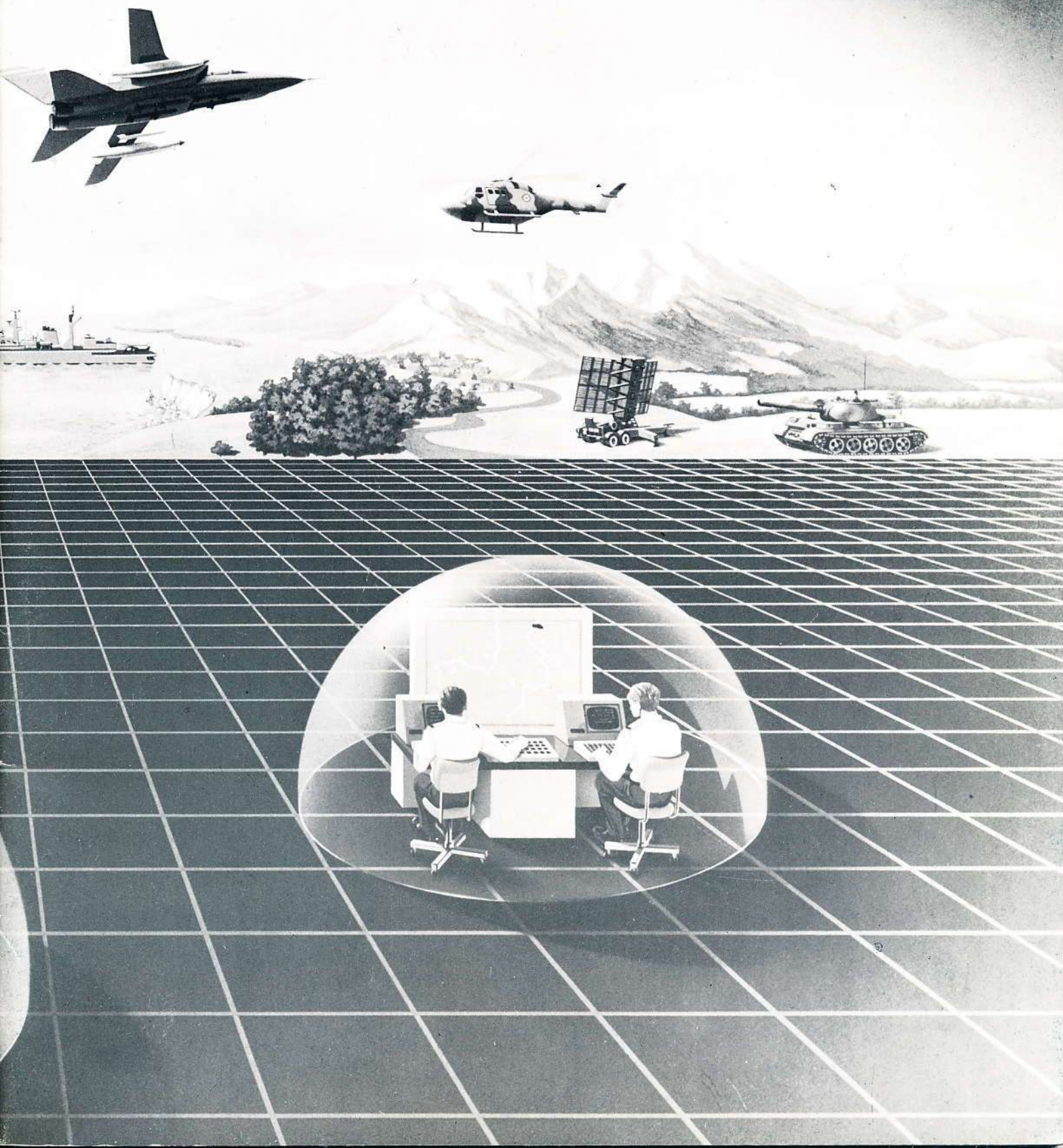


NEWS AND TOPICS RELATING TO THE MARCONI MANAGEMENT



# THE MARCONI DIGEST

VOL 1. NO.4: DECEMBER 1984







# THE MARCONI DIGEST

## IN THIS ISSUE:

---

### CONTENTS

---

<b>FORUM</b>	Editorial, New Life President, GEC Appointment	3
<b>PRODUCTS</b>	Latest Equipment	4
<b>CONTRACTS</b>	Review of Recent Contracts	6
<b>MARCONI '84</b>	A Review of the Event	10
<b>EXHIBITIONS</b>	IBC, INTERNEPCON and FARNBOROUGH	15
<b>SUPPLEMENT</b>	Space in Support of Maritime Law and Order	19
<b>INTERFACE</b>	Company Aspects and Affairs	23
<b>PEOPLE</b>	News of Recent Appointments	29
<b>SPECIAL REPORT</b>	A Profile of the Marconi College	32
<b>FACT FILE</b>	Reorganisation of the UK MoD	35
<b>LITERATURE</b>	'Marconi Today'	38
<b>AD NEWS</b>	Current Advertising from Marconi Companies	39

---

Editor: Tony Marshall

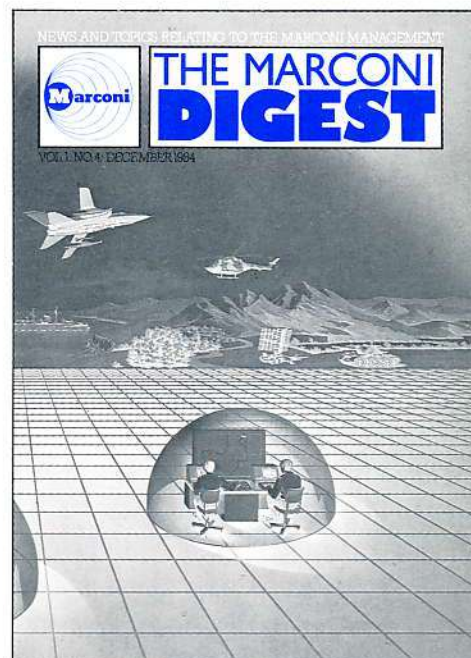
Published by the Public Affairs Department,  
The Marconi Company, Stanmore.

---

Designed and Produced in the UK by The Facet Group.

The Marconi Digest is an internal publication of The Marconi Company  
and all rights of reproduction are reserved.

---



### COVER

An illustration depicting the components of C<sup>3</sup>I –  
Command, Control, Communications and  
Intelligence.



# Forum

## Marconi '84 OUR MOST AMBITIOUS EVENT YET

Commuters using the M4 near Heathrow at the end of October must have been slightly bemused to observe a Centurion Tank suddenly appear one morning on the forecourt of the Penta Hotel. Similarly, visitors to the Hotel were intrigued to see a mini 'Berlin Wall' spring up in part of the Reception area behind which could be heard a veritable army of people at work.

This was the build-up to Marconi '84 – the largest and most ambitious event ever organised by the Company.

In just four days the show was ready to go. A complete exhibition, built from scratch, showing the full range of the group's systems and products. Military, Civil, 'Enabling Technology', C<sup>3</sup>I; these were the four principal themes.

Supporting the exhibition was a programme of technical presentations held during each morning and afternoon of this three-day event. There were two daily press conferences, and top level delegations from both home and overseas were hosted and entertained. This issue of Digest contains a detailed report on Marconi '84 on page 10.

It was an event that demanded full commitment from each company within the Marconi group, and involved months of detailed planning and preparation.

So, what did we gain, and learn, from Marconi '84?

Firstly, we believe that it achieved its prime objective of portraying the enormous breadth of the Company's activities. During the course of our normal Exhibition programme (... and we participate in over fifty shows each year) several of our companies may group together on a joint stand. Invariably however, it has an army, navy or aerospace theme. We also enter other specialist shows appropriate to our broad range of business activities. Marconi '84, therefore, was the theatre

for displaying our enormous diversity of equipments, resources and management skills.

Secondly, we attracted an equally wide range of specially invited guests. Senior customers constituted the highest percentage, of course; and we were particularly delighted to receive visitors from over twenty countries. We had almost one hundred representatives from the national, technical and local press. Academics from leading universities and polytechnics also formed part of our visitor list, as did our constituency MPs. Employees were also welcomed and it was pleasing to greet parties from each main plant including a group of seventy-five from Hillend in Scotland.

We learned some lessons, naturally, and all critiques have been recorded in our overall appraisal. But there is merit and strength in presenting the full force of Marconi and there are limited opportunities for doing this. Marconi '84 was such an opportunity. ☐

## GEC Board Appointment



It was announced on 4th December that Arthur Walsh, Managing Director of The Marconi Company Limited was appointed a Board Director of the General Electric Company p.l.c. ☐



## Sir Robert Telford – Life President

Only once before has there been a Life President of the Marconi Company – and that was our founder, Guglielmo Marconi.

Now Sir Robert Telford, CBE, has been appointed by the Board to that high office on his resignation as Chairman of the Company on 1st October 1984.

In accepting Sir Robert's resignation the Board expressed its 'appreciation of his loyal and dedicated service since he joined the Company in 1937. Sir Robert had become Managing Director of the Company in 1965 and Chairman in 1981 and had made an immense contribution to the Company's success. He had become an eminent figure in the British electronics industry and his name was

inseparable from that of the Company.'

He joined the Marconi Company as a management trainee in 1937. At the end of his two-year apprenticeship he became assistant to the Works Manager in Chelmsford. From 1940-46 he was Manager of the Hackbridge Works responsible for the production of the well-known T1154/R1155 transmitter/receivers for the RAF. At the end of the war he became Managing Director of our Brazilian Company, returning to England in 1950 when he was appointed Assistant to the General Manager. In 1953 he became General Works Manager and five years later he was appointed General Manager, until becoming Managing Director in 1965. In 1968 he was appointed a Director of the English Electric Company.

Following the Company's merger with The General Electric Company in 1968, he was also appointed Managing Director of GEC-Marconi Electronics Ltd and he became a main board Director of GEC in 1973.

In early 1981 he assumed the Chairmanship of the Company until his appointment as President of the Company.

Sir Robert was appointed a CBE in 1967 and created a Knight Bachelor in June 1978 for his services to export. He was appointed a Deputy Lieutenant for the County of Essex in 1981. ☐



# Products

## INSIGHT INTO THE LATEST EQUIPMENT

### A Wide-open Market for Oceanray

One of the talking points at Marconi '84 was Oceanray, the new satellite communications terminal recently introduced by Marconi Marine.

It is not only one of the smallest of its kind—its antenna is only 3 ft—but with a price tag of less than £20,000 it is the cheapest. It is also as simple to use as a land-based STD telephone or telex system.

These features really open up the market to Oceanray and make it suitable for everything from a luxury yacht to a large passenger liner and from a trawler to a supertanker.

Unlike other systems it does not require commands from a 'typewriter' keyboard for operation of the system. Instead, a standard push-button telephone is used. Instructions for the operation of the terminal are given verbally by a computerised voice via the telephone.

Compatible with over twenty types, Oceanray offers the widest choice of teleprinter and the system allows a convenient alternative source of control at the teleprinter if the operator does not wish to use the telephone.

Once installed, the Oceanray terminal can be switched on and virtually ignored from then onwards. In operation, Oceanray's small antenna locks onto the nearest INMARSAT satellite and, by monitoring the satellite signal, will automatically search and select another satellite should the signal of the first become too weak.

The system can be simply and inexpensively expanded to include such facilities as facsimile transmission; high and low speed transmission; teleprinter visual display unit; automatic ship positioning and monitoring for the convenience of the land-based ship-owner; and interface with the ship's PABX automatic telephone exchange.

### Easams Launches Graphics Processors

Easams Limited took the opportunity presented by their presence at ITAME 84 (International Test and Measurement Exhibition) to launch two new graphics processor packages. They are intended, principally, for manufacturers and others with limited CAD capability.



Mandy Brunton of the Marconi Press Office, demonstrating Oceanray.

The 12K machine code programmes, known as FLOW GEN and CD GEN, will spearhead the Company's drive to strengthen its position in the fast-growing market for low-cost computer graphics.

The packages, as their names imply, offer generators for flowchart and circuit diagrams to take advantage of the high-resolution graphics and memory-mapped screen possibilities of Apple II micros.

The hard-copy output provided by the Hewlett Packard plotter is to technical publications standard and of sufficient quality for immediate reproduction-for-print.

### Screening Improves dB Levels

Following on their solution to problems associated with the production of electrical cable harness (Marconiweave—see Digest 2, page 6), MSRSL at Kidsgrove has developed a method of screening the end of woven harnesses of multicore cables so that each individual wire can be screened right up to 1 mm from the rear of the connector pin.

Improvements in decibel levels of up to 10dB at 100 KHz rising to 25dB at 1 GHz over standard 'pigtail' can be demonstrated.

Combining this technique with overall screening of a woven harness can result in added improvements of about 20dB at 100 KHz rising to 50dB at 10MHz compared with conventional braiding and 'pigtail'.



## New Satellite TV Receiver from MCSL

A new, compact satellite television receiver which is only 44.5 mm thick has been announced by MCSL at Chelmsford.

The P3400 has been designed for high quality, cost effective reception of the new European satellite television transmissions beamed from satellites such as the ECS and INTELSAT series.

The main users are likely to be cable system operators and telecommunication organisations who require high quality vision and sound signals for distribution within their terrestrial networks.

However, the receiver is also intended for other professional users such as broadcasting organisations, hotels and conference centres, language teaching institutes, military bases and offshore installations.

To complete a satellite TV receive-only (TVRO) unit it is, of course, necessary to add the outdoor antenna with low noise downconverters and any decryption unit or decoder if encrypted transmissions are to be received.

## Seafox for Light Naval Forces

MCSL already supply well-proven HF communications equipment for major warships (ICS3) and a HF to UHF package (Makaira) for coastal patrol boats.

Now they have introduced the Seafox range to provide an integrated system for internal and external communications for vessels ranging from fast patrol craft to light frigates and submarines.

The system provides intercom for individual vessels and tactical radio nets for inter-ship communication and warfare co-ordination, as well as strategic links to onshore maritime headquarters.

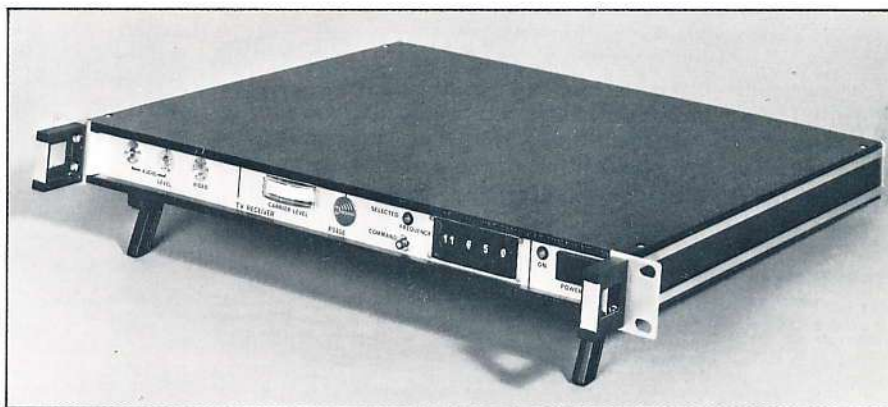
Seafox also has the advantage that it can be containerised for use by rapid deployment forces. It is easy to install, simple to operate and reduces onboard manning levels.

## A New TV Family

Marconi Communication Systems has launched a major new range of Band III TV transmitters.

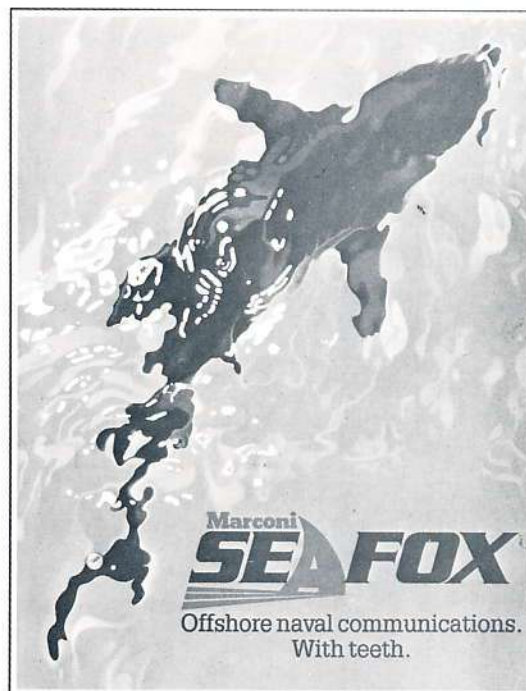
Five transmitters in the 7500 series make up the family and all of them make use of the B7500 drive unit so successfully demonstrated at the IBC '84 exhibition. They range from 1 to 25 kilowatts output.

A new design of output combiner to maximise the power amplifiers, and new advanced technology tetrodes are among the features that put the family in the forefront of modern TV transmitters.

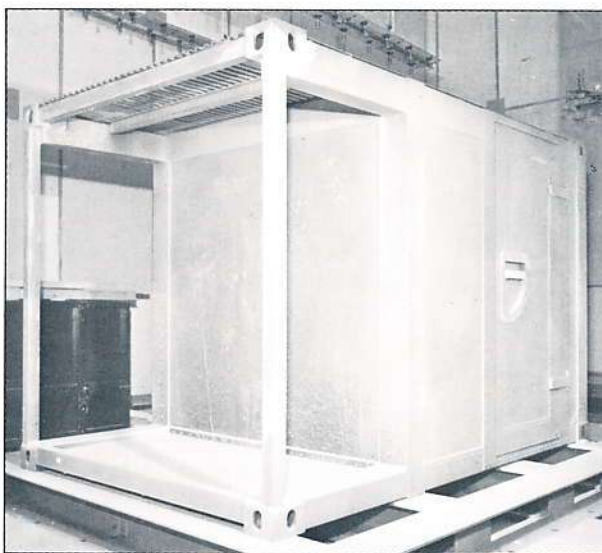


P3400 satellite television receiver.

**Marconi**  
Communication Systems



Showing the new Seafox sales brochure.



The 'Isolator' shelter manufactured by Marconi Radar Systems at Gateshead undergoing environmental testing at Chelmsford. The shelter protects electronic equipment against electromagnetic interference (EMI), electromagnetic pulse (EMP), and counter surveillance activities, and can be supplied nuclear-hardened against blast and thermal pulse, giving it enormous potential in both military and commercial fields.

Easier installation, operational simplicity, reliability and ease of maintenance have been major criteria in the design of the 7500 family. There is a high degree of commonality between individual equipment and so spares and

service support can be simplified even where different output powers are used throughout a network.

