

H.M.S. 'SULTAN'

25 YEARS OF MARINE ENGINEERING TRAINING

BY

LIEUTENANT-COMMANDER C. S. MCHUGH, B.Sc(Eng)., R.N.

'The prelude to action is the work of the engine-room department'

JELICOE
at Jutland

FOREWORD

BY

CAPTAIN A. A. LOCKYER, M.V.O., C. ENG., M.I.MECH.E., R.N.

H.M.S. *Sultan* was commissioned twenty-five years ago on 1st June 1956, since when there has been much expansion and development; the next quarter of a century will see even more progress made.

By way of celebrating this 'Silver Jubilee' a number of events have been arranged about the first week of June, their object being to strengthen our ties with the town of Gosport on the one hand and our role as the Alma Mater of the Marine Engineering Branch on the other. It also seems appropriate at this time to include a new article on *Sultan* in this journal so as to update the previous one which was written some twelve years ago.

I would like to take this opportunity of paying tribute to the foresight of the late Captain C. M. MORRELL, who saw the potential which the old Royal Naval Air Station—H.M.S. *Siskin*—offered, and to the wisdom and efforts of my predecessors who did so much to establish the position which *Sultan* holds today: they were Captains L. F. INGRAM, J. D. FARROW, H. G. H. TRACY, G. W. GAY, G. F. A. TREWBY, H. D. NIXON, L. D. DYMOKE, S. F. BARTON, R. A. HARCUS, D. D. N. LONG, C. B. WILLIAMS, and K. V. HADOW.

Introduction

The last 25 years has seen H.M.S. *Sultan* evolve to become today the Alma Mater of the Marine Engineering Branch of the Royal Navy and June 1981 marks the beginning of the second quarter century of marine engineering training there. The motto of H.M.S. *Sultan*—*Pedetentim*—(step by step) appropriately describes this evolutionary process which has transformed a disused air station into a highly professional training establishment.

The Origins

Those familiar with H.M.S. *Sultan* will perhaps already know its origins. The establishment lies astride Military Road, Gosport, and the majority of the facilities are neatly sandwiched between Fort Rowner and Fort Grange, two of the nineteenth-century forts which formed part of the landward defences of Portsmouth. The site between the forts was converted into an

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MEMORANDUM

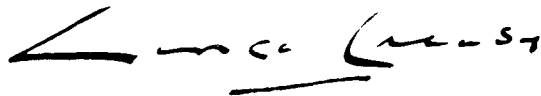
By Sir George Elvey Creasy, Knight Grand Cross of the Most Honourable Order of the Bath, Commander of the Most Excellent Order of the British Empire, Companion of the Distinguished Service Order, Member of the Royal Victorian Order, Admiral of the Fleet in Her Majesty's Fleet and Commander-in-Chief of Her Majesty's Ships and Vessels employed and to be employed within the Portsmouth Naval Command.

H.M.S. SULTAN — Commissioning Order

The Lords Commissioners of the Admiralty having directed that Her Majesty's Ship Siskin is to be recommissioned as Her Majesty's Ship Sultan on Friday the First day of June, 1956, you are to proceed forthwith to commission that establishment as the Mechanical Training Establishment of the Royal Navy.

From the date of commissioning Her Majesty's Ship Sultan will be administered by me, and all matters of policy and importance relating to the welfare of the Ship's Company, the work of the establishment and other matters, as directed in the Queen's Regulations and Admiralty Instructions and Portsmouth Command Orders, are to be referred to me.

Given under my hand this 31st day of
May, 1956.



*George Elvey Creasy
Commander-in-Chief*

To Captain Leonard Frank Ingram,
MIMechE, MIMarE, Royal Navy,
Captain-in-Charge, Mechanical Training Establishment at Portsmouth

FIG. 2—H.M.S. 'SULTAN'—COMMISSIONING ORDER

airfield for the Royal Flying Corps in 1912 and, with the formation of the Royal Air Force after the First World War, it became a permanent R.A.F. station known as R.A.F. Gosport. In 1945 it was transferred to the Royal Navy as H.M.S. *Siskin*, a naval air station, but in 1954 it was announced that the air station would close down and that the establishment would therefore be 'on the property market'.

Captain C. M. MORRELL, C.B.E., Royal Navy, then in command of the Mechanical Training and Repair Establishment in Portsmouth, proposed that the site, with its large number of empty aircraft hangars, should be used as a Mechanical Training Establishment for mechanics and other engineering ratings then trained in the Portsmouth area; his proposals were eventually accepted by the Board of Admiralty, on which at that time the late Admiral of the Fleet the EARL MOUNTBATTEN OF BURMA was the First Sea Lord.

There was considerable debate on a suitable name: *Indus* was suggested to recall the ship in which mechanic candidates from the three ports were first brought together, and *Sultan* to recall the hulk of an old ironclad battleship which had variously housed artificer apprentices and the Mechanical Training Establishment in Portsmouth between 1906 and 1939. In the event *Sultan* won and H.M.S. *Sultan* was duly commissioned on 1st June 1956 under the command of Captain L. F. INGRAM, Royal Navy, as the Mechanical Training Establishment.

Diary of Important Events in the First Twenty-five Years of H.M.S. 'Sultan'

| | | |
|-----------|------|---|
| June | 1956 | H.M.S. <i>Sultan</i> commissions as the Mechanical Training Establishment under the command of Captain L. F. Ingram, R.N. |
| February | 1957 | The first harbour training ship, LST 3031, beaches at the Hardway. |
| October | 1957 | Completion of 'temporary' accommodation in Fort Grange to house LM(E)s from Chatham and Devonport MTC. |
| June | 1959 | Installation of running diesel machinery in Watt hangar, from the ICE School in Chatham and transfer of the Ship Husbandry School from Chatham. |
| June | 1960 | Parsons Block opens as the Marine Engineering School. <i>Sultan</i> title changed to the Marine Propulsion Machinery School. |
| September | 1960 | Vice-Admiral Sir St. John R. J. Tyrwhitt, Bt., Second Sea Lord, opens the Maintenance School Watt Hangar (formerly the ICE School Chatham). |
| November | 1961 | Rear-Admiral H. S. McKenzie, Flag Officer Submarines, opens Rutherford Block as the Nuclear Submarine Propulsion School. |
| January | 1962 | Start of the Senior Rates' Course. |
| September | 1963 | Completion of new CPOs and POs accommodation. |
| December | 1963 | Admiral Sir Wilfred Woods, C.-in-C. Portsmouth, opens the new Chief Petty Officers' Mess. |
| June | 1964 | Title changed from the Marine Propulsion Machinery School to the Royal Naval Marine Engineering School. |
| June | 1966 | Vice-Admiral C. P. G. Walker, C.B., Chief Naval Engineer Officer, opens the Steam Machinery Installation in Watt Hangar. |
| March | 1968 | The first control room simulator (GMD), H.M.S. <i>Buckinghamshire</i> , commissions. |
| September | 1968 | Rear-Admiral G. J. B. Noel, CSO(T) to C.-in-C. Western Fleet, opens the Sheet Metal Shop. |
| April | 1969 | Machinery Controls Laboratories and extensions to Parsons Block opened. |
| June | 1970 | Commodore I. S. Lees-Spalding opens the G6 Gas Turbine Installation. |
| September | 1970 | Completion of building programme of CPO and PO accommodation extensions, Newcomen Hangar classrooms, junior ratings' accommodation, galley and dining halls, and MSC. |
| January | 1971 | The Sultan Club opened by Mrs. R. A. Harcus, wife of the Captain of <i>Sultan</i> . |

