

## The airborne threat to the warship of today

Of the various threats faced by the warship of today, the deadliest, without a doubt, is the anti-ship missile. Suitable for launching from platforms such as surface ships, submarines, aircraft and shore installations, the missiles often approach at speeds in excess of Mach 2. With very small radar echoing areas, adopting attack profiles that range from high-diving to sea skimming and often launched from over-the-horizon platforms, the missiles pose very real, lethal and often unexpected threats. To oppose them, a warship must be fitted with sophisticated weapon control systems, capable of operating with exceptionally short reaction times. A warship without such means of defence is in very grave danger indeed.

To oppose missile attacks, modern designers have produced various counters. All require sophisticated and comprehensive sensor systems, all tend to be expensive — but not so expensive as the replacement of a modern warship and her trained ship's company.

Anti-missile-missile systems, using small missiles such as Seawolf, must be controlled by multi-frequency tracking radars or electro-optical fire control systems in order to overcome the clutter and refraction problems posed by sea skimming missiles in bad weather. They acquire their targets by means of surveillance and target indicating radars and generally expect to counter the threat at a comparatively long range. These systems often also have an offensive capability against surface targets

including small high speed patrol craft.

At close range, rapid firing gun systems rely on saturation of the missile target by literally hundreds of rounds of small calibre ammunition, or by larger rounds with a significant air-burst capability. Automatically operated by advanced fire control equipment, the systems accept target data from the ship's main surveillance and target indicating radar and incorporate dedicated radar or electro-optical tracking systems. Such weapon systems are necessarily large, expensive and use large quantities of ammunition, carried in magazines convenient to the guns. Total engagement time must often be the limiting factor in small ships.

Other defensive measures rely upon the confusion of the missile's guidance systems by electronic counter measure techniques, decoys, jammers and chaff. Most modern missiles and their control systems are to some extent resistive to some types of electronic counter measures and the use of chaff must of course be selective.

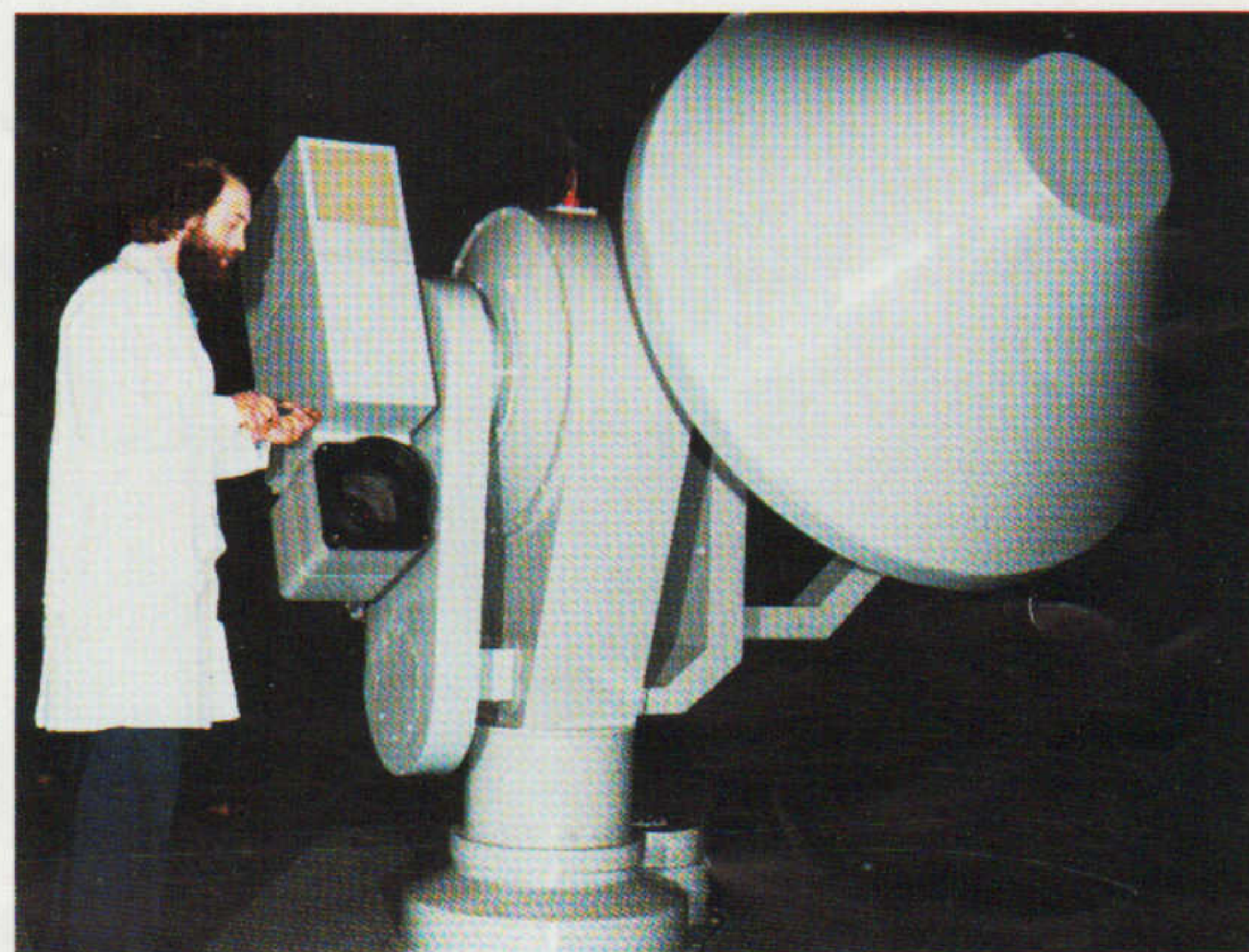
Obviously the best defence against anti-ship missiles, of all varieties, is a combination of methods. Anti-missile-missiles for early engagement supported by gun systems at closer ranges, together with the use of chaff, decoys and electronic counter measures. Smaller ships cannot accommodate completely comprehensive defensive systems, bearing in mind that the offensive capability is the first requirement of a warship and other essentials such as modern multi-

frequency communication systems must also be accommodated.

The Marconi answer to the airborne threat is the 805/Seawolf high performance lightweight and cost-effective naval weapon fire control system. Based upon proven elements of Marconi high technology radars, the system provides defence against attacks by high speed missiles, with strike profiles varying from high diving to sea skimming. The system is capable of controlling fast and medium calibre guns as well as Seawolf missiles and is one of a comprehensive series of lightweight fire control radars. A dual frequency differential tracker, 805 SW is designed specifically to match the performance envelope of the Seawolf missile. The tracker is fully automatic and autonomous, providing the fast reaction time necessary to combat small, fast targets.

To ensure superior performance against low level targets, 805 SW includes a millimetric radar, based upon the fully proven DN181/Rapier missile control radar. Extremely successful trials have taken place, using DN181 to control Seawolf against low level targets over the sea.

805 SW provides excellent clutter rejection in both frequency bands, enabling the ship to be protected in both open and enclosed waters. Frequency agility and other facilities enable operation in hostile electronic environments. Among other 805 lightweight variants is 805 SD, a system to control the Sea Dart area air defence missile.



Marconi Radar 805 SD director.



HMS Sheffield.

## Dual radar GWS25 — Seawolf trials



Seawolf missile.

A series of exacting trials, sponsored by the Royal Navy, has enabled Marconi Radar Systems Limited to demonstrate the effective use of millimetric radar to further improve the GWS25/Seawolf anti-missile missile system's performance against low-level targets.

