

# Radars Systems International

**MARCONI**

No. 26

## SCATCC NOW OPERATIONAL

The Air Traffic Control Centre at Prestwick, the international airport on the west coast of Scotland, is now fully operational.

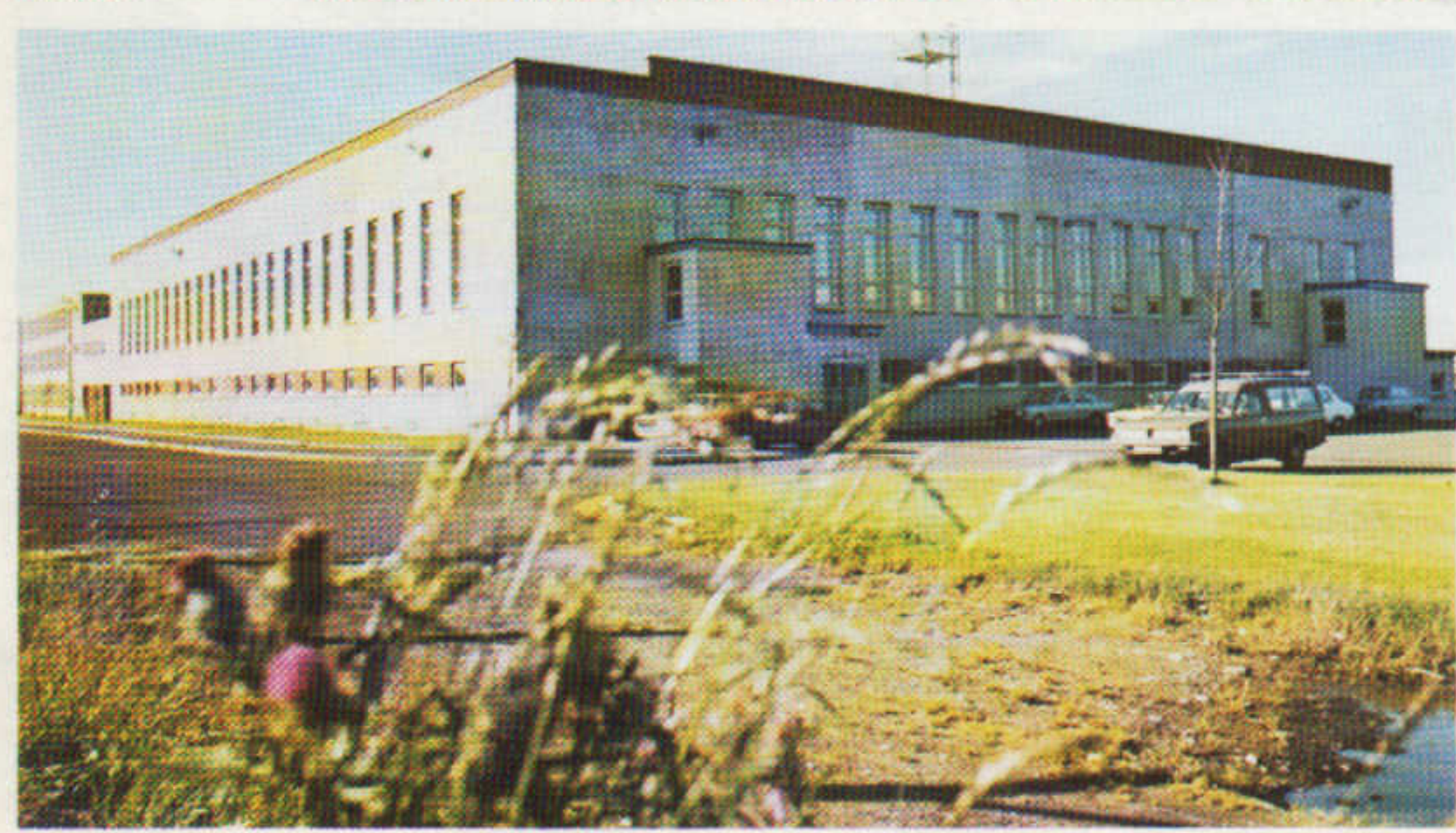
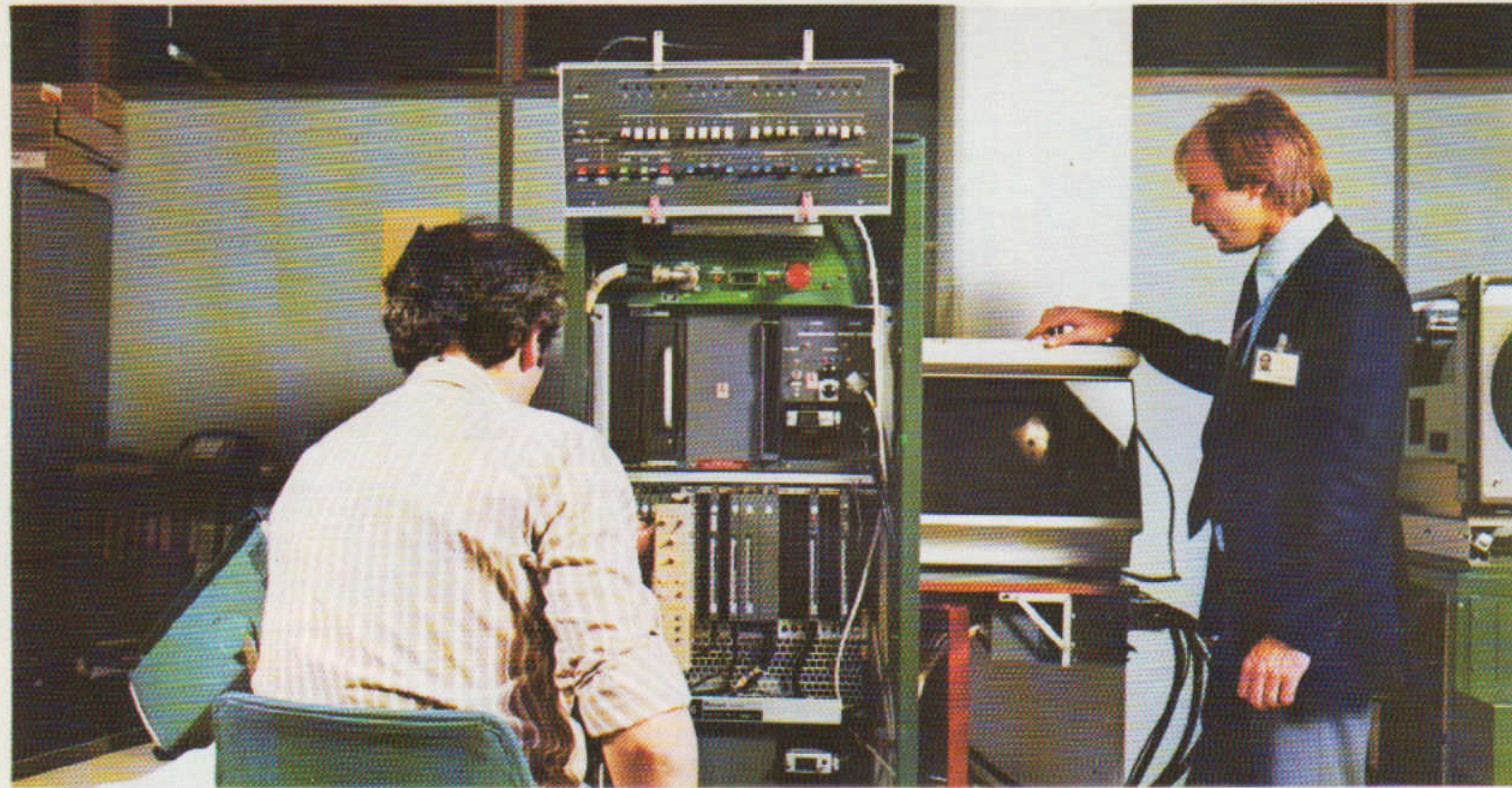
The new centre, which monitors all civil and military aircraft in the air-space of the Scottish Flight Information Region (FIR), uses a very advanced radar data processing and display system supplied by Marconi Radar Systems Limited.

