

# Naval Systems

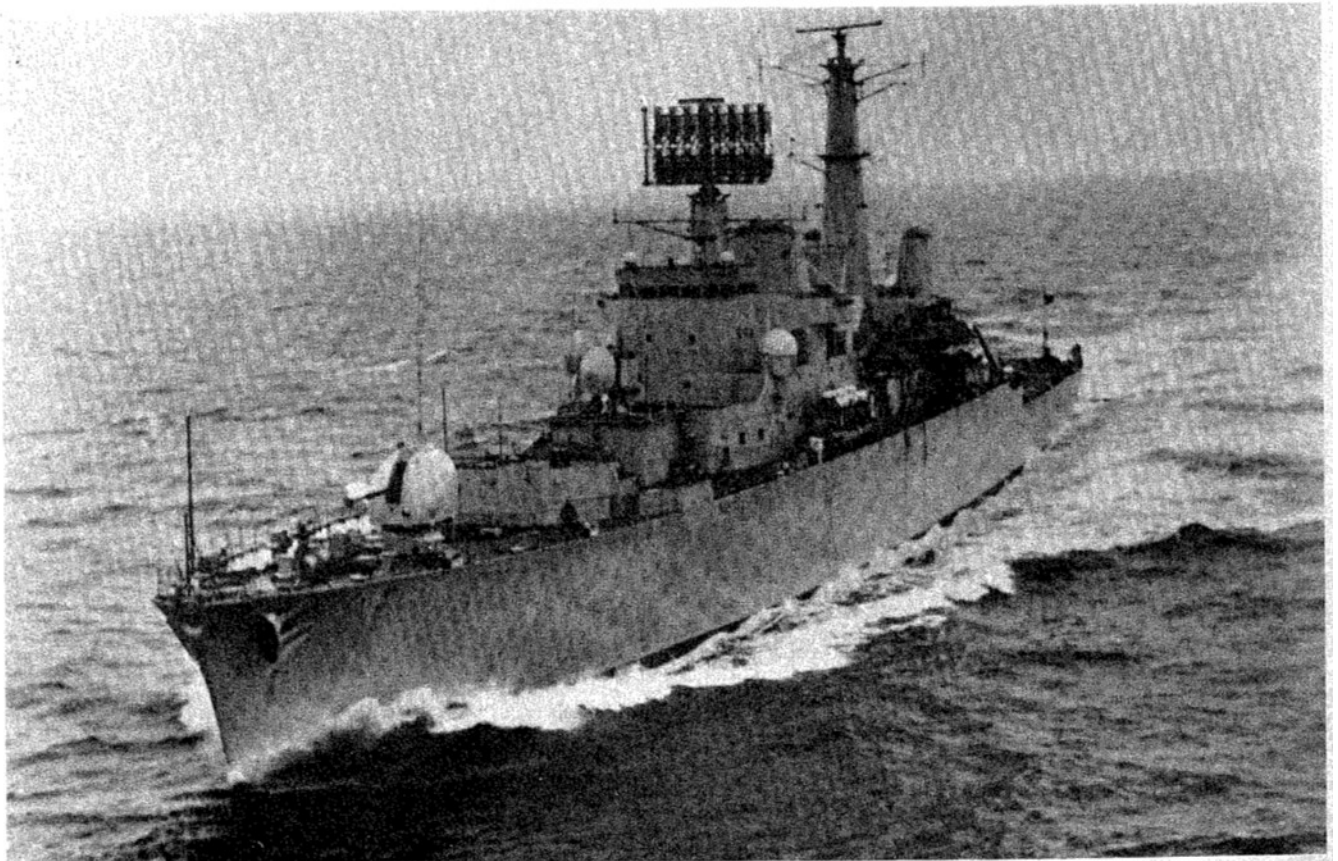
The wide range of naval equipments designed and manufactured by Marconi Radar Systems Limited, together with the available experience of associated companies in the GEC-Marconi Electronics organization, has resulted in a pool of resources and expertise with an extensive capability in naval electronics. The Company has a background of collaboration with the Royal Navy, extending from surveillance radars, tracking radars and electronic control systems, to complete weapon systems. The major product areas in the naval field can be listed as :

1. Surveillance radar systems.
2. Radar systems for offshore surveillance and coastal defence.
3. Tracking radar systems.
4. Weapon control systems.
5. Special-to-purpose ship equipment.
6. Radar data processing, display and data handling.
7. Naval radar simulation systems.
8. Computerized modular monitoring.

