

# THE ROYAL ENGINEERS JOURNAL

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Volume 89

**MARCH 1975** 

No. 1

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COUNCIL OF THE INSTITUTION OF ROYAL ENGINEERS

(Established 1875, Incorporated by Royal Charter, 1923)

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Authors alone are responsible for the statements made and the opinions expressed in their papers

# Editorial

## Births

*RO YAL ENGINEER INSTITUTE*—On 22 May 1875 at Chatham, Kent, to the Corps of Royal Engineers—an Institute, renamed Institution of Royal Engineers in 1922 and granted Royal Charter in 1923.

IN our Centenary Year one is tempted to concentrate on looking back. It is however equally important to report the present and to discuss the future. The first *RE Journal* of the Centenary Year introduces a more modern cover and title page. It is hoped that it meets with your approval.

The two articles published in this issue of the *Journal* on Divisional Engineers in BAOR, "Organization For The Eighties" and "It Must Be Right", are concerned with the future. Both were written before the publication of the Defence Review. They have been published side by side as essentially they deal with the same problem but arrive at two different "solutions". Accepting that there is no truly correct "solution" the authors have written provocative articles which should, if there is any justice at all, initiate some interesting correspondence. One must ask certain questions. Can an engineer commander be fully effective as a commander and adviser? Is there a right level of command advice at brigade and battle group level? Do either of the solutions really increase (or even maintain) the existing flexibility? Are specialist squadrons really necessary? New equipments speed up tasks but do they also mean that less men are required? Should the existing "cake" be redistributed or is the answer to make a new cake? Is Northern Ireland largely to blame for lack of "all arms" contact? The correspondence pages are open!

Other articles deal with the present, some with "future connotations" (to plagiarize a phrase from a popular radio programme). As to the past, Brigadier Lacey has contributed a brilliant article on the History of the Institution.

This balance of past, present and future is not an Editor's gimmick, it is an essential part of military engineering which, as a progressive art, uses lessons from the past to influence the present, which, in its turn becomes the springboard for the future.

The celebrations for the Centenary Year as a whole must be self supporting. A special Commemorative First Day Cover will be issued on 22 May 1975 and the profits from this venture will be used to offset the "guest" costs of the two main events. It is therefore important that the Commemorative Cover be a financial success. The President and five former Presidents have all agreed to autograph a number of the Covers which will enhance their value as collectors' items. Details of the Covers, the prices and an application form are included in this issue at page iii, which can be cut out without damage to the Journal itself.

The two main "events" will be a Centenary Dinner to be held in RE HQ Mess at Chatham on either 28, 29 or 30 October 1975 and a Centenary Meeting and exhibition to be held at the Institution of Civil Engineers in London on 27 November 1975. Details of both functions will be published later.

MLC in his fascinating regular feature "Early Days" states that 1875 was not a very exciting year for the RE Institute, it is up to all of us to ensure that some future chronicler will not write this of 1975.

# Centenary of the Institution of Royal Engineers

# BRIGADIER J H S LACEY, CBE, BA

ON 22 May 1975 our Institution will celebrate the hundredth anniversary of its establishment as a Society under the name of "The Royal Engineer Institute", having for its objects "the general advancement of Military Science and more particularly for promoting the acquisition of historical and scientific knowledge in relation to Engineering as applied to military purposes". Field-Marshal His Royal Highness Prince George William Frederick Charles, Duke of Cambridge, Commanding-in-Chief of Her Majesty's Army and Colonel of the Corps of Royal Engineers, became the Institute's first Patron, and Lieut-General Sir Frederick Chapman, the Inspector General of Fortifications, the senior Royal Engineer appointment in the Army at that time, the first Institute Committee's Chairman.

Before any living plant, being or indeed a society can see the light of day nature demands a process of generation, and this was so in the case of the Society under the name of The Royal Engineer Institute.

The years following the end of the Napoleonic wars witnessed a remarkable renaissance in the field of pure and applied sciences and in engineering throughout Europe whilst overseas there was a rapid opening up and expansion of colonial territories. Sapper officers serving at home were not slow to follow closely these scientific and technological advances and to study how they could be put to military use. At the same time those serving abroad in colonial territories often found themselves the only professional engineers and surveyors in the land and personally responsible for its development.

A vast bank of both knowledge and experience was thus built up in the Corps and it was decided in 1837 to publish "occasional papers on subjects connected with the duties of the Corps of Royal Engineers in order that scientific and professional knowledge could be made more generally known to Royal Engineer officers serving in different parts of the world". The subscription to cover the printing and postage costs of these papers was ten shillings a year. All Royal Engineer officers and officers of the Honorable East India Company Engineers subscribed and many contributed papers to the series. At first the circulation of these papers was limited to those officer subscribers. Soon however the papers' high standard attracted wide interest and copies were purchased by civilian professional bodies and military libraries throughout Europe and in the United States of America. The first Editor of these *Professional Papers* was Lieutenant (later Lieut-General Sir William) Denison who was destined to achieve fame in high government appointments in Australia and in India. He can rightly be considered as the Founding Father of our Institution and the editions of his *Professional Papers* the seeds from which it germinated.

During the period about which we have been talking three important British professional Engineering Societies were formed. The oldest of these was that of the Civil Engineers. John Smeaton (1724–1792) who built the Eddystone Lighthouse and other notable structures was, it is believed, the first to call himself a civil engineer and thereby sever his profession from that of the military engineer—the oldest of the engineering disciplines. An Institute of Civil Engineers was formed in 1813 and it was incorporated by Royal Charter in 1828 which made it the world's first engineering society. Thomas Telford (1754–1834), the builder of the Menai Straights Bridge, became the Institute's first President. Among its earliest Honorary Members were several famous Royal Engineers and the Institute's highest award—the Telford Medal—has been awarded to Sapper officers on many occasions. In 1860 Charles Mamby, the Secretary to the Institute, was instrumental in the formation of a Volunteer force called the Engineer and Railway Staff Corps, an historic Royal Engineer

unit that exists to this day in the T & AVR. The second branch of the modern engineering profession—mechanical engineering—was derived from the inventions of James Watt and the British textile machinists and machine tool industry of the nineteenth century. The mechanical engineers formed their own Institute in 1847 and the Corps has since then provided two of its Presidents. In 1897, at the suggestion of the Council of the Institute of Electrical Engineers, a Corps of Electrical Engineer RE Volunteers was founded and Dr John Hopkinson, the then President of the Institute, was commissioned to raise and command this new Corps, designed to help the Submarine Miners work the defence electric lights then being developed. Somewhat later the Institute of Electrical Engineers was formed in 1871 from the Society of Telegraph Engineers. Three Royal Engineer officers were among its Foundation Members and the Corps has since provided six Presidents of the Institute. Both the Institutes of Mechanical and Electrical Engineers were in due course also incorporated by Royal Charter, and all three Institutes built for themselves spacious headquarters in London.

The aims of these Institutes were threefold. Firstly they kept their Members informed of major engineering projects and technical developments by holding Meetings at which papers were presented and discussed; information was disseminated through Institute publications and each Institute built up a library of works of a professional nature to which members could refer. Secondly they set professional standards for their particular discipline, and acted as examining bodies, and thirdly they laid down ethics of conduct to be observed by their members. The requirements for membership of these Institutes included being of good moral character, having particular educational qualifications and having practised in a responsible capacity for a stipulated period. Membership was graded from student to full membership and each Institute kept a Register of its members. Inclusion on this Register was often a pre-requisite for employment in certain professional appointments. A recognized status had thus been given to these branches of the engineering profession. Each Institute introduced Medals and Prizes as a reward for outstanding competence and maintained a Benevolent Fund to assist in cases of financial distress among its members.

When these Institutes were formed there was nothing derogatory about the word "institute". The name was however changed in 1922, it being considered that the term institute had become synonymous with the work-house and an inappropriate title for august professional societies. The word Institution took its place.

During all this time the Inspector General of Fortifications was closely watching the effects of the introduction of the breach-loading cannon and rifle firing high velocity, flat-trajectory projectiles. Their Lordships at the Admiralty were slowly replacing their famous wooden walls by ironclads, and sail was gradually giving place to steam in the Royal and other Navies, and on land a completely new design of lowsilhouette seaward fortifications and field defences had to be evolved. The operations of a signal service, a responsibility first placed upon the Corps during the Crimean War (1854-56), had grown enormously. Submarine mining, which consisted of the electrical firing of mines placed to defend Naval bases and commercial ports was being developed and also the introduction of defence electric lights (searchlights) to illuminate enemy targets. The railways in the United Kingdom had sprung up at an unbelievable and rather disorganized rate. Some form of central control had become necessary and Major-General Sir Charles Pasley, of Chatham fame, had been appointed the first Inspector-General of Railways. Sapper and General Staff Officers were busy studying how railways could be used to hasten the mobilization of the Army, increase its mobility in war and help in its maintenance. Sapper officers, without any official backing, had become personally interested in ballooning and the possible introduction of an Air Arm into the Army. Sapper officers and soldiers had been actively employed on the 1-inch to the mile survey of the United Kingdom and had completed a 6-inch to the mile survey of Ireland. Captain Francis Fowke, under the sponsorship of the Prince Consort, had been given the task of designing several cultural public buildings. The Victoria and Albert Museum in London, the Edinburgh

Museum of Science and Art and the Dublin National Gallery had been built to his design. His final work, erected in honour of his patron, was the Royal Albert Hall which he designed but died before its completion, the building with its great dome being finished by another Sapper officer Colonel (later Major-General H Y D Scott). Overseas in Canada Colonel John By between the years 1826-32 had constructed the Rideau Canal, a waterway using two river systems and a series of lakes, locks and masonry canals stretching 130 miles from Ottawa to Kingston. Two of the dams in the waterway were in their day the highest man-made dams in North America. In 1858 Lieut-Colonel Moody had been sent with a company of Royal Sappers and Miners to British Columbia to develop the Colony, a task which they had carried out with considerable skill in face of great difficulties. Other Sapper officers had carried out remarkable works in the development of Australia and New Zealand. It was however in the Sub-continent of India that the military engineers carried out their major civil works: the Great Trigonometrical Survey of the country; the construction of Grand Trunk Roads; the building of the State Railway systems, which included bridges greater than Telford's Menai Straights railway bridge, and its attendant electric telegraph systems, and vast irrigation projects, the largest being the Godarvary Delta, the Kistra and Orissa irrigation systems were the work of a Sapper officer, Colonel (later General) Sir Arthur T Cotton, a leading hydraulic engineer of his day.