Built for the Civil Aviation Authority at a cost of over £1½ million the new system is one of the first to use synthetic 'clutter free' radar presentation exclusively. It is also believed to be the largest system of its kind in the world to use the distributed data processing technique.

Using a total of thirty-three Marconi Locus 16 processors, the new system provides an automated radar presentation, simplifying and making more effective the control of aircraft in the Scottish terminal areas (including those around the rapidly expanding airports at Aberdeen, Edinburgh and Glasgow) and the upper, middle and lower airspace in the Scottish FIR area, which covers Northern England, the Atlantic Approaches and the North Sea as well as the Scottish mainland.

The centre is linked via standard telephone cables to radar sites located in Scotland, Northern England and Northern Ireland. At these sites, most of which use Marconi equipment, primary and secondary radar is used to establish aircraft position, height and identity. This 'raw' radar information is analysed by plot extractor equipment to provide plots in digital form for all detected aircraft.

*A Locus 16 Test Station*



*Atlantic House, Prestwick, the Headquarters of Scottish Air Traffic Control*

This is then fed to Prestwick, where four Locus 16 data processors evaluate it and route it via a narrowband data highway to twenty-nine of the Locus 16 display suites.

Each display suite holds its own operational and diagnostic programs and drives a sixteen-inch display. The high brightness level of the displays enables the operators to work in daylight conditions.

Each individual controller has access to all the radar information that is available at the centre. By giving each operational position access to all the relevant data, flexibility of working is improved so that, during periods of light loading, controller's activities may be condensed.

Many earlier ATC systems have been built around large centralized computing complexes in which a single hardware failure may result in a complete system failure. By contrast, the system at Prestwick is based on the concept of distributed data processing. All of the Locus 16 processors operate completely independently of each other, and any failure in one will not affect the operation of the others. Additionally, any of the two configurations of processor can do the work of any of the others of its kind. The reliability of the system is thus unparalleled.

Mr. John Sutherland, managing director of Marconi Radar Systems Limited, says: "The system at Prestwick represents a great step forward in the use of radar and data processing in the control of air traffic and so plays a major part in improving the safety of air transport".

The most significant feature of this



*The Operations Room of SCATCC*

system is its use of radar data from which all the unwanted clutter and extraneous information has been removed before presentation to the controller. This allows the controller to obtain a concise and completely unambiguous picture of what is happening to all the aircraft in his sector at any particular time. By the

ware development and finally one mobile unit.

Data is passed from the radar processors to the display processors on a narrow band serial link, the head data highway. The four radar processors are identical, as are each of the twenty-nine display processors, and all have their own local magnetic disc storage unit on which a full set of operational and diagnostic programs is held. Initially, any three of the four Locus 16 radar processors will handle incoming data from five sites, although the design allows a further processor to be added at a later date without modification of the system. In the interests of improved reliability, each link is duplicated and a radar processor can at all times select the better link. In operation, each of the Locus 16 radar processors handles data from two sites. If a radar processor should fail, the unprocessed information may still be selected and used by the display processors.

Each of the Locus 16 display processors can select data from any

radar head. Identical equipment is provided for the operational training and the system control positions.

### **Radars processing**

These independent Locus 16 processors each with 40,000 words of direct access storage, including 1,000 words of read-only memory and 250,000 words of disc storage, handle the incoming data and distribute it to the display positions. A fourth radar processor acts as an instant standby for any of the three in use.

The radar processors are connected, via independent local data links, to video data terminals (v.d.t.) to provide up-to-date code to call sign conversion and system control facilities. Each processor can be connected to one system control v.d.t. or one code call sign v.d.t. If the need should arise, any radar processor can perform the tasks of any other. The radar processors communicate with each other thus ensuring a stable and complete database with the radar processing sub-system.

use of the Locus 16, it has been possible to design a system in which the controller is freed from any manual tasks and is therefore able to concentrate all his efforts and attention, without distraction, on the true function of controlling all flights under his jurisdiction.