The series is available in Systems B, M or N, with NTSC, SECAM or PAL colour.





# Contracts

## FOCUS ON NATIONAL AND INTERNATIONAL SUCCESSES

### Multi-million Pound Satellite Terminal Contracts for MDSL

Marconi Defence Systems announced at Marconi '84 contracts from the UK Ministry of Defence for satellite communications terminals totalling over £43 million.

By far the larger of the two is for £40 million and covers the supply of 19 Enhanced Shipborne Communications Terminals (SCOT) to the Royal Navy. The equipment will be installed aboard all classes of frigates and deliveries will commence within two years.

This contract is the largest ever placed with a European company for satellite communications terminals.

SCOT 1 was the world's first and only lightweight operational SHF shipborne terminal and revolutionised naval communications planning in the 1970s by offering an immediate and secure long-distance satellite link with the quality and reliability only previously obtainable with terrestrial line-of-sight equipment. SCOT 1 and its successors have been in service as the RN's primary long-distance satellite communications equipment ever since.

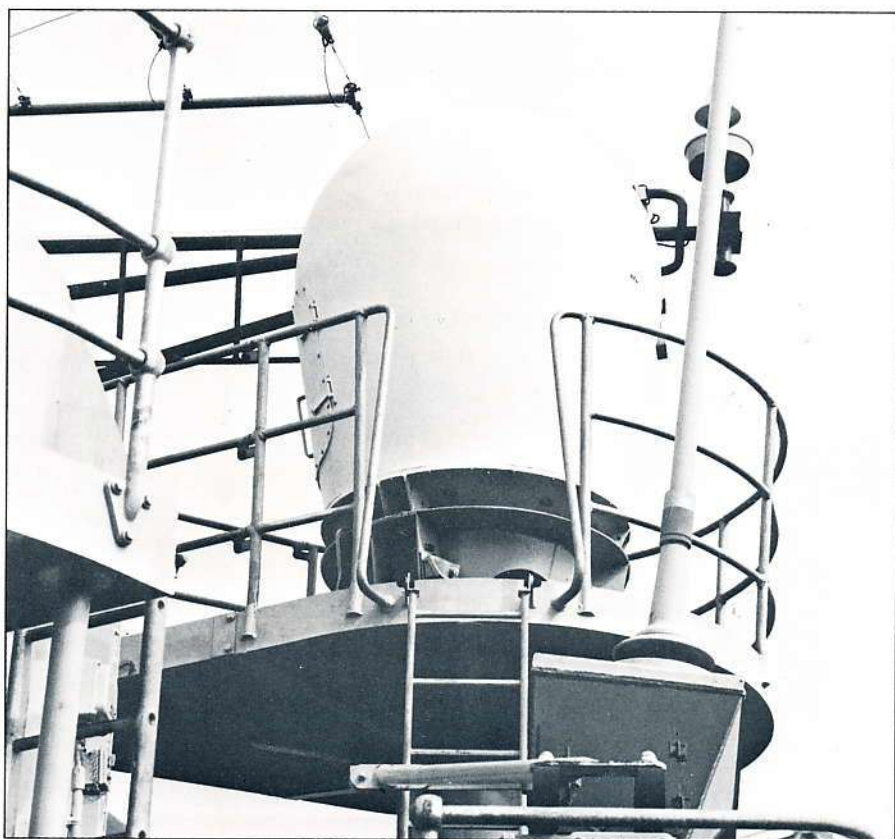
The latest, enhanced version provides even higher availability and full inter-operability with all current and planned US, NATO and UK military communications satellites.

A modular design concept allows a number of variants tailored to different classes of ships and operational requirements.

### Earth Terminal for the Shetland Islands

The second contract for over £3 million is for an earth terminal at Saxa Vord which will form part of the £150 million improved UKADGE programme, a national air defence radar network operated by the RAF.

Refurbishment of existing equipment is included in the contract as well as the



SCOT: the antenna and its protective radome will soon be a feature of all Classes of Royal Navy frigate.

supply of new electronics systems. Rugged reliability will be a particular feature of the terminal because it will have to operate in sub-zero temperatures and withstand the gusts of wind of 180 mph that a typical Shetlands winter can generate.

### On Top Down Under

Two more orders for equipment for the highly successful Australian Digital Data Network have been received by Marconi Communication Systems. They are for multiplexing and terminating units and follow the major order received in August 1983.

These new contracts have been won in conjunction with GEC Australia, and the equipment will be manufactured at its Silverwater (Sydney) factory as well as at MCSL in Chelmsford.

There has been an increased demand for the Australian service which provides point-to-point and multipoint data communications at speeds up to 48K bit/s.

The ability to fulfil the Australian orders so completely is the result of the sophisticated design and development work carried out in connection with the extensive supply of KiloStream equipment to British Telecom who, it has just been announced, has placed yet another contract with MCSL for additional items.

The new British Telecom order, worth £1.6 million, is for terminating units, multiplexers and local line systems.

KiloStream is the name for British Telecom's digital private circuits that offer efficient and reliable links between business locations at high data speeds up to 64K bit/s – enabling users to build mixed voice/data networks.



## MUSL 'Stings' Twice

Two major overseas contracts have been won by Marconi Underwater Systems (MUSL) in the space of as many weeks.

Contracts worth a total of £20 million have been placed by the Royal Thai Navy and the Egyptian Navy for Sting Ray lightweight anti-submarine torpedoes. Strong international competition was overcome to achieve this major coup for the British torpedo industry.

Sting Ray is an intelligent underwater guided missile with its own onboard digital computer. It can make tactical decisions during an engagement and, using the latest digital signal processing techniques, can recognise and reject target-released decoys. It is acknowledged to be the most advanced lightweight torpedo in production today.

The computer, its quick-reaction control system and its multi-mode sonar give it outstanding performance in shallow water, which was one reason why Sting Ray was chosen by the Egyptian and Thai navies. The Egyptian contract includes a technology transfer package and assistance with depot routines such as maintenance and testing in conjunction with the UK Royal Navy.

## More Oil Rig Involvement for MCSL

Marconi has added to its already impressive list of communication systems provided for the offshore oil industry with two new orders totalling around £1 million for transhorizon communications equipment.

British Telecom International has placed an order with MCSL for tropospheric scatter equipment to be used at the Row Brow shore station near Scarborough for radio communication with the North Sea 'Esmond' platform, while Total Oil has ordered equipment for installation on the 'A' drilling



Sting Ray's performance has been proven conclusively during a rigorous trials programme for the Royal Navy and Royal Air Force.

and accommodation platform in the Alwyn North field.

At Scarborough, in addition to the two high-power amplifiers and quadruple diversity receivers, the company will supply supervisory units and installation/commissioning personnel. Although not responsible for the total system, Marconi will guarantee the communication link performance.

Marconi tropospheric scatter communication systems have proved to be ideally suited for transhorizon links in the hostile offshore environment because high-power microwave radio signals beamed into the troposphere become scattered by atmospheric turbulence so that a small but still usable signal reaches the receiving antenna.

The system will provide communications between the platforms and the mainland for telephone, telex and original data.

## Claymore for Middle East

Marconi Secure Radio Systems has just announced another export order for items in the Claymore area communications system.

Valued at £175,000 the contract is for

Oil rig communication terminal.

the supply of the GR083 line-of-sight radio and its associated multiplexer, MUX 983.

The Claymore is a modular-form system that can be purchased complete or in units as required – radio, multiplexer, cryptographic unit, digital exchange, store and forward telegraph switch and ancillary units.

Small size, lightweight and low cost are particular features of Claymore which has a very low primary power consumption. It is easily transported – it will fit into a Land Rover type vehicle – and the GR083 radio can be set up and operating in 10 seconds.

Further orders from the Middle East and other overseas countries are expected shortly.

## Weapon Simulator for RBS-70M

A major defence contract has been awarded to Marconi Command and Control Systems, by Bofors of Sweden, for the development of a weapon simulator for RBS-70M. It was won against strong international competition.

This new night version of the RBS-70 short-range surface-to-air missile system uses a twin launcher. Mounted on the unmanned launcher will be a TV camera and a thermal imager as well as the laser transmitter for the missile's beamriding guidance system. To guide the missile, the operator, who is located in a shelter monitoring the pictures from the TV and IR cameras, keeps the target in the centre of the sight picture. The cameras are bore-sighted to the laser-guidance beam.

The simulator uses Marconi's proven technique of computer image generation to provide both daylight and thermal images to the missile operator. Realistic targets are generated by the equipment allowing practice of optical tracking in parallel with target recognition. A library of multiple attack profiles is provided so that the operator can train under all environmental conditions. Background terrain and missile effects are also generated by the simulator which will form an integral part of the weapon system.





## Emergency Services Rely on Marconi

What is believed to be the largest single order for mobile radios (20,000 units) ever placed with a British company was received by Marconi Communication Systems from the Home Office earlier this year. It has now been followed by a further order for 600 mobile radio base stations.

The orders include associated spares and are for police and fire services in England and Wales.

Several versions of these, state-of-the-art micro-processor controlled radios are involved and all have the latest sophisticated capabilities for rapid, efficient communication 'on the move' while retaining rugged serviceability.

The latest order brings the total received from the Home Office to approximately £17 million to meet requirements under their new re-equipping programme following the World Administration Radio Conference in 1979 at which extensive re-allocation of frequencies was agreed.

## ACE Agreement with TTI

A major share of the North American telephone system market is assured for Marconi Communications Systems by a technology transfer licence agreement with Telecommunications Technology Inc of California.

TTI is the world's largest supplier of switched access test equipment, and is part of the giant General Signal Corporation.

The agreement is for a version of MCSL's Automatic Cross-Connect Equipment (ACE) as used in the Kilostream data service of British Telecom. Initial development work to modify ACE to meet US transmission standards will be carried out in Chelmsford and then transferred to California.

Under the agreement TTI will purchase items common to those used in the UK to benefit from volume production and will combine their own specially developed units in the assembly to suit US customer requirements.

## MRSL Wins Big ATC Export Order

One of the most significant purchases of civil approach radars in recent years has resulted in a big export contract for Marconi Radar Systems.

EESA (Equipos Electronicos SA) of Spain has placed an order with MRSL for the production, in that country, of eight Marconi S511c Approach Control Radars. The order is part of a £20 million contract for primary radars, display systems, installation and system design



Showing a RC690 mobile radio in use by the emergency services.

being handled by a consortium of EESA and Page Iberica with Marconi Radar as sub-contractors.

MRSL was successful against strong competition from two Spanish companies who offered ATC radars by Selenia and Plessey. They will supply drawings and licence the manufacture. Testing will be to Marconi specifications and EESA can call on Marconi expertise as required.

The S511c is a more powerful version of the S511 which has been supplied in quantity to the CAA and is being installed at Newcastle Airport as well as Bombay and in Jordan.

Ancillary equipment with each of the 8 radars includes the Independent Weather Channel (so that controllers can superimpose an electronic map of rain and storm areas on screens without obscuring aircraft 'blips') and a new design primary radar extractor to enable radar signals to be sent over normal telephone circuits.

## £3.3m RN Contract for MRSL and MCSL

A Royal Navy staff requirement for an advanced ship-to-shore automatic HF telegraphy system is to be satisfied by two Marconi companies working together.

MRSL has won the contract to supply two complete shore facilities with associated ship-borne equipment. MRSL will undertake the development and production of the ship-borne items while MCSL, as principal sub-contractor, will develop and produce the shore-based elements.

The new system, due to enter service in 1987, will provide an improved, fully-automated method of determining and selecting noise-free channels in the HF maritime mobile bands. Hitherto channel selection has involved the use

of HF prediction charts and manual switching – a time consuming procedure.

The facilities provided under this contract will mean there is virtually certain to be an instantly available ship-to-shore frequency in each of the maritime mobile bands at any time.

## Marconi in NATO C<sup>3</sup>I Study Consortium

It has just been announced that ACCSCO SA (an international company established by nine leading electronics companies in Europe and the United States) has been awarded its second NATO study contract.

The contract is for the study of communications and data processing design aspects of NATO's projected air command and control system (ACCS).

Marconi is one of the companies in the consortium, and its chairman is Air Commodore Ted Sismore of MRSL.

Commenting on the award of the contract he said "The main strength of ACCSCO is in the unique combination of major European electronics systems companies, together with one leading US company, all with wide experience in the design of command and control systems. This powerful combination covers a wide field of continuing research and development activity and by co-ordinating and integrating the key elements, ACCSCO can provide a balanced and unrivalled view of the capability of NATO to instal and operate new systems to meet the essential operational requirements on into the next century."

## Astrid for the Royal Navy

After detailed evaluation by the Royal Navy, and against intense competition from such names as Plessey, Cossor and Ferranti, Marconi Radar Systems has won a £3 million plus contract to



supply an Astrid display system and secondary radar enhancement to HMS *Heron*, the RN Air Station at Yeovilton.

Altogether 18 Astrid displays will be supplied and the new system (which replaces an existing Marconi display system) will be commissioned in Spring 1985.

Six operational custom-built consoles and ancillary equipment are included in the contract.

Astrid is an air traffic control monitoring system that provides a bright, high-resolution picture of primary and secondary radar information from both local and remotely-sited sources. High reliability, availability and ease of maintenance are particular features of Astrid.

## Marconi Satellite Earth Station on Song

The new docklands satellite earth station (designed and built by MCSL) at the London Heliport is now in commission by British Telecom International transmitting the new Music Box cable television channel to the European satellite ECS Flight One for potential pan-European distribution.

The two 12 metre diameter aerials in the Marconi-built docklands communication complex (see Digest 3) are also being used to send high-quality audio and video signals for daily programmes on the Sky Channel throughout Europe and, via an Intelsat V satellite, Screen Sport and The Entertainment Network (TEN) for distribution within the UK.

## No.11 for MI in Sweden

Marconi Instruments, whose ATE Division has grown faster than any other major automatic test equipment manufacturer in the last two years, has just won its eleventh order from Ericsson, Sweden.

It is for a System 80 in-circuit test system for installation early in 1985 at the Swedish telecommunication giant's factory at Soderhamm. The System 80 is capable of making high-speed tests on printed circuit boards with a wide range of analogue and digital components mounted.

The reliability of the other ten test systems installed by MI in the Ericsson organisation, and proven over the last three years, was a key factor in the Swedish company choosing the System 80. Its flexibility and compatibility with existing equipments, plus the small size and economical approach to fixturing, clinched the order.

## MCSL Improves Radio Monte Carlo

Only 6 months after signing the contract, MCSL at Chelmsford has supplied and commissioned a new transmitter and

antenna to improve the service of the Radio Monte Carlo La Madone transmitting station.

This improved service has been made possible by the supply of a new 30 kW B6034 medium wave broadcast transmitter (identical to those used by the BBC for the UK's national medium wave service) and specialist antenna design.

The important design feature of the antenna network was the modification of the radiation pattern of the existing antennas which has dramatically improved the daytime coverage of the Monte Carlo region.

Work was also carried out to enable the same antennas to operate during the night at the very much higher power level of 1200 kW. The antenna network also allows the new Marconi 50 kW transmitter sufficient protection from a high power transmitter on the same site which operates simultaneously.

## MSSL Controls the Attitude!

Marconi Space Systems Limited has won a US \$1 million plus contract from INTELSAT, against stiff, worldwide competition. The contract is for the design and supply of Synchronous Command Generators (SCG) for installation in satellite ground control stations.

In addition to the day-to-day commanding of the satellite through the MSSL generators, their programmable capability can be used to emulate the satellite's on-board Attitude and Orbit Control Electronics (AOCE) and send commands directly to the thrusters to maintain the correct satellite attitude.

The SCG provides all the processing and synchronisation for such control and so insures against failure of the on-board AOCE at modest cost in terms of overall satellite budgets.

The SCG will be compatible with both the existing and the new series of INTELSAT satellites despite the different methods of stabilisation used in the two series.

## US Navy Buys More from MCSL

The United States Navy has placed a contract with Marconi Communication Systems valued in excess US \$1 million, to upgrade and add receiving facilities to the containerised ship communication system supplied by MCSL to the US Navy 18 months ago.

The Chelmsford-built containerised system has been used for trials both ashore and afloat as part of the US Navy high frequency radio programme. The success of these trials was instrumental in Marconi receiving a recent contract for ICS 3 communications equipment, now designated AN/URC-109, for the new US Navy LHD-1 amphibious assault ship. (See Digest 3, page 11).

The new facilities provided by this latest contract will allow further, more advanced trials to take place, with the containerised equipment operating as a reference system.

## CAA Chooses Marconi

SSR (Secondary Surveillance Radar) is a system in which aircraft fitted with a transponder automatically respond with details of identity and height when 'triggered' by a coded signal sent by the ground station equipment.

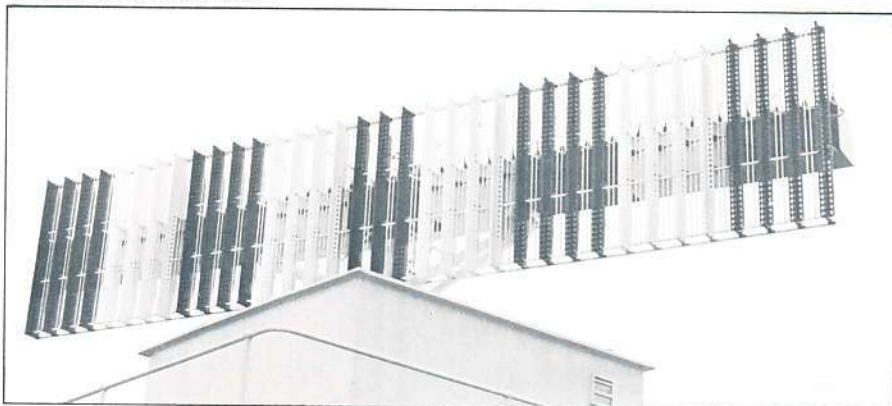
Marconi Radar Systems new LVA (Large Vertical Aperture) antenna provides considerably improved radiation patterns for an SSR system, thus ensuring much greater directional accuracy and reduced unwanted ground reflections.

It is the LVA S1095 that has been chosen by the Civil Aviation Authority for coverage of the UK's Flight Information Region.

This first order for the LVA antenna was won in the face of keen competition.

The antenna was developed as part of Marconi Radar's new Messenger monopulse SSR system and opens the way for practically addressable SSR systems (mode S) in the future. Until the planned introduction of monopulse SSR, LVA S1095 will improve considerably the performance of conventional SSR equipment.

LVA antenna chosen by the CAA.