The illustration, showing a vessel typical of the new generation of destroyers, indicates a selection of the range of equipment which Marconi Radar Systems supply to the Royal Navy. The breadth of this involvement in ship's systems is further enhanced by access to the activities of other companies within the GEC-Marconi Electronics group of companies and the broader GEC organization. The Naval Systems engineers located at Leicester, draw upon these resources to provide an impressive capability in the naval field.

The Company can undertake both the provision of complete ship's system engineering or take responsibility for particular ship-borne systems.

HMS Bristol, the Royal Navy's new Type 82 destroyer, is equipped with a wide range of Marconi radars and control systems



## Surveillance Radar Systems

Marconi Radar Systems Limited has over the years supplied surveillance radars to many foreign navies in addition to the Royal Navy. Equipments supplied include both ship-borne and land-based coastal surveillance systems.

The radar Type 965 (which is fully described in Data Sheet L2) has been in service for many years and, although primarily designed for destroyers and frigates, it is fitted in a variety of vessels. It is a metric wavelength radar which provides long range aircraft warning, and is also fully integrated with IFF Mk 10.

The fully stabilized 10cm (S) Band Search Radar Type 992Q is a high power pulse radar, fitted in destroyers and frigates, which in the Royal Navy is the primary source of surface/air information to the Action Information Organization. It provides space stabilized output data which can be synchronized in pulse and rotation with that from other radar equipments in the ship. The operational functions of this partly transistorized radar are:

1. Air warning
2. Target indication - air targets
3. Surface warning
4. Target indication and weapon direction for surface targets
5. Navigation

A new air surveillance radar has been developed and is combined with a surface surveillance radar, to provide a fully comprehensive coverage from sea level to high elevation angles. This compact system, especially suited for use on vessels such as frigates, is incorporated in the latest Royal Navy point defence weapon system SEAWOLF.

The Marconi 800 series of X-band radars includes a range of surveillance radars suitable for fitting in warships down to the size of fast patrol boats. The equipments, Types S810, S811, S815 and S816, comprise the same basic units but employ different sizes of aerial and offer variants of signal processing. Full details of these equipments are contained in Marconi Radar Data Sheet L3.



County class guided missile destroyer H.M.S. Antrim - equipped with Marconi Surveillance Radar (Crown copyright)

## Radar Systems for Offshore Surveillance and Coastal Defence

A growing need throughout the world for protection of vulnerable coastlines or shorelines from intruders in boats, or other small craft, has led Marconi Radar Systems Limited to develop a new range of radars for offshore surveillance applications. The new range, operating at 3cm (X) Band, is designed to alert shorebases of any impending surface threat and is also suited to special applications such as gunnery and rocket range surveillance.

The system configuration depends on geographical location, the type of threat likely to arise and the measures to be adopted in dealing with that threat. A system can consist of a number of static radars, mobile radars or a combination of both. The static version is usually mounted on a tower which can also support an observation cabin if required. The mobile version employs a smaller aerial mounted on the roof of a suitable vehicle. For either version, cabin air-conditioning, local power supplies and communications equipment (including both v.h.f. and microwave working) can be supplied as required.

A choice of basic system elements is available including aerials, transmitter/receivers and displays to suit a particular requirement.

Within the Marconi 800 series of radar systems are the S844 and the S845. The S845 is a high performance coastal defence radar system providing sea surveillance and low air coverage, being complementary to air defence radar networks. The equipment is mounted on a high building or tower or it is mounted in a mobile unit. The S844 is similar to the S845, but the S844 includes a comprehensive control console to provide target data output to weapon control systems.