### **The system**

Four of the thirty-two Locus 16 processors at Prestwick act as radar processors and handle the incoming data from the radar sites. These four then serve twenty-nine Locus 16 processors driving data displays: twenty-five for the operational positions, (including four for training or standby purposes) one is used for the system control, one to provide maintenance facilities, one is to enable future system soft-



*Locus 16 Display Positions*

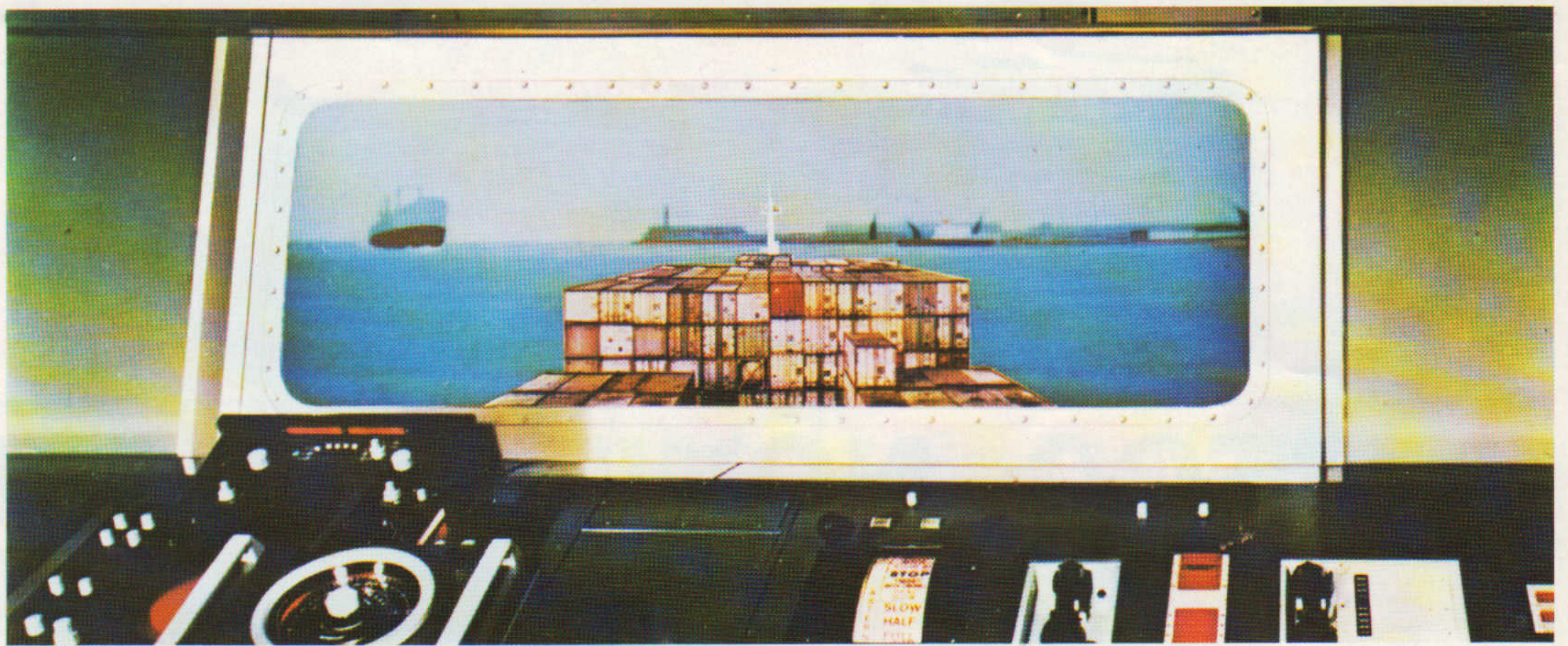


# A £1M Shiphandling Simulator

The Marconi Radar computer generated scenario of TEPIGEN used in conjunction with the Decca Ship's bridge and drive equipment provides a unique shiphandling training facility. This combination is supplying the Department of Industry with a million pound (£1M) simulator for use in advanced shiphandling training. It can also provide 'hands on' experience in those aspects of modern seamanship that deal with the movement and control of larger and faster ships in congested or otherwise dangerous waters. All types of visibility, fog, sleet, snow and day or night conditions can be realistically simulated.

The simulator will be used to subject shiphandlers to stress in emergency situations, which can be deliberately introduced. This will enable them to gain confidence and test their reactions without any damage being done, except perhaps to their pride.

As well as being employed as a training simulator, it is proposed that it should be used for research into psychological stress and other medical aspects in shiphandling.



A realistic ship's bridge view of the simulator

## Versatile Simulator for RAF Buchan

Air defence radar operators of the Royal Air Force at Buchan in Aberdeenshire will soon be carrying out training exercises on a sophisticated radar simulator from Marconi Radar. Valued at approximately £300,000, the simulator will enable the advanced training of operators to proceed in a realistic tactical environment without interfering with the normal operation of the radar station at Buchan. The simulator will be installed in an easily transportable cabin which will permit possible redeployment in the future. It is planned to complete the entire job early in 1980 in a shortened delivery timescale of only six months. The simulator will provide a computer generated model of air space activity in the defence zone. Realistic signals representing primary and secondary video are presented to the operators. Any type of aircraft with its own characteristic performance and other typical aspects may be simulated. Being fully integrated with the operational display and data handling system the simulator offers the choice of working entirely in the simulation mode or of overlaying simulated