# Marconi '84

## A REVIEW OF THE EVENT



**"We Believe we have a Breadth of Activities Unrivalled in the International Field of Applied Electronics."**

Robert Ashwood, Sales Director, The Marconi Company

A bold statement to make but one which can be substantiated.

We can demonstrate a spread of capabilities and a depth of involvement unmatched anywhere in the World.

From satellites to torpedoes, from military command and control systems to civil communications, we offer research, design, development and manufacturing services to fulfil the complex requirements of military and civil authorities all over the globe.

We design and make our own microchips. We have the most sophisticated facilities to test our

manufactured products. We have the technology to develop systems to meet today's sophisticated demands and the technology to link systems together into the realisation of the concept that is C<sup>3</sup>I.

Our record levels of investment in enabling technology are geared to anticipating the demands of future developments.

Perhaps not even among our own management is the *totality* of the Marconi group appreciated. Certainly our customers cannot be expected to comprehend it. Hence Marconi '84



**Drawing Together Our Key Products, Technologies and People**

The Penta Hotel on the northern perimeter of London's Heathrow Airport was the appropriate setting for Marconi '84. Easily reached from Central London itself, from the Continent and from further afield it provided all the facilities needed for mounting an event as complex and all-embracing as this, Marconi's biggest-ever show.



Regular hotel guests at the Penta during the three days 30th, 31st October, 1st November might well have thought that security at the hotel was being taken to the ultimate when they saw, dominating the entrance, a Marconi Marksman Anti-Aircraft Gun Turret mounted on a Centurion tank! It was, in fact, part of the display of our larger equipment that could not be housed within the hotel.

## An International Who's Who

Security, however, did need to be tight. The guest list read like an international

Who's Who of establishment and high ranking service personnel from the free world.

These potential customers and opinion leaders together with media representatives and academics and careers advisers made up the distinguished audience that heard The Right Honourable James Prior, MP, recently-appointed Director and Chairman of GEC open the event on the first morning, to be followed on day two and day three by his erstwhile Government colleagues John Lee, MP, Under Secretary of State for Defence Procurement and The Hon. Adam Butler, MP, Minister of State for Defence

Procurement.

The Company's new corporate film made a dramatic impact on the guests at the start of the opening ceremony in the York Video Theatre of the Penta. Its striking graphics and hard-hitting message punched home the story of Marconi's breadth of activity – a message repeated in greater detail by James Prior in his welcoming address.



# WELCOMING ADDRESS

## Quadrupled Sales

Mr Prior revealed that the Marconi Company was now the largest and most rapidly growing area of GEC's business; a reflection of the enormous impact that advances in applied electronics are having on international commerce and affairs.

In the last ten years, Marconi sales had quadrupled.

This success had been largely due to three factors.

1. The Company's solid technical base. Over 40% of a workforce of some 30,000 are technically qualified.
2. The massive financial investment in basic and applied research and product development. Some £300,000,000 in this financial year.
3. The workforce's ability to produce equipment and systems to the exacting specifications demanded in today's highly technical and highly competitive market place.

## Civilian Spin-Off

The major part of Marconi's business was in the defence field. As long as the threat of war existed, nations would need to defend themselves. He went on to list some of the major Marconi products in daily use in the Navies, Armies and Air Forces of the Western World.

But research in the defence field often triggered developments in the civilian sector and Marconi products were in use in almost all areas of daily life where applied electronics were involved.

A marked change in the pattern of business in recent years was the realisation by more and more customers of the need for a total systems approach. An aircraft was no longer just a flying machine, a ship was no longer a simple hull.

## 'Think Systems'

They were complex systems in which all the individual parts and sub-systems interacted, and the only way to ensure total harmony was to 'think systems' from the outset.



A major example of this approach was the concept of C<sup>3</sup>I where every item formed part of a total system. Marconi was able to bring together all the diverse parts that go to make up a complete C<sup>3</sup>I system.

Underlining all this design and development activity was Marconi's Enabling Technology, without which the Company could not hope to meet the challenge of this decade, or the next.



# THE EXHIBITION

## Corporate Exhibition

Marconi '84 was a Marconi Company event. Individual company demarcations were ignored so as to put over the corporate story. This corporate theme had been evident in the opening speeches, but was even more so in the exhibition areas.

Instead of dividing the displays by company, areas of activity and involvement were used to group Marconi products and systems.

The four areas were:

- Enabling Technology
- The Civil Environment of land, sea, air and space.
- Defence on land, on and beneath the sea, in air and in space.
- The C<sup>3</sup>I Scenario.





Although the areas were complete in themselves, the arrangement of the exhibition linked them together to emphasise the corporate theme.

Space precludes a 'catalogue' of all the Marconi products and systems featured at Marconi '84 but certain items attracted particular interest and highlighted the emphasis placed by the Company on *tomorrow* as well as *today*.

## Enabling Technology

It is Marconi's capability in utilising advanced technologies in the manufacture of product and systems components that 'make it all happen'.

The separate Marconi companies involved in this part of our business joined together to put on a comprehensive display featuring products and technologies reaching into the future.

Marconi research into silicon integrated circuits has enabled the production of complex ICs with 50,000 gates on a single chip, but now the Company's new silicon systems research laboratories will spearhead the drive towards producing complete systems on silicon.

Hybrid thick film technology, power and microwave techniques, computer-aided design and engineering were prominently featured, as were an intriguing demonstration of speech recognition, and the latest developments in automatic test equipment.

A VDU showing computer generated imagery for training in weapon aiming, and simulating flight and ship movements had a constant audience of fascinated spectators.

## The Civil Environment

The Marconi involvement in almost all aspects of everyday life, where applied electronics are concerned, was very apparent in this part of the exhibition. Exhibits ranging from a fascinating demonstration of a radio alarm system for industrial (or even domestic) premises that displays on a VDU the precise location of an intrusion, to meteorological displays receiving information from unmanned sensors outside the building, showed the Company's commitment to technological advances in the civil environment.

Radar for air traffic control, and airfield and coastal surveillance were featured by models, while some of the smaller equipments and systems were actually demonstrated.

For instance, VORAS (Video Overlay Resource Availability System) created considerable interest in showing how microcomputer and video disc technology have been married to



produce a map display that can be changed at will for both area and scale and which can be overlaid with symbolic information of the user's choosing. A vital piece of equipment for the emergency services.

Electronic generation of voice messages is a technology of the future, and Marconi's involvement in it was shown by systems that automatically transmit meteorological and airfield information to pilots.

Security of radio communications is often just as vital in civil life as in the defence field, and demonstrations included cryptographic techniques and the use of fibre optic cables to achieve it.

In fact, the whole gamut of civil radio and landline communications for which Marconi is internationally famous was on show in this area.

Marconi's 'partnership' in international satellite communications for everything from marine safety to cable TV entertainment was well featured – the reception of the European continuous pop video transmission being particularly well received by the younger visitors!

## Defence

A dramatic display simulating an artillery Forward Observation Post was the first thing to greet the visitor on entering this area of the exhibition. The observer's data module of Quickfire, Marconi's artillery fire control system, was prominent here along with the new hand-held imager for observation through all atmospheric conditions, day or night.

Backing up this realistic lay-out was a simulated command post using the battery (or battalion) computer module of Quickfire and an 'at the gun' display of the gun module of the same system.

The concept of realistic settings for Marconi defence equipments and systems was carried through, wherever possible, in this area by the use of actual hardware, such as military vehicles etc, and superbly-made scale models.

Marconi's dominance in the field of military communications was exemplified by the new Skynet 4 satellite for defence communications at one end of the scale through to hand portables for the soldier on the battlefield on the other.

Frequency hopping to combat jamming and encryption technology for security were featured here also.

Radar seekers for guided weapons form a very large part of Marconi's defence business and actual examples or, where size dictated, models of them were on display. Current production includes four radar seekers for naval missiles and a broadband anti-radar seeker is under development for the Air-Launched Anti-Radar Missile.

Looking further to the future a private venture project is leading to the development of a close air defence weapon for the 1990s – a 'hittile' that is the first such weapon to employ an active radar seeker – that can be shoulder-launched.

Electronic warfare systems and counter-measures are now part of the combat scene and Marconi is one of the leading suppliers of airborne systems. The latest developments were on show together with systems for land and sea environments. Torpedoes, mines and sonic systems made an impressive display in the Defence area of the exhibition.

## The C<sup>3</sup>I Scenario

The Defence exhibition area showed the value of the systems approach, but the idea of total, yet flexible, integration of products, people and technologies really came to life in the separate exhibition of Marconi equipments and systems – The C<sup>3</sup>I Scenario.

The Marconi Company is one of the pioneers of turning this Command, Control, Communications and Intelligence concept into reality. Here, in realistic settings, were typical groupings of Marconi products and systems to satisfy the requirements of commanders at all levels.



The C<sup>3</sup>I display was presented in three parts, a Defence Operations Centre, an Air Defence Centre and a typical battlefield setting.

But C<sup>3</sup>I is not just the right products and systems at the right place at the right time. It is a complete approach to the problem of attack and defence in the modern context where the battle moves so fast that the human mind cannot cope without advanced electronics to collect and process data, to help assess alternative courses of action and to convey commands.

Marconi not only has the capability to produce the hardware and systems necessary, but the wealth of experience gained as one of the world's leading defence companies means that it can take account of the varied methods, customs and procedures of the armed forces of many different cultures and allow for them in setting-up integrated operations centres.

Marconi is the first company in Britain to secure an overseas order for a centralised defence operations centre – a success based on the Marconi C<sup>3</sup>I philosophy of 'build-a-little,

spend-a-little'. Hopes are high that the initial £3m order will lead to follow on business worth £50m and open the door to a worldwide market counted in the tens of billions.



## KEYNOTE SPEECHES

Following the formal opening each morning, key-note speeches were delivered by Derek Roberts, Dr William Bardo and Air Commodore Peter Peacock. The speakers then formed a panel to answer questions, and judging by the interest shown in this session and the level of questions asked, the guests were well impressed with what they had heard. After lunch, guests were free to attend any of the technical presentations given by various Marconi companies on topics ranging from 'Advances in Electronic Warfare Technology' to 'Vessel Traffic Systems' or to tour the comprehensive exhibition.



Derek Roberts  
Technical Director  
GEC

### Enabling Technologies for C<sup>3</sup>I Systems

If the lack of a text book definition leaves one feeling a little mystified as to the exact nature of C<sup>3</sup>, its *function* can be clearly defined in four short words: Detect, Amplify, Decide, Act. The technology on which this depended was the theme of a keynote speech delivered by Derek Roberts.

He dispelled the notion that effective C<sup>3</sup> could be achieved simply by applying the hardware and software disciplines that were today gathered together under the generic umbrella of Information Technology. The pervasiveness of microelectronics did, indeed, give it a special status, but other strategic Enabling Technologies were supporting and extending the C<sup>3</sup> concept. He pointed to examples in the area of CONTROL TECHNOLOGY where fibre optics offered an ideal communications medium, being immune to both jamming and eavesdropping. He outlined advances in MATERIALS TECHNOLOGY where current research into molecular beam epitaxy and low temperature metal-organic chemical vapour deposition held out the exciting possibility of improved semiconductor lasers and microwave devices. He also referred to MANUFACTURING TECHNOLOGY, an area in which Britain lagged behind other countries but one in which the techniques of Computer Integrated Manufacture and robotics would increasingly straddle the cost gap between small batch and mass production.

The job of welding the technologies into operational hardware had traditionally borrowed from three parallel yet separate strands of development: Silicon Process Technology, Silicon Chips, and Total Systems. Derek Roberts claimed that the purely commercial interface which existed between IC supplier and IC user had been a factor that had delayed innovation in systems by about two years. It had also inhibited the development of more competitive products based on novel systems architecture.

Looking to the future, he highlighted six areas of current research which could point the way to further developments in C<sup>3</sup>; the best use of silicon technology would come through designing with it at the systems level – the SYSTEMS-ON-SILICON approach. From this would stem more TASK-RELATED COMPUTER ARCHITECTURE, a process that was already evident in signal and image processing. INTELLIGENT KNOWLEDGE BASED SYSTEMS would improve our understanding of speech and image patterns and provide expert systems for a variety of diagnostic and data analysis tasks. Wider use of the ELECTRO-MAGNETIC SPECTRUM – presently limited with silicon devices – would be realised through exploiting compounds such as gallium arsenide. This, in turn, would require new technology able to process high performance bi-polar transistors that utilised compounds in Group III-V of the periodic table. OPTOELECTRONICS would also benefit from the high bit-rate light emitting diodes and lasers which these compounds made possible. Further uses of photons, to perform tasks that had been the exclusive preserve of electrons, included optical switching, optical signal processing and pattern recognition using optical coherence. Finally, multi-disciplinary research into the MAN-MACHINE INTERFACE would throw new light on the subject of human perception and result in better displays and more efficient speech and image processing systems.





William Bardo  
Technical Director  
The Marconi  
Company

## Advances in Systems

The conventional military threat facing NATO in Europe is, at first glance, awesome: 44,000 Main Battle Tanks; 400 major naval surface units; 11,000 maritime and land-based aircraft. Striking visual examples of these forces in action prefaced a keynote speech delivered by Dr William Bardo.

He described how major advances in defence technology were beginning to redress the military imbalance in Europe

and lend added credibility to the policy of forward defence, i.e. NATO's strategy aimed at halting a Soviet blitzkrieg east of the Rhine. As an example, he cited the many-fold improvement in the effectiveness of guided weapons. The increase of complexity of silicon integrated circuits had now resulted in 'smart' weapons – weapons which could find and reach their targets quite independently of their launch aircraft. Lower attrition and higher sortie rates were just two vital spinoffs stemming from this development.

Advances in silicon technology had also changed the way in which systems designers were approaching their task. They had moved away from the old practices associated with MSI and LSI chips and now had an infinitely flexible mixture of gate arrays, full custom and semi-custom chips to use as the building blocks in system architecture. This had brought changes in working patterns for

the designers and we now see core teams consisting of systems designers, silicon architects and real-time software engineers tackling the problems of building large conventional weapons systems. The emphasis was now on 'from the top down', an approach which starts with broad system concepts and then borrows from the concepts and techniques of Artificial Intelligence to refine these into explicit formal descriptions.

Dr Bardo claimed that this approach would lead to the advent of more numerous, more effective and less costly weapons offering even more favourable exchange ratios. But he stressed the need for these weapons to be applied in a measured way – in the right place at the right time – for their potential to be fully exploited. C<sup>3</sup>I provided the structure to do this with the speed and flexibility needed for forward defence.



Peter Peacock,  
C<sup>3</sup>I Consultant  
EASAMS Limited

## C<sup>3</sup>I Concepts and Components

Was the Korean airliner disaster due simply to a lack of flexibility in the Soviet command and control mechanism? This interesting speculation was raised by Air Commodore Peter Peacock another keynote speaker at Marconi '84.

As a former NATO project manager in the important high technology field of Command, Control, Communications and Intelligence (C<sup>3</sup>I), his experience

had shown that a conventional, highly centralised command structure, operating along Soviet lines, would tend to reach a sharp peak of activity at the C-in-C's daily decision-briefing session. The organisation would not, therefore, be fully reactive throughout its 24-hour cycle. Uncertainty and delay would creep into the system and it would lack the flexibility to accurately reflect or appropriately respond to a rapidly developing tactical situation. In short; the whole decision-making process would be prone to human error, omission and delay.

Modern technology – in the shape of computer-based C<sup>3</sup>I systems – could, he said, overcome this weakness at command level. By integrating communications, sensors, data processing, displays, and weapons systems, a commander could now have access to real-time information, could be presented with various options, and could instantly transmit decisions. The

system would be capable of supporting highly-centralised command (e.g. in periods of crisis) or decentralised command once a conflict began. Flexibility was the keynote. He claimed that Marconi was one of very few organisations that could provide the infrastructure and operational elements of a fully-integrated C<sup>3</sup>I system. But no less essentially, Marconi was again almost alone in its depth of understanding of the various strands of military thinking and of its ability to reconcile conflicting requirements. This, coupled with Marconi's 'build-a-little, test-a-little' philosophy had already paid dividends: Marconi is the first British company to secure an overseas contract for the higher level of C<sup>3</sup>I system (a Joint Operations Centre), and is currently negotiating with the customer for £50m-worth of follow-on orders.

## Employee Involvement

While the three days belonged to the invited guests, the evenings belonged to Marconi staff.

Each evening coach loads of employees descended on the Penta to view the exhibition and to see the new corporate video.

Talking to some of them it was soon obvious that most had not appreciated the breadth of activity and depth of involvement of the company for which they worked. Not surprising, really, when one looks at the product guide in the Company's recent publication *Marconi Today* – over 850 general headings covering products, systems and technologies!

Jane Baldacchina summed it up when she said 'I didn't know they made so much.' Jane was there from Secure Radio Systems. She is now a permanent employee having been on a training scheme last year.

Peter Cousins, from Space Systems, highlighted the rapid advance of technology and the way Marconi was keeping up with it – leading it in some areas. 'Definitely a go-ahead company' was his reaction.

## A Customer's View

Among the NATO guests was Lt.-Col. Fred Bush, Assistant Air Attaché at the US Embassy. He was obviously impressed when he said 'Marconi '84 was an excellent opportunity to renew old friendships and make new ones. The symposia gave new insight into Marconi's approaches to NATO problems, while the exhibition itself both clarified the new organisation and demonstrated the most recent levels of Marconi's developmental programs. I learned more than I expected.' Sentiments which were echoed by his colleague, Lt.-Col. Bill Mott, the Assistant Defence Attaché at the Embassy.



# Exhibitions

## MARCONI AT BRIGHTON & FARNBOROUGH 10th International Broadcasting Convention

Brighton, with its excellent road and rail communications, is fast becoming the recognised centre for small to medium-sized specialist exhibitions and conferences in the UK. Its importance is such that it now attracts international events such as IBC and INTERNEPCON.

Marconi was represented at the IBC by the Broadcasting Division of MCSL, and MI.

Although recognised as primarily a studio exhibition, MCSL's display of transmitters attracted considerable attention.

In particular, demonstrations of the new B7500 drive and SAW (Surface Acoustic Wave) Filter caused quite a stir among competitors who were very anxious to find out more about these equipments!

### Mobile operations

Another product featured as a working demonstration was the Broadcasting Division's 12.5 kW Short Wave Transmitter where the status and control unit was operated under normal and fault conditions.

The 3kW B6140 Short Wave Broadcast Transmitter represented a range of Marconi low power HF units suitable for fixed or mobile broadcasting operations within the 2-30MHz frequency spectrum.