Also available is a range of systems based on the Marconi Marine Radiolocator, with a variety of aerials measuring up to 7.6 metres in width. These simple and economic systems are available as fixed or mobile installations and are primarily designed for use in detecting small craft engaged in illegal operations etc.

### Navigation aids

'Sea-Watch 300' radar beacon (Racon) provides accurate range/bearing fixes, with positive station identification, using the vessel's navigation radar.

A swept-frequency transmitter enables the Racon to serve ships using X-band radar frequencies between 9 300 and 9 500 MHz. Receipt of an ordinary radar transmission triggers the Racon, which then automatically transmits its particular in-band response as one of 58 Morse-code station identifications so that it can be observed on the ship's radar display.

Range, dependent on radar horizon, is normally 8 miles for buoy-mounted Racons and may exceed 20 miles on fixed sites having high-gain aerials. Battery power economy and high reliability facilitate long-term unattended use at remote stations.

From the Baltic to the tropics, nearly 150 units demonstrate daily the suitability of 'Sea-Watch 300' for navigational-aid service. A recently introduced lightweight development of 'Sea-Watch 300' is finding new military and civil uses.

Details of 'Sea-Watch' Racons are given in Data Sheet P1

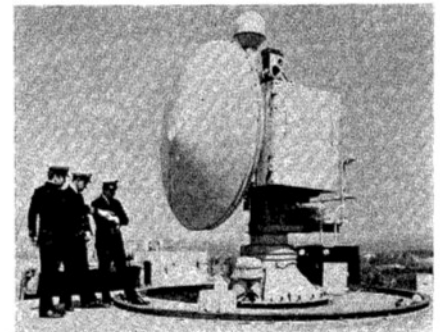
## Tracking Radar Systems

Marconi Radar Systems has gained recognition as the leading British authority on tracking radars because of accumulated experience from the early war years to the present day. Starting with the first anti-aircraft radar, Type GL 3 in 1940 through the well known AA 3 Mk7 to Yellow River for the Thunderbird missile and Blue Anchor for Bloodhound 2, Marconi Radar Systems now manufactures the naval tracking radar Type 909 for the SEA DART system and has developed the SEAWOLF system and the new general purpose tracking radars in the Marconi 800 series.

The radar Type 909 developed by Marconi Radar Systems and now in full production is the tracker/illuminator radar for the SEA DART system. This equipment, installed in pairs in the Type 42 and 82 destroyers, has been designed specifically for use with this weapon, which will provide fleet defence against a variety of targets. In addition to providing target illumination for missile guidance, it is used for gun fire direction. Type 909 employs a single eight feet antenna of the Cassegrain type to provide target tracking and illuminating facilities and incorporates a number of special features to reduce the effectiveness of jamming and other counter-measures or decoy techniques.

A feature of the Type 909 is the prefabricated construction of the radar head and its office cabin, enabling the radar to be tested prior to installation, thus greatly reducing the installation time at the shipyard.

The special-to-purpose tracking radar which is an integral part of the SEAWOLF system, has its own data processor. Although not suited for independent use, this feature makes the equipment more flexible when considering its incorporation in new weapons complexes.



Type 909 tracker/illuminator radar at a Ministry of Defence (Navy) test site (Crown copyright)

To meet the demand for a modern, lightweight, general purpose naval tracker for small ships down to fast patrol boats, Marconi Radar Systems has developed the ST 801, and ST 802 search/tracking radars.

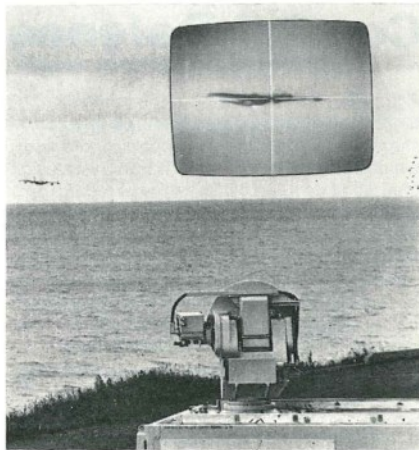
Radar Type ST 801 is an X Band monopulse, search/tracking radar for use in auto-tracking for gunfire direction, and in missile launching and guidance. Any air or surface target which has been first detected either by the ship's surveillance radar or by the ST 801's own search mode is automatically acquired and tracked with the sightline stabilized against ship's roll and pitch motions.