The trials, carried out at one of the Royal Navy's firing ranges, included seven successful 'live' firings of Seawolf against both small and large targets close to the sea surface. They represent the most comprehensive set of trials on any dual tracking radar yet proposed as an alternative to the basic GWS25 system currently in service with the Navy.

Using a derivative of the DN181 Blindfire radar, on the same mount as the Seawolf Type 910 tracker radar, the trials showed that the tracking of such targets as sea-skimming anti-ship missiles flying a few feet above the surface is considerably enhanced, ensuring a very high probability of successful engage-

ment by the Seawolf missile. At present this type of low-angle tracking is carried out by a television system. However, the use of the DN181 millimetric radar gives an all-weather, round-the-clock capability.

DN181 was developed by Marconi Radar's sister company Marconi Space and Defence Systems Limited and is the radar tracker used with the successful Rapier missile system.

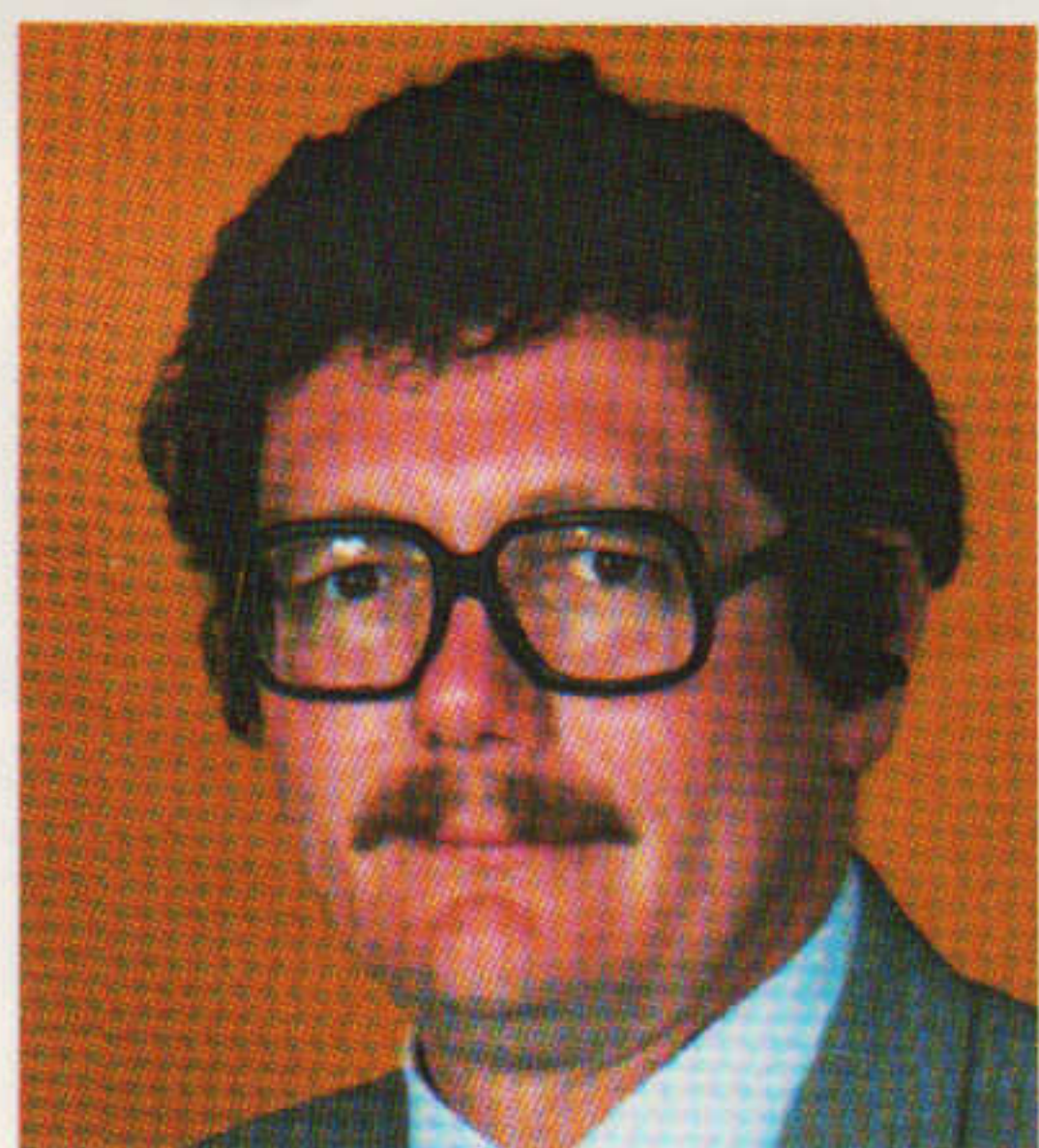
These trials are also directly applicable to Marconi Radar's recent proposal for a lighter system to meet the latest Naval Staff Requirement (NSR). Designated 805 Seawolf, the company's proposal combines an S800 Series radar tracker with a DN181 to give a highly cost-effective dual-radar performance considered to be better than any other known system of comparable weight.

Marconi Radar is the overall ship system contractor for GWS25/Seawolf; British Aerospace is responsible for the missile; and Vickers for the launcher.



805 SW director, including DN 181 millimetric radar.





David Griffiths, Manager,  
Defence Division, Overseas Navies.

# Defence Systems for Small Warships

by D. M. Griffiths,  
Manager, Defence Division,  
Overseas Navies

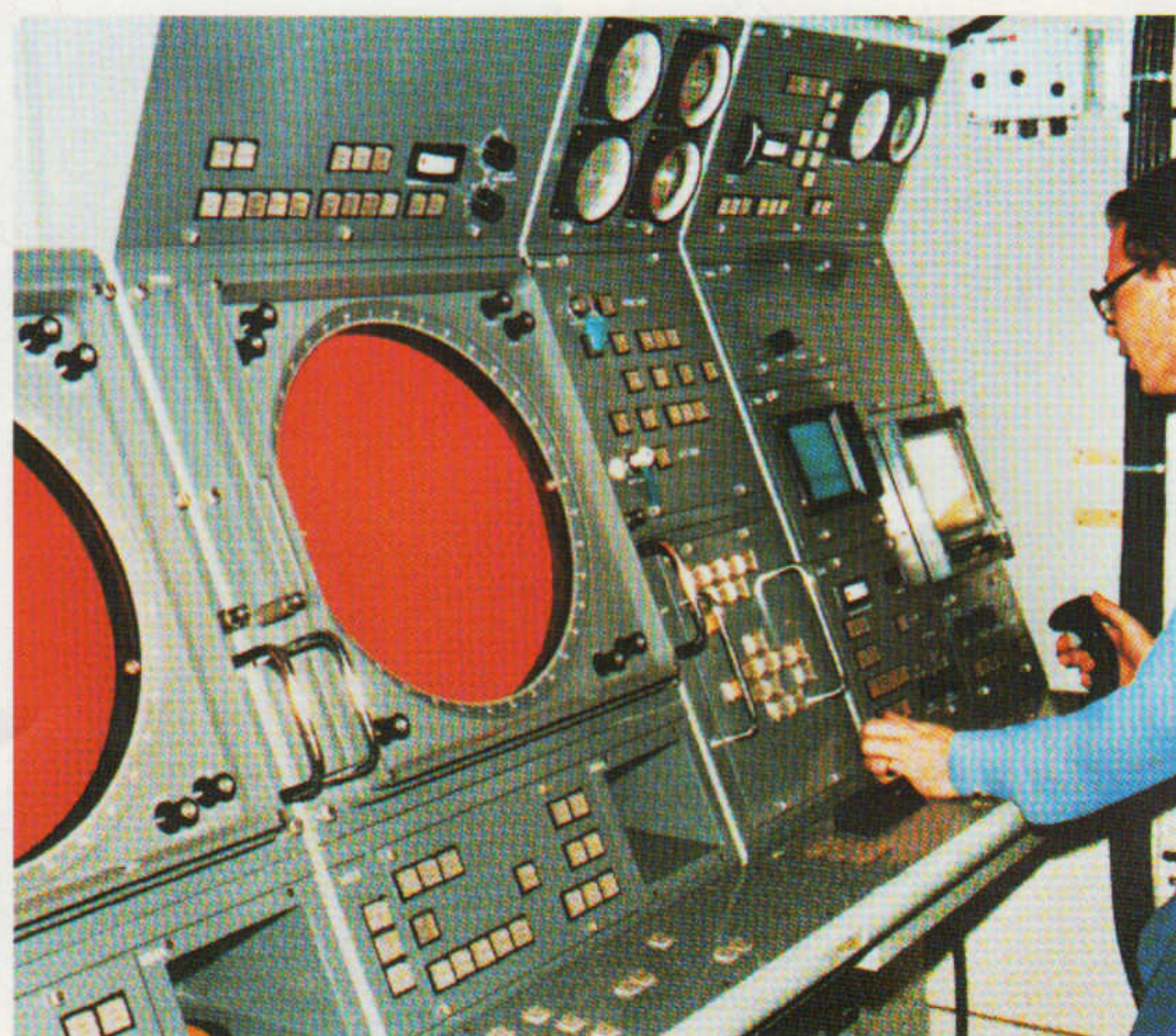
As the threats grow more sophisticated, the battle zone in which warships must carry out their missions grows increasingly hazardous; as the offensive capability of the small warship is increased by modern weaponry, so the determination and ability of an enemy to destroy it increases; only by giving the small warship a genuine self defence capability can its survival as a fighting unit be maintained.