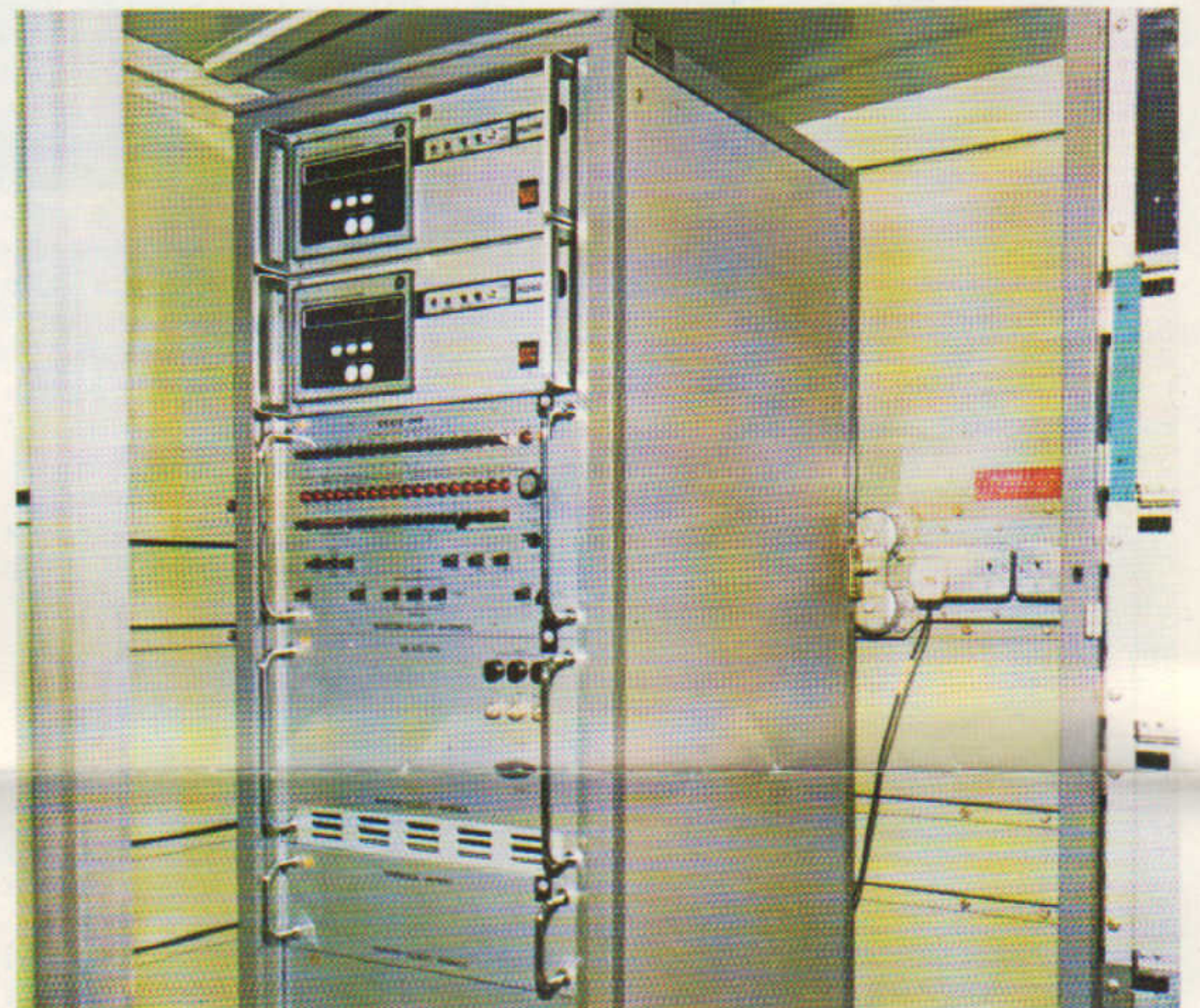
tracks on a 'live' radar picture. Many aspects of training from individual to system exercises can be called upon as required.

This is the fourth order from the Royal Air Force received by Marconi

Radar for a radar simulator of this type. Similar systems are also in use with Air Forces in Africa, the Middle and Far East and another is shortly to enter service with the Royal Australian Air Force.



Simulator cabin showing aircraft control units and peripheral equipment cabinet



The digital processor cabinet

### Employment Minister Visits Baddow Research Establishment

The Minister of State at the Department of Employment, Lord Gowrie, paid a visit to the large Marconi Research Laboratories at Great Baddow near Chelmsford, Essex recently.

In the forefront of high technology and innovation, GEC-Marconi Electronics Limited is deeply involved in research into the application of microprocessor techniques. This

aspect of Marconi activities was of particular interest to Lord Gowrie seen here with David Brazier, Chief of Computer Aided Engineering.

A few days later Lord Gowrie opened a conference on Micro-processors at Colchester at which John Sutherland, Marconi Radar's managing director, was the principal industrial speaker.



Marconi 'Computervision' is demonstrated to Lord Gowrie

### Helicat Chooses Marconi Radar

Marconi radars have been specified for a radically new concept in coastal defence craft. This new project, the design of a British company, Helicat, based in Jersey in the Channel Islands, is a twin-hulled vessel capable of operations in coastal waters. The Helicat HC40D is a 260 tonne vessel over 46 metres long, suitable for the surveillance of coastal regions and many other roles. The g.r.p. construction and design of this twin-