| | | |
|-----------|------|--|
| September | 1971 | Part II Mechanics' training begins at <i>Sultan</i> . |
| March | 1972 | Captain H. W. F. Lowman, R.N., first Training Commander of <i>Sultan</i> opens the Ship Husbandry School. |
| September | 1972 | Admiral Sir Derek Empson, Second Sea Lord, opens Brunel Block. |
| June | 1973 | The Type 21/42 simulator, H.M.S. <i>Aylesbury</i> , commissions. |
| May | 1974 | The son of Captain C. M. Morell opens Morrell Block. Captain Morell visits the block at a later date. |
| April | 1975 | Ceremonial inauguration of H.M.S. <i>Sultan</i> to the Freedom of Gosport. |
| June | 1976 | Visit of Her Majesty Queen Elizabeth the Queen Mother to H.M.S. <i>Sultan</i> and Gosport. |
| April | 1978 | Vice-Admiral Sir George Raper opens the Olympus/Tyne Gas Turbine Installation—Raper Block. |
| April | 1980 | The Type 22 simulator, H.M.S. <i>Benefit</i> , commissions. |
| January | 1981 | Vice-Admiral Sir John Fieldhouse opens the extensions to Rutherford Block and commissions two new submarine propulsion control simulators. |
| March | 1981 | Installation of new CVS and MCMV simulators. |

The Early Years

The diary of important events in *Sultan* highlights the step-by-step, though often sporadic, development of the establishment. Scarcely two years have gone by without a milestone: the opening of a new building, the installation of a major training facility, or the arrival or development of an important training programme.

Early residents will recall what might, by today's standards, be considered somewhat primitive facilities centred around an embryonic organization.

The officers inherited the spacious wardroom built to excellent pre-war R.A.F. standards, whilst senior and junior ratings lived in good, if somewhat overcrowded, accommodation on the east side of Military Road.

Sultan had acquired the Mechanics Course and the Portsmouth Mechanical Training Course (MTC) for the LM(E)s, both well-established courses. In addition, a General Engineering Course of six months had been started for POM(E)s together with a number of smaller courses including the relatively novel idea of ship type pre-commissioning courses.

There were few classrooms, but an excellent workshop, which remains almost unchanged today, was established in one of the large hangars and early in 1957 the first harbour training ship LST 3031 beached, literally at the Hardway Elson.

Within a short time the Mechanical Training Courses from Devonport and Chatham arrived, thus swelling the numbers in *Sultan* considerably. The problem of housing these additional LM(E)s was solved by 'modernizing' Fort Grange to provide temporary accommodation whilst long-term plans for permanent accommodation were developed and implemented. By late 1957 the 'modernization' of Fort Grange, including the coke heating system in messdecks for twenty, had been completed and the MTC at Devonport and Chatham ceased to exist.

Plans to move both the ICE School and the Ship Husbandry School from Chatham were implemented during 1959, a move which required the transfer of a considerable number and range of diesel engines from Chatham. These were installed in an empty hangar and the following year Watt Hangar, the new ICE School, was officially opened by the Second Sea Lord. At the same time Parsons Block, a large workshop, was opened as the Marine Engineering School and the title of the whole establishment changed to the Marine Propulsion Machinery School.

The 1960s

The nuclear submarine building programme, boosted shortly afterwards by the Polaris programme, was also calling for a considerable increase in the quantity of theoretical training of future plant operators; nuclear propulsion training was therefore appropriately transferred to the Marine Propulsion Machinery School from H.M.S. *Collingwood* and an impressive new block, Rutherford Block, was opened the following year (1961) by the Flag Officer Submarines.

One of the more important developments in the career training of senior ratings, since the advent of the still controversial General Engineering Course, was the start in 1962 of the Senior Rates Course. This was the first attempt at further career training of artificers who until then received no further training after leaving H.M.S. *Caledonia* apart from a few special technical courses. The new course, aimed at management and administration as well as engineering, subsequently evolved into the Charge Confirmation Course as further career courses were introduced.

Another interesting aspect of the times, particularly in the light of subsequent events more than fifteen years later, was the consideration given to starting electrical training at *Sultan* in the wake of AFO 1603/63, the re-defined responsibilities for 'heavy electrics'. This was to come to nothing and the Marine Engineering Branch will have to wait till the mid-eighties before the majority of electrical training associated with the Engineering Branch Development (EBD) policy of DCI 155/78 can effectively be taught in *Sultan*.

By the early sixties, the extensive building programme for accommodation and messing for senior ratings was nearing completion and, at the end of 1963, Admiral SIR WILFRED WOODS, then C.-in-C. Portsmouth, officially opened the luxurious and modern facilities of the CPOs and POs messes.

The training facilities too were improving; the old LST had been replaced as the harbour training ship, initially by H.M.S. *Vigo* and now by H.M.S. *Solebay*, a BATTLE Class destroyer, offering robust and excellent maintenance and operator training facilities, and plans were drawn up to complement the maintenance training facilities in the ICE school with a working steam plant.

The range of courses offered was now extensive, particularly in the pre-commissioning training league which ranged from the well-established Y100 and Y101 steam frigate machinery to the very latest Type 81 and GMD COSAG machinery. Training now covered the whole field of marine engineering at sea and, in 1964, the title of the establishment was again changed. In just eight years H.M.S. *Sultan* was very firmly established as the Royal Naval Marine Engineering School.

A New Technology

On 1st June 1966, the Chief Naval Engineer Officer, then Vice-Admiral C. P. G. WALKER, came to *Sultan* to open the new steam machinery installation in Watt Hangar. This important new training facility included a Y101 controlled-superheat boiler with a variety of steam-driven pumps and auxiliaries available principally for maintainer training. Stripping, inspection, refitting, and reassembly procedures could now be verified under 'live steam' testing conditions.