The most dramatic and well known development in naval warfare over the last two decades has been the emergence of the small, fast warship, equipped with surface-to-surface missiles. This type of vessel, introduced dramatically by the sinking of the 'Eilat' off Port Said, delivers a punch many orders greater than that of its predecessor. The missiles, typically Sea Dart, Exocet, Otomat and Harpoon, can be very effectively fitted in strike craft as small as the 75 tonne, 25 metre vessels recently re-armed by Marconi Radar for a Middle East country.

The threat represented by these small warships has had an impact only equalled in history by the threat of the torpedo boats in the first world war. Just as the navies of those times took extreme defensive measures against the torpedo boats, so, nowadays, navies must take effective counter measures to protect their warships against the missile armed strike craft. One of the greatest strengths of Marconi Radar Systems Limited is in its understanding of the nature of such counter measures.

A small modern warship, expensively equipped with a significant offensive capability, is a very high priority target. Representing a poor target for torpedoes, it is too dangerous to approach sufficiently close to engage with gunfire. It is therefore most likely to be attacked by hostile aircraft and missiles — and if inadequately defended, most likely to be sunk by them. In the work which Marconi Radar has carried out for various navies, concentration has been placed upon the "anti-air-warfare" requirement; in other words, on the necessity to destroy attacking aircraft and missiles before they destroy you.

Defence in depth is axiomatic and in handling the air threat, Marconi Radar adopt the multiple defence philosophy, believing that all attacks must be met at as long a range as is possible — and then be dealt with in an organised and effective way by every suitable weapon on-board. To this end the Company developed not



Fast patrol boat Weapon Control Suite.

only sensors and weapon fire control channels, but also the data processing and display sub-systems necessary to make the most effective use of the weapons and channels of fire available, in fully integrated Command and Control Systems.

The obvious requirement is to destroy or disable the enemy; if possible before they can enter into an engagement. The first need is to identify them, by a combination of surveillance radars, IFF and ESM equipment. Marconi Radar not only have the necessary radars (the 800/1800 families of modular lightweight equipments) to meet this requirement in ships from 75 tonnes upwards, but also the data processing systems and expertise necessary to integrate and utilise sensor information with the high speed necessary in such an engagement. Such systems have been supplied and are fully proven in service. Against hostile aircraft, which may be launching missiles, or shadowing and providing an over-the-horizon missile guidance capability, the 805 Sea Dart system, manufactured in partnership between Marconi Radar, British Aerospace and Sperry Gyroscope, is the only true area defence GW system suitable for small warships. Using fully proven missile guidance components, this weapon system offers anti-missile, anti-aircraft

and anti-ship capabilities in a single system. If the hostile aircraft or missile penetrates the outer defences, two further weapons can be brought to bear; the point defence missile system and medium calibre and fast firing guns. The Marconi Radar 802 tracker used in the Marconi/Sperry Sapphire fire control system has demonstrated its ability to bring accurate fire to bear on air targets, using 30mm calibre or larger gun mountings. Experience has suggested that smaller calibres are ineffective against modern aircraft and missiles.

The new Marconi 805 series of lightweight missile control radars is also available for use in point defence systems such as 805 Seawolf. This system also incorporates the Marconi DN 181 radar used with Rapier, a system which has achieved world-wide sales to more than 15 countries. 805 SW offers an all-British lightweight fire control system, operational day and night, in all weather conditions and which can be fitted in ships of less than 1000 tonnes.

For the armament of large and small warships, in the threatening environments of the 1980' and 1990's, Marconi Radars Systems Limited can offer fully operational weapon control systems, designed to meet the requirements of navies, who, in the words of John Paul Jones "mean to go in harm's way".



Sir Philip Watson, Chairman,  
Marconi Radar Systems Limited.

The build up of a naval capability or the modernisation of existing forces is an expensive business for any nation to undertake and the wise Minister of Defence will require expert and detailed studies to be made to ensure that the resulting Fleet is operationally and cost effective. Thus identification of potential enemies and the threats they present must be carefully assessed, and the concept of operations necessary to counter the threats must be worked out.

Armed forces are instruments of government policy and threat analysis must therefore start from a political assessment, identifying potential enemies and their possible hostile aspirations. This will lead to a detached analysis of their potential for hostile action and an assessment of the threat imposed by their naval capability; that is, by the co-ordinated and controlled deployment of their surface ships, submarines and aircraft and their associated weapons and command, control and communication systems. This analysis will reveal a pattern of threats to the national interests, such as the protection of the Merchant Fleet and friendly merchantmen on the high seas and in territorial waters, the zone of economic interest, including defence of the important maritime assets such as offshore oil platforms and so on.

Studies must therefore be undertaken to work out the strategy and tactics required for defence against these enemy threats and to these must be added one's own plans to carry out operations necessary to counter-attack, to secure and retain the strategic and tactical initiative. The old axiom that attack is the best method of defence has many followers.

From these studies will be deduced the types and number of ships, submarines and aircraft necessary to enable the concept of operations to be implemented and the balance between the various elements established. Account will then have to be taken of logistic needs, repair facilities and other vital support considerations. The total naval requirements having been established, costs can be examined and it would be most unusual if economic consideration did not loom large throughout the development of the concept of operations and the resultant

# "Choose

by Vice Admiral  
KBE, MVO. C.F.