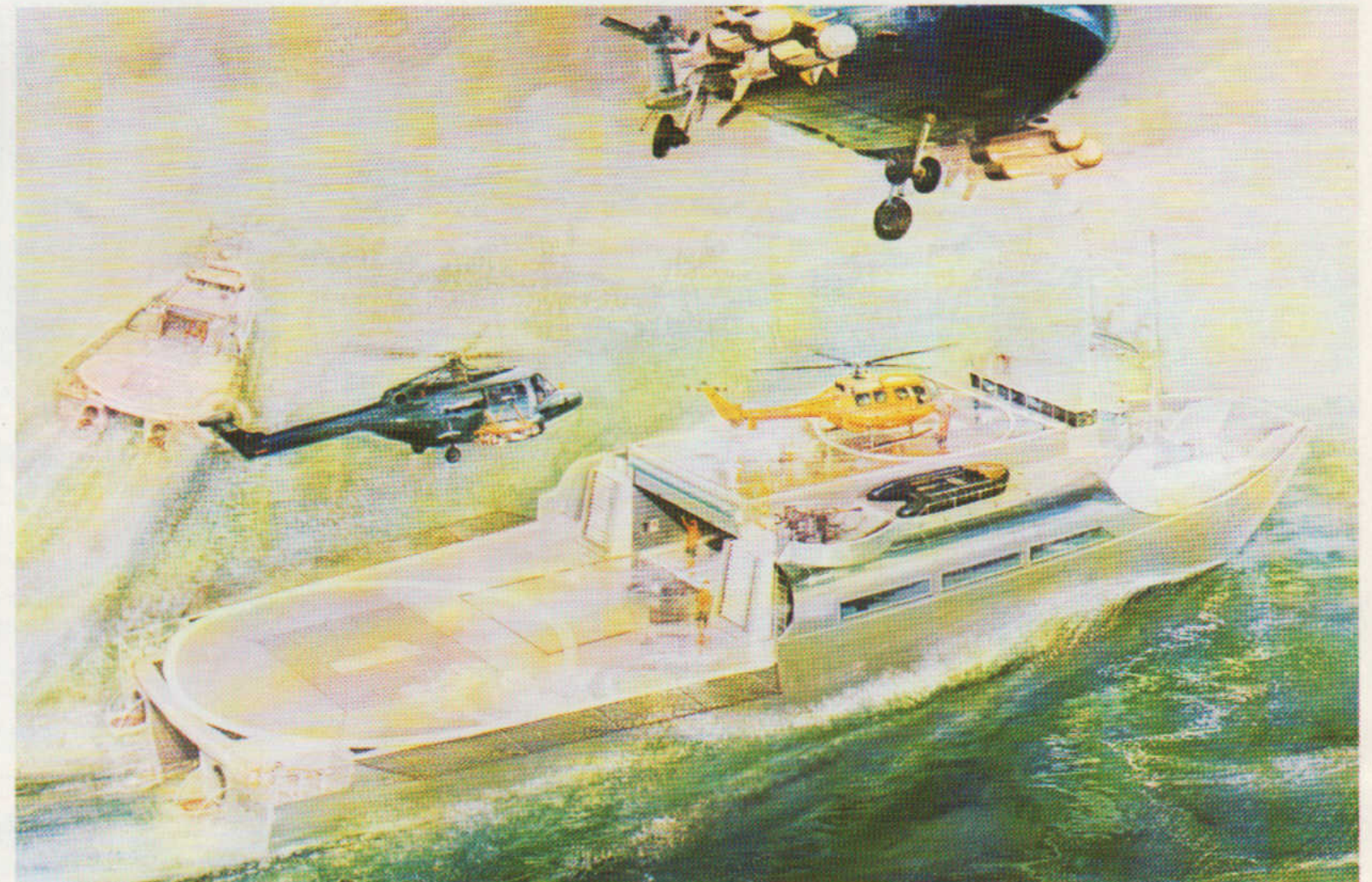
screw craft results in a vessel which is very stable yet is able to move at high speed.

The great advantage of this craft is that it can carry two helicopters or even act as the home base for a Harrier jump jet.

Ample room in comfortable conditions are provided for up to 26 personnel. The Helicat is propelled by two Rolls Royce engines of 5,000 brake horse power which gives the

vessel a maximum speed of more than 30 knots. For the normal cruise speed, of about 11 knots, two Rolls Royce C8M-410 diesel units of 315 bhp will be used.

The installation of the main surveillance radar, an S810 lightweight X band radar from the well-proven series and the display system equipment, is to be undertaken by Marconi Radar.



The Helicat shown operating helicopters



# SAXA VORD COMPLETED ON TIME

Despite appalling weather conditions during much of the thirty-six month installation time, the new early warning radar system at RAF Saxa Vord in the Shetlands was completed on schedule on 31st May, 1979.

The £10M radar station was funded by NATO and built under a Ministry of Defence contract within the three years allotted to this turnkey project.

The installation task was managed by Marconi Radar Systems in collaboration with Plessey Radar Limited and the civil engineering contractor Cementation Construction Limited, the consulting engineers were Messrs Bullen and Partners.

A Marconi S649 search radar and a Plessey HF200 heightfinder with all the associated electrical and civil engineering on site was also included in the contract.

position data within an airspace bounded by the radar horizon and to a ceiling in excess of 35,500 metres (100,000 ft). The Type S649 is a modern radar derived from those radars which were part of the original NATO early warning system.

The transmitters used are S-band and L-band radiating through a highly efficient off-set linear feed system. The back-to-back antenna system, in conjunction with extensive digital signal processing, result in outstanding performance under the adverse conditions of weather, ground clutter and electronic jamming.

Both reflectors are single curvature type and the S-band antenna is energized by a linear squintless feed.

The S-band system provides long range low cover for early warning and the L-band system provides the



RAF Saxa Vord (photo by courtesy of RAF News)

signal processor utilizes digital techniques and provides triple cancellation moving target indication and pulse recurrence frequency discrimination.

An IFF antenna is mounted above each of the primary radar reflectors, with a switched interrogator/responder.

The majority of the electronics circuitry is solid-state, the extensive use of micro-miniature digital techniques results in an improvement in reliability of performance and easier repair and maintenance.



Snowed up last winter



Main entrance to the site office March 1979

The entire radar installation, within the last few months, has been subjected to the most stringent reliability, maintainability and flight trials, which were completed successfully and the station is now fully operational.

The new radars replaced a twenty-year-old Type 80 search radar and an even older Type 13 heightfinder radar.

## The surveillance radar

The new Marconi Radar Type S649 is a high power, static air defence surveillance radar which provides plan