In the search mode, the ST 801 antenna rotates (effectively about a stabilized vertical axis) at 20 rev/min, thus providing a 'true horizon' search. The effectiveness of the radar in performing a low angle air search is enhanced by the selection of MTI signal processing particularly when sea clutter conditions are present.

A television camera fitted to the aerial provides automatic gathering of 'command to line-of-sight' missiles and provides the means of viewing along the radar boresight. Facilities are provided to control the sightline manually from the visual presentation when required.

The principal functions of the ST 801 are:

1. Surface and low angle air search.
2. Radar acquisition and tracking of a surface or air target to provide the necessary polar co-ordinate data on the target during an engagement by gunfire.
3. Radar tracking of an air target during the engagement by surface-to-air missiles such as SEACAT, with the television equipment forming part of the automatic missile gathering system.
4. Radar tracking of surface targets to provide the initial data for launching of surface-to-surface missiles such as EXOCET.



ST 801 in operation at a Ministry of Defence trials Establishment. Inset is the television monitor picture from the aerial-mounted camera

Radar Type ST 802 is the autonomous version of the ST 801 with the facilities necessary to allow it to function on its own without the interface and the control of a weapon system computer. Selection of the operational sequences in the radar is manual and additional equipment is incorporated for providing stabilized scan patterns.

*Full details of Radar Type ST 801/ST 802 are given in Data Sheet L1.*



The ST 801 lightweight tracking radar

## Weapon Control Systems

The Company is engaged in the development, for the Royal Navy, of the SEAWOLF system, the advanced shipborne point defence guided weapon, with anti-missile capability. Marconi Radar Systems is the project manager of the complete shipborne electronics system including missile gathering, data handling and display equipment and command guidance communications – with direct responsibility for the development of the surveillance and tracking radars.

The contribution of the Radar Type 909 to the SEA DART system has already been mentioned. Previous to this the Company was involved in the design, development and production of the director and launcher control for the SEASLUG, the first guided missile in the Royal Navy, which is fitted in the County class destroyers. It will continue to be the fleet's premier anti-aircraft weapon until SEA DART becomes fully operational.

An integral and vital part of any weapon system is the remote power control of the missile launcher or gun, where in spite of any disturbances caused by ship's motion or weapon firing, fast response times with rapid and accurate positioning are essential.

The Control Systems Department, part of Marconi Radar Systems Limited at Leicester, specializes in power servo drives for weapons, and their control equipment is found on every weapon in service with the Royal Navy, including the 4 inch, 4.5 inch Mk5 and Mk6, 6 inch, 3 inch and the new 4.5 inch Mk8 naval guns. Launcher power controls have also been designed and supplied for the SEASLUG, SEA DART, SEAWOLF, IKARA missiles and the AS Mk10 anti-submarine mortar. Whilst in the past, the basis of remote power control has been the metadyne (a rotary amplifier) the latest equipments use thyristors to supply the power to the weapon driving motors with the advantage of faster response, greater reliability and quietness of operation.

Experience in the highly specialized sub-systems fields of naval radar and control, together with capability in data handling and display, place Marconi Radar Systems Limited in a unique position to undertake complete weapon system development and management.



Launch of a Sea Dart guided missile

## Special-to-Purpose Ship Equipment

A wide variety of special-to-purpose equipment for Naval vessels has been developed by the Company and supplied to the Royal Navy, and to Commonwealth and foreign navies. Many of the equipments were sponsored by the British Ministry of Defence (Navy) who appreciate the naval and advanced technical expertise available in the specialist teams employed exclusively on defence projects at Leicester. The range of equipments is described in detail in the complementary leaflet Section 6, 'Naval Control Equipment', but to illustrate this capability, some products are outlined below:

### Degaussing Equipment

A gyro degaussing system used on Royal Navy submarines has been designed and developed. More recently, magnetometer degaussing equipment has been supplied for use on minesweepers and other vessels requiring more highly effective protection. The magnetometer scheme includes extensive fault indication equipment, built-in test facilities and quick, easy repair procedures. Developing very little acoustic noise with no interference, it exploits fully the advantages offered by integrated circuits.

