

The Marconi Company acquired a fund of data handling and transmission expertise in the 'fifties', when it was carrying out advanced research and development work in the automation of radar defence and air traffic control. As a result, it produced the world's first commercially available microelectronic computer, MYRIAD I.

MYRIAD I is a very high-speed, on-line, real-time machine which employs some of the most advanced microelectronic circuits in the world. It has a maximum storage capacity of 32,768 24-bit words and an input/output highway system allowing for the connexion of up to 4,000 peripheral devices. MYRIAD II is a modular version of this machine, enabling users

to order only those facilities necessary for specific applications and to extend them at any time. The wealth of software which has been generated for MYRIAD I also applies to MYRIAD II.

A machine of the capacity, speed and flexibility of MYRIAD obviously finds itself at the heart of a wide diversity of automation systems. It is the basis of the systems designed by Marconi's Automation Division; it is the heart of the automated message switching system (MARS), designed by the Company's Line Communications Division, which is already installed in Cyprus and is to be installed for NATO and in the Defence Communications Centre, London. It was used in the tracking systems of the military satellite



COMPUTER TEST MYRIAD I computers at the Division's test establishment at Widford on the outskirts of Chelmsford

communication earth stations, designed and manufactured for the British Government by Marconi's Space Communications Division. It is in the automated meteorological system, ordered by Sweden from Marconi's Radar Division, and in the Australian defence system 'Hubcap'.

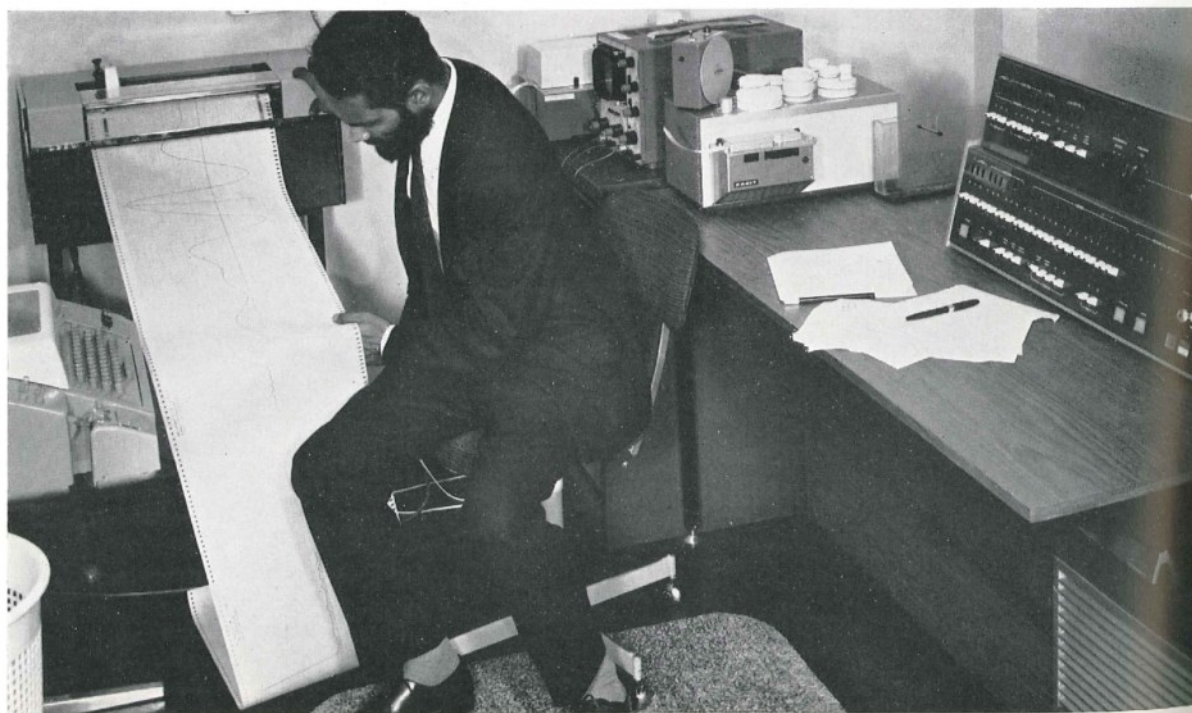
MYRIAD computers also play an important role in research laboratories, where speed of calculation and analysis are of paramount importance. They have been installed in Southampton University's Institute of Sound and Vibration Research, the Deutsche Forschungsanstalt für Luft-und-Raumfahrt, the Royal Radar Establishment and the Central Electricity Research Laboratory.

Computer Division is engaged in developing extensions of the MYRIAD range. Development work is continuously in progress to increase the variety and efficiency of the peripheral devices. Future activities will include investigation and development of even faster logic units, faster random access stores and new machine configurations.