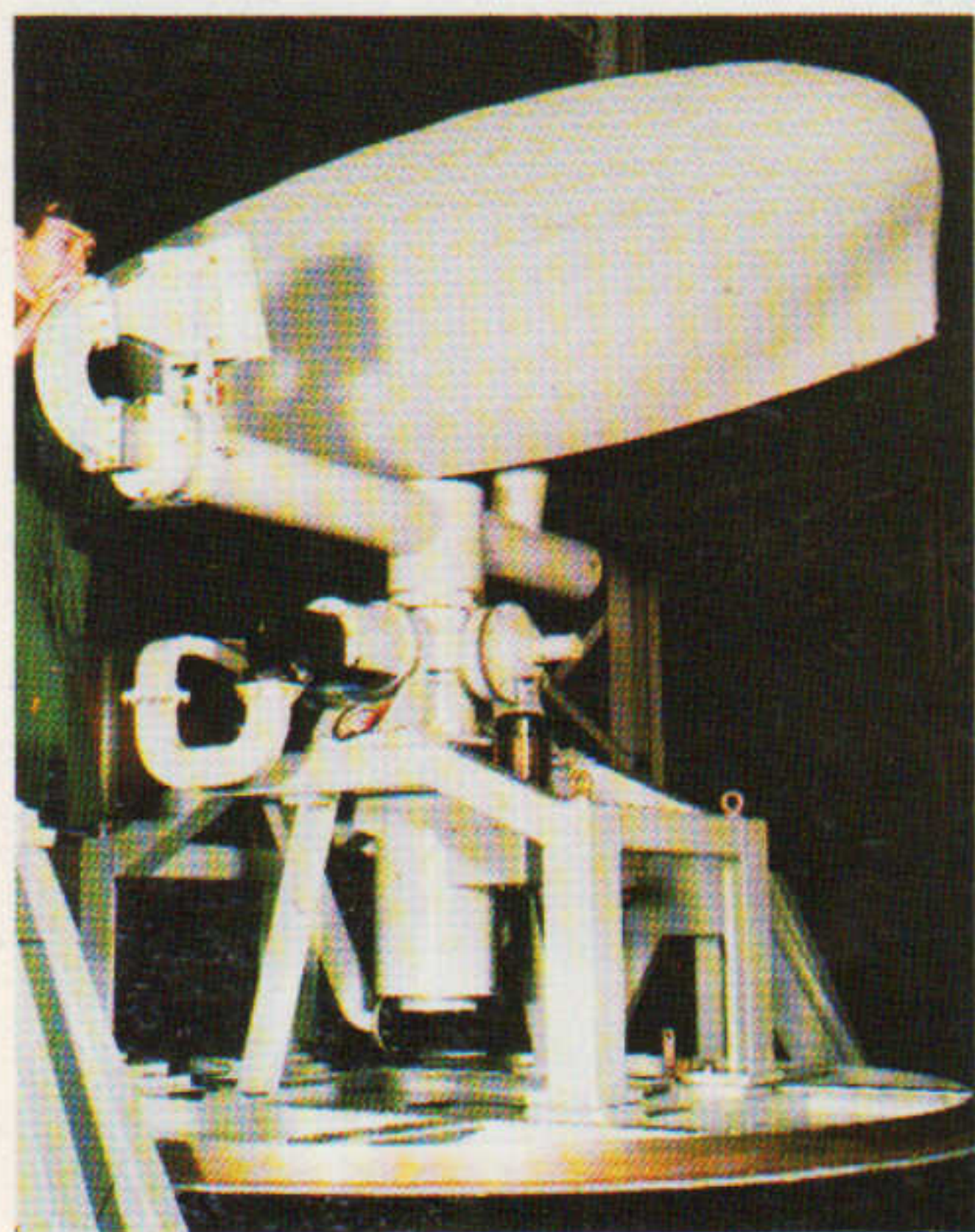


HMS Invincible.



costings. All these considerations generally produce a series of options costed not only in financial terms but also in terms of people and other resources and national policies. Only when all this is completed is it possible to see what ships and aircraft need to be procured and which weapon systems and other features which turn them into fighting units should be adopted. Great care must be taken at this stage to be sure that the threat has been accurately assessed. Assessments both of the threat and the concept of operations must be re-examined to test the validity of the later against the Fleet and resources that can be provided and the necessary adjustments made.

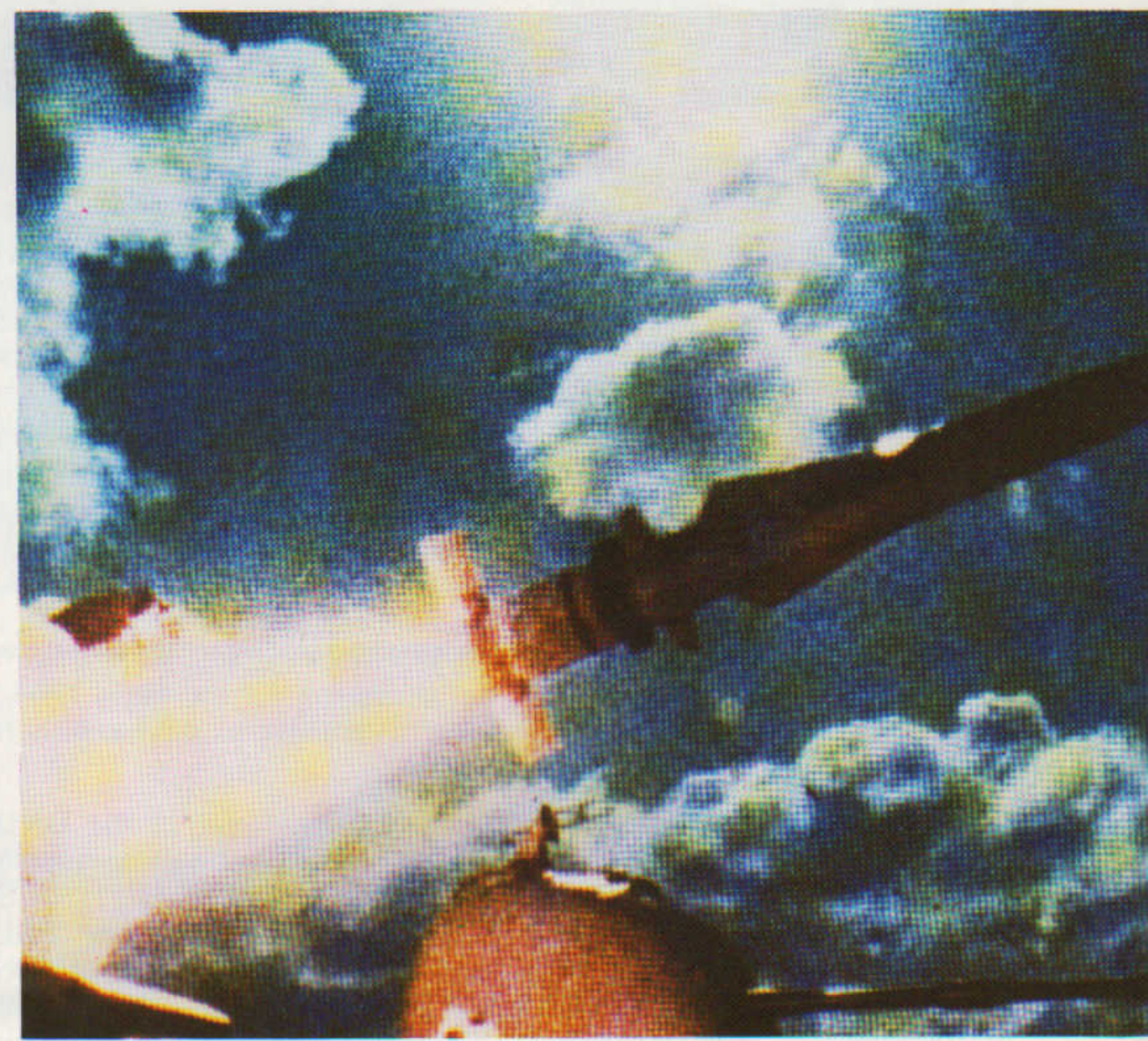
In considering the ships themselves, such matters as the environment, weather and sea conditions to be met, prevailing temperatures, distances to be covered,



Marconi Radar lightweight surveillance radar.