Another centre of interest was the type B6526 20kW FM Transmitter—a completely self-contained unit with provision for mounting optional modules such as logic for paralleling or auto changeover and a stereo coder.

Eddystone Radio was there, too, with a VHF Band II FM Drive Model 1660 (incorporating a broadcast receiver, and covering the 88-108 MHz range) and an AM frequency synthesised model, 1740, covering 500kHz to 1700 kHz.

### A Major Order

MI used IBC to launch its new TV test equipment, the Model 2923 Signal Generator Inserter.

This product will assist television engineers to maintain picture quality by producing a versatile signal 'package' to check, automatically, different parts of a TV system. The Inserter uses digital waveform generation for accuracy and stability.

Complementing the 2923 was MI's accurate Insertion Signal Analyzer, Model 2914A, which can make a complete range of measurements to identify all forms of picture distortion.

Accurate timing of these measurements is carried out using the MI 2920 Interval Timer.

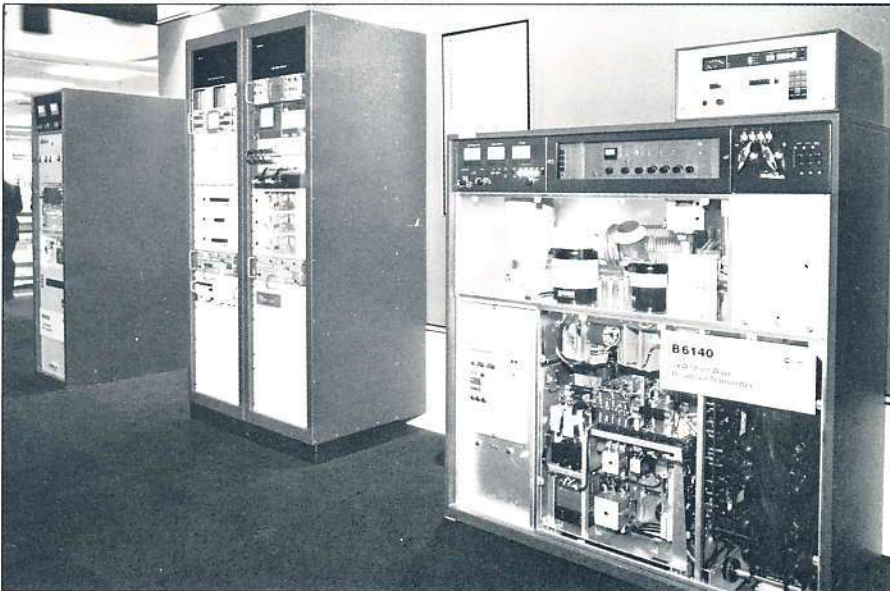
Marconi Instruments also used the occasion to announce the first major order for the 2923.

British Telecom has placed an order for 100 of these instruments which meet their stringent criteria for accuracy and stability, in a compact and cost-effective package. □



Signing a major order for Marconi Instrument's new 2923 Signal Generator Inserter are Mr P. Coulston for British Telecom and Mr R. Charlton, Deputy Managing Director of Marconi Instruments.

A range of broadcasting equipment demonstrated at IBC.





# INTERNEPCON

Despite the fact that the Grand Hotel bomb outrage occurred next door to the Metropole Exhibition Centre – and only a few days before it was due to open – INTERNEPCON, the industrial efficiency exhibition went ahead on time.

MEDL and MI were the Marconi companies flying the flag at INTERNEPCON, and both report a most successful show.

## Thick Film Capability

MEDL principally featured a wide range of Hi-Rel custom-designed microelectronics based mainly on hybrid thick-film techniques. They are designed for defence and specialised-equipment industries and are suitable for applications from d.c. to microwaves at various voltages and powers.

MEDL's specialist capabilities were shown by displays ranging from simple

hybrid thick-film circuits to totally integrated and packaged sub-systems including integrated circuits and power semiconductors, microwave devices and components in state-of-the-art single thick-film packages.

Lower cost systems and sub-systems are a result of Marconi Electronic Devices Ltd's thick-film capability, which also offers a number of other advantages including a very high degree of design flexibility.

## System 80

Marconi Instruments network, Trinet, was a major feature of MI's contribution to INTERNEPCON. Trinet is designed for high-efficiency sharing and transmission of data with consequent benefits in productivity, quality control and management information.

The network was used to demonstrate various MI equipments and systems, and how their compatibility leads to an integrated factory system.

System 80, in-circuit board tester for high rate testing of complex digital devices, was one such system and was shown with its bar code reading facilities.

CAR (Computer Aided Repair) system, featuring a high-definition multicolour graphics facility, for fault location on high-density boards in a fraction of the time taken with conventional means was also operated over the network.

The MI Workstation type 1949, offering powerful processing and data management facilities and centred storage, demonstrated the power of Trinet software.

## Six-fold Improvement

MicroQUAD, the latest in MI's range of CAE systems for the printed circuit board designer was also shown. Among its features are, fast interactivity, improved edit facilities and auto-routing of tracks on the board using the powerful Marconi CAE Multi-route suite of programs. MicroQUAD can improve screen repair times by a factor of six.

Complementing the networked systems was the MI recently-introduced Real Time Fault Analysis package which provides managers with up-to-the-minute reports of board failures and status.



The System 80 is an advanced in-circuit test system featuring a built-in synchronous logic tester for enhanced testing of VLSI devices. There are also data communications links to off-line programming, result analysis, repair stations and networking.



The Computer-aided Repair (CAR) Station, with its multicolour graphics terminal, gives instant identification of faulty components or tracks. The keyboard incorporates joystick control of the zoom cursor to highlight faults.



# THE FARNBOROUGH AIR SHOW

## A Shop Window for the World's Aerospace Industries

Organised by the Society of British Aerospace Companies, the Farnborough International Air Show has become, arguably, the most important trade exhibition for aerospace companies in the Western World.

For a week in September in alternate years, this area in Hampshire (which saw some of the earliest and most memorable of British flying experiments) is the stage for displays of the very latest developments in civil and military flying, communications and flying control.

## 'The Tallest, the Largest ...'

Heading the Marconi presence was Marconi Radar Systems with a dominant display in the radar and guided weapons park at the Show. It was dominant in both prestige and size.

Not only did Radar Systems show four major new radars, but their display included the tallest of the non-flying exhibits (the S711) and the largest (the Martello S723) on the largest outdoor stand at the Show!

They also shared the Marconi indoor stand with Marconi Secure Radio Systems, Electronic Devices, Space Systems, Defence Systems and Communication Systems, while Marconi Command and Control used a part of the outdoor stand to feature Marksman anti-aircraft gun turret which had proved to be the star of the show at BAEE in June.



Two new air traffic control radars made their first public appearance at Farnborough – the Messenger secondary surveillance radar the antenna of which is shown here mounted atop the new Terminal Area Radar, the S512.

## 3D and 300 NM

Overshadowing the whole radar and guided weapons park was Martello S723, a 3D long-range radar developed by Marconi Radar Systems. Although of massive dimensions, it is self-contained, transportable – and capable of erection and operation in 1½ hours after reaching its chosen location.

Its operational range means it can detect small fighter aircraft as far away as 500 kilometres. Discrimination between aircraft flying close to each other is the result of the very latest technology which provides even higher performance than the present generation of static radars.

Its transportability and resistance to enemy jamming or conditions of severe clutter mean that it will meet the needs of air defence commanders well into the '90s.

Martello has already been sold to the RAF and NATO.



Michael Heseltine discusses with executives Marconi's presence at Farnborough.

## Pop-up Antenna

Vying for visibility at the radar park was the telescopic antenna of the new S711 low level tactical radar. This member of the S700 family is designed for use in mountainous, forested or even urban areas because its telescopic mast will carry the antenna to a height of 60 ft, if necessary, to 'see' over local obstructions. It has the ability to detect small fighter aircraft and slow-moving helicopters up to a range of 64 nautical miles.

It is transportable in a two-vehicle convoy and its telescopic feature allows easy camouflage to avoid detection by reconnaissance aircraft.

The three radars in the S700 series share the same standard of high-quality, state-of-the-art technology with rugged reliability under adverse conditions. The same design of cabin to house the electronic equipment and operator positions is common to all three.

## Gap-Filler Applications

The S706 is a radar intended for coastal surveillance, but with transportability that gives it tactical capability. The two-vehicle system can be used

unmanned in a radar plot reporting role or with two operators to provide track reporting or weapon control functions.

It has the high performance and resolution that is essential when searching for small low-flying targets in sea clutter environments.

The third member of the family is the S712 battlefield surveillance/point defence radar. Rapid deployment and 'crashdown' are features of this radar which is contained in a single vehicle system that is readily transportable by land, sea or air.

Despite its lightweight antenna and its manoeuvrability, the S712 still offers high quality, reliability and the capability to detect small objects up to a distance of over 60 nautical miles.

Together the three S700 series radars give Marconi a total capability in strategic and tactical gap-filler applications.

## Airfield Surveillance

The third 'first' for Marconi Radar Systems at Farnborough was the S512, terminal area radar for air traffic control.

It is intended for airports needing radar cover for effective control of even the smallest aircraft in the terminal area, on the approach and on departure. A new signal processor ensures detectability of all sizes of aircraft in conditions of fixed, or movable clutter such as rain.

## CAA Orders

The Civil Aviation Authority has ordered seven of the new Marconi Messenger Monopulse secondary surveillance radars (and taken an option on another 10) for air traffic control in the UK.

The Messenger is an aircraft identification sensor and acts by triggering a transmitter in each aircraft which then sends identification and height data about the flight to air traffic control.

The very advanced solid-state electronics digital processing and sophisticated antenna design in Messenger give particularly accurate position information resulting in more efficient and reliable control of both civil and military aircraft.

## Total Product Support

A vital part of Marconi Radar's activities is the provision of 'total product support' from initial customer enquiries to installation and commissioning and throughout the useful life of the equipment.

Such support goes way beyond conventional 'after sales service' and can cover such aspects as staff training, updating modifications, documentation, maintenance and repair work. In fact all the support a customer needs to keep his equipment up-to-scratch and up-to-date.



The four major new radars launched at Farnborough were not the only items attracting the keen interest of 'trade' visitors.

Marconi Radar also showed the Astrid display and radar data processing (RD) family, which has already resulted in more than £2.5 million worth of orders from the UK and overseas, along with features on their proven lightweight naval weapon control systems such as Sea Dart and Seawolf.

## A New ATIS Launched

Another 'first' for a Marconi company was the first public display of a new Automatic Terminal Information Service (ATIS) being developed by Secure Radio Systems.

Hitherto, conventional ATIS equipment has used continuous loop or revolving drum technology for storing/transmitting weather reports and operational information to aircraft on take-off or approach. Now, the new Marconi ATIS will use semi-conductor technology and the company's proven synthetic speech capability to develop solid state equipment with speech output that is indistinguishable from a live human voice.

## Electronic Countermeasures

Marconi Defence Systems' six operational divisions were represented at Farnborough with impressive displays exemplifying their total involvement with the defence of the free world.

The well-known Zeus in-board ECM package which is the subject of a £100 million contract placed by UK MoD for Harrier aircraft is now matched by another ECM, Apollo, which was shown for the first time. Life-size models of Sea Skua and Sky Flash missiles were also on display, while Marconi ESM systems were represented by Hermes, the in-flight enemy radar monitoring system.

## Marshal for Message Switching

Marshal is a range of store and forward message switching systems and MCSL showed their latest addition to the range. This new automatic system is designed specifically for operation in the ICAO Aeronautical Fixed Telecommunication network.

Along with the advantages of low-cost maintenance and minimum operator staffing levels that modular design ensures, Marshal has a built-in expansion capability to allow the system to grow with the demand on it. As the brochure says, the average message switching system is like a school uniform... however big you buy it, it's too small in the end!



## MEDL's Boast

Occupying only a small part of the indoor stand, MEDL's exhibits nevertheless represented an enormous breadth of high technology. It is their proud boast that virtually all Marconi designed and manufactured equipment includes at least one item from MEDL.

They also compete on the open market, and the success of countless 'Brand X' products is due to integrated circuits, hybrids, microsystems, power semi-conductors and the comprehensive range of electronic and allied components that come from Marconi Electronic Devices Limited.

## The Uncommitted

Space has precluded a complete coverage of the Marconi products and services on display, and so only a selection have been mentioned.

Visitors to this year's biggest ever 'Farnborough' cannot fail to have been impressed by the Marconi presence which was more than adequate to assure our customers and to convince the uncommitted.



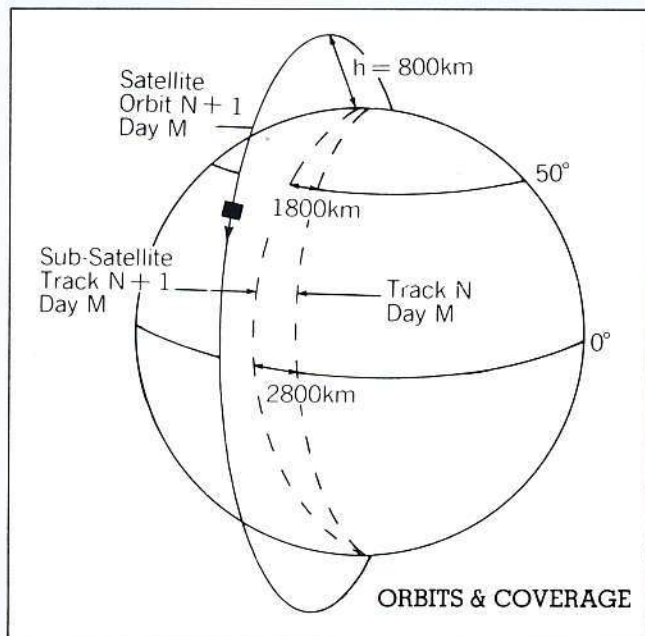


# Supplement



## Sir Peter Anson Space in Support of Maritime Law and Order

With the rapid increase in the provision of high quality maritime satellite communication systems, international surveillance in support of maritime law and order is closer to reality. But space surveillance is expensive and dependent on the level to which the law is found to be acceptable to the world shipping community. Sir Peter Anson, Managing Director of Marconi Space Systems, reviews the situation.



In recent years there has been increasing pressure on the maritime nations of the world to revise and enforce a new Law of the Sea. The reasons for this are numerous but the most important are: tanker disasters, discovery of oil beneath the sea-bed, disagreements over fishing rights and the need to protect the marine environment from all forms of pollution.

As yet international agreement has not been achieved, but nevertheless in April 1982 the conclusions of the United Nations Conference on the Law of the Sea were adopted by a very large majority with 130 votes in favour, 17 abstentions and 4, including the United States of America, against.

If we make the assumption that eventually international agreement is achieved, the new law will of course need to be generally accepted but it will also undoubtedly require some form of enforcement. There has during the same time period been a growing capability in the field of spaceborne maritime surveillance as well as a rapid increase in the provision of high quality maritime satellite communications. The purpose of this paper is to examine to what extent these improved facilities could be used in support of maritime law enforcement.

### Law and order issues

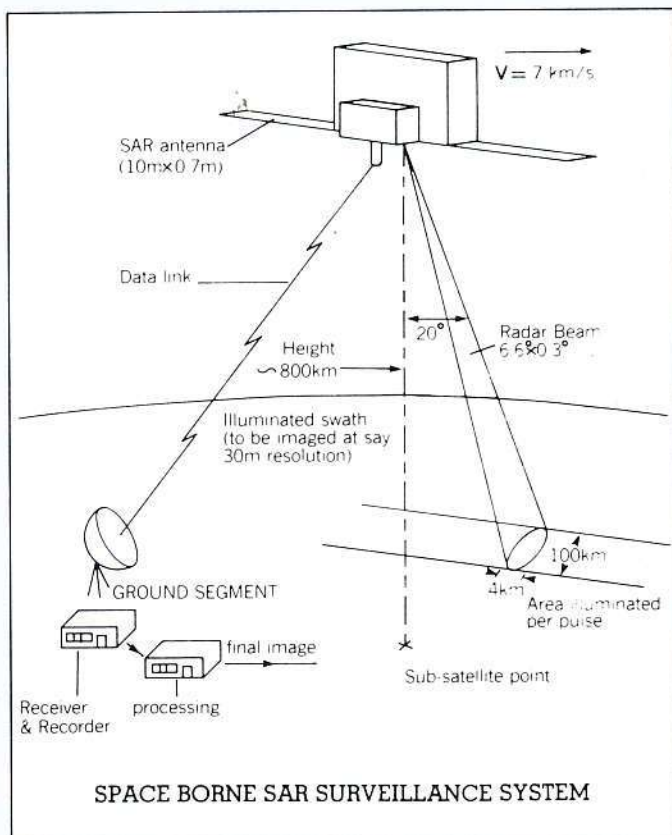
Maritime Law and Order issues can be listed as follows:

- (a) Interference with high seas freedom
- (b) The right of innocent passage
- (c) Fisheries jurisdiction
- (d) Security for merchant ships
- (e) Marine insurance
- (f) Piracy and Hijacking
- (g) Protection and preservation of the marine environment, including pollution from oil rigs and vessels, effluence and the dumping of toxic substances
- (h) Traffic separation schemes

All these issues lead to a possibility of criminal acts, which in their turn need to be detected, by identifying the criminal as well as the location, time and nature of the offence. Detection will have to be followed by adjudication and some form of punishment or enforcement. Communications are required between the Detector and the Enforcement Agency and the criminal, and for efficient direction of ships employed in enforcement.

As with other types of crime the best form of enforcement is achieved by providing such a high likelihood of detection, that the criminal is deterred through an inherent fear of being detected. It will be shown that the communication and remote sensing capability of spacecraft can be exploited to make a significant contribution to this form of enforcement. The form of this contribution is dependent on how great is the general level of acceptance of the law.





### The international aspects of space

By its very nature, if space is to be exploited it will provide communications for, or surveillance over, many countries as well as their territorial seas. Its use already carries its own legal problems; as yet there is no agreement on the use of the geostationary orbit, the retention of space for purely peaceful purposes or the collection of data from sensing satellites and its dissemination to those who want it. This means that either an international organisation will have to be formed to procure satellites and organise their efficient deployment, or use will have to be made of an existing organisation.

### Maritime satellite remote-sensing

In practice if a maritime remote-sensing satellite is to provide the sort of data that will be of use in contributing to Law and Order, such as for instance the display of interpretable radar echoes of ships, it is necessary for the satellite to be flown at a height which maximises the possibility of detection and together with all the other available information produces a contribution towards classification and identification. At the same time the satellite must not be flown so low that its life is shortened by an early return to the earth's atmosphere (see below).