### Cathodic Protection Equipment

New, versatile and inexpensive Cathodic Protection Equipment, which is suitable for installation on vessels of 110 tons and above, is now available.

This supersedes the AEI Morgan Cathodic Protection System which has been in service for several years.

The system is designed to provide complete protection against corrosion of a vessel's underwater hull. It is fully accepted by the Royal Navy as standard equipment for steel-hulled vessels, being considerably more effective than the systems employing sacrificial anodes which are used on the majority of ships afloat today.

The system is designed to full Ministry of Defence (Navy) specifications and can be installed during the shipbuilding phase or during a normal refit.



The new Cathodic Protection control cubicle

### Automatic Voltage Regulators

The Mark 100VR is the standard voltage regulator for the Royal Navy and has also achieved world wide sales. It has been designed on a modular basis to achieve standardization so that it can be used for both main generator sets and motor generator sets. This versatility means that the AVR may be used with generators working at voltages of 117V, 205V or 450V and frequencies of 60Hz or 400Hz, three phase, which greatly reduces logistics and maintenance problems.

The Mark 100VR Series AVR can operate continuously with main or motor generator sets of up to 3MVA rating at any temperature within the range of 0-55°C and will function satisfactorily for up to 6 hours in an ambient of 70°C.

Overvoltage or overvoltage/undervoltage facilities are available as well as rectifier failure detection when used with brushless main generator sets. The equipment meets Ministry of Defence (Navy) shock and vibration specifications and also conforms to NATO specifications.

### Static Inverters/Frequency Changers

A range of static inverters and static frequency changers are available for numerous applications on board ship. These equipments are stabilized in voltage and frequency and supply the necessary power to the equipment with which they are associated. Some are 'no break' giving standby supplies in the event of mains failure.

Ship compasses, communication equipment and weapon system supplies are amongst the applications of these equipments.

Various other special-to-purpose equipment is available including motor thermal protection units, temperature monitoring equipment and 3-term controllers for specialized equipments.

### Variable Speed AC Motor Control

New solid-state techniques for the speed control of a.c. motors have been developed by the Control Systems department. These provide a variable speed capability with characteristics similar to those of separately excited d.c. motors. Thus, simple robust a.c. motors without brushgear or commutators can be used. Typical applications are:

- Power servo drives
- Hoists, winches and capstans
- Pumps
- Air conditioning plant and fan drives.



A.C. Motor Control Type EC 583

Further information on Naval Control Equipment can be obtained from the Marconi Control Systems series of data sheets.

## Radar Data Processing and Data Handling

In modern weapon systems, continuous up-dating of displayed information ensures that the weapon controller is presented with the current tactical situation. This enables suitable weapons to be allocated for a particular assignment, immediately a threat comes into range.



The S 3017 analogue display

A typical shipborne data processing system accepts inputs from sensors in the ship and from external sources via data links. It provides up-to-date information, for display, on the overall tactical situation and any special individual aspect thereof, either automatically or modified by manual injection.

Marconi Radar Systems can provide computer hardware and software which performs all functions. The system is designed on a modular basis, which makes it suitable for small ships such as corvettes and fast patrol boats.

The wide experience of the Company in radar display equipment has resulted in the development of a range of naval displays to present the information available from radar, data processing and data handling systems. These displays are based upon the well proven Marconi S3000 series which have commonality of electrical and mechanical components and a modular construction.

The SN 3017 is a 400mm (16in) analogue (monochrome) display whose deflection coil has sufficient bandwidth to handle high speed character writing waveforms.

The SN 3015 is a 400mm (16in) digital (monochrome) display similar to the SN 3014 but operating in the digital mode.