Fast patrol boat.



Sea Dart missile and 4.5 Mk VIII gun.



# your weapons"

al Sir Philip Watson,  
ng., FIEE, FIERE, CBIM.



HMS Birmingham.



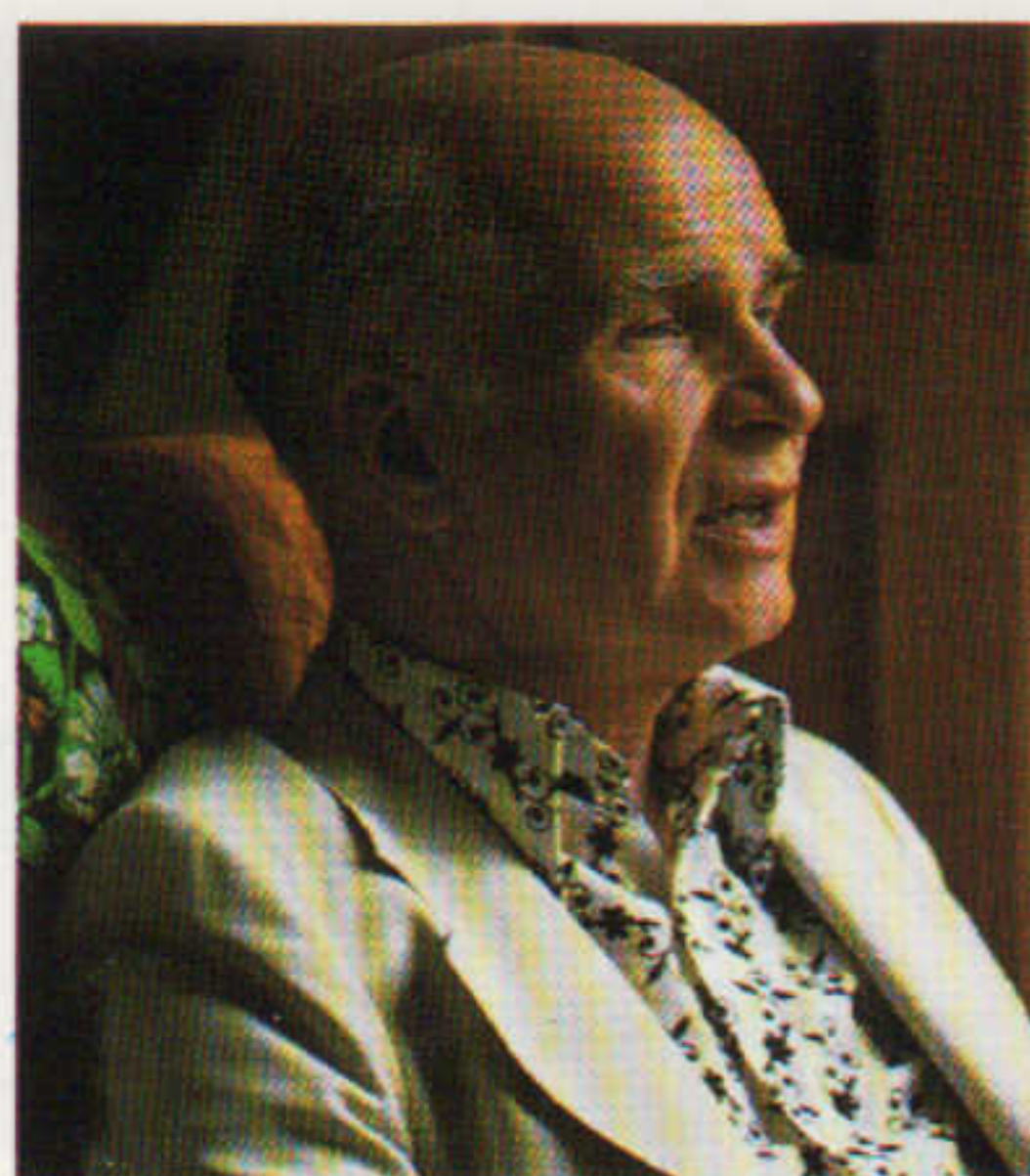
complexity of total systems but also in problems relating to mutual interference. These problems have brought about the need for a new cult, which has come to be known as Ship Weapons Systems Engineering, whereby a single authority, which may well be a group of different sub-specialists working together as a co-ordinated design team, must be created to carry out this vital task of integration of the individual weapons systems and of the total weapons package into the ship.

In practical terms, of course, all but the larger navies must accept standard ship designs which will meet the sea going demands of their requirements with a minimum of changes. In conjunction with the shipbuilder, a competent Ship's Weapons System Engineering (SWSE) contractor will be made responsible for the total weapons package, carrying out the assessment and study tasks and helping the customer to choose a suite of weapons, electronics, communications, above water and underwater sensors, electronics warfare and other necessary warlike and vital systems, in order to meet his needs within his financial and other resources. Marconi Radar Systems Limited have this competence and are experienced in the practice of SWSE.

Nowadays, increasing emphasis is being applied to consideration of the total cost of ownership of expensive warlike systems and equipment and the ships and aircraft which deploy them. In this method of costing, initial procurement costs are only one of the many elements in a total costing throughout the life of the vehicle or system. These total costs include day to day running costs, cost of repair, maintenance and other support requirements and costs of manpower and training from acceptance into service until final scrapping. This can highlight where increases in initial costs, for instance, can show savings in support and running costs, achieving greater economy in the long term.



GWS 25 and Seawolf missile.



David Thomas, Manager,  
Instrumentation and Simulation.

The modern warship is an immensely sophisticated and expensive weapons platform, demanding a highly trained and skilful ship's company. Communications, weapons, sensors and tactics have become adaptable to the terms of a particular engagement, success being dependent upon the exact and correct exploitation of the various possibilities. Those who man the ship must function as a whole and need continuous team exercising, even after qualifying training is complete.

## The learning syndrome

Five levels of training are distinguished by the Royal Navy: Introductory; Skills; Sub team; Team and Command Team. At HMS Dryad, one of the most advanced training academies in the world, all five levels of course are run. The question now being debated, is exactly how much additional training (or exercising) should be done afloat, and also how much basic training could be transferred afloat with advantage. Some of the divisions are clear, for instance, classroom instruction, with multi-position teaching aids, could not be accommodated afloat, yet this method gives the very best use of expert instructor time, a very scarce commodity. In other cases, such as practising tactics for a particular mission, possibly en-route, the advantage definitely seems to be on the side of the shipborne trainer.

## Simulation

The goal of all training is in the correct and exact use of 'real' equipment and in some cases the training sticks to real equipment all the way. But in all the three main subdivisions of ship activity, weapon systems, ship handling and engine room, there are aspects which for reasons of danger, expense or secrecy cannot be rehearsed in exercises at sea using real ECM, real squadrons of aircraft and real weapons. In these cases the simulator is the only means of training.