It is usual to compromise by using a polar or near polar orbit at a height of about 700 kms. The satellite orbit remains almost fixed in space and takes about 100 minutes to circle the earth which rotates inside the satellite orbit. Depending on the angle between the satellite and the polar axis, and the orbit period, so the interval between successive passes by a satellite over a particular patch of sea is determined. Before it is possible to calculate the frequency with which any portion of the sea surface can be 'seen' by the satellite it is necessary to know the swath covered by each of the various instruments which will be discussed below.

### Remote-sensing instruments

There are several remote-sensing instruments which have a greater or lesser bearing on the subject of law and order.

**Synthetic Aperature Radar (SAR)** A pictorial view of a complete SAR surveillance system is shown on this page. It consists of a satellite carrying a special form of radar that uses the forward motion of the satellite to build up from successive radar pulses the effect of a very long aerial, while keeping its physical dimensions small. The data collected by the radar is passed directly to a ground terminal, where it is processed into the form of useable pictures. SAR can penetrate cloud and work by day or by night. Today it has a swath 100 km wide but studies are in hand at least to double this width.

SAR produces radar pictures which look deceptively like aerial photographs and display a similar wealth of detail. They must however be interpreted with great care because the physical interaction between the microwave energy and the sea surface is affected by very different parameters from those producing different intensities of visible light.

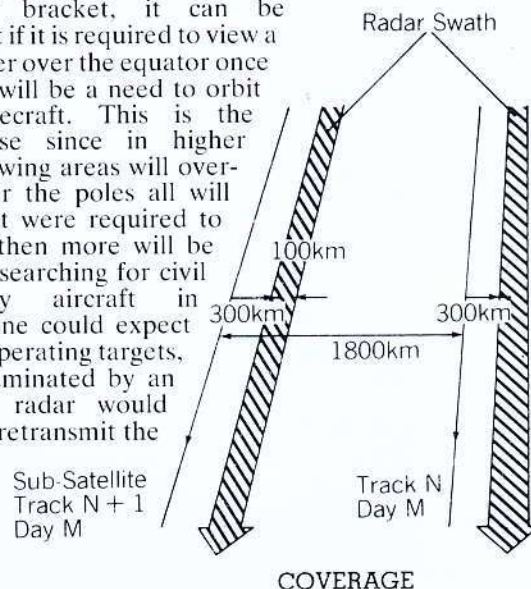
Today, before SAR images can be produced, it is necessary for the satellite to pass a massive stream of data at a rate of at least 100 megabits per second to a ground terminal (which has to be in view) before the processing of an image can be started. UK experience of these techniques rests in the National Remote-Sensing Centre (NRSC) situated at the Royal Aircraft Establishment at Farnborough.

The NRSC collected much data from the US SEASAT satellite launched on June 27, 1978, and which failed on October 10, 1978. It has been found that this imaging radar can readily detect large ships. Even very small boats, if moving, create large wakes and from these, courses can be measured to an accuracy of 10 degrees and speed to an accuracy of 5%. SAR can also readily detect ice and the water/ice interfaces. It can additionally detect oil slicks due to the mechanical effect of oil smoothing the ocean surface which reduces the slope and reflectability of the waves.

### Satellite Life Dependency on Orbit Height

Height (km)	Life before re-entry
250	12 days
500	10 yrs
600	50 yrs
1,000	1,000 yrs
10,000	indefinite

**The number of satellites in a SAR system** — The number of satellites considered necessary in a SAR system is directly related to the detailed requirements of the Law Enforcement Agency and the swath width. If the latter is in the 100-200 km bracket, it can be deduced that if it is required to view a patch of water over the equator once daily, there will be a need to orbit 15-30 spacecraft. This is the extreme case since in higher latitudes viewing areas will overlap and near the poles all will overlap. If it were required to track ships then more will be required. If searching for civil or military aircraft in peacetime one could expect to have co-operating targets, which if illuminated by an appropriate radar would receive and retransmit the





signal at an enhanced level with their transponders thus simplifying the task of the search radar.

Such an approach does not seem impractical for ships. Small boats already enhance their radar reflectivity by passive retro-reflectors. This tremendously simplifies the spacecraft radars' requirements and leads to a possibility of swath widths of 1000 km. Crudely, this reduces the number of spacecraft required by a factor of ten, but at the same time would require a very large measure of international cooperation.

**The processing of SAR data**—Computer processing of synthetic radar data to extract information is time consuming. Today the NRSC requires 48 hours computer time to process an area of 25 sq-km using an adapted general purpose mini computer. The time required is proportional to area and the vintage (quality) and cost of the computer.

The 'quick' facility intended for the European Remote-Sensing spacecraft now being designed will process 100 km x 1000 km each day with a delay time from imaging to output of three hours. If at first sight this seems excessive, it may be helpful to take into account the fact that it takes the satellite about 140 seconds to sweep a track of 1000 km length. The amount of data to be collected and passed to the processing ground terminal in this would be 140 x 100 Megabits or 14 G bits.

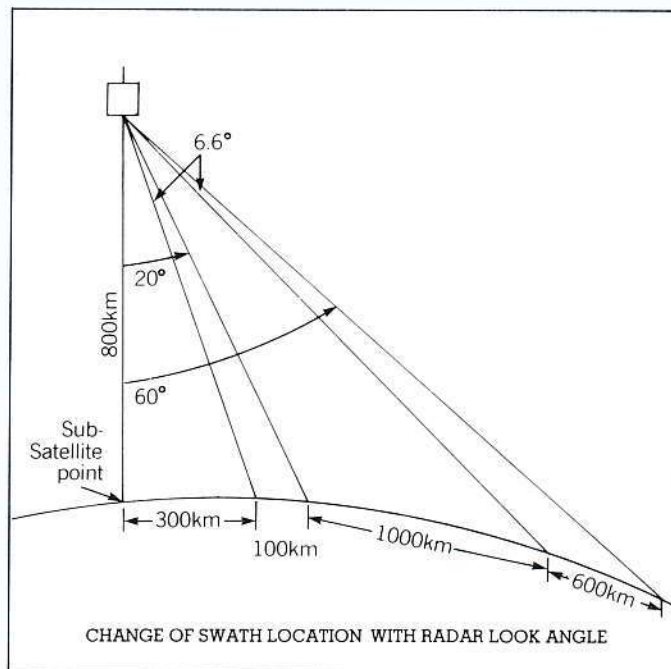
Due to the very rapid advances being made in digital electronics one can foresee that there will soon be either a big reduction in the cost or a large speed improvement in computing devices. Advances are already being made in the area of efficient data reduction processing, and pattern recognition algorithms and techniques. There is little doubt that in the future the possibility of performing much of the processing and classification on-board the spacecraft will be realised.

Even with today's technology, transponder/corner reflectors could provide returns which would allow onboard filtering and processing and thus reduce the processing time to a few 10's of minutes.

**SAR for Law and Order**—It will have already been seen that the factors to be taken into account in designing a SAR satellite system are complex and so an attempt will be made to summarise the implications as they affect law and order:

- SAR should not be considered on its own but rather as a part of a bigger surveillance system (this might include other space sensors such as Infra-Red) which as well as detecting radar targets can produce a pattern that can be used for classification and identification.
- Bearing in mind that it is not reasonable to expect law-breaking ships to commit their crimes on a cloudless day after having fitted transponders to assist the forces of law and order in their detection, SAR is the only suitable spaceborn instrument capable of penetrating cloud and of working at night.
- The total number of satellites required for an operational system can be reduced after taking into consideration the fact that the vast majority of ships are compressed into relatively small areas of the earth's surface—the North Atlantic Ocean, the Mediterranean Sea, the Gulf, the Caribbean Sea and the Cape route.
- More effective use of SAR will be achieved when the current designs give it a capability of changing the radar look angle.

It will be seen therefore that all the considerations of the chosen orbit, SAR design swath width and processing arrangements have to be taken into account and deserve a more detailed study in support of a clearly defined requirement, but for the purposes of this paper and taking



account of all the factors listed above it is believed that a useful service could be provided by 30 operational satellites supported by 10 ground stations.

### The Ocean Colour Monitor

**The Ocean Colour Monitor** is an optical instrument and therefore will not work in cloud conditions. It consists of an earth-scanning multi-channel radiometer with optical telescope and spectrometer for producing a multi-spectral (colour) image. It covers a swath of 1,000 km and has a mean-image resolution of 500m. The detection signals are converted to digital data and stored on-board the satellite before transmission to ground for final processing. The function of the OCM is primarily for the measurement of sea-surface temperature and the ocean colours.

The accurate measurement of colour has many interesting applications; for instance in the green channel it is possible to measure the presence of chlorophyll in the water, whereas other channels highlight the presence of sediment and pollutants. At the infra-red end of the spectrum it is possible to measure sea surface temperature.

At first sight its purpose in support of law and order is less clear than that of SAR. However it can on a cloud-free day detect oil slicks and associate them with ships previously detected on SAR. It can detect many forms of pollution including those stemming from river estuaries. It can also detect chlorophyll which in turn indicates the presence of plankton and fish. This data will of course also be available to fishermen if they wish to use it and may possibly affect their attitudes to obeying the fishery laws.

### Navigation Satellites

It is believed that really accurate, reliable and trusted navigation will always have a bearing on law and order. Satellite navigation is simple and quick. It is provided by TRANSIT today. Other systems such as NAVSTAR GPS will soon be introduced.

SAR also makes a contribution to navigation in that it can if necessary be used to provide positional information for ships and it can also measure the perturbation of the sea over sand-banks, thus enabling these to be mapped with far greater accuracy and regularity than that provided for the Admiralty Charts.

**Other remote-sensing instruments**—There are a number of other instruments which variously can detect the height of the sea to great accuracy, the reflection and direction of the



waves and the water content and densities of clouds. These instruments can be used to great effect in providing the accuracy of weather forecasting, but have no great bearing on issues of law and order.

### Maritime space communications

At present maritime space communications are provided by the INMARSAT organisation which has its headquarters in London and is supported by 40 of the principal maritime nations including the Soviet Union and the US. It provides very high quality telephone or telex communications between ships and shore and vice versa around the globe from approximately latitude 70° North to 70° South. The service is achieved by means of satellites stationed over the Atlantic, Indian and Pacific Oceans, whilst reliability is guaranteed by flying in-orbit spares ready to take over in the event of failure or degradation of the operational satellites.

Once a ship has been connected to the shore via the satellite, it is possible for the call to be onward routed to any destination on the international telephone network. The charge is £10.50 for three minutes. However before the service can be used it is necessary today to fit ships with a terminal weighing 370 kg and costing in the order of £50,000. Today some 2,000 ships have been fitted and the numbers of those using the service are growing rapidly.

In the years to come there can be little doubt that terminals will get smaller and less costly, but this will in its turn involve investment in larger, more complex and more expensive satellites. For the time being the council members of INMARSAT have decided to move cautiously by carefully gauging the growth of the service and its revenue before investing too heavily.

From a law and order viewpoint the principal advantage of satellite communications is the certainty of quick and reliable connection. This could be a most valuable aid if used to direct ships employed in enforcement.

### Costs

It is emphasised that any indications of cost in this paper must be taken as the broadest of budgetary estimates. In order to give a feel for the problem a rough costing has been made of a 30 satellite SAR/OCM system supported by 10 ground stations. It has further been assumed that the bill is shared equally by the 37 INMARSAT nations, who, it could reasonably be assumed, have the most at stake, and it was found that the annual bill per country was of the order of £3 million.

### Simpler solutions

There are more simple methods of employing space for maritime surveillance but they all have an inherent disadvantage that they require the cooperation of the potential criminal. They could perhaps be used in conjunction with SAR as an aid to identification by eliminating law-abiding cooperative vessels.

It might be possible to fit a combination of a tachograph and a 'black box' (as used today in aircraft and trucks) in many ships. Such an instrument could monitor course, revolutions, bilge pumps, fishing gear or any other relevant equipment. Any ship refusing to fit the instrument would immediately become suspect. Arrangements would be necessary to ensure that any attempt at tampering with the equipment would be readily discernible.

It is also absolutely technically and operationally feasible today to connect such a box to suitable transmitting equipment and a relatively cheap antenna so that it can on say, a daily basis, transmit to the shore operational centre a summary of proceedings since the last report.

In order to ensure that only low cost equipment is required, the messages can be sent at a relatively low data rate. Since 1977 a facility has been in use provided by the geostationary meteorological spacecraft METEOSAT to interrogate small inexpensive transponders which may be situated anywhere in the North or South Atlantic area.

They are normally attached to automatic weather stations and transported by ships, aircraft (Pan American or KLM flights across the Atlantic) or stationary on buoys. About six transponders monitor water conditions in rivers and locks in Britain. All these devices transmit to the spacecraft relatively short messages at the rate normally used for telex. They could equally well be transmitting information relating to ships operation.

In a similar timeframe another system has been in use. It is entitled ARGUS and is a joint French/US programme. It performs in a similar manner to the METEOSAT system but is carried on one of the US meteorological low-orbiting series of spacecraft. This allows the position of the ship, aircraft, balloon or drifting buoy to be determined but obviously only each time the satellite passes by. The use of this system by yachts in the single-handed transatlantic yacht races has brought it noticeably to public attention.

It goes without saying that the cheaper surveillance solutions outlined in this paragraph have obvious defects in that complex measures will have to be taken to ensure that they are not proved ineffective by the determined criminal. They do however need to be taken into account in the process of defining the eventual requirement and in the final system-definition.

## CONCLUSIONS

- SAR is the only spaceborn instrument that can operate independently of cloud-cover and at night but a considerable number of satellites will be required to provide a composite system. As many complex factors are involved a detailed study is necessary to work out a more exact specification.
- The Ocean Colour Monitor can play a useful part in sensing pollutants and the movements of fish and could be flown in tandem on the same satellite as a SAR.
- The cost of SAR/OCM system of satellites does not appear prohibitive if shared equally by a group of nations such as the INMARSAT investors.
- Simpler solutions are available depending on ship cooperation, and require widespread use of some form of shipborn transponder.
- The use of space in support of maritime law and order introduces its own legal problems and requires the employment of an existing international organisation or the setting up of a new one.
- The nature of the space surveillance system employed is dependent on the level to which the law is found to be acceptable to shipping.
- INMARSAT already provides a high-quality space communication service which covers most of the globe but it is costly to fit and so far only 2,000 ships have been equipped. Its initial use is probably most suited to the direction of enforcement operations.

It is recommended that the responsible authority commission a detailed study of a SAR system to be employed in support of maritime law and order.

\*This paper was originally presented at the Seminar on Maritime Law Enforcement, held in London last year and is reprinted by kind permission of MARCONI.



# Interface

## COMPANY ASPECTS AND AFFAIRS

### Tigerfish in Action

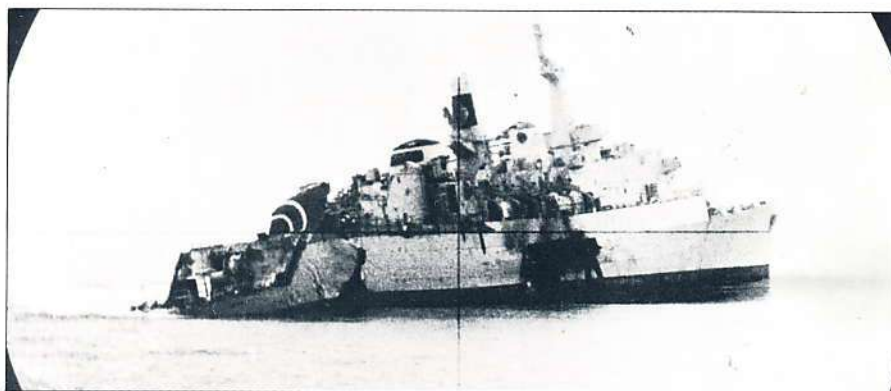
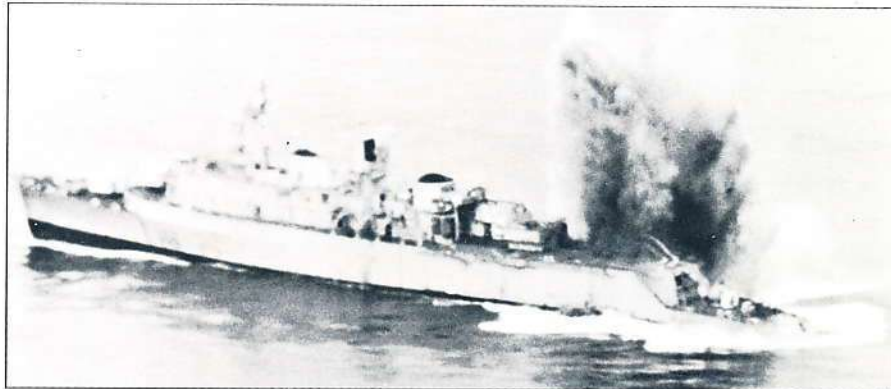
Each year the Royal Navy tests the quality of its warstock torpedoes by firing one in as near a combat environment as possible – right through to detonation.

This year the target was HMS *Devonshire*, a decommissioned County Class destroyer, and the firing took place in the Eastern Atlantic in July.

The torpedo tested this year was a Marconi Tigerfish taken 'off the shelf'. It was fired from the Swiftsure class submarine HMS *Splendid* and ran precisely according to plan, detonating at the depth and position selected to cause maximum damage. The destroyer sank shortly afterwards.

Tigerfish was developed and manufactured by Marconi Underwater Systems and meets the RN requirement for an advanced, wire-guided, dual purpose acoustic homing torpedo for use against submarines and surface ships. After initial wire-guidance at the start of a long-range attack, Tigerfish will acquire the target on its own sonar before finally homing-in under its own autonomous control.

Tigerfish is standard armament for all RN submarines and has recently been exported to the Brazilian navy.



## Now It Can Be Told

Although much has been written on various aspects of the Falklands Campaign, one area in particular continues to intrigue defence analysts and commentators. It concerns the nature and role of the 'black boxes' that gave ships, land forces and aircraft of the Task Force a vital Electronic Warfare (EW) capability. The extreme sensitivity which normally surrounds the subject means that, even now, little has been made public.

Like many other British companies, Marconi Defence Systems was called upon to respond to the pressing needs of that time. As a principal supplier of EW equipment to Britain's armed forces, the Company was soon involved in a number of 'crash' programmes, and it is the story of one such project – the saga of 'Blue Eric' – that can now be told.