It was about this time that the Corps of Royal Engineers set up an Institute of its own to become the custodian of the Corps' long and distinguished history and to disseminate among its members professional knowledge, gathered from such a wide and ubiquitous field. To this end a Royal Engineer Institute Committee was set up in 1870 to study how this could be brought about.

The Secretary of State for War had to be persuaded as to the need for such an Institute and a building had to be provided in which it could operate. Fortunately the Corps had the full backing of the C-in-C HRH The Duke of Cambridge for the project.

It was decided that membership of the proposed Institute should be limited to Royal Engineer officers on the Active and Retired List of both the Regular Army and of the Auxiliary Forces. The tasks of the Royal Engineer Institute would not embrace all of those which the Institutes of Civil, Mechanical and Electrical Engineering had taken upon themselves. The status of the professional military engineer in this country had been established in Norman times and had never been questioned since then. There was, therefore, nothing for the proposed Institute to do in that respect. Furthermore it could have no say in the standard of educational attainments required by those commissioned into the Corps, their further training, their promotion in their profession or their ethics of conduct. Such matters were already the province of wellestablished departments of the Army. The subject of Corps benevolence was being studied elsewhere. The main task of the Institute would as a result be limited to the dissemination of knowledge among its members, a task analogous to that of a "Learned Society". In such Societies membership is not graded as was the case in the professional engineering Institutes. It was agreed, therefore, that there would be no grading of membership in the Royal Engineer Institute. It was further agreed that stress should be laid upon the acquisition of historical as well as scientific/technical knowledge because so many lessons could be learned from the successes and also from the failures of by-gone military engineering activities. As a means of disseminating this information it was decided to publish regularly a quarterly Royal Engineer Journal in addition to the Professional Papers, published only occasionally. The first Journal was published in August 1870. It was a combination of what we now know as the Journal, List and Supplement, containing historical and professional matters of interest primarily to officers of the Corps, a Register or directory showing the appointments of serving officers and addresses of those on the retired list and domestic Corps news. The occasional papers however continued for some time as the main professional publication. The September 1970 issue of the RE Journal-the Centenary Number of the Journal-described in detail the somewhat intricate way in which the present day Journal, Supplement and List evolved from the original Journal and the gradual assimilation of the professional papers into the Journal.

In 1871 a Royal Commission on Military Education approved the provision from public funds of a building in Brompton Barracks, Chatham to provide accommodation for the proposed Institute, a lecture theatre and classrooms for normal instructional purposes. Lieutenant (later Sir Montagu) Ommanney was selected as the building's architect. The foundation stone was laid by HRH The Duke of Cambridge on 28 May 1872. The construction of the building was entrusted to Colonel J W Lovell, Commanding Royal Engineers, Chatham. It was completed on 31 December 1873 the cost being within a few shillings of the estimated £21,000. Inflation was not a bugbear in those days! After the completion of the building the Committee submitted its final report on how the proposed Institute should function and be organized. It was approved in its entirety by the Commanding-in-Chief and the Secretary of State for War. A precis of the report was formally accepted at the 22 May 1875 Annual General Meeting of the Corps and the Royal Engineer Institute saw the light of day at that moment.

HRH The Duke of Cambridge graciously consented to be the Institute's first Patron and Lieut-General Sir Frederick Chapman, the Inspector General of Fortifications, became the first Chairman and Captain R H Vetch the first full time Sceretary to the Institute and Editor of its publications. He was also responsible for the publication of the *Corps Funds Report* (the Yellow Book) for submission to the Annual General Meetings of the Corps and other Corps domestic duties.

And how has our Institution conducted itself during the hundred years since its formation?

It has changed its name and the title of some of its publications. In 1881 it was decided at an Annual General Meeting of the Corps that an "s" should be added to the name of Engineer for all Corps Associations. The Institute thus became the Royal Engineers Institute and its Journal the *Royal Engineers Journal*. In 1922 keeping in line with other professional bodies the word Institute, whose meaning had become debased, was replaced by the word Institution and the title Institution of Royal Engineers was adopted and the style Chairman of the Institute changed to President of the Institution of Royal Engineers.

On 27 February 1923 the Institution was incorporated by Royal Charter under the Sign Manual of George the Fifth, by the Grace of God of the United Kingdom of Great Britain and Ireland and of the British Dominions beyond the Seas King, Defender of the Faith, Emperor of India. On granting the Royal Charter HM King George V graciously consented to be Patron of the Institution and subsequent Monarchs have, in their turn, graced the Institution with their patronage.

During the hundred years of the life of the Institution the development of the art of military engineering has marched hand-in-hand with developments in the civilian engineering profession. Very close contact has therefore been kept with professional Institutions by the inter-change of publications and by the holding of Joint Professional Meetings at their London Headquarters when papers of mutual interest were presented and discussed. Recently Joint Branch Meetings have been held at various centres throughout the United Kingdom to further and widen this contact. Many erudite members of the civilian professional Institutions who have served as Sapper officers in the Reserve Army have become Members of Council of our Institution where their competent advice has been greatly valued.

In the field of the dissemination of historical knowledge the Institution has published, in nine volumes, a history of the Corps from Norman times to 1948, histories of the Royal Sappers and Miners and of Submarine Mining and early military flying, histories of the East India Company and Royal Engineers in India, a history of the Indian Sappers and Miners, a history of the Royal Engineers in Egypt and the Sudan and a wide range of works on particular Sapper wartime tasks and domestic and sporting activities. Whenever practicable articles of an historical nature of general interest have been included in the *Journal* and Memoirs, published in the *Journal*, of deceased Sapper officers are often in themselves of great historic interest. The Secretary to the Institution is charged with keeping up to date the Roll of the Corps which contains the names and records of promotion of all officers commissioned into the Corps since 1759 when officers of the Corps were first given military rank in addition to their engineer grades.

Recently a RE Historical Society was formed to maintain unit histories and records of Sapper activities. This record of today's happenings becomes tomorrow's history. The Institution is now recognized universally as the best source of all information on British Military Engineering and on the past activities of the Corps and works carried out wherever Royal Engineers have served. Such information is in constant demand from all kinds of sources and it is only very seldom that a comprehensive answer cannot be given, and given quickly.

The Institution's publications, and in particular its *Journal*, have been the main medium for the dissemination of scientific knowledge in relation to Engineering as applied to military purposes.

The Journal today has a circulation of about 4,000. About 3,600 copies are distributed to Institution members. The rest are sent to the major professional Institutions in this country, and to certain Universities, as well as to the various Staff Colleges, the Royal Military College of Science, most of the Arms Schools, the RMA Sandhurst and overseas to certain Staff Colleges, Arms Schools, Universities and Military Engineering Colleges of Commonwealth Countries, the United States and other NATO countries, the Republic of Ireland, Spain, Portugal and some South American countries—a circulation greatly exceeding Denison's Occasional Papers. With such a ubiquitous reading public we must do all in our power to retain the high standards set in the past and this will depend entirely upon the excellence of contributions for publication submitted by Institution members.

The present day *RE List* is a combined Institution/AG7 publication. AG7 is responsible for the Sections dealing with officers on the Active List and the Institution is responsible for the other Sections. The *List* used to be published quarterly and gave a complete world wide RE Orbat showing all engineer staffs and units and the names of officers posted to them. For reasons of security this detailed information is no longer given and, for reasons of economy, publication was first cut to two *Lists* a year and has now been reduced to one.

The Monthly Supplement has since 1905 been the official organ of the Corps in which is published extracts from Army Orders and London Gazettes affecting RE officers, Corps notices, Births, Deaths and Marriages and reports on social and sporting activities. For reasons of economy alas the reporting of sporting activities has had recently to be curtailed which is a great pity since many of the reports sent in had a particular historic value in their own right and were often most entertaining and witty.