The SN 3024 is a 305mm (12in) analogue (monochrome) autonomous unit for use as a standard video display, a tote or a labelled plan display.

The SN 3016 is a 3-colour display providing a new dimension for radar operators. The basic colours of red, green and orange are available as required, to distinguish different classes of target or information. Different combinations of colours can be made available and the cathode ray tubes can be supplied in all standard glass-sizes up to 610mm (24in), circular or rectangular.

The SN 3006 is a fixed coil bright display unit incorporating a direct view storage tube to give a picture several hundreds of times brighter than the ordinary display. It is designed for use in any ambient lighting, including sunlight, with obvious advantages for use on a ship's bridge.

An autonomous display system is now available in the new Marconi 800 series. It consists of a 12-in fixed-coil PP1 display, plus a rate-aid processing unit with store and interface unit having outputs for the ship's fire control systems. A keyboard is incorporated for the initiation and allocation of up to 4 rate-aided targets.

An auto-track facility for surface targets is also offered as an option.

# Naval Radar Simulation Systems

The team training of weapon systems operators makes demands on equipment and time which cannot be readily spared by operational ships. The Royal Navy has, therefore, installed in its navigation and direction school, HMS Dryad at Southwick, one of Europe's most sophisticated tactical trainers.

Here, command teams are situated in positions representing those they would man in ships, submarines and aircraft. They are presented with all the weapon information which would be available to them with realistic situations arising from the interaction of radar, sonar and external communications. The data is presented on Marconi 305mm (12in) PPI, 610mm (24in) conference or 535mm (21in) tabular displays.



Part of the Marconi display complex at HMS Dryad

For complete fleet exercises to be performed in this manner, weapon system details must be simulated exactly. The Sea Dart weapon system using the Marconi Type 909 tracker/illuminator radar, is the main armament of the new Type 42 and Type 82 destroyers and consequently, is of major importance for inclusion in the trainer at HMS Dryad. Marconi Radar Systems Limited has supplied the Sea Dart radar simulator as part of the simulation of the navy's most advanced fighting vessels. Battle training of ship's weapon and data system teams requires that their responses and environment are virtually indistinguishable from those that would be experienced at sea. Thus, the simulator must use the same operator interface as used on board ship. Complete replicas of ship's operations rooms, for various classes of vessel can be constructed. The input to the various systems are simulated by computer and the operator experiences true conditions. For instance, with the Sea Dart radar simulator, operator display sequences are initiated in the correct order of



Marconi display back-up cubicles in the computer room at HMS Dryad with (inset) part of the Sea Dart radar operator's console

circumstance by computer, and even typical radar noise is produced. Automatic monitoring is simulated and operator action has the same effect on the rest of the ship's system as would be the case at sea.

Certain simulator equipments, such as the Sea Dart radar simulator, can be used independently of the main training exercise in order to train operators in their own particular skills.

To meet the general requirement for operational training of officers and men in surveillance, navigational and tactical situations, the Company have developed STEG (Simulated Timebase and Echo Generator) - a cost-effective flexible and portable simulation facility which can operate:

1. On board ship, at sea or in harbour.
2. With or without the use of live radar.

STEG can be integrated with any display system and enables personnel to be exercised on the actual equipment in realistic conditions and, where possible, in the environment in which they are expected to fight.

New techniques in simulation, developed by Marconi under contract to the Ministry of Defence (Navy), have been directed to designing a television picture generator (TEPIGEN) for training missile aimers who normally have to work from a television picture. The picture presented moves as the line of sight changes, in the same way as a television picture. Thus the air target changes aspect, and the position of the missile flares responds realistically to the aimer's movement. This type of simulator has a wide range of applications wherever men have to be trained in a visual task.

The Company can apply experience and expertise to any naval simulation problem, both present and future.