But amongst those who witnessed this official opening, there must have been some who thought that this facility had come almost too late. The G6 gas turbine was already at sea in the COSAG plant, the marinized versions of the Olympus and Tyne engines were being conceived and the Type 42 destroyer was already on the drawing board. This new technology with its increasing emphasis on upkeep by exchange and plant monitoring and operation from a ship control centre questioned the balance of the existing

training philosophy—a philosophy based on a mix of theoretical instruction on systems in a classroom, craft training, and practical instruction on individual items of the whole system, with operator training left predominantly to the Fleet. Accordingly in 1968, the first simulator, a full size GMD propulsion plant control console, with an analogue computer, was commissioned in *Sultan*. Named H.M.S. *Buckinghamshire*, it has since been used for ongoing team training of COUNTY Class propulsion plant operator crews as well as providing a realistic training aid for career and specialist control training.



FIG. 3—TRAINING TO BE A GRADE-A WELDER

of the establishment; 1970 also saw the opening of the new junior ratings' galley and dining halls and the Manpower Services Centre and, in 1971, an impressive new junior ratings' club, with what is now acknowledged to be the best discotheque in Gosport.

The 1970s

For the previous fifteen years *Sultan* had been a 'mature trainees' establishment which counted a high proportion of petty officers and more-senior men under training. In 1971, that was to change dramatically when young mechanic initial training was transferred from H.M.S. *Raleigh* and H.M.S. *Ganges* to *Sultan*. Henceforth the scope of training in *Sultan* expanded to include not only engineering at a more fundamental level but also the now familiar sight of large numbers of young men marching around the establishment, and the spectacle of weekly Divisions witnessed by parents of young mechanics passing out on completion of their formal training. Yet another empty hangar had been converted into a workshop/demonstration area and a block of classrooms and offices built adjacent to it; this now became Newcomen Hangar (since changed to Rattler Hanger) the self-contained initial training school for young mechanics.

Notwithstanding 'simulator' training, the need to delve into the hardware itself was still recognized and a full-size working G6 English Electric gas turbine and dynamometer was installed in an annex to Watt Hangar some two years after the control room simulator.

In other parts of the establishment, the building programme was also gathering momentum. A new sheet metal shop was opened in 1968 which provided facilities, amongst others, to train and re-train Grade-A welders for the nuclear submarine programme. Extensions to Parsons Block to house the new machinery control systems laboratory and a cinema were completed the following year and by 1970 five new large accommodation blocks, housing over 600 ratings, had replaced the old parade ground on the east side

As the numbers under training expanded, so the need for yet more classrooms and supporting facilities grew and, in 1972, the largest new complex yet built in *Sultan* was opened by the then Second Sea Lord, Admiral SIR DEREK EMPSON. Brunel Block and its adjacent annex contained no less than twenty-two modern classrooms, a laboratory, lecture theatre, library, administration offices, and common rooms, located beside a very well equipped gymnasium and changing rooms.

The cleanest building in *Sultan* was also opened the same year, the immaculate Ship Husbandry School. In the new technological age, ships' companies have gradually been reduced and replaced by computers and control consoles; thus, far fewer men are available to chip, clean, and paint. It is in the Ship Husbandry School that ships' staff from all branches learn the correct way to cope with corrosion and dirt in the ship environment without the benefit of a large semi-skilled labour force previously available.

It was also in the early seventies that all the Naval Home Command training establishments took a critical look at the training content of every course. Up until that time, many courses in *Sultan* had been designed or had evolved along generally subjective lines based on the views and sea experience of the engineer officers and senior ratings associated with both the design and execution of the training. Henceforth, the content of the courses was to be pruned of much of the 'interesting-to-know' topics and matched strictly to the knowledge and techniques that a man required either to do his job at sea or ashore or to understand the further practical training he would undergo in his ship. The concepts of task books to standardize sea training of young mechanics, of the Fleet Training Feedback Team, of the quality assurance of the training both for standards reached by trainees and standards of technique reached by instructors, were also instituted and all required a significant increase in the staffs and workloads of departments not directly involved in training execution.

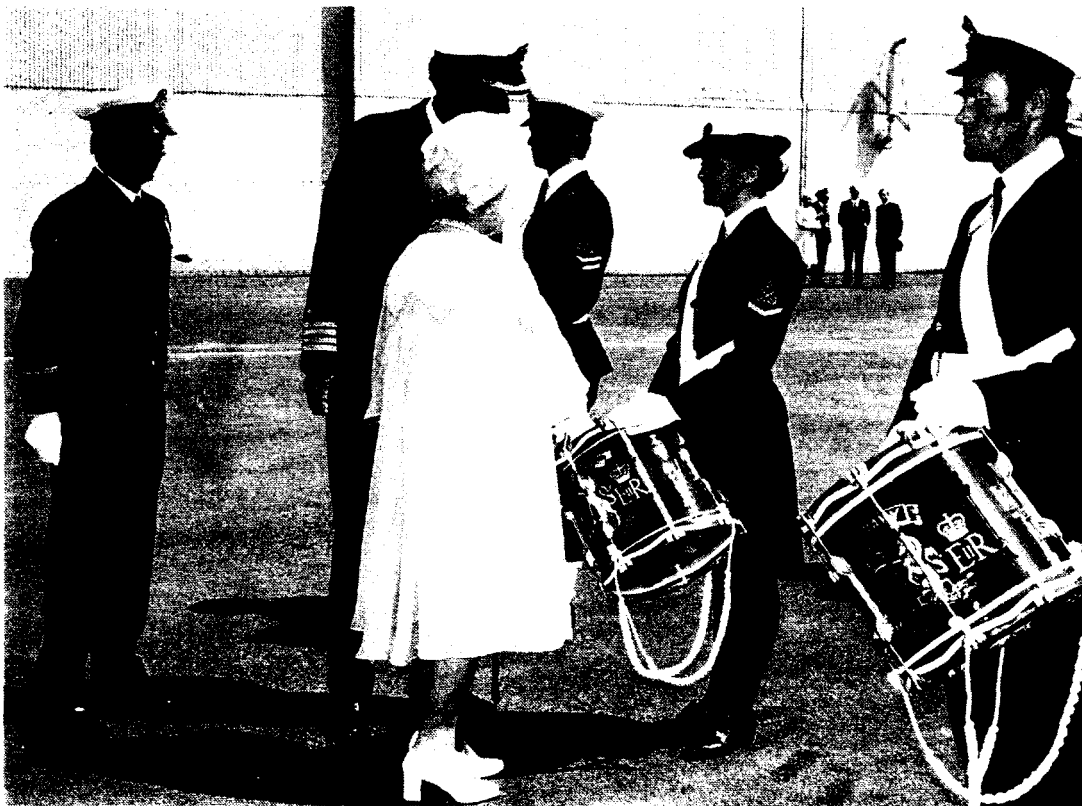


FIG. 4—HER MAJESTY QUEEN ELIZABETH THE QUEEN MOTHER INSPECTS THE VOLUNTEER BAND 1976

Not only was *Sultan* fast developing into a very important training establishment but also it was becoming a very large community of people within the Borough of Gosport. In recognition of the close ties that had gradually been forged between the establishment and the town of Gosport over the years since 1956, H.M.S. *Sultan* was granted the Freedom of Gosport in 1974 and subsequently exercised her right to march through the town 'with drums beating, flags flying, and bayonets fixed' at a formal inauguration ceremony as Honorary Freemen of Gosport on 17th April 1975.