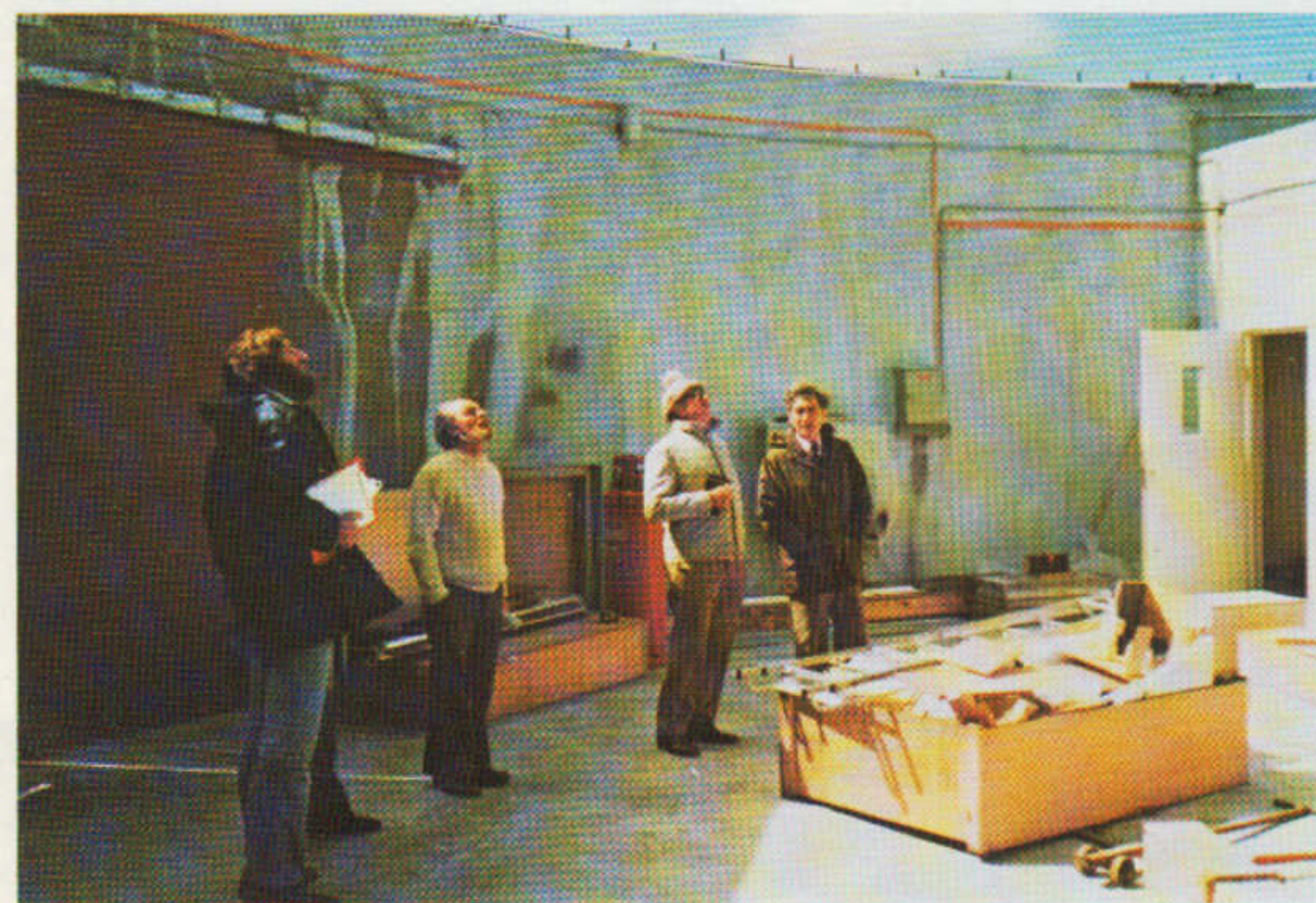
high angle cover necessary at shorter range. The L-band transmitter/receiver comprises the Type S2011 while at the S-band the Type S2012 is used. Each type of transmitter/receiver has ECCM equipment fitted for use when 'jamming' conditions are encountered.

A video combining unit Type S7102 controls the operation of the transmitters and combines the video outputs of the receivers prior to further processing.

A signal processor is connected to the L-band transmitter/receiver. This



Preparing for an equipment load test



Checking the gantry alignment



The Directors of the new company after the signing ceremony

## UKADGE SYSTEMS LIMITED IS FORMED

In order to submit proposals to the United Kingdom's Ministry of Defence, for the modernization of the country's air defence system, a new UK company has been formed.

This company is known as UKADGE SYSTEMS LIMITED, the word UKADGE being the acronym for United Kingdom Air Defence Ground Environment. The new company is made up by Marconi Radar Systems, Plessey Radar and the Hughes Aircraft Company of the United States. The company hopes to meet the requirements of the MoD and NATO for the improvement of the British defence system structure. The projected improvements call for the incorporation of modern display and automatic data processing equipment together with a comprehensive communications network. Much of the cost will be met by NATO funding. Hughes Aircraft Company and Marconi were members of the con-

sortium of NATO companies called NADGECO which previously produced the NATO air defence ground environment system. This network stretches from the north of Norway to eastern Turkey and it continues to be an important part of NATO's air defence system. Both the Marconi Company and the Hughes Aircraft Company have also been involved with similar schemes in many countries throughout the world. The member companies of NADGECO are still collaborating for future marketing under the EUTRONIC name.

The new UKADGE SYSTEMS company will be jointly owned by Hughes, Marconi and Plessey. It is expected that the Ministry of Defence will announce the award of the UKADGE contract early in 1980.

Pictured above, seated, after the signing ceremony are (left to right) Clare G Carlson, Vice President and Group Executive, of Ground Systems

Group, Hughes Aircraft Company; Peter Bates, Deputy Chairman, Plessey Electronic Systems Limited and John Sutherland, Managing Director of Marconi Radar Systems Limited.

## John Sutherland is elected EEA President

Marconi Radar Systems' managing director John Sutherland is the newly elected president of the Electronic Engineering Association, and Chairman of the Council for the year 1979 to 1980. He succeeds D. W. Morrell of Royal Electronics. Mr. Sutherland's other official appointments are membership of the Radio, Radar and Navigational Aids Sector Working Party of NEDO and the Economic Development Committee for the Electronic Industry.



# Marconi Radar Fills Urgent Need at Sumburgh

To cope with the rapidly increasing air traffic serving the offshore oil industry in the Shetlands area a new Marconi radar has been installed.

The S1061 radar was rapidly installed at Sumburgh Head, the most southerly point of the Shetland Islands. Delivery had to be within the very short timescale of only 24 weeks, one of the shortest on record. The Civil Aviation Authority called for the commissioning of the system in July 1979 in readiness for the increased summer air traffic in the area.