In shore based simulators, the operator consoles are facsimiles of the actual ship's consoles but instead of interfacing with the ship's system, are connected to a simulator which produces all the co-ordinated indications of a real ship on a real mission. The shipborne simulator would ideally work in the same way, unfortunately it runs into very tricky problems attempting to impose a fictitious scenario upon consoles which remain obstinately connected to the real one.

The requirement is to inject into the ship's information gathering systems the signals characteristic of a real mission, to enable operators to react with picture compilation, status reporting, identification, and all the other steps in the engagement without activating any armaments or filling the internal and external communication links with spurious messages. Easy ways out of these problems, for example, by installing massive multiple change-over switches in the ship's wiring to select TRAINING or FIGHTING modes, are almost always inadmissible due to the risk of reducing reliability.

## 'Carry-on-board'

While it is probable that completely integrated or federated training afloat will not be realised except where it is planned into the ship from the beginning (which could be the case with the type 23

# Simulation Systems for Naval Vessels

by D. C. Thomas, Manager,  
Instrumentation and  
Simulation



View from the bridge in a TEPIGEN ship simulator.

ships) we know that a lot more can be done with 'carry-on-board' simulators than ever has been done.

Marconi experience in developing this type of simulator has uncovered many useful concepts relevant to training operators on real equipment. The second generation of portable simulators will be compact enough to stay on board adjacent to its point of input, the several such devices will be capable of being linked to form a 'federation'. The degree to which innovation and effort can build these elements into an on-board trainer with mission capability remains to be established, but for the Type 42 and Type 22 this must be the present goal.

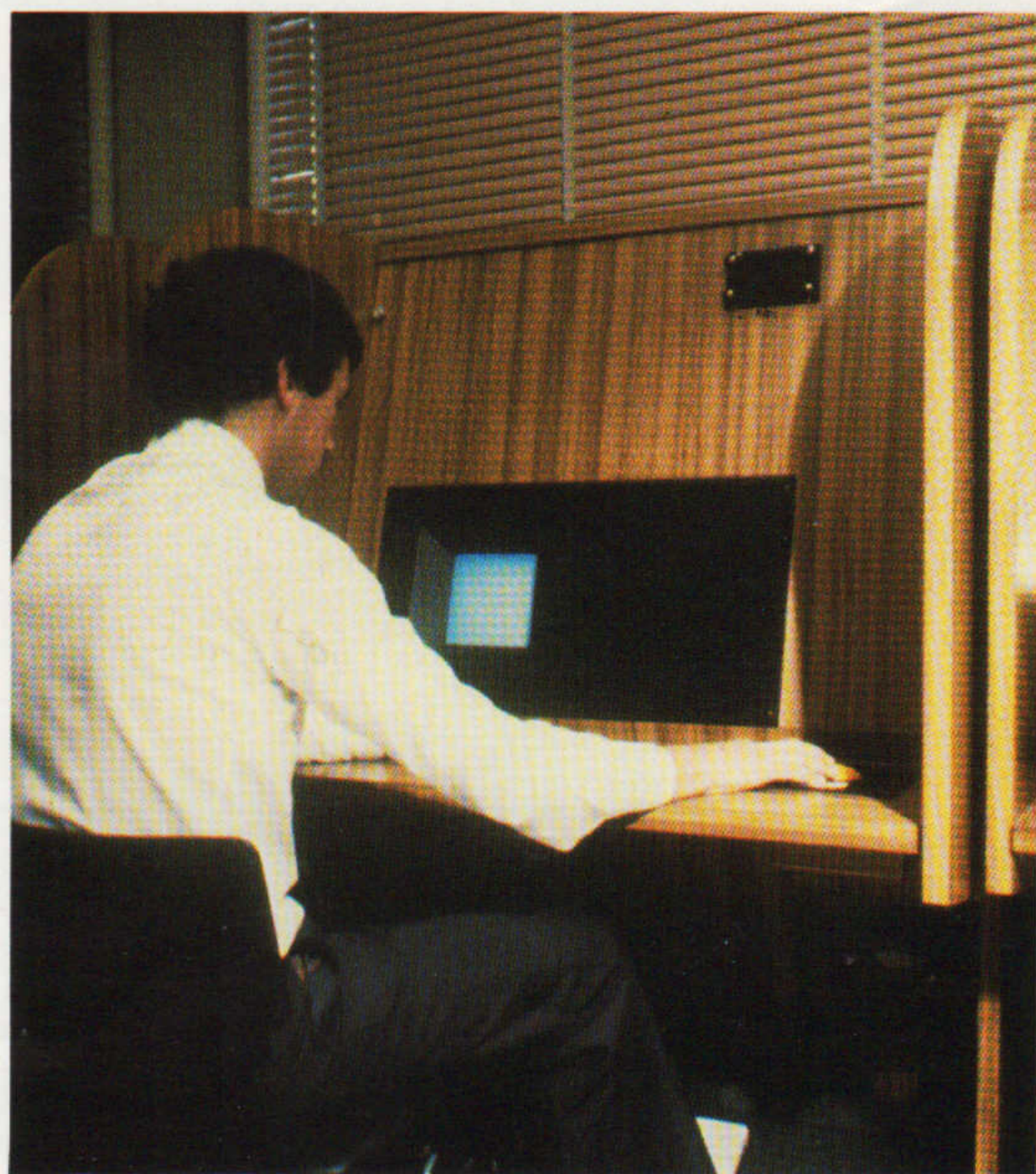
## Naval Systems Training Group

The dividing line between shore and shipborne trainers is likely to flow back and forth for some time as the possibilities become more clearly defined: so is the balance between surface and underwater training needs and the balance between the needs of weapon systems, ship handling and engine room.

For better regulation of the entire

training procurement, the RN has set up the Naval Systems Training Group. It is certain that they will have plenty to do, as training is the one branch of the Navy which, despite restrictions elsewhere, is bound to expand. Projects like the Navigation Trainer, whose specification was drawn up last year, are awaiting funding and to this may be added the simulated visual scene from the bridge, a new possibility based upon the computer generated imagery which Marconi Radar have developed under the name TEPIGEN. Trainers based upon smaller configurations of TEPIGEN are already in use for Aimer Training and this could be extended with advantage to periscope training.

Another new product now emerging from the development labs is the digital radar simulator in which coastline and terrain can be given reasonable reproduction in the simulator, using the Digital Landmass Data which the USA, Britain and Europe are compiling in collaboration. Authentic geography in the simulator may turn out to be a facility of considerable future importance.



Classroom trainer.



# Marconi submarine capability



RN patrol submarine HMS Osiris

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The Control and Simulation Division of Marconi Radar is responsible for the design, development and manufacture of Naval and Military Control, Simulation and Instrumentation systems for important defence applications.

Control and Simulation Division has supplied equipment for submarines for countries world-wide and has undertaken numerous major studies, using advanced modern techniques. The division is currently co-operating closely with the Vickers Shipbuilding and Engineering Company Limited in the design of a number of systems for a new patrol submarine which will replace the Oberon class of submarines and incorporate many advanced features.

The overall system design and project co-ordination for the propulsion system

for the new patrol submarine is being carried out by Marconi Radar Systems Limited, who are liaising with Vickers and with the sub-contractors. The system incorporates equipment from Control and Simulation Division and from other GEC Companies. The main propulsion motor is a twin armature non-compensated machine, by GEC Large Machines Limited, Rugby.