The following year the establishment was honoured by a visit from Her Majesty QUEEN ELIZABETH THE QUEEN MOTHER. On the 8th June 1976, whilst on her way to a civic ceremony in Gosport, Her Majesty landed at *Sultan* in a helicopter of the Queen's Flight and inspected a Royal Guard of Honour of 96 petty officers and the H.M.S. *Sultan* Volunteer Band.

Rapid Developments

Early feedback from the Fleet on the GMD simulator had indicated the great value of this sophisticated training aid and a combined Type 21/42 simulator H.M.S. *Aylesbury*, with updated technology, was commissioned in 1973 next to H.M.S. *Buckinghamshire* in Parsons Block.

Alongside the rapid technological evolution of the marine propulsion plant had come developments in auxiliary machinery. In every field, from refrigeration and air conditioning systems to hydraulic power distribution systems, there was now something new which required both maintainer and operator training. In 1974, therefore, yet another new annex to Watt Hangar was opened to house a full-size working refrigeration plant, a full-size air conditioning and chilled water plant, and a variety of other static and working displays and equipment. The building was called Morrell Block in recognition of Captain MORRELL's work for H.M.S. *Sultan* almost twenty years earlier and was opened by his son.



FIG. 5—CEREMONIAL DIVISIONS

In exactly the same way that operator and maintainer training had been established for the COSAG plant with a simulator and a working G6 turbine, so with the COGOG plant a similar training aid procurement policy was followed and yet another annex to Watt Hangar was built to house the Tyne and Olympus modules with their running engines. On 4th April 1978, this impressive new training aid was appropriately opened by Vice-Admiral SIR GEORGE RAPER, the 'father' of the R.N. gas turbine navy, and called Raper Block. By now the concept of operator training on simulators was firmly accepted and this led to the commissioning of H.M.S. *Benefit*, the Type 22 simulator, in April 1980; at the time of going to print, the installations of the new CVS and the new MCMV simulators are also under way.

In the field of nuclear submarine propulsion, simulator training for plant operators is also well established and, as a result of the decision to transfer operator training from H.M.S. *Vulcan* to *Sultan*, a large extension to Rutherford Block was opened in January this year by the then Controller of the Navy, Vice-Admiral SIR JOHN FIELDHOUSE. It currently houses the propulsion plant simulators and control panels for the CHURCHILL Class and SWIFTSURE Class submarines and a further simulator for the TRAFALGAR Class is due to be installed shortly. This will bring the total number of simulators in H.M.S. *Sultan* for operator training to nine—without a doubt the new age of training technology is upon us.

Throughout the seventies, the Engineering Branch of the Navy had been critically examining its manpower structure and the divisions of technical responsibility in the light of engineering developments. A paper published in 1972 by the C.N.E.O., Vice-Admiral SIR GEORGE RAPER, entitled *The Engineering Specialization and Engineering Branches for the 1980s* culminated in the Engineering Branch Development (EBD) policy defined in DCI 155/78. This, more than any single event in the last twenty-five years, will transform and increase the size of *Sultan* and the scope of its training over the next decade. Design work to re-shape career and other courses to match the new branch structure had already begun in 1978 and, in June 1979, the first EBD training course began with the arrival of the first post-EBD young mechanics—one of the more important milestones in the history of the first twenty-five years of *Sultan*.

The 1980s

Today H.M.S. *Sultan*'s primary task remains clearly defined: to provide career and specialist training for officers and ratings of the Marine Engineering Branch.

The basic management organization to deal with this task has not varied enormously since it was first set up over twenty years ago; this reflects the imagination and foresight of those who first installed it, bearing in mind that the number under training has increased threefold. The establishment is always commanded by a Captain of the Marine Engineering Branch to whom are accountable the Executive Commander, the Training Commander, the Support Commander, and the medical and dental officers and chaplains.

The training department, which understandably is the largest, is run on functional lines ensuring that, with one or two exceptions, facilities and training resources are shared by everyone. A Commander (I) is responsible for career training, a Commander (ME) is responsible for specialist training, and a Commander (ME SM) is responsible for nuclear submarine propulsion training. A very recent addition is a Commander (ME) responsible for the project and development group known as the 'think tank'. Analysis of the managerial family tree shows the many varied tasks that are carried out, together with an indication of the level of experience required in each section.

Inevitably, the training execution task must be supported by a number of other necessary functions: training design, training planning, training resource procurement, as well as establishment support departments, all of which increase the number of staff not directly involved in teaching. Nonetheless, out of a total of 726 persons on the staff, over 300 are actively involved in training duties.

The efforts of the large training staff devolve on the trainees, the number of which, at any one time, varies considerably throughout the 45-week training year. Numbers on course regularly exceed 1000 and, for the statistically minded, the number of actual trainee-days in an average year exceeds 200 000. These figures combine to give an average instructor/trainee ratio of 1 to 5.