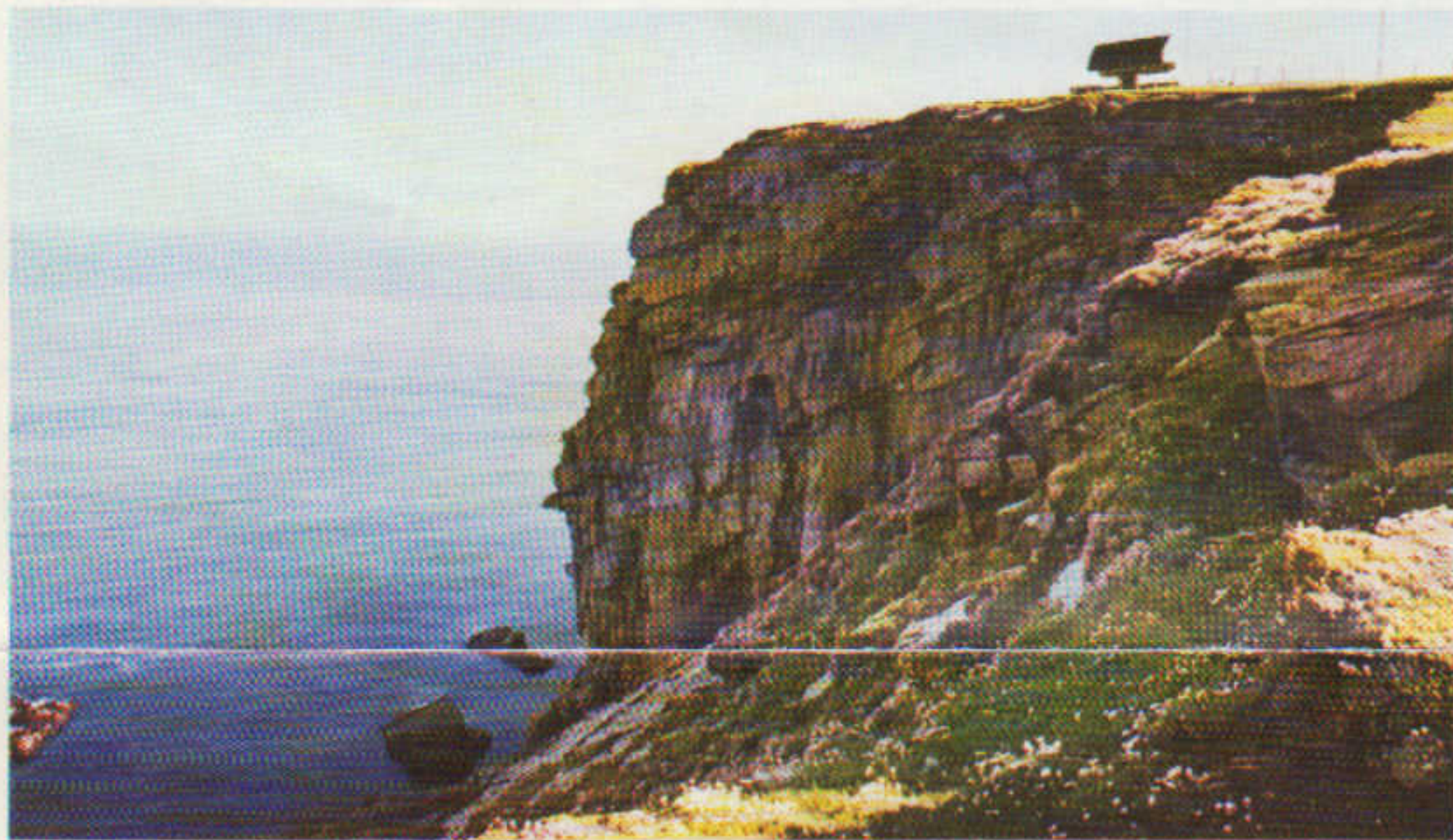
Fortunately Marconi Radar was well able to comply with the CAA's compressed timescale by the use of modules from their range of S600 transportable radars.

The S1061 L-band (23cm) antenna was chosen to operate with an S2011 transmitter/receiver. The S1061 is a semi-trailer for road transport. This combination, with the easily transportable S2011 transmitter/receiver, was selected for its good long range performance against small radar targets such as helicopters and light aircraft. The associated S7100 Digital Signal Processor is a well-proven equipment, and with its excellent MTI system is deservedly popular with users in many countries. This radar using circular polarization, will ensure a clear display with low clutter, even in the unfavourable weather conditions frequently encountered in the Shetlands. The mobility of this type of radar installation means that it can easily be redeployed.

This installation by Marconi Radar included air conditioning equipment and an antenna control rack.



The antenna and S2011 transmitter/receiver undergo on-site tests



The S1061 antenna on the skyline at Sumburgh.

## Expansion at Marconi Radar Establishments

Over 6,000 people work in the three main establishments of Marconi Radar at Chelmsford, Leicester and Gateshead. As the company expands there are an increasing number of employees, and various building extensions at these establishments have been made recently. New premises have been taken over at Hebburn as part of the Gateshead operation of Marconi Radar.

A satellite drawing office at Marconi Radar, Leicester is now in operation at Clayton-le-Moors near Accrington in Lancashire. This new department is capable of providing all the detailed drawings for a large part of any system.

At Watford too, there has been an expansion of activities. As well as the handbook technical illustration section a training school for draughtsmen and draughtswomen is now firmly established there.

At New Parks, Leicester, new premises were completed in September to house the model shop. The two storey building has 18,000 square feet of space and is also occupied by part of the print room for the drawing office. A new establishment in Plymouth has just opened to cope with the company's increasing order book. The work here will initially be development in radar i.f. receivers and radar transmitter power supplies. Digital signal processing systems of an advanced nature are to be designed and developed at Plymouth. Technical documentation will also be undertaken at this new Marconi Radar site.

A further expansion in Norwich will bring more of Marconi Radar's work to that city. The company only started up in Norwich about five years ago and now employ well over

100 people there. Most of them are engaged in technical handbook writing, software compilation and computer programming. The new facility at Norwich has been set up in Thorpe Road to test electronic circuit boards from other Marconi establishments.

As the managing director of MRSL, John Sutherland, said recently "At a time when so many firms are in difficulties, in so many industries, it is encouraging to know that Marconi Radar employs more people than ever and has a strong and growing order book". Mr. Sutherland went on to say "our strength lies in our people, in our investment, in a development of new products, training and new plant".