# Computerized Modular Monitoring

CMM is a monitoring concept devised and developed by Marconi. It is a versatile control and monitoring system which can be built up from a range of hardware and software packages to meet the maintenance requirements of almost any group of electronic or electro-mechanical equipments. It is designed to be equally applicable to existing equipments or new projects and can be expanded from a simple, manually controlled data gathering network to a comprehensive system, controlled from a central computer (remotely over G.P.O. telephone lines if necessary), with facilities for automatic fault diagnosis and data analysis.

The CMM system has been designed to quickly gather and process data from a selected number of 'key points', in order to provide performance assurance for the equipment as a whole, and to give a rapid assessment of the extent of the failure, particularly with regard to the loss of an operational facility.

The same techniques applied to a larger number of points can be used to provide more detailed information for fault location with drift analysis and, by including suitable computer programs, will result in a monitoring system which not only gathers data, but also analyses the results and supplies information to enable the equipment to be maintained by a reduced staff.

The control facilities of CMM can operate over the same network as that used for data gathering and can be used to bring a standby unit into service or to institute marginal testing during maintenance.

The CMM hardware consists of a number of data selector units (DSU) which, because of their small size, can be implanted in the equipment to be monitored; one or more digitizing and control units (DACU), to which the selected parameters are returned for measuring and digitizing, and a central processor where the final assessment and analysis takes place.

CMM has been designed to be capable of gathering data from the monitored equipment in a logical and efficient manner to provide the following functions:

1. To ensure that the monitored equipment is operating to specification and that its performance is not degraded.
2. To provide immediate fault information automatically presented in plain language, locating the fault to unit level.
3. To allow organized preventive maintenance and revision of standard maintenance procedures.
4. To provide records which can be printed or punched automatically. If required, these records can be sorted and abstracts prepared.

CMM reduces the mass of wires usually required for monitoring by multiplexing vast quantities of information over one single pair of wires. At sea this obviously offers an advantage where space is limited and information has to be passed through watertight bulkheads or slings with limited capacity. When all monitored information is centralized for processing and display,

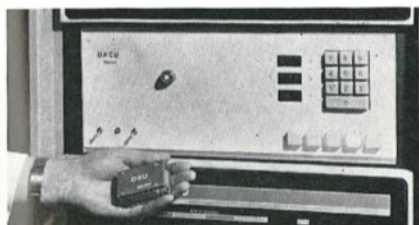
damage at the centre could deprive the controller of the whole monitoring facility. CMM overcomes this possibility by offering a measure of local autonomy at each section of the installation.

As CMM is computer based, programmes can be made available to provide detailed technical and operational information on the monitored equipment. This information, presented in a simple form, can be called for by semi-technical staff and used to advise the controller on the actions he should take to maintain his equipment or return it to an operational state.

This feature of CMM can assist:

1. Where the crew at sea is limited and no specialist knowledge on equipment is available.
2. In the training of operational crew and maintenance personnel.

As CMM is modular, it is suitable for inclusion in new design or retrofitting. The modular approach offers an economical solution which the user can build into his system to improve plant management.



Components of computerized modular monitoring – a hand-held sensor unit and a 483mm (19in) rack-mounted control unit

## The Systems Concept

With the computer as a calculating tool, problems of increasing complexity can be solved more accurately and in time scales which were unthinkable only a few years ago. In order to achieve the optimum performance from an equipment or combination of equipments it is essential that they should be considered as an integrated entity and not just as single items. Out of this requirement has come the systems engineer, who uses advanced analytical tools such as mathematical modelling, information and queueing theories etc. to consider the over-all requirements of a system in terms of its performance and cost effectiveness. These models enable the engineer to simulate the performance of the equipment without having the hardware available.

Marconi Radar Systems has created a focal point for Naval Systems Engineering at Leicester where the team have at their disposal not only the expertise of Marconi Radar Systems Limited, but also the facilities of the whole of GEC, ranging from steam turbine sets to high-speed computers.

With its background of Naval involvement, there are two areas in which the Company's system engineering team can play an exacting and important role.

1. Main/sub system engineering.
2. Ship system engineering.

This capability ensures that the customer will receive a system which has been thoroughly analysed from a cost-effective and

overall efficiency point of view, thus avoiding the dangers of equipment overlap and incompatibility.