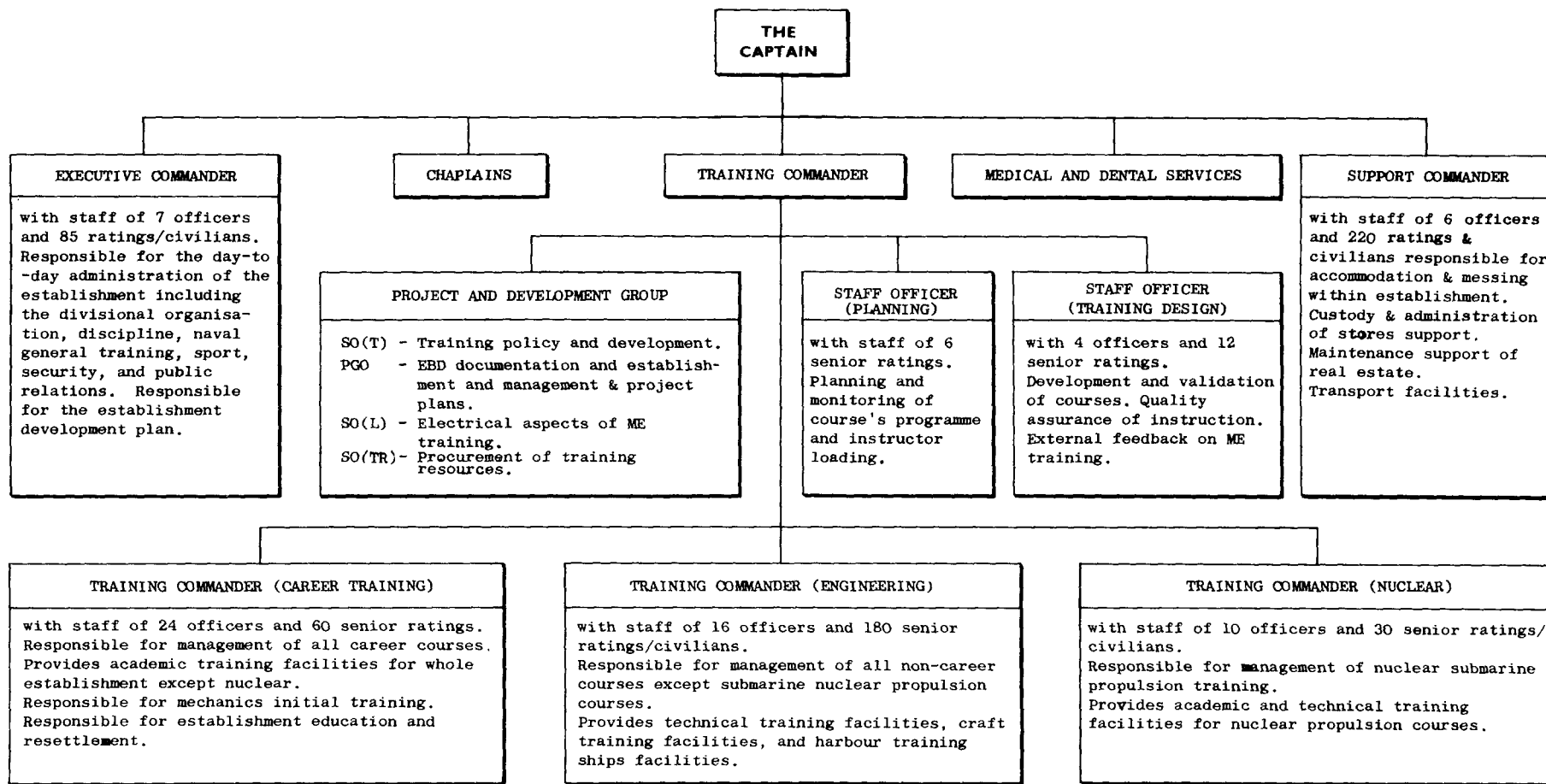


FIG. 6—H.M.S. 'SULTAN'—MANAGERIAL FAMILY TREE SHOWING DEPARTMENTAL RESPONSIBILITIES

Training revolves around a complex programme which ensures that officers and ratings in the branch return regularly to *Sultan* throughout their careers. Marine engineering training has always been, and will probably always remain, a careful mix of structured training ashore with consolidation training and work experience in the ships and maintenance bases of the Fleet—the concept of having only full-trained men at sea or in FMGs is a pipe dream which will continue to elude the most determined of sea dogs!



FIG. 7—THE ASSAULT COURSE FORMS PART OF THE YOUNG MECHANICS' NAVAL GENERAL TRAINING

The full implications of this are well illustrated by a study of various courses that exist (DCI RN 564/80 reprinted annually) but it is important to appreciate from the outset the different categories of trainees—the mechanics, the technicians, and the engineers—at which these various courses are aimed. The traditional difference between the mechanic, the technician, and the engineer, that of semi-skilled, skilled, and managerial, has become rather more intricate than this simple definition suggests. The mechanic depending on his level of experience, has both operator and maintainer skills, albeit at considerably different levels to the technician, whilst the engineer too has a need to develop operator skills required in a modern control room.

Courses fall broadly into one of the following groups:

- (a) Career courses which aim to give to trainees defined levels of naval general training, marine engineering technology, craft skills and academic ability, and engineering administration necessary at various levels in either the mechanic or technician streams. These courses dovetail closely with appropriate 'on-job training' at sea necessary for each level of advancement or confirmation in the rate.
- (b) Adqual courses which aim to update technicians and to impart to them further detailed knowledge and skills in specific fields beyond that covered in their career courses.
- (c) Pre-joining training (PJT) which aims to give to the mechanic, the technician, and the engineer a knowledge of systems and marine engineering technology and, where appropriate, operator skills, at different levels necessary for them to fulfil their designated roles in the ships they are about to join.
- (d) Specialist technical courses which aim to give selected mechanics, technicians, or engineers detailed knowledge of specific equipment, engineering or administrative systems, or craft skills.

As a result of EBD, the balance and content of the courses (and in particular career courses) has been, or according to a planned programme will be, altered and increased. Nonetheless, with one or two exceptions, the pattern of courses and their aims remain broadly similar.

Career Courses

The Mechanics' Initial Training (Part II and Part III) Course, which was naturally the first to be altered to the post EBD Training Scheme in June 1979, aims to make young mechanics 'safe at sea' and prepare them for their 'on-job training' in their first ship. After an 8-week common module Part II (a 50/50 mix of naval general training and marine engineering) they are categorized mechanical or electrical and undergo further basic semi-skilled maintainer training in their own M or L discipline (Part III) before passing out to join the Fleet.

For the Specially Selected Marine Engineering Mechanics' Course, mechanics from both mechanical and electrical disciplines who show very promising qualities as naval ratings and well above average aptitude as mechanics are selected on completion of Part III training. In broad terms, this represents the top 10 per cent. of the young mechanics' stream and these ratings undergo a 4-month course, two months of which is spent at sea with their course instructor from *Sultan*. They obtain an appropriate auxiliary machinery watchkeeping certificate (AMC) and pursue their 'on-job training' to the level usually obtained by the average rating in about nine to twelve months at sea.

The Leading Rates' Qualifying Course is the direct descendant of the original Mechanical Training Course. It will be replaced in April 1982 by a redesigned electro-mechanical course. The course is for acting leading marine engineering mechanics and the aims, which remain unchanged, are to develop their craft skills as maintainers, to improve their knowledge of marine engineering technology for the next higher rate, and to provide the primary filter for selection of suitable candidates for further training as technicians (i.e. selection for the Mechanics' Qualifying Course).

In December 1980 the POMEM's Qualifying Course was abolished. It had begun its life 25 years beforehand as the General Engineering Course. Logical though its aims were, close analysis showed that in the post EBD structure, a significant proportion of the content was or should be included in earlier career courses or Adqual courses and the remainder did not merit a formal course.

The Mechanics' Qualifying Course has also, after more than two years design effort, been extensively restructured to take account of EBD and the first of the new courses began in April 1981.



FIG. 8—THE MECHANICIAN CANDIDATE'S DAY OF RECKONING

The aim of the course remains that of bringing craft skills, academic and marine engineering knowledge, and naval general training of suitable mechanics to the level of technician, where they hold the rate of mechanic and automatically become interchangeable in their employment with marine engineering artificers. The new course is slightly longer than its two-year predecessor and is 'modular' in format; different combinations allowing easier adaptation for the various categories of the sub-branch.

The Chief Marine Engineering Artificers' and Mechani-

cians' Career Course lasts eight weeks and is the direct descendant of the old senior rates' course which started in 1962. It aims to give those who have qualified at their provisional examination a basic grounding in engineering administration and a technical updating on new equipment and new ME department responsibilities as a result of EBD policy.