A Digilux keyboard with 8 x 4 touch positions

## Digilux Finds New Applications

Digilux touch masks are a practical alternative to joysticks, rolling ball and light pen interfaces with electronic displays. Digilux is frequently finding new applications. For example in the guidance of an operator in making steel, or in the control of a large plastics plant, in the booking offices of Travel Agents or transport systems or in Computer Aided Design systems.

Yet another application that has been mooted is in sorting, anything from diamonds to potatoes. Without the need to touch the items this can be done in complete safety using a remote TV monitor and Digilux touch mask.

Recent applications for Digilux would seem to be more in the realm of simplifying complex decisions in a positive safe and rapid way. In this particular area, Digilux touch panels and displays are being used in a Ministry of Defence study of man/machine interaction in the cockpit of advanced military aircraft.

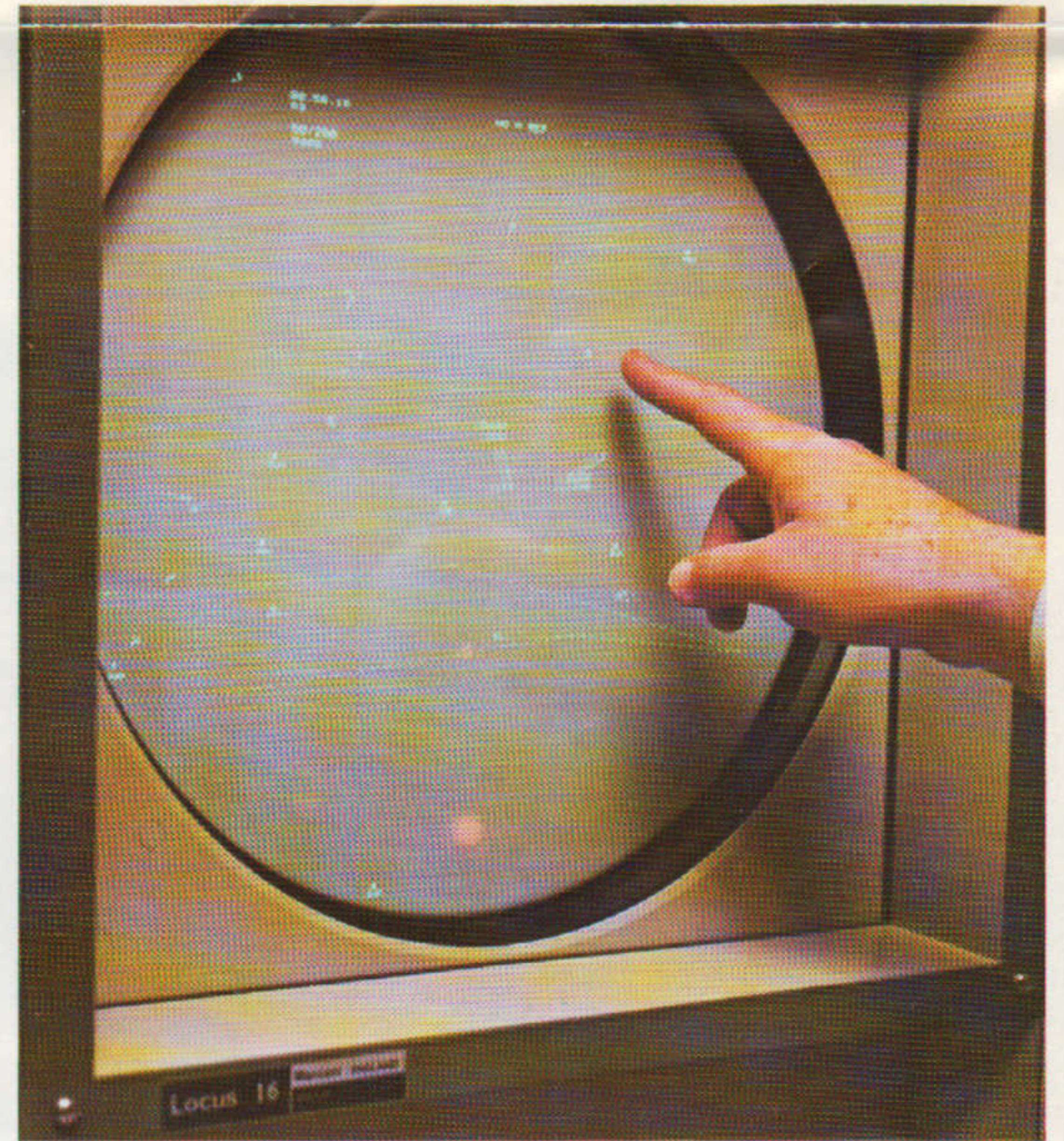
Supplied to the Royal Aircraft Establishment at Farnborough and to the British Aerospace establishment at Warton, near Preston, Lancashire, these Digilux units will be evaluated carefully as a method of centralizing many of an aircraft's controls.

Although Digilux has many applications in air traffic control this is thought to be the first attempt to control certain aircraft systems by such means. With computers manipulating many control functions in fast low level strike aircraft, the interface of man/machine becomes of increasing importance, and indeed crucial

when split-second decisions are required of the pilot. Any simplification of his selection task will help to ease the stress on the pilot in such a situation.

The Digilux touch sensitive panel, when used with an appropriate display provides a responsive man/machine interface. Information displayed on

any TV monitor, VDU, PPI or Plasma Panel, over which a Digilux panel has been fitted, instantly becomes the labels of a programmable keyboard. A touch at the appropriate position will activate an operating sequence causing the data to be updated and providing a positive tellback of the operation.



The Moving Finger Writes . . . The finger is not merely pointing, it is actually switching information on this 21 inch display fitted with Digilux

### New Number For New Parks

The New Parks, Leicester, Marconi Radar establishment will be changing its telephone number on the fourth of February 1980 to Leicester (0533) 871481. The present number is (0533) 871331. The Telex code 34551 GEC NPL G remains unchanged.

## Radar Systems International

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