'Blue Eric' was not even an idea at the time the Task Force was being feverishly assembled at Southampton in the early days of May 1982. But, just ten days following the Task Force's departure for the South Atlantic, Royal Air Force Harrier jump jets were flying out to Ascension, equipped with a brand-new self-protection radar jammer: 'Blue Eric' had been designed, flight tested, batch-manufactured and delivered by Marconi in an unbelievable fifteen days!

'Blue Eric' got its name from Squadron Leader Eric Annal, an RAF electronics engineer who was the MoD project officer.

It was on May 6 1982 that Eric Annal was given the responsibility of organising a radar jammer, suitable for carrying on a Harrier jump jet, that would counteract the types of radars being used by the Argentine forces.

He immediately contacted Marconi Space & Defence Systems at Stanmore (now MDSL) and, together with representatives from the RAF Electronic Warfare Operational Support Establishment, the Royal Aircraft Establishment, Farnborough, and Bryan

Sheppard leading a team from MSDS, set about the problem. By the next day, it was decided to look at the feasibility of fitting a modified reduced capability MSDS Sky Shadow radar into a Harrier gun pod.

While Eric Annal and his team were checking on the implications of fitting a jammer into a gun pod, Bryan Sheppard and his colleagues were putting together the prototype jammer which was ready for ground testing on Wednesday May 12.

Exhaustive vibration tests were carried out and the necessary further modifications made to enhance cooling and ensure security of component fixings etc.

'Blue Eric' flew for the first time on May 14, and again the next day in simulated operational conditions when a 30mm Aden gun was fired from a pod adjacent to it.

Tuesday, May 18 saw the production of ten 'Blue Eric' pods commence, and delivery to RAF Wittering was made only fifteen days after the initial conception of the jammer!

The full, incredible story is told in *Harrier and Sea Harrier at War* by Alfred Price, published by Ian Allan Ltd, due out in the near future.



## Off-Duty Heroism

Before the first World War Marconi supplied the only trained wireless operators on board ships.

In May 1914, Ronald Ferguson was the operator on the *Empress of Ireland* when she was in collision and sank with the loss of 1,000 lives. When the appalling disaster occurred, Ronald was in his cabin off duty.

He rushed to the wireless room and started to tap out SOS and the ship's position. He remembered that the only operators on shore would be amateurs and so he transmitted slowly despite a natural inclination in the situation to tap out at the highest speed he could.

Even after the vessel heeled over to 45° and more he continued to transmit while standing on a bulkhead with water rushing in at over 200 gallons a second. When the ship sank he was thrown free and rescued by one of the vessels he had managed to call up.

On board the rescue ship, soaked to the skin, he co-ordinated the rescue by wireless.

## Another Far East Market for ATE

Marconi Instruments, already holding a remarkable 50% share of the major European ATE markets, is rapidly expanding in the Far East.

Hong Kong now joins the growing list of countries in that part of the world where Marconi automatic test equipment has been launched. Hong Kong's electronic industry is growing apace and now has need for the more sophisticated methods of pcb testing and repair that MI can provide.

Marconi Instruments ATE Division will only market its equipment in countries where total applications and service support can be provided. This policy can be clearly seen in action with Nanco Electronic Supply Ltd whose involvement in the electronics production field goes back many years and whose staff include MI trained engineers.

The ATE equipment demonstrated at the Hong Kong launch included systems for cost-effective and reliable quality control, high-capacity testing and a system for the fully automated factory. Also demonstrated were items of peripheral equipment such as the advanced and highly efficient Computer Aided Repair Station for the identification and repair of pcb faults.

## More Channel 4 for Northumberland

Marconi Communication Systems has delivered the final pair of UHF transmitters to the IBA for their high powered transmitting station at Chatton just north of Alnwick, Northumberland, and installation is now under way. This



Our picture shows Mr. Ferguson (now aged 90) at the National Maritime Museum when he visited the 250th Anniversary Exhibition of the Lloyd's List.

transmitter will provide Channel 4 reception for an area within the Tyne/Tees Television region.

The contract worth around £10 million was signed in October 1979 and installation of the first pair of transmitters commenced at Winter Hill, Lancashire, in June 1981. By November 1982 when Channel 4 and S4C came on air, 15 stations had been completed by MCSL.

The order, placed with Marconi Communication Systems, covered the supply of high power UHF transmitters to 25 stations throughout the UK including Northern Ireland, the Isle of Lewis and the Orkney Isles. Twelve stations use 2 x 15 kW B7445 operating in parallel and 13 stations use a 15 kW B7445 with a 5 kW transmitter as a passive standby.

## 'Perfect' Launch for MARECS

November 9 saw the launch of MARECS B2, the second Maritime Communications Satellite for which Marconi Space Systems provided the transponder.

The launching aboard the European Ariane rocket from French Guiana went so successfully, and used so little fuel, that it is estimated the satellite will have a life of about 15 years.

MARECS B2 will provide enhanced communications for merchant shipping in the Pacific Ocean as part of the INMARSAT (International Maritime Satellite Organisation) system and augments the capability provided by MARECS A which has been orbiting over the Atlantic since 1982.

The Marconi transponder is similar to that on MARECS A and is the most powerful of its type yet to be launched. It has performed faultlessly, and its extensive capacity (44 telephone channels and up to 110 telex channels) is rapidly being taken up as users realise the benefits to ship management, oil rig operations and safety of life at sea, that the improved communications provide.

INMARSAT is now considering a second generation system and an international team headed by MSSL has put forward a proposal which it is hoped will lead to a contract early in 1985.

## USA Tie Up for MCSL

Marconi Communication Systems has appointed Comark Communications Inc. of Southwick, Mass., as the sole distributor of their Broadcasting Division transmitter products in the USA, Central and South America.

According to the agreement Comark will distribute Marconi UHF Exciters, VHF, AM, FM and HF transmitters from low power to 250kW output power. The agreement also includes the recently announced 7500 series of high band VHF television transmitters. In addition Comark will provide engineering, service and spare parts support for equipment sold into the territory.

This is the first time a European manufacturer has teamed up with a domestic US transmitter company to provide such a wide range of products. It is expected to signal the start of a long-term commercial arrangement between the two companies.



## 'Admiral' to Link High Speed Networks

The Alvey Directorate is sponsoring a £3 million joint venture to research into advanced data communications. The venture is being co-ordinated by the GEC Research Laboratories at the Marconi Research Centre at Great Baddow.

The partners in the study with GEC Research Laboratories are British Telecom, University College, London, and the University of London Computer Centre. Each partner has different but complementary specialist expertise to bring to bear on the problems being tackled by the research project, code-named ADMIRAL (Advanced Mega Internet Research for Alvey).

The project will investigate techniques to enable effective use and management of interconnected high-performance data networks over local and widespread areas. A high-speed, wide area network is being set up based around 2 Megabit links, and ADMIRAL will use this network to link together a number of local area networks to form a high-performance internet.

Local area networks (LANs) are finding increasing use for sharing computing resources in business and research facilities because they allow dissimilar equipment to intercommunicate at high speed. However, they are limited to 'on-site' use.

ADMIRAL will run for three years and will tackle the requirements for distributed heterogeneous computing systems. It will provide a framework to support a wide variety of applications which need high performance communication.

## New Research Labs at MEDL

As a further stage in its commitment to investment in leading edge technology, the Company is establishing a silicon systems laboratory adjacent to MEDL's IC fabrication area at Lincoln.

It will provide advanced processing facilities for 1.5 micron CMOS silicon-on-sapphire technology and will be fully equipped for direct step on wafer photo-lithography, dry etching and dedicated furnace processing.

It will have its own dedicated team of process, test and equipment engineers within MEDL's advanced development unit.

Silicon-on-Sapphire technology has advantages in improved speed or reduced power combined with a high logic packing density and proven radiation resistance. It is particularly suitable for applications where power consumption and heat dissipation must be kept to a minimum while still achieving very high logic throughput rates.

A typical important example is in satellites where the cost of providing electrical power is high and electronic circuits are exposed to many years of continuous natural radiation.

## MSSL Meet Tight Space Deadline – Again!

Only a few weeks after meeting a critical deadline for completion tests on the UOSAT-B satellite in record time (see

Marconi Digest 3, page 12), Marconi Space Systems has completed complex tests on a space shuttle payload to another very tight deadline.

One of the two UK experiments to be flown on a 1985 shuttle flight is the University of Birmingham's X-ray 'telescope' designed to obtain high spatial resolution X-ray images of the sky, including emissions from extremely remote galaxy clusters, for telemetering to ground control and conversion into a positive image.

A team of specialist engineers at the Portsmouth facility of MSSL carried out electromagnetic compatibility proving tests on the telescope. These tests, completed in rapid time to meet the shipment date, involved accurate measurements of conducted and radiated emissions to ensure that they met NASA specifications and to establish that the instrument would operate at peak efficiency without interfering with other on-board equipment or power supplies.

The telescope is now at Kennedy Space Centre undergoing integration procedures.

## Ministerial Visit to Marconi Washington

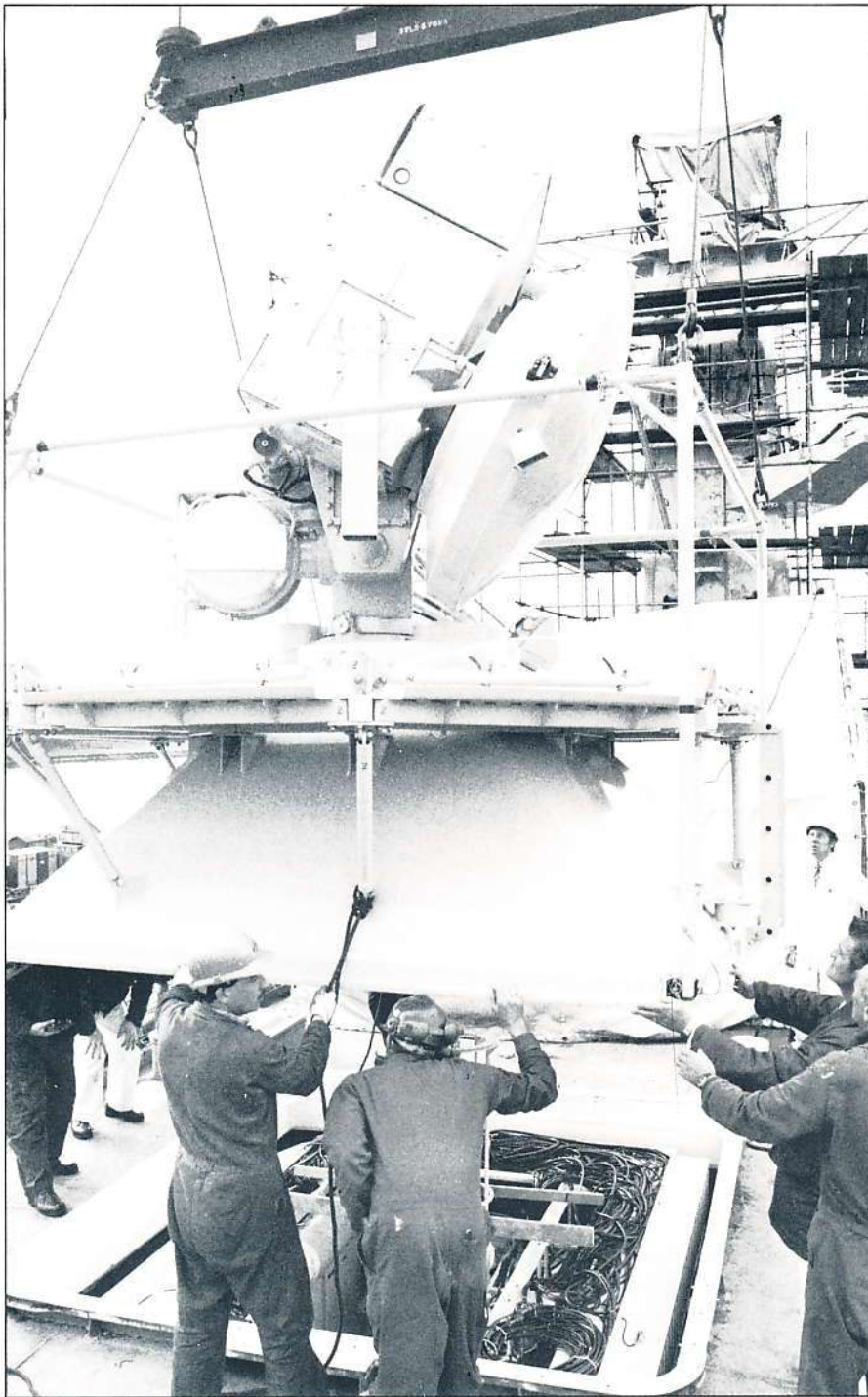
Marconi Electronics Inc now employs 2,000 people in the USA.

Recently the Head Office at Washington DC, has been improved and at a party to celebrate the new facilities Chairman Ian Sutherland welcomed the UK Under Secretary for Defence Procurement during his visit to the US capital.

The Minister, John Lee, MP, is here seen with Ian Sutherland (left), Air Cdr Leslie Swart and Peta Sutherland.







The Tracker section of the new Lightweight Naval Fire Control Radar (805 SW) produced by Marconi Radar Systems Ltd for the Seawolf missile system being lifted into HMS Brave. The frigate has one Tracker mounted forward and one aft, and a Marconi 967 surveillance radar on top of the mast.

## Full Naval Acceptance for Seawolf

The Marconi Radar Seawolf missile control system has just been awarded Fleet Weapon System Acceptance. This is the first time that such acceptance has ever been granted to a complete weapons system by the Royal Navy and means that it meets or surpasses every aspect of the staff requirement. Marconi is the overall ship system prime contractor.

Seawolf, a surface-to-air weapon, can

operate against missiles and other small targets with very fast reaction time and is now fitted in five Leander class frigates and six Type 22 frigates of the Royal Navy.

Three of these ships were in action during the Falklands war, where the system was responsible for successful engagements resulting in the destruction of at least five enemy aircraft. More recently, in a Royal Navy exercise, *it became the only missile system ever to shoot down an Exocet missile.*

The first of the new lightweight Seawolf systems, incorporating a new Marconi tracker and a new surveillance radar will be fitted in HMS Brave, a Type 22 frigate built at Yarrow Shipbuilders' yard in Glasgow.

Seawolf can operate in all weather conditions and has high ECM resistance.

## Collaboration Agreement Between MEDL and Thomson

Two key technologies which will have a major bearing on the future of European energy management and power control systems are the subject of a major technological agreement between Marconi Electronic Devices and Thomson CSF.

Both companies have agreed to collaborate with a technology cross-licence and dual sourcing agreement in Gate Turn-Off Thyristors (GTOs) and Power MOSFETS. The Collaboration will enable European power equipment manufacturers to embark on design commitments using the new technology in the full knowledge that two dependable qualified sources are available supported by enhanced R&D resources.

Over the past few years MEDL has invested heavily in a development programme for the production of a range of Gate Turn-Off Thyristors—the acknowledged way forward for the control of variable frequency drives and DC choppers, which will immediately give significant advances in the design of control systems for DC electric traction systems due to the inherent ability of the device to combine both high power and high frequency performance characteristics.

Similarly, Thomson CSF, who is amongst the world leaders in the power semiconductor field, has developed a Power MOSFET Transistor technology specifically adapted for low and medium power applications. This Power MOSFET technology is characterised by high switching speeds, excellent safe operating areas and can be driven directly from low power logic circuits.

## 'Now, Get Out of That!'

Employee training in Marconi is not all sitting at a lecture room desk, getting your hands dirty at the work bench or being initiated into the mysteries of electronics laboratories.

It can be a lot tougher than that!

Just ask the teams of young Marconi people who went in for the GEC National Young Employees Competition in September. Two teams from MDSL and one from Easams were among the 100 GEC Group teams that pitted their wits, knowledge and stamina against each other at the Royal Welsh showground and in the surrounding countryside over a 15-hour period during a weekend of outdoor events.

The annual competition is designed to foster team spirit, develop powers of leadership and help the participants realise their own potential in challenging situations.

This year it had a distinct flavour of TV's popular programme 'Now get out of



that', in that it covered orienteering, outdoor sports, raft construction and what the organisers call 'multi-activity problems' (problem solving, dexterity skills, general knowledge etc.).

Intensive training paid dividends for the Easams team who reached the finals and ended up ninth. Congratulations!

The two MDSL teams didn't do quite as well, but one got 17th place – very creditable in a field of 100. Regardless of the final result all the participants, their team managers and trainers and the reserves found the training and the

taking part not only enjoyable but helpful in enhancing that sense of team spirit that was a prime object of the competition.

### Operation 'Golden Fleece'

Even more closely allied to the same TV programme, 'Operation Golden Fleece' was organised by MSRS at Hillend with similar objects in mind.

A weekend in June saw twelve teams each of four volunteers tackle a 14-mile, 2,000-ft ascent, course in Glendevon

and Dunning Glen in a typical 'Now, get out of that' expedition.

Teams not only had to complete the course in 15 hours, but had to perform a wide variety of tasks from abseiling to first aid and raft building to archery.

As on the GEC competition and the Ten Tors course, the teams learned a lot about themselves, their capabilities and just getting on with each other in situations where team spirit was more important than the individual.



## SPONSORSHIP

Each year the Marconi group of companies sponsors a whole range and variety of activities – from the three Service youth organisations undertaking adventure training through to the Army Lawn Tennis Association championships, young people undertaking adventure training with the Sail Training Association and young people benefiting from Marconi bursaries available through the British Schools Exploring Society. Each year we look back at this time and can report again on a successful season of sponsored activities the latest of these being our involvement at the Royal Military Academy and Staff College at Camberley and our sponsorship of the scurry. On this page are photographs illustrating some of Marconi's

involvement during the year. Fuller details of the Marconi's commitment to the community are contained in the booklet "Marconi in the Community" available through local publicity departments or direct from the Public Affairs Office at Stanmore.

### Raleigh Report

Not only is Marconi supplying the youth adventure project 'Operation Raleigh' with communications equipment (see Digest 3, page 23), the Company is also supplying eight of the young people taking part. The whole scheme will cover a four years' period in phases. Marconi is sponsoring two young employees each

year to go on the expedition and the first year's sponsorship is of John Dargan and Ian Dunn.

John Dargan of MSRS volunteered and successfully passed the rigorous physical and mental selection tests to become one of 125 venturers in his particular phase of the operation.

John will be off to the Bahamas for three months over Christmas where he will be helping to build three youth centres, using local stone, and will have sail training in the brigantine 'Zebu'. Can't be bad!



## 'It's All Down Hill Now ...'

'... except for the uphill bits!' So said Colin McKean of MSSL half-way round the Ten Tors course on Dartmoor earlier this year.