The first class rates' course which was started in 1972 and also aimed to give first class rates a good grounding in engineering administration was abolished in 1979. Senior ratings who need this specialized knowledge now undergo the Small Ships MEO Course.

The Direct Entry Marine Engineering Artificers' Course moved from H.M.S. *Caledonia* to H.M.S. *Sultan* in May 1980. The Course lasts four terms and gives naval general training and marine engineering training to technicians who have joined the Navy after completing a recognized apprenticeship outside. Successful completion of the course brings the trainees to the same standard as newly qualified mechanics but with the limited naval experience of newly qualified artificers.

Adqual Courses

Currently, additional qualifications can be obtained in one of five different subjects, namely machinery controls, ICPEs, refrigeration, boilers, vibration analysis. Depending on their complexity, the courses last between one and thirteen weeks. In September 1981, a sixth Adqual course, the Hull Adqual, is due to begin after transfer from *Caledonia*. It will last up to twenty-two weeks, depending on the stream followed.

Pre-joining Training Courses

As new classes of ships are planned to join the Fleet, so pre-joining training (PJT) courses are designed and the special simulators and equipment are

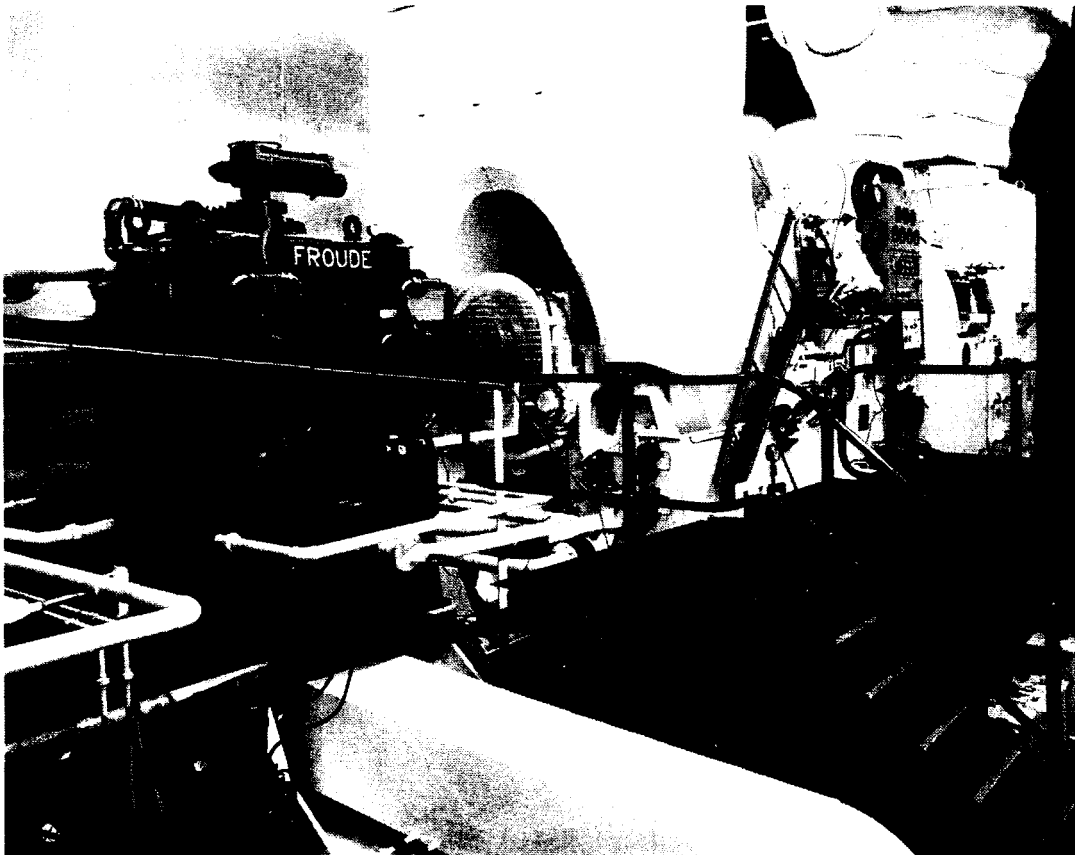


FIG. 9—THE OLYMPUS GAS TURBINE AND DYNAMOMETER

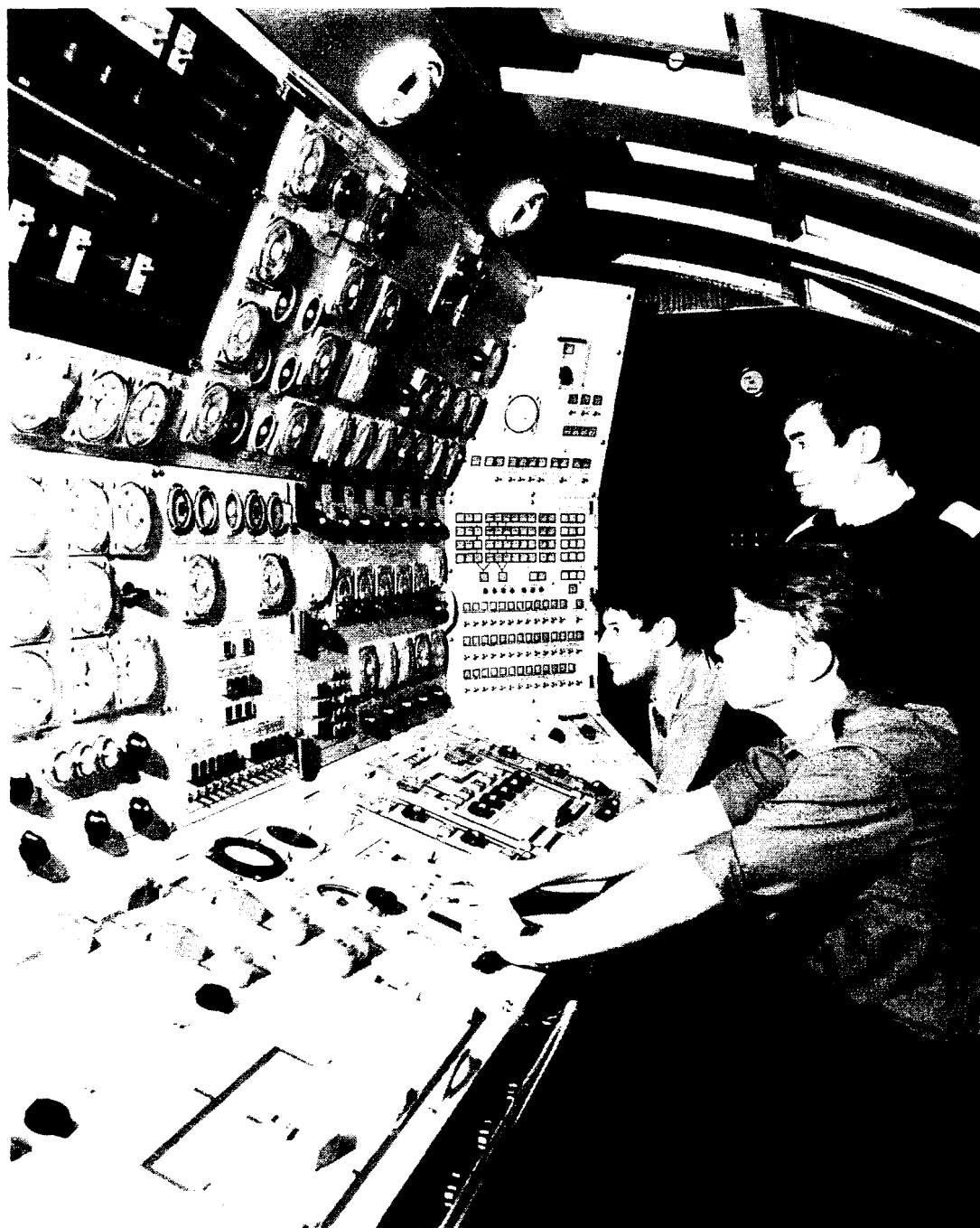


FIG. 10—THE 'SWIFTSURE' CLASS CONTROL ROOM SIMULATOR

procured. In time, when either the ships are relegated to the disposal list or when feedback from the Fleet suggests that sufficient expertise is being derived from the normal career courses, the appropriate PJT is discontinued. Currently, there are six PJT courses, all associated with the very latest ships, namely CVS, Type 22 frigates, Type 42 destroyers, Type 21 frigates, HUNT Class MCMV, and ISLAND Class patrol vessels.

Specialist Courses

Last but not least, since with over fifty of them they outnumber all other types of courses put together by almost three to one, come the specialist courses. These range through a whole spectrum of subjects, complexity, and length. Typically, at one end of the scale comes the 26-week Nuclear

Submarine Propulsion Long Course for up to twenty senior technicians or the 21-week High Duty Pipe Welding Course for only four skilled technicians at any one time; at the other extreme is a 1-day Commanding Officers Designate Course for those about to take up sea command or a 1-day Sewage Treatment Plant Course for those in need.

Training Resources

The teaching staff, classrooms, and the infrastructure of these courses is not all that is required. Mention has been made of the eight simulators already installed, the steam plant, and the running gas turbine engines but these, whilst obviously the most sophisticated, form but a small proportion of the vast inventory of equipment; an inventory that ranges from the very latest illuminated animated diagrams which show the workings of the CVS gearbox or the fluid flow in a flash evaporator, to full-size working diesel engines and gas-turbine generators and full-size but sectioned boilers and steam turbines. It also includes well over 200 lathes, grinders, milling machines, and other workshop machinery and, of course, the largest of all in the inventory—two harbour-training ships, a Type 14 frigate and a Type 81 frigate. (The aging H.M.S. *Diamond* was replaced this year by H.M.S. *Ashanti*.)

This enormous inventory is continually updated by a small procurement team within *Sultan* which regularly disposes of old equipment and acquires new.

Foreign Navies

These resources are the envy of many other navies and training is not confined to R.N. uniformed personnel or even civilians employed by the Ministry of Defence. At various times in its twenty-five-year history, *Sultan* has been involved in both career and specialist training of naval personnel from no less than forty-six different nations. Currently, officers and ratings from Australia, Bangladesh, Jamaica, Kenya, Nigeria, the Sultanate of Oman, the United Arab Emirates, and St. Vincent are under training at *Sultan* but in the past the spectrum has been even greater, ranging from Eire to Japan, and Peru to Burma.