The first Royal Engineer Journal of 1870 was printed by T Woolley of 26 High Street, Old Brompton. When this firm folded up the printing of Institution publications was carried out in London. The separation of the Editor from printers so far away however produced many difficulties and, after a short and unhappy time, printing was entrusted to W & J Mackay Ltd of Chatham in 1888. This firm has remained the printers of all Institution publications, including Corps Histories, ever since—a most remarkable record covering three generations of the Mackay family. Their new printing works were opened a few years ago at Lordswood in a large clearing in the wood in which the RE Drag had hunted for many years. The new works are the most modern of their kind and the close, happy personal liaison at all levels, so essential to efficient and "on the dot" publication, is still as it always was, which is a felicitous augur for the future.

The First World War did not in any way interfere with the printing of Institution publications. Indeed the copy for the *Journals* during those war years was greater than ever before. The heavy air attacks on the Chatham Dockyard of the Second World War caused the departure of the School of Military Engineering from Brompton Barracks to Ripon. The staff of the Institution however remained put and, despite the air-raids and the destruction they caused, the publication and distribution of the Journal, List and Supplement weathered the storm. More recently problems have arisen due to industrial disputes in the printing industry. During one of these disputes no National or other newspapers were printed for a time. The publication of a Monthly Supplement would have suffered a similar fate had not Mr Mackay Miller and the apprentices of his firm personally set up the type for it and run it off. To help him the Supplement was kept down to bare essentials and it was the slimmest one ever printed. However the tradition of never failing to publish was preserved.

On the formation of the Royal Engineer Institute a Library was established in London and Branch Libraries set up in other military centres at home and overseas to make available to Institute Members "information of a scientific and technological character bearing upon problems of national defence". Over the years these libraries grew in size and added to their holdings biographies of famous statesmen and soldiers, historical works and books on travel. The Second World War saw the closing down of all these Libraries. Many of the volumes from them were crated and stored in the cellars below the Headquarters Mess at Chatham. After the war the laborious task of unpacking and sorting them was undertaken. The lecture theatre in the Institution Building was converted into a Corps Library which now contains the Roll of the Corps, a complete set of all Institution publications, many historic documents and over 30,000 books. It also contains several albums of photographs of great Corps history interest. Branch Libraries were not re-established.

The Royal Engineers Museum was set up in its present location in Brompton Barracks by the Institution in 1912, taking the place of a model room and small Museum previously run by the School of Military Engineering. Its aim is to display in a visual form the development of military engineering and the development of the Corps of Royal Engineers and its outstanding achievements in peace and war. Today it is among the foremost Military Museums in the land. One of the most interesting collections displayed is that of the obverse and reverse of every campaign medal awarded since such medals were first awarded, each medal having been won by members of the Corps from the rank of Sapper to General Officer. Only a Corps with "Ubique" as its motto could produce such a unique collection of battle honours.

The Institution is now also responsible for the maintenance of certain Corps Memorials and the administration of funds set up to provide Medals and Prizes for professional competence and for outstanding contributions to the *Journal*. In 1921 the Institution took over responsibility for the administration of the RE Kitchener Scholarships Fund which exists to help in the cost of the education of the children of deceased Royal Engineer Officers and Other Ranks. Many such children have been helped by this Fund and been sent to schools that their fathers would have wished, thanks to this help and the courageous self-denial of their mothers. With the recent reorganization of Corps Benevolence the Royal Engineers Association has been able to assist financially in many of these cases.

The provision of sufficient funds to pay for the many Institution spheres of action has always been a problem. In the early 1950s it became possible for members to covenant their subscriptions to the Institution which, because of its educational role, had become a Registered Charity. The Institution was thus entitled to recover the income tax paid by members on the amount of their subscription. This greatly increased the actual value to the Institution of such subscriptions. Shortly afterwards however the Inland Revenue disallowed this scheme in our and other cases and it was decided to appeal against their ruling. Thanks to the good offices of Lord Nathan, who took up our case, and the skill of an eminent QC briefed by him on our behalf, the appeal was sustained in February 1959. The scheme was allowed to continue and claims for back payments were met. It is essential to the financial stability of the Institution that all members should covenant their subscriptions so that full advantage of this heaven (government) sent opportunity to increase subscription income can be taken. It is a heartening thought that the great majority do so. Thanks to the Council's careful and enlightened management of Institution investments their capital value and the income derived from them have over the years steadily increased. It has, however, been difficult to keep pace with the present inflation. To achieve economies the scope of the Institution's publications, on which a large percentage of its income is spent, have had to be curtailed.

Ever since the Institution saw the light of day in 1875 at Chatham it has received the full support in every way from successive Commandants and their staffs. The Institution offices, the Corps Library and the RE Museum are located in the Commandant's "hunting country" as are many of the major Corps Memorials. It would be highly improper at this time not to acknowledge the debt of gratitude the Institution owes for this century of never-failing help in large things and in small.

Finally it would be inappropriate not to mention the devoted and dedicated service rendered by the Institution staff. Comparisons can be odious but in this respect the names of the following long serving Chief Clerks should be mentioned. Mr Sampson (1885 to 1921), Captain Hurwitz (1921 to 1945) and Mr Mills (1947 to 1965), as should that of Mr Jennings who was the Publications' Clerk from 1951 to 1968.

What about the next hundred years? With the rate of growth of scientific knowledge in relation to engineering and the changing role of our Armed Services it is difficult to foresee the future. However so long as the Corps of Royal Engineers exists surely its professional competence and mystic will be maintained and its Institution will, in the words of its Royal Charter: "diligently continue to disseminate knowledge connected with the Science and Art of Engineering in its application to military purposes and thus provide a most valuable source of information of a professional kind to all who are engaged on the defence of the Realm".

# **Recent Thoughts on Bursaring**

Not likely to stimulate PQEs or those who contemplate further advancement

in the Army

# MGS (RARO)

SOME people think of becoming a School or College Bursar on retirment. I know very little about being a College Bursar: Tony Gye at Oxford or Mike Crosthwait at Cambridge know far more. For that matter I have great depths still to plumb in school bursaring: I suppose that applies to anyone doing anything.

I think you have to be a bit of an academic to find a College life congenial. Someone who has not been educated at a university might find the day-to-day company of his fellow-Fellows, whose youth is often camouflaged by hirsute growth and who have little or no small talk, forbidding. My line is just school bursaring: at which, so far at least, a touch of Service rank and a passing acquaintance with Camberley and Latimer still carries weight. I would not include the Higher Establishment in Belgrave Square. "Two Star" men tend to be considered too high-powered; and anyway most go in for serious gardening, university Chairs or managing directorships. Within the last year or so, one such has given up bursaring and become an un-salaried Governor; and a second (not of course a Sapper) has resigned. (I suspect that the latter had been in danger of taking over his school in a big way and, like General Walker and Colonel Stirling in a different context, had been given a few hints.)

And so to School Bursaring. As retirement grows near, I gather one can't just decide to be a Bursar. There is much competition for these jobs—heaven knows why! You have to have a primary objective with an easier entrée. Election to a bursarship is more a matter of luck than of qualifications and experience, and the type of man or woman required varies from school to school, but the fact is that bursaring is popular with those about to leave the Civil or Armed Services, with industrialists who want to get out of the rat race and with stockbrokers feeling the pinch.

What does the job entail? The short answer is that one acts as Staff and Regimental Paymaster, Messing Officer, Quartermaster and Garrison Engineer—curiously enough most of the things which one strives to avoid in the Service—with a touch of GSO2 (Plans) thrown in. The degree to which one is also a Clerk of Works (and even a draughtsman) depends on the size of the School. Obviously one is more of a "senior officer" at Winchester or Charterhouse than at St Trinian's or Dotheboys Hall. But in these days there are many trivia at all schools. So it is no good embarking on a bursarship unless one is prepared to do without GSO3s, RQMSs and Chief Clerks, and to "DIY" to some extent.

Should one go for boys or girls? I don't think that, as a general principle, the sex matters. But girls look after the premises better than boys, which helps on the "Q" side: they are also more figure-conscious (age for age) than boys, which makes for economy in catering. And of course girls mature rather earlier than boys, which makes the company of the young more charming. Mistresses are rather more prone than Masters to leave bursaring to the Bursar, and that minimizes interference. Perhaps a Headmistress is more difficult to know quickly than a Headmaster, but one should take a medium-term view. I have a feeling that a Headmaster is not content until he has the Bursar under command, whereas a Headmistress will negotiate indefinitely on the basis that her Bursar is "in direct support". I would still tend to go for girls.

That brings me to the all-important question of command or, as civilians have it, status. It is important to be Clerk to the Governing Body, and appointed by them, as well as Bursar. It is as Clerk that one has a hand in policy and development, and so there are planning papers to write. Like most military papers they will probably have a long shelf life, but if a generous Old Boy or Old Girl dies unexpectedly you have the plans laid and a new music school or gymnasium on the horizon. Boards of Governors, not unlike MOD Committees, tend to be too large. All other things being equal one should go for a school with not more than twelve Governors, and they should not contain too many lawyers or chartered accountants, or the Clerk will have difficulty in interpreting their opinions and in recording the Minutes. If you see the Chairman of a Clearing Bank on the list of Governors, make for his (or her?—Equal Pay comes in by December 1975) school. He/She has a flair for articulation, clever ways of making money and a unique "Old Boy/Girl Net" when it comes to swelling Appeal Funds.