To the uninitiated, the Ten Tors Expedition is a gruelling test of stamina, skill and teamwork held annually on that inhospitable moorland in Devon that was well-chosen last century as the site of Britain's most famous prison.

Mal James, Production Director of the Marconi Company, takes an active interest in the Ten Tors event, and this was the fifth year that a team of young people from the Company had taken part.

Altogether 411 teams competed in one or other of the 35, 45 and 55 mile events and 43 more in the special event for the disabled and handicapped.

The team this year consisted of four apprentices and two YTS trainees under the management of Stephen Rolfe with Graham Jackson as his assistant, (principal Training Officer of MSSSL) to drive the bus and Brian Coles (Portsmouth Site Training Manager) the support van.

The Marconi team competed in the senior event over 55 miles and completed the tough course, in far from ideal weather, within the time limit to be presented with well-deserved medals.

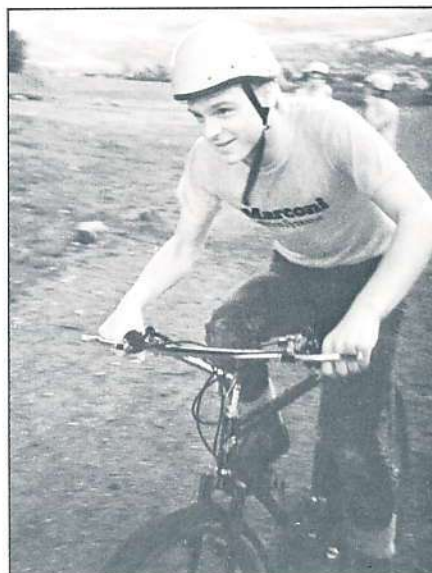
It's not only the climbing, scrambling, hiking and camping on the Moor for the best part of two days that is tough. The training in the Multi-gym at Cosham, at Highbury College three evenings a week and over two weekends on the Moor was no picnic either.

Our congratulations to the team – Richard Gorman (team leader), Anthony Parrott, Martin Pountney, Colin McKean, Adrian Roberts and Mark Brown.

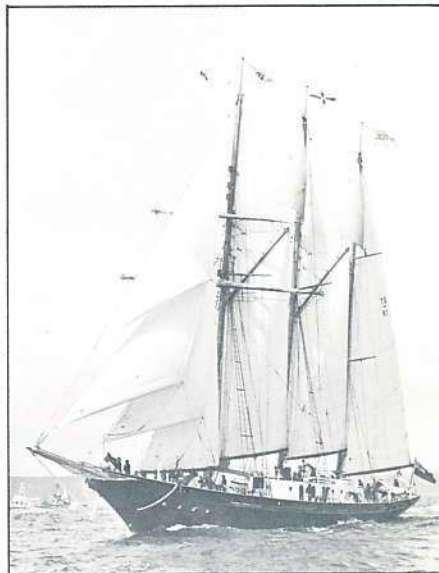
Thanks are also due to the many fellow-employees who played no small a part in helping, encouraging and supporting the team, among whom Alan Gardner deserves special mention as do the two team reserves, Andy Neal and Nick Linford.



The Sailing Training Association is another organisation benefiting from Marconi's support. Here are shown young people under training on board T.S. Sir Winston Churchill.



Richard Bye, one of Marconi's sponsored students participating in GEC's Young Employees Competition.



The T.S. Sir Winston Churchill.

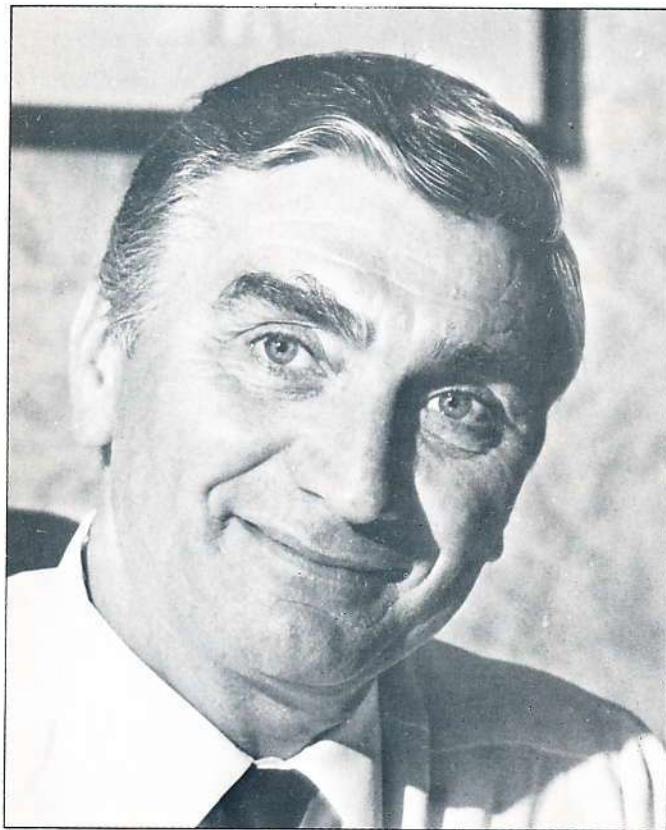


Geoff Little leading a party of Air Cadets at the Outward Bound Mountain School in the Lake District under Marconi's cadet sponsorship scheme.

Marconi at The Camberley Horse Show.



# People



**Mal James –  
Production Director,  
The Marconi  
Company**

Following the Company reorganisation in April, Thomas Maldwyn James has been appointed Production Director of the Marconi Company.

At the time of the reorganisation he was Production Director of Marconi Space & Defence Systems at Portsmouth, after having held a number of senior management posts at the Broad Oak Works and the unit at Fife, Scotland.

Mal's extensive engineering background covers both mechanical and production engineering in the civilian field and aeronautical engineering in the Royal Navy. He is a Chartered Engineer, and a fellow of both the Institute of Mechanical Engineers and the Institute of Production Engineers.

He is married, with three sons and will continue to live in the Portsmouth area, operating from his office there.



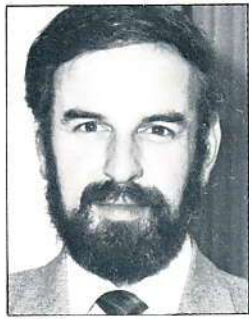
**George Hill –  
Managing Director,  
The Marconi International Marine  
Company Ltd.**

The Marconi Company Ltd. announces the appointment of George Hill, DMS, MBIM, MIIM, MRIN, as Managing Director of The Marconi International Marine Company Ltd.

George Hill joined Marconi Marine in 1968 from Coastal Radio Ltd where, on completion of a technical apprenticeship, he held a number of key executive, technical and commercial posts. He came to Marconi Marine as assistant to the area manager, Scotland, and subsequent promotional appointments have included technical co-ordination, training, sales, marketing, regional office management and divisional management which involved working in all aspects of the company's business both nationally and internationally. He was formerly Marconi Marine's General Manager.

George, who was born and educated in Aberdeen, now lives in Braintree, Essex, with his wife and two teenage daughters.





Howard



White



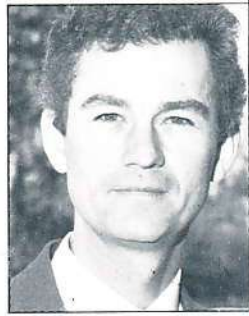
Cunliffe-Jones



Foy



Ellingham



Long



Williams



Bridges



Johnston



Painter



Thompson



Willmott



Dent



Jones



Cooke

## Marconi Command and Control Systems Limited

**'Tony' S. Howard**, Marketing Director. Previously Manager, Military Weapons Control Division, MSDS, Frimley.

**'Bob' A. Long**, Commercial Director. Previously Commercial Manager, MSDS, Stanmore.

**Dr. John B. Thompson**, Technical Director. Previously Assistant General Manager, Technology, MSDS, Frimley.

**Paul B. White**, Financial Director. Previously Chief Accountant, MSDS, Frimley.

**Graham C. Williams**, Project Director BATES. Previously Manager, Military Command Systems Division, MSDS, Frimley.

**John H. Willmott**, Manufacturing Engineering Director. Previously Manager, Product Support Group Radar Division, MSDS, Frimley.

## Marconi Secure Radio Systems Limited

**David N. Cunliffe-Jones** to Marketing Director. Previously Assistant Marketing Director, MSDS since November 1978.

**Dr. Clive A. Bridges** to General Manager (B/L) from Divisional Manager, Military Communications, MSDS, Browns Lane since April 1983.

**Paul W. Dent** to Technical Director. Previously Advanced Systems Manager for six years at MSDS, Browns Lane.

**'Dick' A. Foy** to Financial Director. Previously Assistant General Manager MSDS, Broad Oak from 23/5/83.

**Alan A. Johnston** to Commercial Director. Previously Commercial Manager, MRSL, Chelmsford from 23/1/84.

**Huw Jones** to Company Personnel (Manager). Previously at Portsmouth Site (Personnel Manager) from January 1983.

## Marconi Space Systems Limited

**R. 'Barry' Ellingham** to Commercial Director. Previously Commercial Services Manager MSDS, Browns Lane.

**'Mike' J. Painter** to General Manager MSS, Browns Lane. Previously Project Manager for INMARSAT II Space Division, MSDS, Browns Lane, from Spring 1983.

## Marconi Communication Systems Limited

**'Bill' O. Cooke**, appointed Chairman of Eddystone Radio Ltd. Bill Cooke was previously Managing Director.

**Gary W. Head** takes over as Manager of Line Division which will be responsible for the line and computer services unit activities.





Head



Pettit



Jewkes



Forrest



Pendlebury



Nice



Smith



Brocklesby



Franks



Slater



Nicholson



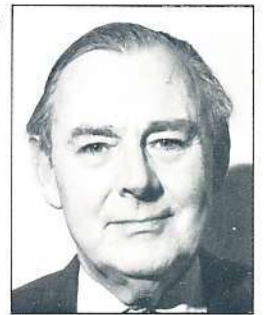
Williams



DaCosta



Cowan



Watson

## Marconi Communication Systems Limited

**'Bob' A. Nice**, formerly Defence Marketing Manager, heads a new group entitled Radio Systems Division which has been formed by combining the Defence Communications with the Radio section of the original Radio and Line Division.

**John A. Nicholson**, formerly Defence Divisional Manager, becomes General Manager with responsibility for business and central functions and also deputises for the Managing Director.

**Christopher A. Pettit**, appointed Managing Director of Eddystone in succession to Bill Cooke. He has been with Marconi for 18 years, latterly with the Antenna Systems Division.

**Bryan M. Smith**, formerly Director of Export Sales, is the new Marketing Director with responsibility for export sales and general marketing policy.

**Graham J. Williams**, formerly in various management positions in the GEC group of companies, is appointed Production Director.

## Marconi Radar Systems Limited

**J. 'Dick' Jewkes** appointed as Production Director.

## Marconi Defence Systems Limited

**Richard T. Brocklesby** has been appointed Financial Director. He was Assistant Financial Director with MSDS.

**David J. DaCosta** has been appointed Production Engineering Director. Formerly he was Assistant Production Director, The Marconi Company.

**Dr. John R. Forrest** has been appointed Technical Director and will be responsible for the direction of research and PV activities. He will have direct responsibilities for the Advanced Technology Division and the MDS Research Laboratories.

**'Nick' E. Franks** has been appointed Marketing Director. He was formerly Deputy Managing Director, GEC, Singapore.

## Marconi Underwater Systems Limited

**Harry Cowan**, Assistant Managing Director MUSL at Neston from Managing Director, Marconi Projects Ltd.

**Dr. David T. Pendlebury**, General Manager, MUSL, Farlington.

**'Ken' F. Slater**, Engineering Director.

**Keith C. D. Watson**, Vice-Chairman from Marketing Director.

## EASAMS Limited

**'Ted' McDowell**, Technical Executive and Services Group Manager.



McDowell



# Special Report

## TAILOR-MADE TRAINING IN APPLIED ELECTRONICS

Time was when the Marconi Wireless Telegraph Company trained every operator in the UK.

In fact, Guglielmo Marconi established the first electronics College in the world at Frinton-on-Sea, Essex, back in 1901.

That College eighty-three years, several addresses and three names later is now the Marconi College in Chelmsford where it has been established on the same site since 1920. But apart from an adherence to the same high standards of training the present organisation bears little resemblance to Guglielmo's brain-child.

He might recognise the exterior of a couple of the buildings – he would certainly remember his old Company's crest over the entrance to one of them – but the high-tech training complex that is today's Marconi College would be as strange to him as the cockpit of a Tornado would be to Louis Bleriot.

### Complementary Areas

The original concept of the College was as an establishment to provide training for the Company's own staff – newly recruited engineers, and employees who were transferring to other disciplines or technologies.

This aspect of the College's work is still vitally important but the growth of Marconi and its association with GEC, encompassing such a breadth of products, systems and technologies, has led to the College opening its doors to the Company's customers.

Customer training has increased to such an extent (particularly since World War II) that it now forms over 70% of the College business.

Thus Marconi College serves the Marconi Company in two different but complementary areas.

### Versatile, Adaptable, Viable

Under the leadership of its principal, Ian Donaldson, the College offers courses in virtually every aspect of applied electronics.

From radar to communications; from electronic warfare systems to close circuit television, from broadcasting to automated traffic control, the Company employee or the Company customer can



The main entrance to the College Technical block.

be trained to the optimum level.

Its reputation is such, that some organisations will not employ engineers for the installation and maintenance of Marconi equipment and systems unless they have been College-trained. It is among the largest establishments of its type in the UK.

Talking to Ian and his principal lecturers Fred Boot and Arnold Clegg, it soon became obvious that three words can sum up the character of Marconi College.

#### VERSATILE

The list of courses on offer at any one time covers a very broad spectrum of topics related to applied electronics. The published syllabus gives some idea of these, but the method of working and the

expertise of the thirty plus full-time lecturers means that courses in new topics – sometimes at the request of outside organisations – can usually be laid on in a surprisingly short time scale.

#### ADAPTABLE

Until the 1960s courses tended to be somewhat rigid and of several months duration. Since the increase in numbers of customer students and the present-day Marconi graduate training policy, the courses have been re-structured into modules of much shorter length so that combinations and permutations of them can be tailored to suit requirements.

The College's adaptability also shows itself in its ability to provide training on new Marconi products sometimes



before development is finished and the published manuals are available.

### Viable

The College is a viable operation to both the Company and its customers.

Although it is not a profit-making operation – its commercial targets are to break-even on a total costing basis – it provides the Company with the highest standard of relevant training for its technical staff and a very powerful 'sales plus' when seeking orders and contracts.

The College's reputation also adds to the Company's prestige.

The customers regard Marconi College training as a viable proposition because it is cost-effective and comes straight from the source of the product or system. The fact that once customers (inside or outside the GEC/Marconi group) start to use the College they almost invariably stay with it, is proof enough.

No one *has* to use the College – and not even the Marconi group companies – and if it was not offering the customers what they want it would soon go out of business.

## International

Just as export contracts form a big part of the group's business, so overseas visitors constitute a large proportion at any one time.

Very few countries in the Western World and the Third World have not been represented at some time or another at Arbour Lane, Chelmsford. Even some Eastern Bloc countries have taken advantage of the College's facilities.

The very attractive and informative College brochure lists nearly seventy countries – and that is a few months old now!

## Fundamental Grounding

Industrial training in the '80s – *real* industrial training – is much more than just putting new recruits into a factory or development laboratory for a few weeks before considering them fully qualified. Current technologies are such that fundamental grounding in the subject is necessary before the finer points of specialities can be mastered.

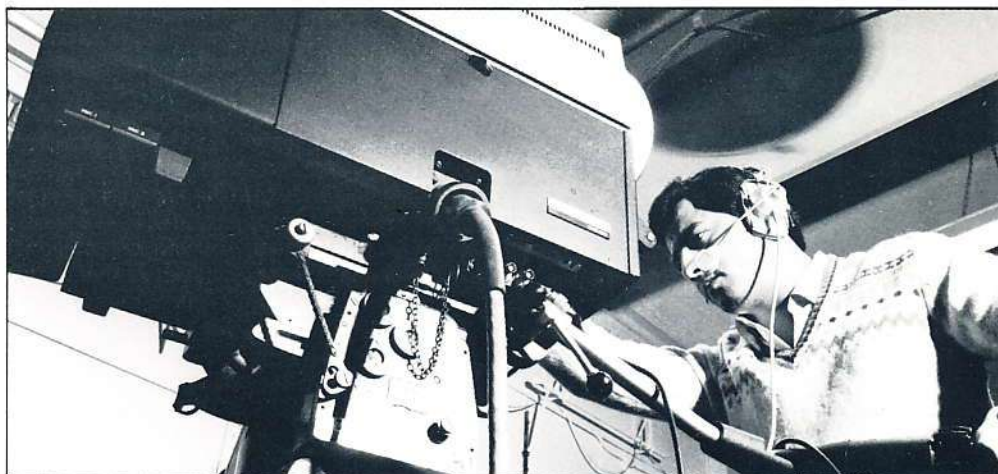
Part of the task of Marconi College is to provide that basic grounding when required, in a practical 'hands-on' context, before leading its students on to the more specialised areas of training in GEC/Marconi products and systems.

## Specific Courses

As touched on earlier, the College serves two groups of students. One is Company staff requiring training to equip them for their jobs or to enable them to retrain for transfer and advancement,



Working on the radar console of an ANVIL cabin in an S600 radar.



A student from the middle-east learning to set up the Marconi Television Automatic Colour camera.

while the other consists of Company customer staffs mostly requiring instruction in the installation and maintenance of GEC/Marconi products and systems.

That is really an over-simplification. Sometimes the two groups' requirements are interlinked, but often they are so individual that training is on an almost one-to-one basis. It is a feature of the College that it can usually provide just what is wanted, when it is wanted – and often *where* it is wanted!

In general, Company staff training is based on syllabi published in an annual prospectus with modifications in

content, duration and scheduling, if necessary to fit in with the individual Company requirements. Often the training can be given at Company locations but, of course, some instruction has to be centred on the College for maximum achievement.

The most popularly supported area of staff training is software engineering with much of it meeting particular Company requirements. Topics range from simple programming techniques and languages to structured programming and real time practice.

The courses on microprocessors, from an introduction through hardware





A Marconi engineer takes a measurement on the Marconi Fast Tuning hf communications 10 kW amplifier.



Two Jordanian Air Force students using the Marconi College microprocessor tutor.



Learning to use the television studio vision control suite.

and software techniques to design, are also very popular.

Co-operation with individual Marconi company training officers, and augmentation of training given at company level is an important part of the College's work.