Naval General Training

Life afloat for the Marine Engineering Branch is not confined solely to dealing with machinery; like all others, the branch must bear its share of general tasks at sea and must maintain its morale and team spirit. For this reason, all career courses contain varying amounts of training aimed at developing leadership, physical fitness, initiative and resourcefulness, acceptable standards of naval ceremonial, and a myriad of other activities which properly fall into the precinct of the naval rating rather than the naval mechanic or technician.

Resource and initiative training is carried out every weekend either on the Isle of Wight, based at the newly acquired site of Fort Bouldner, or in the New Forest. The parade ground is in frequent use with Divisions held every week for certain courses and Ceremonial Divisions four times a term for the establishment. Small arms practice, internal security training, and the assault course also form part of the curriculum.

Inevitably, the dividing line between naval general training and recreation becomes blurred when centred around more popular pastimes such as sea-sense training in the *Sultan* MFV, indoor games in the gymnasium, or sailing in the *Sultan* dinghies at Clarence Yard or the establishment's yacht *Kalisana* based in Hornet. For the more junior people in the establishment, sport, of the individual's own choice, is compulsory once per week. The range is almost limitless, from the more conventional rugby, cricket, soccer, or hockey to the



FIG. 11—SPORT —AN IMPORTANT ACTIVITY IN THE DAILY LIFE OF THE ESTABLISHMENT

more exotic canoeing, fencing, or windsurfing on the Solent. Perhaps the most notable observation is the latent talent associated with a throughput of some 3000 trainees a year. *Sultan* men and women regularly represent the establishment at sport at Command and Navy level; the *Sultan* Volunteer Band is always well supported by beginners and gifted amateurs alike; and the Amateur Dramatic Society seldom fails to get a mention in the annual Naval Drama Festival. Every year the list of clubs grows; it is presumably a prerequisite of any engineering establishment to have a thriving car and motor-cycle club and, of course, *Sultan's* steam lorry too remains alive and puffing; there are also the modelmakers, the equestrians, and the karate experts (male and female!)—there is something for everyone.

The Future

The philosophy of EBD was brought about by an appreciation that marine engineering is no longer a predominantly mechanical discipline but an electro-mechanical one and this has far-reaching consequences on training within the Marine Engineering Branch. In order that the age-old difference between electrical and mechanical disciplines is not perpetuated, the training must be modified to integrate from the very beginning both the training resources required and the training execution—it is not sufficient merely to build on new facilities to accommodate the training necessary as a result of the inheritance of responsibility for power and distribution, electrical propulsion controls, and electrical prime movers.

In addition, the perpetually increasing cost of some modern training resources (e.g. control-system simulators and full-size working engines and plants) precludes duplication in other establishments. Notwithstanding other

strong arguments for decentralization of training outside the Portsmouth Area, this tips the balance in favour of centralization of marine engineering training at H.M.S. *Sultan*. In the first instance, the demise of H.M.S. *Vulcan*, the nuclear propulsion plant operators' school, and the transfer of DEMA and Hull Adqual training from *Caledonia* have already increased the training load at *Sultan*. The projected move of artificer apprentice training from H.M.S. *Caledonia* to *Sultan*, now scheduled for the late 1980's, will complete this centralization process.