MYRIAD II at Southampton University's Institute of Sound and Vibration, where it is programmed to perform sophisticated analyses

HEADQUARTERS of Computer Division in Chelmsford



Two factors led to the formation, three years ago, of Marconi's Automation Division.

One was the existence of the MYRIAD computer and a considerable software capability, which clearly had applications ranging beyond the automation of military defence and civil radar systems, and which could be of immeasurable benefit in other spheres.

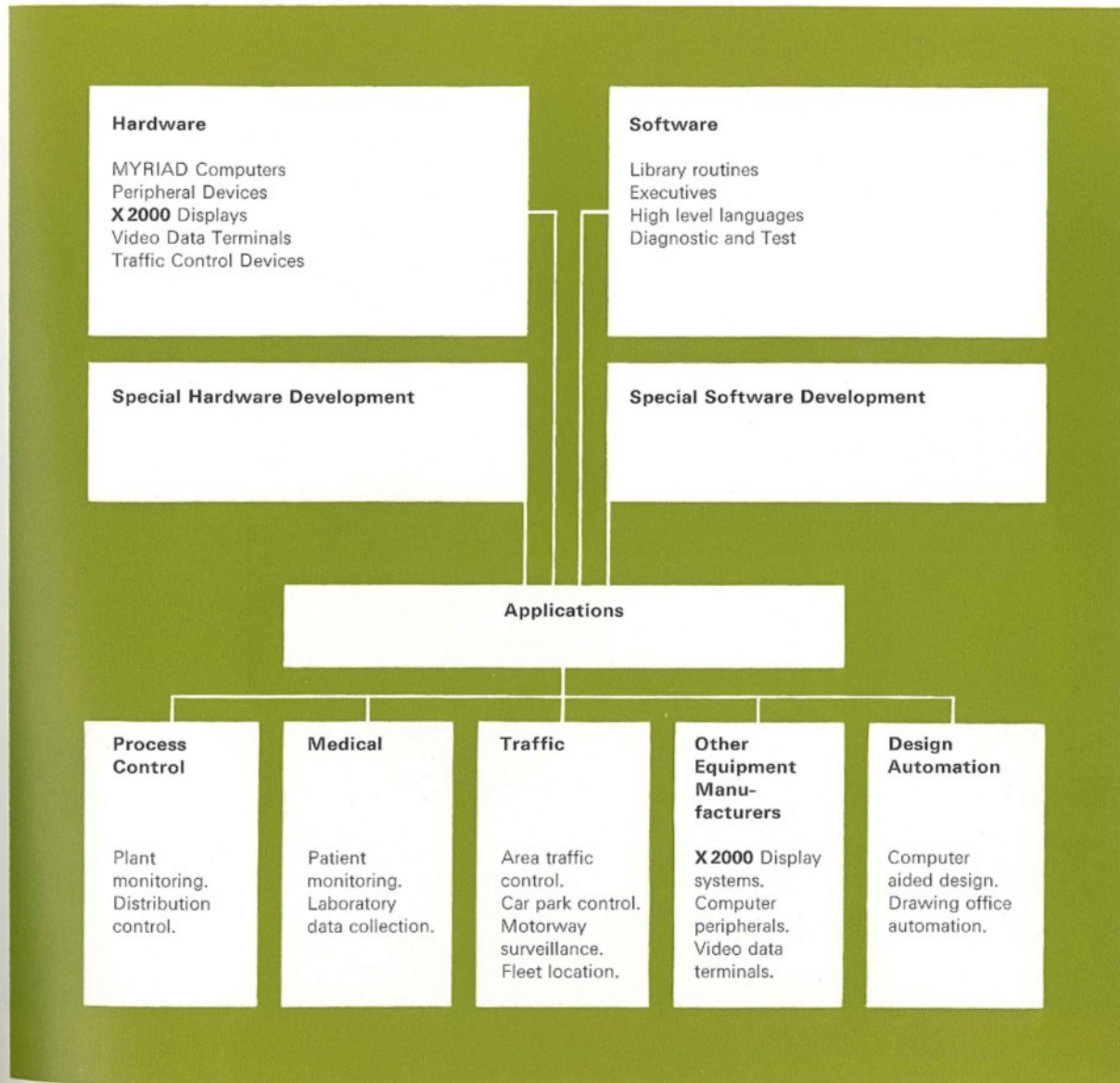
The other was the existence within Marconi of a nucleus of people not only having computer systems expertise but also a knowledge of the long-term and day-to-day problems facing the policy-makers and operators in a wide variety of areas—areas with which Marconi has been familiar for a great many

years and which include aviation, telecommunications, broadcasting, industry and commerce. It is therefore, in a strong position to assess where and how automation can promote efficiency.