This report is not the place to detail all the topics covered by the College syllabi, but a 'phone call to the College, (0245) 350011, will bring a prospectus to your desk in double-quick time.

## The Customer Involvement

Marconi customer students usually require specific training on installation, operation and maintenance of group products and systems.

However, sometimes basic skills have to be acquired before they can benefit from the more advanced instruction and Marconi College can provide whatever level of technical training the customer may need – right down to familiarisation with essential tools.

When such lead-in training is required courses may often take up to 12 months

to complete, whereas familiarisation, setting-up and maintenance training for technically experienced staff may well take only a few weeks.

## The Outside Element

Whilst the majority of the College work is geared to the training of Company staff and customers, there are few constraints on the services that Ian and his staff may offer. Demand and resources are the key factors.

For example, two on-going courses have been offered for many years in response to requests from outside the GEC/Marconi group. One is the maintenance/familiarisation course on the Marconi Mk IX automatic colour TV camera, which has been used by staff from many ITV companies.

The other course, and one which continues in popularity, is the printed circuit board repair and rework course.

## The Residence

College courses are now being taken by students from further and further afield. Some are staff from more distant Company locations, some are Service personnel from both home and overseas stations and some are customers from all over the world.

Consequently, living-in facilities are essential.

The Residence attached to the College is a most professionally-run establishment catering for 45 students in comfortable study bedrooms – each with its own wash hand-basin and generous sized desk for personal study.

There are two TV lounges – one with a bar – and a pool room. The food is of a very high standard and special diets are catered for.

Demand for places is very high but arrangements are made for overflow accommodation in nearby hotels, if necessary.

## The Future

Ian Donaldson and his staff have plans for, as he puts it 'gentle expansion' as demand and resources permit.

Studies are being undertaken to assess the viability of 'open' or 'distance' learning in the Marconi context. There is the possibility of extending the syllabi into more basic training. But, above all, there will be a continued response to demand – whether from inside or outside the group.

If you have a training problem, pick up the 'phone and call the College. That will cost you little enough, but it will almost certainly save you time, worry – and money!



# Fact File

## MINIS AND MOD: APPLYING THE LESSONS

By Peter Ireland,  
Press Officer,  
MDSL/EASAMS

"In judging the appropriate management structure for the Department, my overriding aim has been to strengthen the fighting effectiveness of our forces" –  
Michael Heseltine.

Since its formation in 1964, no less than eight attempts to reorganise the top echelons of the Ministry of Defence have foundered on the rocks of entrenched Service opposition. The latest, and considered by many the most radical attempt at reform, comes irrefragably into effect on January 2nd.

The harbinger of change was introduced to the Ministry by Michael Heseltine on his appointment as Defence Secretary in 1982. Known familiarly as MINIS (Management Information Systems for Ministers), it accompanied him from the Department of the Environment where he had first deployed it in the quest for greater efficiency.

Its immediate impact was felt by 156 key departmental heads at military two-star and equivalent civilian grade level. Individuals were brought together in small groups to brief Heseltine on their existing roles and in turn to be briefed on what was required from them under the MINIS process; in short, they were to go away and commence an in-depth study into their own departments and provide detailed written reports covering three areas: the staff and functions for which they were responsible, and how these linked-in with the overall Departmental structure; the true nature of the costs for which they were responsible, itemised to the nearest £1000; their achievements over the past year and their plans for the next two years with an emphasis on their key objectives for change. The reports had, if required, to be personally justified to Heseltine.

The information gathered as a result of this, often painful, self-analysis, painted a less than rosy picture of the work directly and indirectly undertaken by 275,000 military and civilian staff. In particular, it revealed...

... a triplication of functions amongst staff of the three services down to the lowest levels,

... a picture of overstaffing at the higher levels,

... and a blurring of lines of accountability and decisions which mirrored rival service interests rather than defence policy.

The main findings of the twelve-month study were encapsulated in a consultative document issued earlier this year. Heseltine's proposals for change were outlined in decisive first-person prose and it was these proposals, largely unchanged, that were presented to Parliament in July's White Paper. Although the plan affects less than 300 of the Department's 400,000 staff, its avowed intention to centralise and simplify the whole policy-making process will mean a fundamental departure from traditional single-Service practice. The plan will see:

- The creation of a simplified top-level MoD organisation with Field Marshal Sir Edwin Bramall as Chief of the



Sir Edwin Bramall

Defence Staff and Sir Clive Whitmore as Permanent Under Secretary jointly reporting to the Secretary of State (see fig. 1, page 36).

- The formation of a centralised and unified Defence Staff headed-up by



Michael Heseltine



Sir Clive Whitmore



Sir Peter Harding

Air Chief Marshal Sir Peter Harding as Vice Chief of the Defence Staff. This new organisation assumes the policy and operational planning functions previously the prerogative of each Service. Of particular interest to Marconi management is the group headed by Air Marshal Sir Donald Hall which is concerned with defence systems (see fig. 2, page 37).

- The disappearance of individual Service staffs hitherto responsible for



strategy, programmes, operational requirements and logistics planning. Nine top jobs go, including those of the Service Vice-Chiefs of Staff and their civilian equivalents.

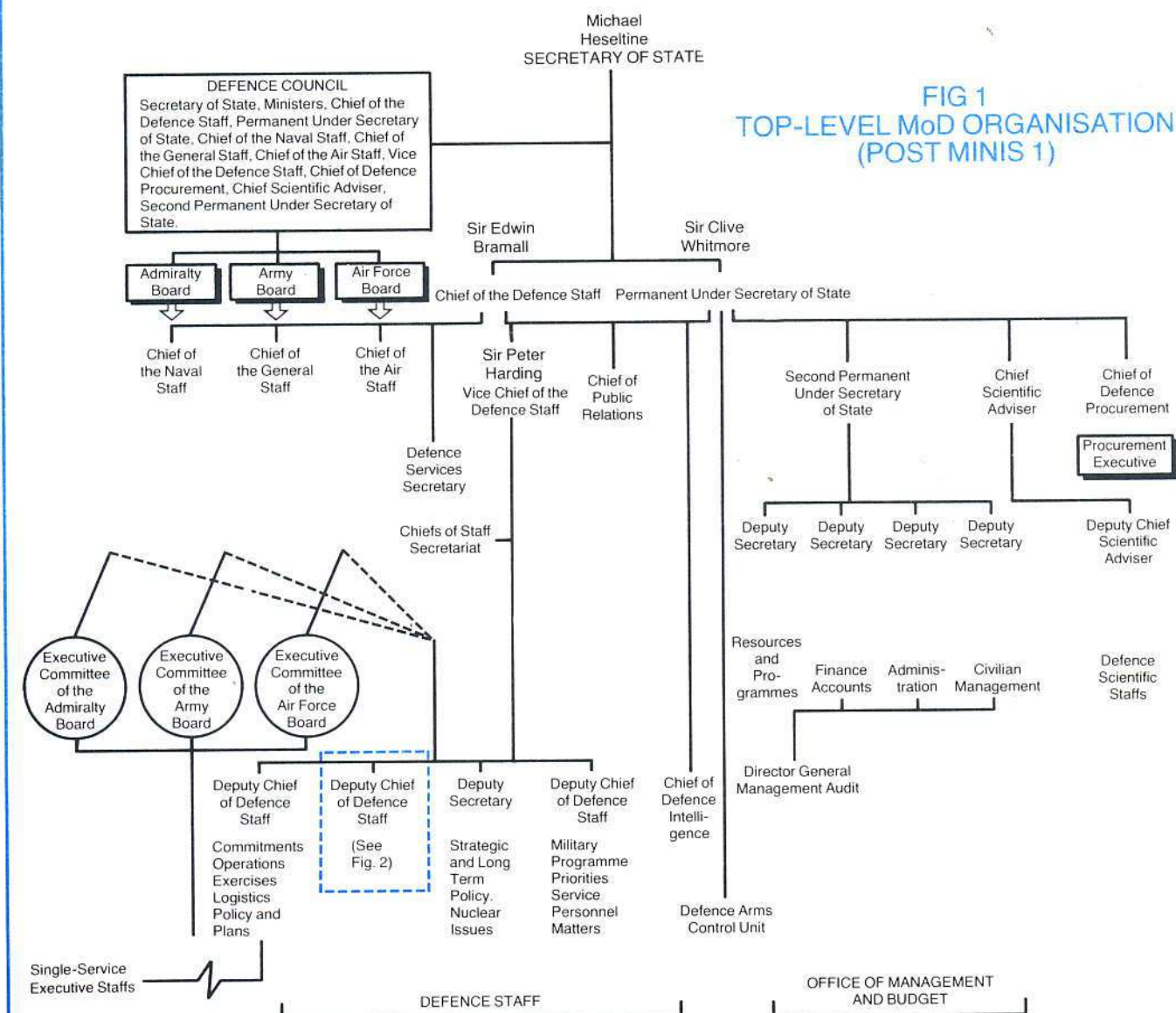
- A reduced role for the heads of the three Services (Chiefs of the Naval, General and Air Staffs). They effectively lose their policy powers and become managers, responsible for administering and implementing policy decided at the centre. Yet even here, the overall thrust towards a centralisation of policy and decentralisation of management calls for a large measure of administrative power to be delegated to officers in the field. But despite fears to the contrary, the Service Chiefs retain their traditional rights of access to the Prime Minister. They also continue as members of the Defence Council, the

body which provides general guidance on defence issues to government.

- The creation of a centralised Office of Management and Budget (OMB) under the day-to-day control of 2nd PUS, John Belloch. The OMB will seek to exercise stronger control over the Department's £17bn corporate budget and is specifically structured to look for further efficiencies in four key areas: resources and programmes, finance, administration, and civilian management.
- The first of a number of forthcoming changes within the Procurement Executive is the merging of the existing Defence Equipment Policy and the Operational Requirements Committees into a single Equipment Policy Committee. It will be chaired

by the Chief Scientific Adviser and draw members from the Defence Staff, the OMB, MoD(PE) itself and other government departments such as the Treasury. Its primary job will be to sharpen domestic and international competition for the Department's £7bn equipment procurement budget and encourage a closer and more self-reliant defence industry. Already announced, following a Government Contracts Review Board report, is the ruling that all non-competitive contracts exceeding £10m must have ministerial approval and that a real rate of return to companies on such contracts be reduced from an average of 11 per cent to less than 6 per cent. Two thirds of MoD contracts are let on a non-competitive basis although it is conceded that this figure masks the

FIG 1  
TOP-LEVEL MoD ORGANISATION  
(POST MINIS 1)



Note:  
Single Service Chiefs of Staff have access to staffs of Vice Chief of Defence Staff, Chief of Defence Intelligence and Chief of Public Relations.



fact that many prime contractors let sub-contracts through competitive tender. Even so, the MoD aims to achieve a £70m saving in this area of procurement. Further savings are foreseen through manpower reduction and restructuring in the Quality Assurance activities undertaken by MoD(PE). This process will be eased thanks largely to the increasing development of QA by defence contractors themselves.

- Other changes to be instituted on January 2nd involve a restructuring of the defence intelligence staff; a rationalisation of the services' training, logistics and support areas; the establishment of a separate defence Arms Control Unit, responsible to PUS, and reorganisation of the MoD's scientific staff. The three service Chief

Scientists will now report to the Chief Scientific Adviser who will centrally control the management of all operational analysis work.

MINIS is now central to the future strategy of MoD. MINIS 1, as described, is but the first phase – a framework for reappraising defence policy in the late 1980s and 1990s. The process is now geared to undertake a more detailed examination, particularly at lower levels. A thorough understanding of the Department's evolving structure and the constraints and opportunities that arise will be of paramount importance to our industry. It need hardly be said that each and every manager within Marconi has a vital part to play in achieving this awareness.

#### Further reading

'The Central Organisation for Defence' Cmd 9315, HMSO, £2.25

'MINIS and the Development of the Organisation for Defence' Open Government Document 84/03, MoD, March 1984.

'Value for Money in Defence Equipment Procurement' Open Government Document 83/01, MoD.

'Statement on the Defence Estimates, 1984' Vol 1, Cmd 9227-1, £4.00.

'First Report from the House of Commons Defence Committee: Statement on the Defence Estimates, 1984', House of Commons Report 436, £6.55.



FIG 2  
DCDS (SYSTEMS)



Deputy Chief of Defence Staff (Systems)  
Air Marshal Sir Donald Hall



ACDS (Concepts)  
Maj-Gen J. C. Reilly



ACDS (Sea Systems)  
Capt J. B. Kerr  
(in rank of Rear Admiral)



ACDS (Land Systems)  
Maj-Gen L. A. W. New



ACDS (Air Systems)  
AVM M. K. Adams

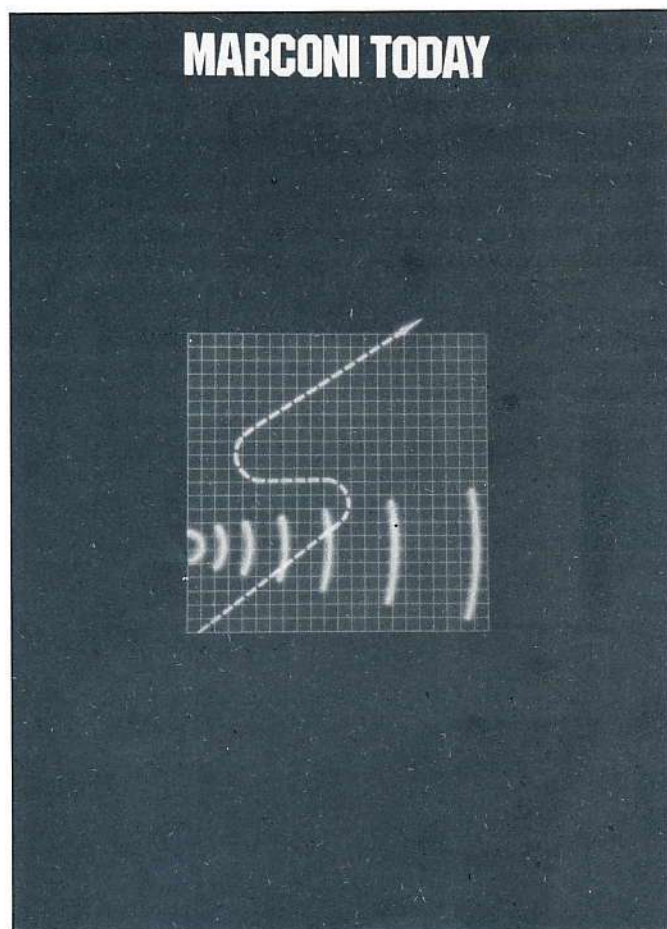


ACDS (C'I)  
Maj-Gen G. R. Oehlers



# Literature

## NEW CORPORATE BROCHURE

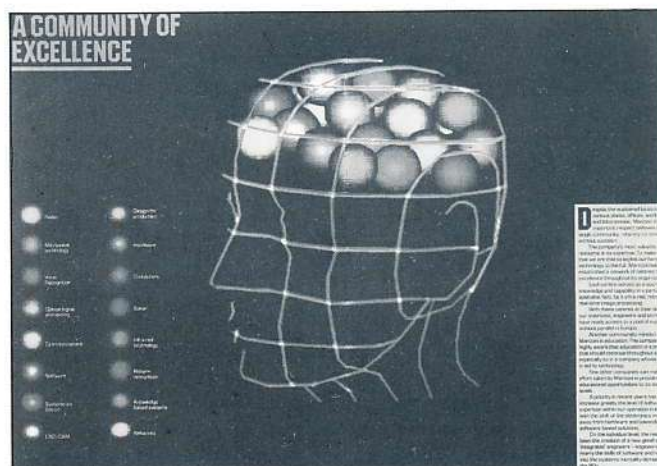
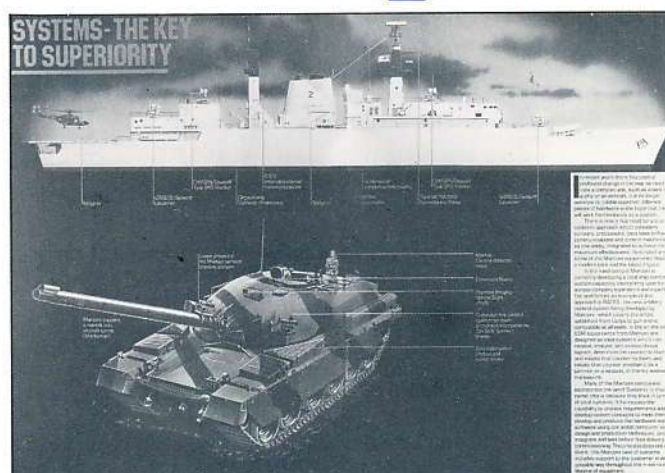


In this issue of Digest you will see repeated mention of the word 'breadth'. It is this single word that sums up the Marconi group's most important single strength – in products, technologies and skills.

A new brochure 'Marconi Today' spells out the many aspects of the business that make us different from our competitors, our achievements and our plans for the future.

The new full-colour corporate brochure will form an important tool in communicating with our customers. Copies are available either from local publicity departments or the Public Affairs Office at Stanmore.

The front cover and three of the spreads are reproduced here in monochrome.





# Ad News

## CURRENT ADVERTISING FROM MARCONI COMPANIES



100 miles to the nearest satellite.

Fortunately, Marconi knows a short cut.

If your existing tropo system is feeling its age, you're probably considering satcoms. Trouble is, space travel doesn't come cheap, even for radio waves.

Happily, Marconi can show you a way to achieve exactly the same results, at a fraction of the cost. We call it G3 Tropo.

G3 is an FM/FDM or digital tropo-spheric scatter system. It enables you to convert your existing tropo to the latest and highest standards of performance, with minimum disruption, and maximum use of existing facilities.

Proven in military applications G3 offers outstanding reliability, simple in-service maintenance, and complete compatibility with modern telecoms equipment. Plus a transportable link

option which builds in unbeatable flexibility. Best of all, the whole package will probably cost you less than you paid for your original tropo system.

So you can avoid not only the space travel, but also the astronomical bill.

For further information please contact Brian Ackroyd.

### G3 TROPO

#### 3rd Generation

#### Marconi

Communication Systems

Space & Microwave Division,  
New Street, Chelmsford, England CM1 1PL. Tel: (0245) 353221.  
Telex: 99201 Chelmsford.



This current advertisement for MCSL's Digital Tropo systems is currently appearing in a range of general communications journals.



# Marconi

The Marconi Company Limited  
The Grove, Warren Lane  
Stanmore, Middlesex HA7 4LY, England