Does bursaring offer a career? Probably not for the usual retiring officer. And anyway those entering the job at fifty, or rather less, probably want to take root locally and stay put. For a younger man there is a vague promotion ladder, and a few years' experience at a 2nd XI school should stand him in good stead on the short list for Eton. The minimum salary ought to be £3,000. With a free house or a living-out allowance instead, plus a few perks—at least the house telephone free and perhaps a "Company car"—the remuneration is not too bad. And if there are young children they can probably be educated at the school for half the normal parent's fees.

What by way of the most recent thoughts? I believe that the job of Bursar is rewarding. Were it not so I think that fewer Bursars would stay in post as long as they do. The first year (at least) is trying and even a little humiliating: the days of being able to delegate successfully seem a thing of the past, and all too many of the trivia are boring. But the Bursar works side by side with a dedicated band of congenial teachers, matrons and housekcepers, and they are all grateful for the Bursar's efforts if he never says "No". (How I wish I could say that the cooks too are dedicated!) It was that great soldier "Honker" who once advised me at the outset of a tour as a DCRE in Malaya: "If the CO asks you to put a false ceiling in his ugly Romney Officers' Mess, you won't be able to afford it. But don't say 'No'; give him something else instead, perhaps a small hatchway from his office to the Chief Clerk's next door. He will be equally pleased at a fraction of the cost." That is advice which I have never forgotten.

I have only one further thought on this subject of bursaring. Possibly the greatest reward lies in winning the trust of the Headmaster or Headmistress and thereby becoming, quite unofficially, his or her private counsellor. It is good to be felt just a little bit indispensable on that account, particularly at the end of a day in which mundane matters have seemed almost over-powering and certainly nauscating. All in all I suggest that a Bursar's life is worth serious consideration.

# Sojourn at Ripon 1972–74 Reflections on a Tour in Command

LIEUT-COLONEL A J V KENDALL RE

## Introduction

WHEN news of a posting to Ripon early in 1972 first filtered through from the recesses of the Military Secretary's department at Stanmore, one of my first reactions was to look for a map. I knew little or nothing of Yorkshire, and except for a spell with airborne forces fifteen years earlier I had not previously served in a field force unit in this country. The prospect of a command tour in 12 Engineer Brigade was therefore welcome not only as a major piece of good fortune but as an introduction to a refreshingly new environment after earlier tours at regimental duty in BAOR. In no way did the subsequent two and a half years in 38 Engineer Regiment prove a disappointment.

The notes which follow are an attempt to convey a general idea of what the regiment's role entailed and to describe the nature and scope of some of the tasks we were called upon to undertake. They also cover a few of the attendant training and management problems confronting a CO of this type of unit. They are, in short, intended to do no more than give a glimpse of the life and atmosphere of a home-based field force sapper unit over the past year or two.

## Organization and Role

Together with its twin sister at Maidstone and more luxuriously appointed airfields counterpart at Waterbeach, the regiment, based at Ripon since 1957 and presently consisting of 11, 32 and 48 Field Squadrons and 15 Headquarter Squadron, was fortunately spared the defence-cutting axe of the late sixties. 15 Field Support Squadron ceased to exist in name in 1972 on combining with regimental headquarters to form the headquarter squadron, but the manpower loss was minimal and the squadron's traditional function—the provision of plant, workshop and resources support to the regiment—remained unaltered. The only significant difference was its assumption of the responsibility for administering and staffing RHQ; this made it much less vulnerable for detachment as a separate entity on an emergency tour or major overseas project, much to the chagrin of many of its members and the approval of most of their wives.

38 Engineer Regiment's designated operational role as part of the NATO Order of Battle was, and still is, the provision of sapper support to the Harrier Force of RAF Germany. This commitment, initiated nearly five years ago with the introduction of the VSTOL Harrier aircraft to squadron service, took a little getting used to in a unit designed primarily for the airportable role and not specially tailored to a specialist form of combat engineering in NBC conditions. Nevertheless the regiment has since had its full share of Harrier support commitments and over the past few years one field squadron has normally been earmarked for exercises, routine assistance or emergency operations in this role for four to eight months at a time.

Harrier apart, the unit (like in many of its counterparts in UK Land Forces) is continuously at a week's notice to move anywhere by air in a contingency. Our main day-to-day role, however, was the straightforward provision of engineer support to the Army, and to a lesser extent the RAF; this encompassed the provision of squadrons for operational tours in Ulster, a variety of construction projects, several demonstrations and showbiz activities for both military and civilian consumption and miscellaneous forms of assistance to the reserve army, cadet forces and the recruiting organization. In warmer climes the regiment provided detachments of troop strength or larger for several unaccompanied tours in support of overseas garrisons, and in addition was fortunate enough to obtain three challenging engineer projects in underdeveloped countries.

With such a diverse range of commitments on the programme, I found myself



Photo 1. Germany: Harrier exiting from hide.

serving several masters in addition to the brigade commander. 38 Regiment is the furthest extended limb of 12 Engineer Brigade, whose headquarters at Barton Stacey allocates and monitors most of the unit's major commitments. However we lay within the physical parish of North East District, whose GOC exercised a controlling interest in administration, security and regular army assistance and could task the unit direct in a local emergency or in aid of the civil power. While engaged in Harrier support in Germany I was ultimately responsible to Chief Engineer BAOR, while in the field we came under operational control of the Harrier Field Force Commander, a RAF group captain. Playing off one of these several senior officers against another was in itself a full time occupation.

## **Operations and Training**

What did these differing roles involve in terms of unit commitments between early 1972 and mid 1974? Harrier support is perhaps the most suitable starting point.

We naturally spent a good deal of our time exercising our operational role on West German soil. Consequently we gained invaluable first hand experience in the rapid construction and maintenance of the tactical strips, hides, taxiways and forward operating pads which are part and parcel of Harrier support in the field. In dry conditions the task, though time-consuming, was fairly simple, but the problems arising from wet weather and sodden ground fully taxed both manpower and resources on more than one occasion. Back home, support was provided for the UK based Harrier squadron at Wittering on several exercises in the more remote areas of Britain or on the flanks of NATO, and help was given for a plethora of demonstrations and displays culminating in the Farnborough Air Show. The regiment's first experience of operations inside the Arctic Circle was gained in autumn 1972 when supporting the Harriers from Wittering at Tromso in North Norway.

Closer to home Northern Ireland inevitably held the centre of the stage. Following the construction by 48 Squadron in 1971 of the first phase of Long Kesh prison (since much better known as the Maze), the field squadrons between them carried out four more emergency tours in the engineer role in the extensive border areas of Ulster over the next two years and the headquarters squadron chipped in with a sizeable reinforcement for the engineer park at Antrim. One squadron also made a brief, unscheduled visit to the province during the UWC strike of May 1974 which, coming typically over

a public holiday weekend, fully tested our rapid recall and emergency deployment drills. Most of the past four years have seen at least one element of the regiment either serving in Ulster, recently returned from operations, or training for an oncoming spell in the province, and in mid 1974 a squadron was breaking new ground by preparing for an infantry-role tour in Belfast which by the time of writing was well under way. To the disappointment of some, however, regimental headquarters hdd not, by the time I left, yet been called upon to cross the Irish Sea.

Further afield, diverse projects in Ethiopia, Seychelles and the Sudan were probably the most worthwhile features undertaken. As the field squadrons were operationally committed elsewhere, the Ethiopian venture in the spring of 1972 was given to 15 Field Support Squadron immediately before its change of identity. The exercise, named MINTON and supported from a base camp in the British Embassy compound at Addis Ababa, required the installation of a 700 ft power driven aerial ropeway across a remote section of the Blue Nile gorge for use by leprosy control officers otherwise faced with a five day detour on foot or mule. Additionally it included the building of three Bailey bridges near Gondar in the North and a number of smaller tasks elsewhere on behalf of the local community. The squadron, backed by sections from RAMC, RAOC and the Army Air Corps and reinforced by TAVR soldiers from Glasgow and a company of Ethiopian engineers, was dispersed over 100,000 square miles of mountainous, desolate terrain in three main detachments linked primarily by air and radio. Unrivalled technical and administrative experience was obtained by management and soldiers alike and the Emperor's visit to open the bridges in person provided a welcome reminder of the political value of this type of project sponsored by the ODA department of the Foreign and Commonwealth Office. Its success did a great deal for the morale and standing of the support squadron before the adoption of its less popular "headquarter" role and whetted the regiment's appetite for further overseas ventures of this type.

The next opportunity, Exercise TAMORA, arose the following year with the sending of a regimental shallow water diving team to Mahé in the Seychelles. Its primary mission was to extend several seaward approaches to the main port of



Photo 2. Ethiopia: Finishing touches, Blue Nile Ropeway.



Photo 3. Tonj Bridge under reconstruction.

Victoria and its adjacent airfield by demolishing 16,000 tons of submerged coral. Reinforced by selected sapper divers from two other units, the team of twenty, the first British troops based on the islands this century, enjoyed the tour of a lifetime in carrying out the three month winter task. Several minor undertakings of a similar nature were also carried out for the Seychelles government on outlying reefs and islands in what was not only a most unusual and valuable exercise but a much-needed shot in the arm for diving as a Corps activity.