Clearly these projects will more than double the size of *Sultan* and will have to be carefully dovetailed into the existing infrastructure of the establishment. At an early stage, therefore, studies were commissioned on the future development and the ensuing reports, including the Pulvertaft Report, identified the constraints brought about by the present distribution of buildings and resources and recommended solutions which in broad terms form the basis of the establishment development plan for the 1980s.

The plan foresees development along the following lines:

- Parsons Block will become the centre for training in control engineering and PJT courses.
- Watt Hangar and its annexes together with Morrell Block and Raper Block will become the centre for training in marine engineering technology including power generation and electro-mechanical systems. It will overflow into Rattler Hangar presently occupied by the Mechanics Initial Training course.
- Rutherford Block will remain as a predominantly self-contained nuclear propulsion training centre.
- Brunel Block will expand to provide academic training in electro-technology, measurement and electrical machine theory and electronics, as a foundation for further electrical training in marine engineering technology.
- A new allied trades workshop and classrooms complex is currently being fitted out in connection with the move of the Hull Adqual to *Sultan* and future requirements of artificer apprentice training.
- New machine and fitting shops with supporting classrooms will be built to house apprentice training.
- A new Mechanics' Initial Training School will be built to provide a generally self-contained environment for ratings undergoing Part II Training.
- A new Electrical School will be built to house training facilities for power distribution, electrical systems, NBCD and electrical craft.
- A new administration block is planned to house a considerably expanded management structure.
- The existing parade ground will be expanded and converted to car parks on completion of a new three-acre parade ground sufficiently large to accommodate the projected establishment numbers of 3500 on Ceremonial Divisions.
- Recreation and physical training centres will be expanded in the immediate area of the gymnasium and in Fort Grange where an all-weather soccer/hockey pitch is planned.
- A considerable expansion of the accommodation facilities for both junior and senior ratings (male and female) together with dining halls and social clubs is planned in the north east corner of the establishment.
- A number of other smaller projects exist for the expansion, modification, or rebuild of present facilities.

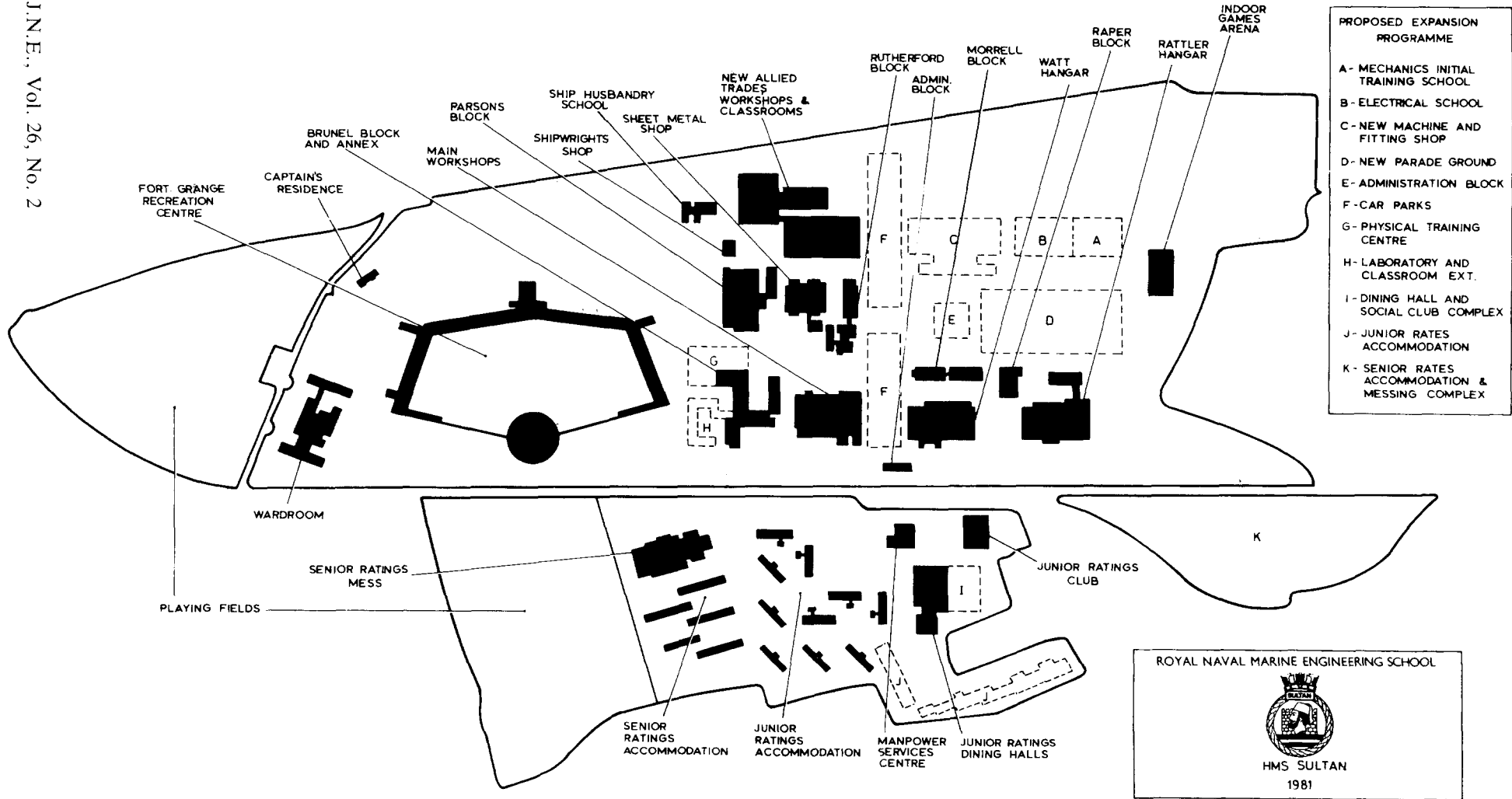


FIG. 12—THE PROPOSED EXPANSION PROGRAMME



FIG. 13—THE NEW ALLIED TRADES WORKSHOP

Clearly, an ambitious development such as this requires careful co-ordination and monitoring to ensure the minimum disruption to present training, and accordingly an elaborate programme management plan, which stretches into the late 1980's, has been set up. Inevitably, of course, the implementation of the plan is also dependent on the availability of money and it is very probable that in the present financial climate certain elements of the plan will be deferred or modified. *Pedetentim* indeed!

This then is a picture of *Sultan* as it is today, and of how it has contributed to naval engineering training in the last twenty-five years, and above all how, as the now undisputed Alma Mater of the Marine Engineering Branch, it is ready to face the challenge of the next twenty-five years.

'They are an amazing breed these quiet, rather pale, men in whose hands lie the strength and power of the ship.'

A Fleet in Being
RUDYARD KIPLING. 1899