The capabilities and activities of Automation Division are summarized in the diagram below.

MYRIADS I and II accept direct data which, after computing, they use as the basis for exercising direct, dynamic process control. Thus MYRIADS are real-time machines suitable for all those on-line applications with which Automation Division is concerned.

The X2000 display system is driven direct from a



computer and shows the high-speed data output in tabular or graphical form on a C.R.T screen. On the input side, it is designed to enable the operator to communicate with the computer either by means of light-pen, touch-wires, tracker ball or keyboard.

Regarding software, 50% of the Division's staff of 245 are employed in the Central Automation Systems Department, which is equipped with four MYRIAD computers. In addition to general purpose program development and the provision of programs for Automation Division's systems, the department is responsible for virtually all the Company's in-house, real-time programming work, and provides operational software for other Marconi Product Divisions

such as Radar, Line Communications etc., to satisfy special customer requirements.

Applications

The Division's first significant entry into the automation of process control was made in association with the English Electric Company and was mainly concerned with power generation and distribution and with industrial processes. The systems include MYRIAD II computers and X2000 displays for the Midland Electricity Board and the British Steel Corporation, X2000 displays for the Pembroke and Drax power stations, X2000s for the Hinckley Point Nuclear Power Station and computers and displays for the Wylfa Head Nuclear



AREA TRAFFIC CONTROL *The MYRIAD I computer in the control centre at Glasgow, where the Ministry of Transport's Road Research Laboratory is carrying out an experimental scheme*

Power Station, where the computers monitor 4,800 analogue variables and 2,400 contact closures.

An example of medical automation is the system installed by Marconi in one of the U.K hospitals, where a MYRIAD II computer and X2000 displays are used in a cardiac intensive care unit for the early detection of cardiac arrhythmia, and will also be used to evaluate new techniques in the maintenance of drug therapy records and to determine physiological patterns. Clinical staff will be able, via the displays, to input data for storage in the computer. Following the formation of GEC-Elliott Medical Equipment Limited, which Automation Division will supply with equipment, systems and programming support, all

enquiries for medical systems should be addressed to that Company at Grafton Road, Croydon, Surrey.

In Area Traffic Control, MYRIAD computers are being used in both Glasgow and West London, where X2000 displays are also employed. In these schemes the computer reads in data from detectors in the roads and forms a model of the traffic situation. From this model, optimum settings are derived for the signalling equipment at intersections in the area.

The Division has also designed systems for motorway surveillance, tunnel control, centralized car park control, etc. Fleet location systems have also been developed, allowing a central control room to monitor



CENTRAL AUTOMATION SYSTEMS DEPARTMENT with a staff of over 100 and four MYRIAD computers is responsible for virtually all the Company's in-house, real-time programming work



LONDON AIR TRAFFIC CONTROL CENTRE where 100 X2000 displays are to be installed

Crown Copyright

the position of vehicles. In Marconi integrated area traffic control schemes, all the above control routines may be effected using the same central computer. With the formation of GEC-Elliott Traffic Automation Limited, which incorporates GEC Road Signals, Marconi's Automation Division now provides the new Company with systems and programming effort, equipment and product support for road traffic schemes. All enquiries for applications in the field of Road Traffic, with the exception of Fleet Location, should be addressed to GEC-Elliott Traffic Automation Limited, East Lane, Wembley, Middlesex.

In Air Traffic Control, the vast flight plan processing system at the London Air Traffic Control Centre is based on three MYRIAD Is and peripherals and 100 X2000s, while the Air Traffic Control Evaluation Unit at Hurn Airport is using 36 X2000s.

Design Automation is one of the newest and most significant applications. In this the C.R.T display enables a designer to create complex drawings on the tube face by using a light-pen or tracker ball and a keyboard. The most significant thing about this

drawing medium is the ease with which shapes may be drawn and manipulated. This type of system has very many applications, for instance, microcircuit mask design, civil engineering, the design of structures, architectural design, etc. It is predicted that in a few years' time all major data processing installations will be equipped with C.R.T displays as an integral part of the computer system. They will allow much more efficient man-machine communication than has previously been possible. A system of this type is installed at the English Electric Mechanical Engineering Laboratory at Whetstone.

Automation Division also maintains a Graphics Bureau in which time can be bought on a MYRIAD graphics system, complete with C.R.T display, computer disc storage, plotter etc and including a comprehensive graphics software package. From the middle of 1969, several operator positions will be available, all able to operate independently although using the same computer. One of the Bureau's earliest users has been Marconi-Elliott Microelectronics Limited who are desinging a complete microcircuit mask on the screen in a matter of a few hours at very low cost.