This was closely followed by Exercise MIRZA in the Southern Sudan, arguably the most demanding of the three. Undertaken early last year by 32 Field Squadron supported by two companies of Sudanese engineers and a Beaver aircraft, its aim was the reconstruction of two large and badly worn Italian-built road bridges over the River Tonj 700 miles south west of Khartoum, while the laying of a Bailey over a damaged crossing 200 miles nearer the Zaire border formed a worthwhile subsidiary task. The project, which included the collection and moving by sea of 600 tons of stores, was preceded by the setting up of a planning team at Ripon the previous spring and involved the maintenance of a liaison and support cell in Khartoum under the squadron QM for a full eight months. As surface communications from the remote township of Tonj to the Sudanese capital were non-existent following the seventeen year guerilla war in the region, the 200 man force was supplied entirely by air through the good offices of an RAF Andover. The success of the exercise in restoring a major link on the important Wau-Juba route led to a second, slightly smaller bridge 250 miles down the road being allocated to another of the regiment's squadrons for a similar facelift in 1975.

Tours of a different sort, undertaken by a reinforced field troop or somewhat larger element, were also mounted to the Mediterranean, Central America and the Middle East. In Gibraltar a troop of 11 Field Squadron spent six months working on the Europa Road project. The road, only half a mile long but blasted through a built-up area out of some of the world's hardest rock, was designed by DOE but built to sophisticated standards almost entirely by units from 12 Engineer Brigade. Two separate tours of similar duration were completed by troops of 11 and 48 Field Squadrons in British Honduras (now Belize), where the means exist for a wealth of small projects, a wide range of training in combat engineering and jungle warfare and

superb recreational opportunities offshore. Turning east, tactical headquarters and a troop of 48 Squadron spent four arduous but fascinating months in the highly contrasting environment of Oman.

At home an unusual series of projects fortunately came our way. Support for the military ranged from the erection of a triple double Bailey with a 210 ft main span across the River Swale for use by RAF Leeming to the construction of a new earth dam for the Army Ski Centre at Rothiemurchus in the Cairngorms. A tarmac road was built by 15 Headquarter Squadron across the Sennybridge ranges, while in Snowdonia horribly steep slate ramps were dozed into the normally inaccessible quarries of Linaberis to enable the RAF's EOD teams to reach and dispose of several forbidding dumps of disused wartime ammunition.

With so much else going on, opportunities for providing Military Aid to the Civil Community (MACC) proved relatively few and were confined mainly to minor plant or artisan work in support of local councils and schools in Scotland and the North. The one exception was the building of a spacious community centre of modern timber design for the Glasgow Scout Council at Auchengillan. The job, involving two years work by detachments from successive squadrons, offered rare practical experience for Clerks of Works and tradesmen, but it proved far more time-consuming than was initially envisaged and no further MACC commitment on this scale was undertaken.

This varied miscellany of construction tasks provided the most challenging feature of our existence. Naturally, however, there was much more to unit life than a continual succession of squadron tours and projects. Back in barracks refresher training in basic military matters and combat engineering was necessarily fairly intensive, and space had still to be found for the normal round of annual and technical inspections, VIP visits, command post exercises, bridge camps, adventurous training, sports fixtures and the like. The regimental diary was invariably crowded. What, then, were the effects of this full and mobile life on the regimental officer and soldier and their families?

#### Life Within The Unit

The UK-based engineer regiment bears only a passing resemblance to the normal infantry, cavalry or gunner equivalent in the sense of a fully composite whole with a



Photo 4. Yorkshire: Leeming Bridge over River Swale.

common aim and training programme. The size and spread of commitments over the year leads almost to a semi-independent status for the field squadron, whose OC has a thoroughly active and demanding job. A nearby battalion commander, used to running his unit on a permanent, closely integrated four company basis, often sympathized on the apparent frustration of not setting eyes on half one's regiment for months on end. While there was assuredly an element of truth in this, the involvement in such an unusual variety of work more than compensated for having the complete unit under command in Ripon for no more than three months out of thirty.

In these circumstances there was no place for an annual training cycle on the traditional pattern, nor was there a need for one. RHQ still arranged and ran, with the aid of squadron instructors, regular central courses for combat engineers, junior NCOs and radio users, while a steady stream of men moved to and from the RSME on basic and higher trade training. In general, however, the majority of collective training was directly linked to the separate tasks of individual squadrons, while refresher periods on fundamental military and combat engineer subjects were fitted in between. While this may suggest a false sense of priorities, the key commitments like overseas projects and Ulster tours were often confirmed anything up to a year ahead and naturally obtained top billing; one of the CO's main concerns, therefore was the risk of squadrons becoming so overcommitted in advance that "essential" training in such things as fitness, skill at arms, NBC defence, airportability and basic field engineering were squeezed out of the programme altogether. Squadron block leave was a panacea used not only to give men a chance to make some firm domestic plans (exigencies of the Service permitting) but also to ensure that during such training the maximum numbers were available. Moreover it was important to give squadrons the occasional period of relative quiet during which they could look to their administration and wind down a little.

One hears a lot these days about the Army's manpower shortage and its serious effect on the strength of combatant units. It was particularly encouraging, therefore, to find the regiment being maintained continually at or over its full establishment of 885 all ranks despite a continual trickle of wastage. A squadron with several men away on long courses occasionally needed strengthening for an operational tour at the expense of the others, but in general few serious manpower problems were met. A deficit of key technicians made itself felt from time to time, but this normally reflected a Corps-wide shortage in a few specialist trades and the men were borrowed from 62 or 64 CRE at Barton Stacey for individual projects. An average tour in Ripon of two years for officers and warrant officers and nearer three for the remainder, however, meant an annual turnover of at least 300 men, and it was lack of continuity more than anything which complicated the task of keeping the unit at a high overall standard of training. The most frequent changes unfortunately occurred at the level where they could least easily be afforded, that of troop commander. The frequent departures of young officers for degree training well before completing a full apprenticeship was, however necessary, a disrupting factor I could well have done without.

The regiment's intake of soldiers was made up of three categories; experienced hands posted in from other units, apprentices and junior leaders arriving from Chepstow and Dover and men from Training Brigade recruited straight from civil life. Evenly distributed amongst squadrons, the three types normally merged together remarkably quickly and after a few months it was often hard to tell them apart. There is nothing to equal an overseas project or an active spell in Northern Ireland for turning the younger members into men and developing genuine cohesion and spirit in a squadron, while such tours invariably succeed in uncovering the true quality of junior management and establishing the leadership potential of cach and every sapper.

For the soldier returning home after a tour in BAOR, comparisons were inevitably drawn between the quality and style of regimental life on either side of the North Sea. Though to many the grass is always greener on the other side, opinion seemed evenly divided. Germany provided the unattached young sapper with more time in the field, more cash in his pocket and a general broadening of outlook, but off-duty time had frequently weighed on his hands there and many had obtained very little practice at their trade. With the notable exception of Ulster, service at home normally gave him a five-day week, better accommodation, more trade satisfaction and a far wider opportunity to travel. However a relatively isolated barracks twenty five miles from the bright lights of Leeds and lacking the widespread facilities of a large garrison hardly bore comparison with the likes of Osnabruck; for evening entertainment the sapper had little diversity of choice away from his troop television set other than a visit to a local pub unless he belonged to the energetic few who patronized badminton, small bore shooting, photography or a similar part-time garrison activity. Essentially, therefore, the more the single soldier was away from barracks doing an active, demanding job of work and saving his pay the happier he was—and far less trouble to his superiors!

For the married man (comprising some 45% of the total) the situation was rather less clear cut. He and his wife were invariably a good deal worse off financially than their BAOR contemporaries, but quarters on the spot were plentiful and many of the high proportion of families who hailed from the North bought houses in the area. Some men, particularly sappers and junior NCOs with young children, were very torn between the pull of domestic life and the attractions of off-base soldiering, but where their programme was reasonably balanced over the year the majority seemed to thoroughly enjoy their tour provided it did not extend much beyond the three year point.

Their better halves, reasonably enough, often took rather less tolerant a view. The annual separation rate in field squadrons of 38 Engineer Regiment between 1972 and 1974 averaged 50% in doses varying from six months at a time to the more frequent example of a four month tour in Ulster or overseas and a further eight weeks away in several shorter detachments. Many wives became well hardened to this and accepted it remarkably philosophically, often obtaining lucrative jobs while the man of the house was away. Others naturally found it much harder to accept, particularly the new bride who had recently moved from her own home scene to live in a totally unfamiliar military environment, but then saw her husband for less than half the year.

Herein lay something of a problem. To train, exercise and practice the unit effectively in its many roles much of it had necessarily to be detached for over six months of the year. Conversely the separation rate should ideally have been reduced to well below this figure to keep married soldiers in the Service, foster a spirited regimental identity and give squadrons an acceptable degree of stability. The Army's policy of debarring a unit from further service in Ulster or overseas for a set period following its return home provided a partial safeguard against excessive overstretch, but even this was not immune from emergency contingencies for which 12 Brigade units are particularly vulnerable. The answer lay, in the end, in a compromise between the two extremes.