Thereafter, the Company will work with the customer and the shipbuilder to ensure co-ordination of effort at all stages of planning, design, installation, setting to work, and acceptance. The SEAWOLF contract with the Royal Navy is a typical example of co-ordination of effort, where the involvement spreads well beyond the boundaries of Marconi Radar Systems Limited and is, in fact, the first Ministry of Defence (Navy) contract in which an electronics contractor has been nominated as overall systems manager.

To ensure efficient control of projects of this nature, in addition to co-ordinating the development of equipment, it is necessary to monitor the entire programme using PERT techniques.

In the Company's experience it has been found that, if regular checks on progress against the proposed plan are made at every phase, then the problems of co-ordination are greatly reduced and the projects successfully completed within the required time scales.



County class guided missile destroyer, H.M.S. Fife (Crown copyright)

## Ship Refit and Refurbishing Service

The electronic equipment in a ship represents a high proportion of the total cost and its diversity and complexity make it essential for a specialist team to be employed by the customer and/or the ship repairer to take responsibility for the ship's electronics during a refit programme.

The wide range of naval equipment designed and supplied by Marconi Radar Systems Limited, together with the available experience of other associated companies in the GEC-Marconi Electronics organization, enables the Company to offer a complete service for the refurbishing of the ship's electronics.

The Marconi Radar Systems Limited comprehensive repair and refurbishing service covers not only ship's electronics but the associated mechanical items such as aerials and gearboxes, which is especially important because of the corrosive environment in which they have to operate.

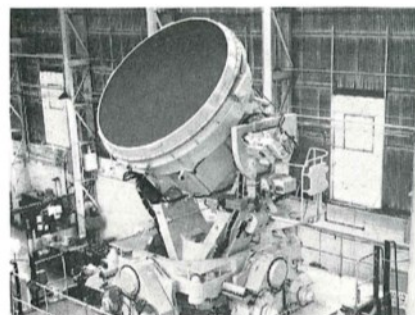
To enable the overall planning of a refit to be completed at an early stage, Marconi Radar Systems offers to undertake a comprehensive survey whilst the ship is still operational. This survey consists of detailed reports covering system recommendations and cost estimates together with time scales.

The reports take into account the new role of the ship, equipment obsolescence, availability of spares etc. and make recommendations as to the category of repair or refurbishment of each equipment.

When the refitting programme has been agreed, Marconi Radar Systems takes responsibility for the work to be carried out. Some equipments are refurbished in our own factories, others are sub-contracted to the original manufacturers.

Schedules of work and performance specifications are issued to the category required on each equipment and the programme is monitored by a Contract Implementation organization to ensure conformance with specification, quality control, delivery programme and cost. If required, procurement specifications are placed on suppliers of new equipment and delivery is scheduled to meet the refit programme.

The experienced installation teams, at the disposal of Marconi Radar Systems, can co-operate with the ship repairer in the removal of the equipment from the ship, re-installation, setting to work, testing to Naval handbooks and participation in HATS and SATS.



Seaslug missile director undergoing refurbishment at Marconi Radar Systems Limited, Leicester

## Support and Post Design Services

Marconi Radar Systems Limited accepts that its responsibility for Naval Systems continues after the equipment has been despatched from the manufacturing units. Therefore, units within the Company have been set up to provide support and post design services:

1. Installation and maintenance engineers are available as required, to work in close co-operation with the development engineers on projects of equipment fitting, commissioning and on-trial evaluation. If problems arise in service, then engineers are available to investigate and take remedial action.
2. Post Design Service engineers form an equally important part of the after sales team. With the speed of advance in technology of sophisticated military systems, some of the equipment becomes dated and unacceptable after a period of time, and this team specializes in modernizing existing systems using new techniques to improve the performance.
3. Product and system training schools have been set up to ensure adequate technical and operational training of customers' and shipbuilders' personnel.
4. Technical handbooks and documentation to cover all aspects of equipment and systems, are supplied by a specialized technical publications group, backed by drawing office personnel working to British Military Standards specification.