The submarine has two 1,400 KW generators for battery charging and surface running/snorting. These are a.c. generators with in-built rectifiers to give a d.c. output. The propulsion switchboard contains the necessary switchgear for regrouping batteries and armatures for different propulsion speeds. It contains two circuit breakers for motor protection.

Marconi Radar supply a static drive

unit for each field of the twin armature motor. This consists of a transistor chopper stage which can be remotely controlled to give the desired field levels. Separate field supplies ensure good armature current sharing at full speed and enable running on a single armature.

## Equipment for export submarines

Marconi Radar Systems Limited supply a wide variety of submarine equipment for vessels manufactured abroad. For slow speed propulsion, a static drive unit is produced to give a variable armature supply. Judicious setting of armature and field levels gives high efficiency at slow speeds. The static drive unit consists of remotely controlled uni-directional thyristor chopper.

A propulsion control system is provided to give automatic control of the main motor in all propulsion states. The system controls the starting and grouping camshafts and the field and armature drive units, provides and/or checks the interlocks and provides the automatic acquisition of desired speeds. Alternatively, a microprocessor based control system is available, offering full closed-loop speed control and incorporating extensive self-checking and in-built test facilities.

For automatic battery charging routines, Marconi Radar supply a microprocessor based control system. This utilizes the same hardware as the propulsion control electronics, but with a different software package. The charger controls the battery charging generator via the automatic voltage regulator. Less sophisticated battery charge control regulators are also supplied, all designed to charge the battery safely in the minimum time. The Company also supply a system for monitoring the health of battery cells. Measurements are made of voltage, temperature, specific gravity and electrolyte level, by a sensor fitted to and powered by the cell.

Static inverters are also supplied to provide main a.c. supplies. These inverters convert the battery variable voltage d.c. supply to 440V 60Hz three phase supply for distribution throughout the vessel. The converters are designed to have excellent transient performance and high efficiency.

# Racons - 500th Sale

Five hundred Sea-Watch Racons have now been delivered to 35 territories around the world. Installed as radar beacons in areas as wide apart as the Antarctic, Arctic and the tropics, they mark lighthouses, buoys, lightships, oil rigs and other navigational hazards.

Installed as transponders, they mark pilot boats, range safety craft and other units such as light aircraft.

In Canada, the Canadian Coastguard has acquired further racons to augment those already marking channels in Arctic waters, some north of 70° latitude. These radar beacons mark the difficult approaches to the oil fields and offshore mineral prospects in the North West Territories. They will be shortly joined by more Sea-Watch 300's supplied to Dome Petroleum, users of Marconi beacons since 1975.

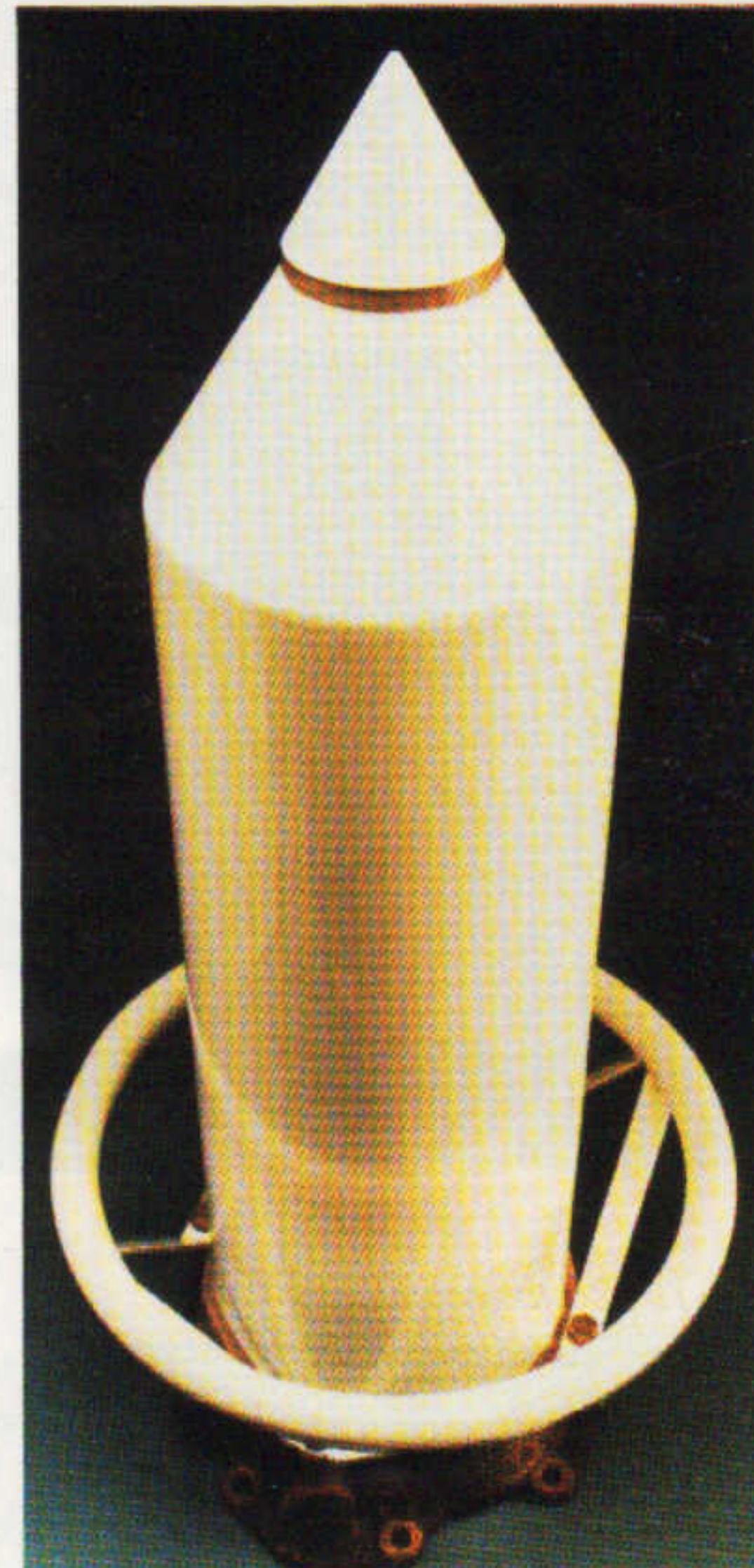
The panclimatic utility of the design is illustrated by the delivery to tropical Papua New Guinea of their first racon. The modest power consumption and high reliability of the design being particularly welcome to authorities requiring to deploy beacons in remote and inaccessible areas.

There is even a Marconi Radar marine transponder in the hostile environment of the Antarctic. This Sea-Watch 300 racon, recently installed on a drifting buoy, forms the point of reference about which the Royal Research ship John Biscoe executes sweep patterns in its important plankton sampling studies in Southern waters. The purpose of the racon is to aid perception of the buoy in clutter and to facilitate retrieval should contact be lost in the area's frequent storms.