It would be surprising if this varying kaleidoscope of regimental life had not produced its accompanying crop of welfare problems. While advice and assistance is always available from many sources, the main burden in this situation falls inescapably on regimental and squadron management and wives. Frequent separation (especially with husbands serving in Ulster) produced an unusually high strain on many families, accentuated by the sad deaths on operations of a squadron commander and sergeant major in the summer of 1973. While the spirit of the majority under the circumstances was admirable, a number inevitably failed to cope and required regular and patient attention. Nevertheless well publicized family activities, outrageous squadron magazines and an active social life in the various messes all played a part in helping to alleviate the problem.

Closely connected with the question of morale was the sensitive subject of wastage. Regarded a little unfairly sometimes as an unerring pointer to a unit's state of health, the annual rate of discharge by purchase (averaging between 3 and 4% of the unit) was frequently monitored and analysed in unsuccessful attempts to establish a common cause. Soldiers wanting premature release did so for a wide variety of reasons, though insufficient pay and excessive separation were quoted more frequently than most. The very proximity of many a soldier's home in the North provided a mixed blessing, as the ease with which he could return there at weekends induced a strong pull towards the lucrative jobs on offer from industry and the building trade. A particularly high standard of man management at troop level was necessary to retain the better soldier. Though wastage of this sort was never sufficiently serious to affect the operational stage of the regiment, it was nevertheless always a matter for concern.

With the gradual spread of terrorism to England security became a major issue, and a great deal of time and effort was spent in trying to reduce the degree of risk to life and limb of both soldiers and families. Conditioned though we were to the possibility of an incident after several inconclusive hoaxes in previous months, the four bombs deposited in Claro Barracks by a small guerilla group early one morning last March came as a salutary jolt. The fortuitious avoidance of death or serious injury did little to alleviate fears of what could happen again, but in an open barracks there is clearly a limit to the proportion of the unit which can be permanently committed to security. The temptation to deploy innumerable guards and pickets to reduce the risk of undetected entry had to be counterbalanced with the effect on operational efficiency of adding to the already high burden of calls on squadrons for regimental duties. The incident did, however, bring home to all the value of a workable, practised reaction system and far from morale being adversely affected by the incident, the reverse occurred.

Major Q problems were generally few and far between. A postwar barracks is free from the continual maintenance which is a feature of less fortunate garrisons and we were able, despite the inevitable delays where big spending was involved, to get the works services we needed. For engineer projects materials were obtained from every imaginable source, while a wide variety of training resources was always available with the help of the local engineer park. Care and control of stores during exercises and projects in these increasingly expensive times was one of my main concerns; an inordinate amount of time was spent by one and all investigating the whereabouts of missing items blown to bits by a Harrier's exhaust, lost between Tilbury and Djibouti or mysteriously "lifted" from the Sudanese railways. Equipment-wise we were pretty well off, as whenever a squadron was warned for operations (irrespective of whether it eventually deployed) it was immediately made up to scale in the items for which it had been frantically indenting for a year!

Despite, or perhaps because of, its turbulent nature, this type of unit provides rich and varied job satisfaction for the sapper officer, especially the troop and squadron commander. Besides, Yorkshire is a thoroughly pleasant place in which to live. To many officers (let alone their wives) the prospect of a tour in the North as opposed to the well worn belt from Chatham to the Camberley/Aldershot complex is viewed initially as a spell in exile, but Ripon has much to offer over southern garrisons besides the great advantage of being at arms length from formation headquarters. Militarily, the mere volume of elbow room is a real bonus; a variety of spacious training areas are within close range and readily available, while traffic on the roads is light and movement uncomplicated. Domestically, waits of more than a few weeks for quarters were rare and the surrounding moors and dales provided a variety of opportunities not only for field sports but for all those who like a wide choice of outdoor or adventurous activities. Moreover the Ripon populace is well disposed towards the Army, and particularly to members of the Corps as the only remaining freemen of Ripon. Links with the city are close and every July the regiment welcomes the public to the traditional Ripon Weekend.

There were naturally several disadvantages to being somewhat "off the map". Many of us spent an inordinate time on the move to and from reconnaissances, meetings and briefings, while squadron deployments to training areas like Stanford, Hythe or Wyke and three trips a year to the continent via the Channel Ports effectively neutralized most other attempts to economize on fuel and mileage. Moreover the relative scarcity of field force units in the north east did tend to restrict liaison with officers of other arms, while sports teams suffered from lack of competition and a great deal of travelling was sometimes necessary to obtain good opposition. The open, undulating Pennine roads, however, lend themselves admirably to cyclists and following the regiment's success in the 1973 Army Championships, Ripon is now the recommended destination for all aspiring young sappers on handlebars.

#### Summary

The frequent cuts and reviews in defence policy by successive post war governments and the publicity given to Ulster by the media have led many to believe that regimental soldiering at home today consists of little more than an unappetizing round of tours in Northern Ireland separated only by short spells of training and guard duties in barracks with an understrength unit. While this may be so in respect of a few unfortunate battalions, in 38 Engineer Regiment's case in recent years it has been well wide of the truth. In UKLF today the motto "Ubique" is highly relevant and life for the Sapper offers an interest and challenge unequalled elsewhere. I went to Ripon. expectant that the experience would be a highly satisfying one. On leaving the regiment 130 weeks, 150,000 miles and a few grey hairs later I felt I had been more than usually fortunate.

# Early Days

# MLC

1875 was an eventful year for the Royal Engineer Institute. Incidentally when it started life it was called the "Institute" and not "Institution". In December 1875 the newly elected Committee discussed whether the name should be changed to Institution, but decided that it was not within the power of the Committee to make the alteration; also that Institute was the more correct term of the two. The Oxford Dictionary would seem to bear this out, despite the fact that the name was indeed changed to Institution—but not until 1922!—the full title thereafter being the Institution of Royal Engineers rather than the Royal Engineers Institute. There was clearly room for a conflict of opinion, as the Royal Artillery was already calling their counterpart the RA Institution!

In the May 1875 Journal a notice appeared that the future of the Institute was to be discussed at the Annual Corps Meeting. There was already an ad hoc Committee in being, composed of Sir Lintorn Simmons, then Governor of the Royal Military Academy, Major-General Sir Henry Harness (retd) and Colonel Gallway, Commandant SME. The AGM was to elect fifteen non-official members besides sanctioning the Inspector General of Fortifications, the Deputy Adjutant General RE, the Deputy Director of Works for Fortifications and Barracks, the Commandant SME, the AAG RE, the Secretary of the RE Committee and the Secretary of the RE Institute, as ex-officio members.

The Institute had been established mainly for the recording and dissemination of scientific information among the officers of the Corps. Up to that time, the officers had, at their own cost, written and published papers on Professional Subjects (since 1837), formed professional libraries at all the main stations (since 1847) and published the *RE Journal* (since 1870). In 1875 the time had come to co-ordinate the activities of the Institute (including the use of the new Institute building at Chatham) and the SME. There was, for instance, the need to decide exactly what was to be accommodated in the new building besides the Library, Museum, Lecture Theatre and sundry class rooms, and what material taught at the SME could and should be published by the Institute. The authority of the Commandant SME clearly had to be acknowledged in the resolution of such matters, and the new Committee was expected to draw up a code to regulate these and other aspects.

The AGM in May 1875 duly elected the Committee, although there was some unhappiness at the informality of the method of balloting (in fact the procedure seems to have been little changed since!). Indeed, a resolution, settled by a show of hands, was required as to whether the ballot was acceptable. So started the Council of the Institution and, thereby, the Corps formally acknowledged that the Institute was in being. At the same meeting the *RE Journal* was officially recognized as the means by which notices, etc, should be communicated to the Corps. At one of its first meetings the new Institute Committee made the necessary arrangements to take over the management of the *Journal*, and the special Committee, which had been appointed in 1870 to carry out this task, was discharged.

The November issue of the *Journal* appeared for the first time with a list of contents. It also contained under the heading of General Notices, a sort of Editorial, made up of items of general interest which had not been formally submitted for publication, but which appeared to have caught the Editor's eye. The idea of having "editorials" in the *Journal* seems to have waxed and waned since that time!

"Nothing proves ultimate success impossible, everything goes to show its possibility. Many great difficulties lie in the way . . . A failure in experiment generally ends fatally, and this is not a favourable condition under which to make attempts. Had fatal results attended failure with the bicycle, that valuable instrument would never have reached its present state of perfection." So wrote the Editor in the November 1875 Journal (in the "Editorial" mentioned above) in commenting on a book, a review of which appeared later in the same issue. There is no prize for guessing that the subject of the Editorial comment was the prospect of "manned flight"! The book Animal Locomotion, or Walking, Swimming and Flying by J B Pettigrew MD, FRS, was not reviewed favourably. Solid statements such as "in water we encounter a medium less dense than the earth and considerably denser than the air" did not commend themselves to the reviewer! It seems, according to the Editor, that the development of the bicycle proceeded "unchecked under much derision; The pursuit of discovery should provoke an admiration rather than our sneers." Perhaps we should have more faith in such pursuits, even if the tax payer has to pay out anything up to £1,000m to finance them!

There was also a letter in the December Journal suggesting that if the Corps publications were "to do us credit", all articles of a lighter nature, together with notices, details of postings etc, should, be collected together and issued monthly as the Supplement while the Journal, as such, should be suppressed as a monthly publication. The papers then appearing annually as the "Professional Papers" plus the more serious articles in the Journal should, so the letter continued, be published quarterly. The Supplement could then have its name officially changed to the "Pick Axe". Except for the latter point, this is exactly what was to happen later, although it took many years for this suggestion to catch up!

1875 also saw the official recognition of the RE Cricket Club. A Chatham based team had been playing well-known Club sides for some time. From then on such matches would be played in the name of the Corps. One has some sympathy with an I Zingari team, which cannot have cared much whether they were playing against a Chatham side or a Corps side. In 1875, in a two day match, the RE made 724 for 8. The IZ did not bat!

In the December Journal some publicity was given to a "small pamphlet" published by Major Mitchell, who wished to "warn his brother officers" of the iniquities of the Treasury attitude to commuting pensions. For every £100 of pension commuted by an officer aged forty, a sum of £1,338 was allowed. "But if he were to purchase that annuity from Government he would have to pay £1,653." Even the Church Commissioners apparently paid £1,601 per £100 of pension commuted. The hope, no doubt pious, was expressed that "Government would change its rules"!

An interesting comment on the times is to be found in a notice reminding officers that if they exchanged into another Corps (by two officers mutually agreeing to exchange Regiments or to exchange between battalions of the same Regiment), or

#### EARLY DAYS

whenever they were to be promoted, they must sign a Certificate "on my honour as an officer and a gentleman" that no money had changed hands. In the case of promotion the certificate not only covered the time of promotion but also that money had played no part in facilitating "steps in the Regiment leading to promotion". In case an officer salved his conscience by making payment not "on promotion" but sometime after, a promise also had to be made "honourably and unreservedly" that no payment would be made "hereafter"! In Parliament a special bill had been passed to permit these Regimental exchanges. The bill met much opposition as it was alleged that it would facilitate the possessors of wealth to avoid "irksome service" and it would create inequality founded on money. There was also the fear that it would divide the Army into two classes-those serving at home and those abroad. Presumably the certificates referred to above were introduced because of such fears. On the other hand if the Army authorities were concerned to take steps to avoid bribes, in the context of "bad" service, "good" service was, reasonably enough, a different matter! The Army Estimates for 1875 contained a large increase in expenditure for good conduct pay which, so the Secretary of State for War told Parliament, "was an encouraging symptom"!

The Corps has always been envious of the experience and interest available to the Corps of Engineers, United States Army, through their responsibility for Civil Works. In the April 1875 *Journal*, readers were reminded by a letter from the Chief Signal Officer, US Army, that the Signal Service was not only charged with the production of the National Weather Reports (thrice daily) but also with connecting Signal Stations at Life Saving Stations and Lighthouses, and the construction and operation of frontier lines of Telegraph in the "Indian country". All this seems to have been quite a responsibility for a small service, consisting at that time of thirteen officers and four hundred or so enlisted men. "The US Signal Corps has not been disbanded—on the contrary..." wrote General Barnard, US Engineers, at the same time. History does not relate what prompted this tart denial. It seems that a member of the IGF Staff at the War Office may have written to the Chief of Engineers asking after the health of the Signal Service!

The early Journals, as has been remarked before in this series, were not exactly the most exciting of publications. But 1875, except for developments in the Institute, may not have been, all in all, a very eventful year. Sir William Harcourt, MP, addressing his constituents in Oxford in 1875, remarked "if the old saying be true that happy is the nation whose annals are dull, I may congratulate you this Christmas on being citizens of the most fortunate kingdom in the world".

The Royal Navy would perhaps not have agreed with the above. For that Service, 1875 was not a happy year. The *Vanguard* was rammed and sunk by the *Iron Duke* during Fleet exercises in the Irish Sea. The incident itself and the handling of the subsequent inquiry gave rise to much public concern and some bitterness. Things were not improved when shortly afterwards the Royal Yacht, while carrying Queen Victoria from Cowes to Portsmouth, collided with a large vessel under sail. The latter sank with loss of life. There was no Court of Inquiry—merely the somewhat inconclusive findings of the Coroner—which did not particularly help Naval public relations.

Even if 1875 was a dullish year for the Corps, it was spared incidents such as these!

\* \* \* \*

# **Engineer-in-Chief (Army)**

ON 1 March 1975 Major-General M E Tickell CBE MC will hand over as Engineerin-Chief (Army) to Major-General J H Foster.

The new E-in-C is the younger son of the late Licut-Colonel T H Foster, RE and he also had two uncles in the Corps one of whom, the late Major-General F G Hyland CB MC, retired at the end of the last war having commanded 6 Anti-Aircraft Division and having been Chief of Staff and Deputy Fortress Commander, Gibraltar.

Major-General John Foster was educated at Charterhouse and after a year in the ranks was commissioned into the Corps from the RE OCTU in April 1945. As a subaltern he was posted as a reinforcement to 82 West African Division in Burma and served as a troop commander in both 1 (Nigerian) and 2 (Gold Coast) Field Companies. After returning via Nigeria he was posted in early 1947 as an instructor to the RE OCTU arriving just in time to take parties of cadets out on snow clearance and flood relief operations in the bad winter of that year. After this he attended a Supplementary course at the SME at Ripon.

From this course he was posted to Kenya and served as an SOIII on the Chief Engineer's Staff, the main task being the construction of the ill-fated McKinnon Road project. After eighteen months of construction, and just before completion, the whole project was cancelled and he had to take part in the planning for dismantling. Luckily neither aspect prevented him from seeing most of the countries of East Africa or learning to play polo.

At this time 3 Division was being reformed and he was sent as Second-in-Command of the new 39 Field Squadron of 25 Engineer Regiment. After an exciting and hectic training season the Division was moved at a week's notice from Corps exercises on Salisbury Plain to the Middle East to reinforce the Suez Canal Zone and he found himself as acting OC embarked with his Squadron on HMS *Triumph*. After a period in both Cyprus and Egypt, and having moved to the Field Park Squadron, he returned in 1953 to RMA Sandhurst as an instructor.

He was a student at the Staff College in 1957 and then went to HQ Northern Command as a DAQMG, the highlight of which period was the mounting and maintenance of a battalion group for the British Cameroons, possibly the only time a force of this size in Africa was commanded directly by a static UK headquarters. In January 1961 he became Officer Commanding 23 Independent Field Squadron, the Squadron previously commanded by Major-General Tickell who at that time was only a few miles away at Shrivenham. When this Squadron was reduced to a cadre, prior to its move to BAOR, he took command of 3 Independent Field Squadron, the other Squadron in 3 Division Engineers, and during his time the Squadrons exercised in Libya, Cyprus, Canada and Germany.

He went to the Joint Services Staff College in 1963 and from there to be DAAG of AG7. In 1967 he became Commanding Officer 38 Engineer Regiment and during the next two and a half years the regiment was involved in a wide variety of tasks throughout the world including Cyprus, Canada, British Honduras, Kenya, Gibraltar, Arabian Gulf, Singapore and at home undertook several projects in Scotland and the Investitute of the Prince of Wales in Caernarvon. Following this he served as GSO 1 in CICC (West) where he was involved in NATO planning before moving to BAOR as CCRE 1 British Corps. After two years there he went to the Royal College of Defence Studies as a student in 1973 and since then has been attached to the Ministry of Defence planning a series of presentations.

Major-General Foster is married and has five daughters and an adopted son. One daughter is married to a naval officer and a niece has recently married into the Corps. His main interest is in horses and he still rides when he gets a chance.



Major General J H Foster.

# Constructing a 22 kV Overhead line in the Outer Hebrides

# CAPTAIN M R GIBSON, RE (V), C ENG, MIEE

ANNUAL Camp for 504 Specialist Team Royal Engineers (Power Station) (V), saw a change in venue in 1974, from the Mediterranean to the Atlantic, from Gibraltar to the Outer Hebrides, and a change in role from power station maintenance and operation (see *RE Journal*, December 1973) to planning and construction of high voltage distribution systems.

Finding someone willing to let a team of soldiers construct high voltage lines for real is almost as difficult as finding a client who will loan a real live active power station for two weeks.

OC 504 STRE was prepared to recce most of the world's "Supply Authorities" to find a suitable task but had to make do with using his telephone which seems a bit unsporting! Contact was established with the North of Scotland Hydro-Electric Board who were made aware of the capabilities and training requirements of the Team and a suitable project was found, to plan and construct 550 metres of 22,000 volt overhead line on the island of South Uist. The approval and support of the Hydro-Board, the Unions, HQ Scotland (Army) and the Commandant RA Range, Benbecula was sought and received. Suddenly it was all on.

This STRE has an establishment which is filled largely from the CEGB, the Atomic Energy Authority and the Electricity Boards, so it is not just by chance that the Team includes a senior foreman linesman, with many years experience in the construction of overhead lines, together with one jointer/linesman and two others who had received engineering training with Electricity Boards. It was their responsibility, however, to supervise the project and also train the remainder of the Team in the various aspects of overhead line construction. While the project was for real, there was to be no race to complete, the prime motive of the exercise was to train and practice techniques.

The Advance Party arrived in Benbecula on Wednesday 4 September 1974 and was able to arrange a meeting with the local Hydro-Board Engineer on the following day. A visit to site indicated that the digging would be in firm sand. Access was reasonable and firm for about half of the route, waterlogged for the remainder.