## Sea-Watch Accord Racon

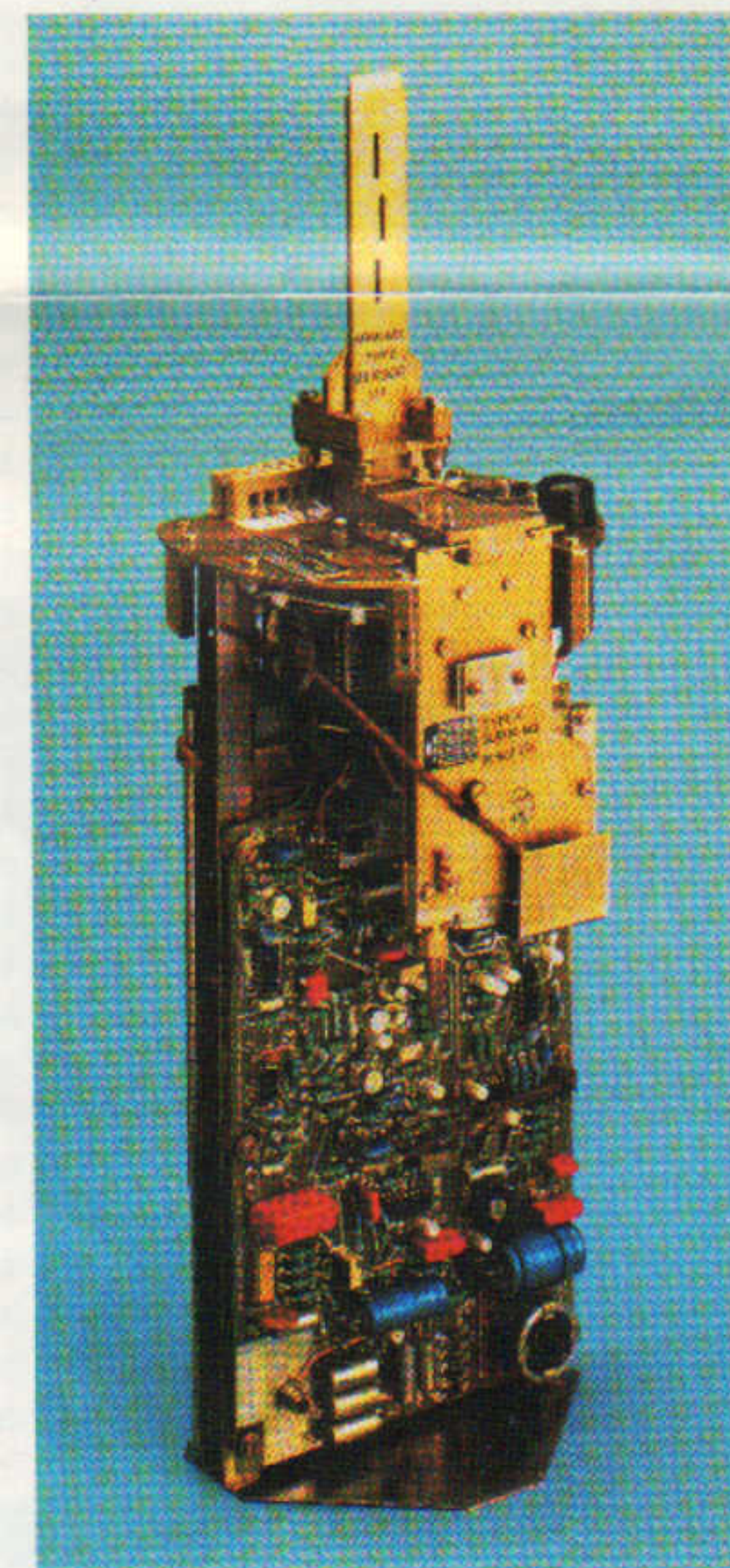
The Sea-Watch Accord Racon nears the end of the development phase. Sea-Watch Accord is a new generation of racons which respond at interrogation frequency and display much more frequently than previously. With the extensive assistance of Northern Lighthouse Board, sea trials will be held off St. Abbs Head lighthouse this Autumn. Performance of Accord will be compared with fixed and swept frequency Sea-Watch 300 models. The improved design of Accord, coupled with its higher power and sensitive super-heterodyne receiver, will significantly extend range, particularly important for traffic separation schemes for offshore, and when making landfall. The frequent display updating will be particularly useful in harbours and other short range stations.

Trials will also be made of the Accord sidelobe suppression system, this being an important feature in conditions where there is heavy traffic at short range, such as a harbour thronged with radar equipped yachts. Opportunity will be taken to compare Accord, working in the newly developed Fixed Offset Frequency (FOF) mode, with Fixed Frequency (FF) Sea-Watch 300 racons type 5B. FOF responses are offset some 50 MHz from radar frequency, FF responses being at band edge, 9310 MHz. The new mode obviates technical difficulties which



Sea Watch 300 Racon.

prevent general introduction of a fixed frequency racon service. Retained are the three forms of presentation available to the observer of a suitably equipped radar: radar/racon returns on alternate scans, the normal presentation; radar only, used when the racon station has been fixed; racon only, where radar returns are temporarily suppressed to permit detailed examination of racon traces unimpeded by clutter.



Interior of Sea Watch Accord Racon.

## News Review

### ACCSCO S.A. — A new industrial joint venture for NATO

A major grouping of electronic companies from NATO countries is forming a new company to undertake work on the NATO Air Command and Control System (ACCS) forthcoming programme. To be registered in Brussels under the name ACCSCO S.A., the company will be jointly owned by AEG-Telefunken (Germany), Hughes Aircraft (USA), Marconi (UK), MBL (Belgium), Plessey (UK), Selenia (Italy), Siemens (Germany), Hollandse Signaal-Apparaten (Netherlands) and Thomson-CSF (France).

The most experienced and best qualified in this field, the companies have already collaborated for more than a year on this task. They will aim to win contracts on a competitive basis for studies and implementation work for the up-date of the NATO Air Command and Control System in Europe.

### CAA buy Marconi radar at Sumburgh

After a two year leasing period, the Marconi radar installation at Sumburgh in the Shetlands has been purchased outright by the Civil Aviation Authority at a cost of approximately £½ million. The radar has been providing valuable cover support for helicopters and oil related air traffic serving the offshore oil industry north of Scotland.

Comprising an S1061 23cm band squintless feed antenna, together with an S2011 transmitter-receiver, the radar provides good range performance against small targets such as helicopters and light aircraft, while circular polarization and the S7100 Digital Signal Processor ensure a crisp, low clutter display.



Mr. J. Sutherland, Managing Director of Marconi Radar.

### John Sutherland in Birthday Honours List

Mr John Sutherland, Managing Director of Marconi Radar Systems Ltd, was made a CBE for services to export in the Queen's Birthday Honours List published recently.

John Sutherland is a Chartered Engineer and a Fellow of the Institution of Electrical Engineers. During the War he served in the Royal Navy as a Radar Officer in HMS King George V and HMS Ravager.

His early engineering training and

experience was with Metropolitan Vickers. He joined the Marconi Company in 1954 and was promoted to Project Manager in Research Division, and transferred to Radar Division in 1960 as Manager, Defence Projects. In 1965 he was appointed Manager of Radar Division.

In 1969 he became Managing Director of Marconi Radar Systems Limited.

Among Mr Sutherland's official appointments have been: membership of the Capital Electronics Sector Working Party of NEDO; and membership of the Economic Development Council for the Electronics Industry. He is a member of the Electronic Engineering Association of which he was President in 1979-80 and he is the current Chairman of UKADGE Systems Limited.

## Radar Systems International

the journal of

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## STOP PRESS!

### Another SFCS 600 sale

Vickers limited have received a large order from Nigeria for Mk III Main Battle Tanks.

These tanks will be fitted as standard

with Marconi gun control and stabilisation systems and SFCS 600 Fire Control systems developed by Control and Simulation Division at Leicester.

Vickers Mk III tanks are built to the firm's design and are a completely private venture. The Mark III mounts a 105 mm gun and the front of the cast steel turret is contoured for better protection. Before the contract was signed, testing and evaluation had been in progress for several years.