The terminal pole position was pegged near the building for which the electricity service was required; and the whereabouts of the stores and materials ascertained. It was agreed that the planning of the line, schedules of tools and materials and construction was to be the complete responsibility of the Project Team and that the Hydro-Board would arrange the shut-down and assist, if required, in the final connections on the take-off pole which would, of course, be alive until then. The construction of the line was to be to British Standard 1320.

The location of the project is at the north end of the RA Range where a range building, requiring an electricity service, is situated. This is approx 550 metres from an existing 22,000 volt overhead line at Ardivachar Point on South Uist. The route is mostly flat with a small hillock at about 60 metres from the terminal pole position and the ground rising to the take-off pole over the last two spans. The only approach to two of the pole positions was through a field of standing corn, so access had to be arranged with the farmer concerned.

At the time of the Advance Party Recce the scene was one of a long expanse of calm white beach upon which the Atlantic breakers gently terminated their long journey from the New World disturbing the sea birds busily seeking food on the shores. The local crofts stood out on the flat landscape drawing attention to the farmers gathering corn and tending their sheep and cattle. The peaks of Ben Mor and Hecla dominated the south east vista and the Wedge of Eaval to the north east. This wasn't always to be the scene!

Administratively an STRE depends on a host unit. For this Camp it was to be the

CONSTRUCTING A 22KV OVERHEAD LINE



Photo 1. Erecting terminal pole, Ardivachar Point.

RA Range, Benbecula. The Range Headquarters and accommodation is at Benbecula with the Maintenance and Launch Areas at Rangehead on South Uist some 15 miles away. Four Landrovers were made available. This number was required since several other smaller tasks were being carried out concurrently with the major overhead line project, necessitating two and three day detachments for several independant groups. One vehicle was allocated permanently to the Overhead Line Project and this and one other were to be fitted with C45 radiosets which proved very valuable in radio training, for arranging collection of tools and stores and for arranging movement of personnel between tasks. They also provided an essential safety link with Headquarters.

Headquarters was set up in a "Visiting Units Block" at Rangehead and could not have been more suitable or luxurious with telephones, fully equipped offices and a whole Classroom! This location was especially useful since it was only about two miles cross-country from the overhead line, and the Maintenance Area contained the Equipment Store, REME Workshops and provided hot mid-day meals, all essential to a team of scrounging Sappers.

The Team arrived on the early flight into Benbecula on Saturday, 7 September, and after settling in, lunch, parade and situation reports on all of the tasks, everyone went to Ardivachar to recee the overhead line site and to get the feel of the job. Sunday was free except that tool and material schedules and most of the planning had to be available by 0800 hrs the next day.

Monday was the big "scrounging" and "fixing" day. By the late afternoon eight 8.5-9 metre poles were on site through the efforts of a civilian low-loader (and an Army recovery vehicle to winch it out of the cornfield) together with materials and

# Constructing A 22kv Overhead Line 1

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tools from at least three Hydro-Board Stores, the RA Equipment Stores, REME Workshops and Royal Signals Stores, all properly listed and properly documented (I think).

The plan for the construction was related to the need to train personnel at each stage of the operation. Thus it was decided to commence work at the terminal pole end and work towards the tee-off pole. All the effort was initially concentrated on taking poles to the now pegged pole positions and then digging the stay and pole holes for the terminal pole. The technique of digging a 2 metre deep pole hole using a correctly positioned step was explained and then put into practice. These holes were dry and quickly completed. The terminal pole was properly "dressed" and then erected using shear legs borrowed from the NSHEB. Once the peculiarities of the particular type of shear legs available was mastered, it proved a very useful piece of kit for the speedy "planting" of the "sticks".

At this stage, some time was given over to the explanation of safety procedures. This was especially valuable as initially the pole gang was inexperienced and also since later in that first week the idyllic picture set by the blue skies and calm seas proved to be the exceeption rather than the rule. It was seen to be a "good thing" to have four guys on a pole with a force 5 gusting 6 + blowing straight over the seaweed.



Photo 2. Stringing Conductors under very windy conditions.

# Constructing A 22kv Overhead Line 2

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All went well until the Friday, the 13th, when wet holes were encountered at positions 3 and 4. This really was an arduous day for the pole gang, with high winds and heavy rain. Water and running sand poured into the pole holes as fast as they were being excavated using buckets and a chain of bucketeers; a seemingly hopeless task. However, our experienced linesman, Sergeant David, commandeered a discarded packing case and installed "shuttering" around the pole position to prevent ingress of running sand and to facilitate removal of the water/sand mixture. This procedure was later repeated using a discarded oil drum. After the poles were erected they were rocked to settle them down into the holes and backfilled. Easy to recount, difficult on the day. Once backfilled the poles were firm enough; although the line was a bit difficult to spot from the air on our way out . . .!

The work was, by then, rather behind schedule so the Saturday morning, which had been set aside for a Classroom period for training in Voice Procedure and Map Reading, was given over to the crection of the next pole, again in running sand another late lunch. This pole was left with four guys (not soldiers) and holdfasts over the weekend just to make sure. On Monday the eight poles stood perfectly straight and in line and then, very quickly the conductors were run out and hoisted into position on the insulators. Suddenly the line took on its own character and looked alive at last (no pun intended)—not lonely anymore but part of a community.

Equally rapidly the transformer was hoisted on to the terminal pole and the plan for making the connection into the main line looked possible again. The supply interruption for the main line had been scheduled by the Hydro-Board for Thursday, 19 September, but on the night before, and that day, the weather was nasty and all the Hydro-Board personnel were engaged on repair work. This actually suited the line gang as the job of binding-in the conductors to the insulators was made very difficult by the high winds and heavy rain squalls.

The trenches for the earth cables (neutral and metalwork) and the service cable to the building took some time to complete, the final connections to the transformer and at the internal service position being completed on Friday, 20 September.

Statistically the Project looked like this:

Day	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun Mor	n Tue	Wed	Thu	Fri
Personnel			12	10	9	9	9	13	9	8	10	9	9
Man Hours			90	70	68	63	68	58	68	60	75	60	36
Vehicles			4	I	1	1	1	2	1	1	Ĩ	1	3
				_									

TABLE A

Actual working time was limited by the need to fit into existing administrative arrangements, especially meal times. The Team were able to leave the main Admin Area by about 0815 hrs which meant arrival and start on site at about 0845 hrs. An urn of tea was taken for mid-morning break which often allowed a brief opportunity to get out of the wind for ten minutes. For the first week hot meals were arranged at lunch-time at Rangehead but this meant at least a one hour break and usually more by the time travelling, washing, etc was taken into account. Finishing time was 1630 hrs in order to be in time for evening meals. Arrangements for regular late meals was inconvenient to the host unit and not very satisfactory for the soldiers. For the second week packed lunches were taken, which was more satisfactory from the work point of view but not so good otherwise, especially as for that week the weather was bad. If further time had been spent on this project, the only reasonable solution would have been to set up a field kitchen of sorts to provide hot tea, soup and other goodies which Sappers are adept at concocting.

The total man hours shown in Table A includes only for time spent on site and does not include travelling. It does, however, include meal breaks where taken. Some daily totals are less than the maximum possible because personnel were frequently detached for half-days to attend for interviews, technical visits elsewhere and assistance on



Photo 3, Completed 22,000 volt overhead line, Ardivachar, South Uist.

other projects. Probably an hour each day was spent on informal training and discussion on site regarding different aspects of the task before these aspects were tackled, eg, binding-in insulators, safety, pole erection, making-off stays, dressing poles.

Since the Team were due to leave Benbecula at 1000 hrs Saturday, 21 September, there was a planned scramble to return all stores and tools on the Friday, dismantle radios, clean and hand back office accommodation and, that afternoon, write the final Sitrep for the Hydro-Board Engineer so that there would be no doubt as to what had been completed. See Annex A. The project was then completed as far as it was possible to complete without the final connections being made.

What lessons had been learnt? Briefly these: planning value, safety techniques, radio procedures, construction techniques, the success of determination and above all teamwork. It can, with confidence, be stated that 504 STRE have the capability of planning and constructing overhead lines up to and including 33 kV—and we've got one to prove it!

#### ANNEX A

#### SITREP 201500 SEP.

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#### 22 kV OVERHEAD LINE ARDIVACHAR

 The overhead line constructed by this Unit is complete with the exception of the following:

- (a) Tee-off pole crossarm not installed.
- (b) Tee-off pole insulators not installed and line temporarily fastened to the Teeoff pole.
- (c) Transformer not megger tested.
- (d) Transformer internal taps not checked.
- (e) HT jumpers not made-off to transformer.
- (2) The HT conductors are connected to earth with a temporary lead.

(3) In addition to the construction of the overhead line, the low voltage single phase underground service to the North Vedette building has been installed complete from transformer to meter except that the meter to cut-out connections have not been installed. The pole fuse and cut-out fuse carriers have been left in the N Vedette building.

(4) All transformer and steelwork earths have been installed but not tested.

Constructing A 22kv Overhead Line 3

# The Achievement of Quality Through the Operational Requirement Statement and the Design Phase of Defence Equipment

# CAPTAIN M A NAPIER MSc, CEng, FICE, MIMechE

The views expressed in this paper, written in 1974 when the author was Assistant Director, DQABE(1), are not necessarily those of the Department.

"Quality is never an accident, it is always the result of intelligent effort; there must always be a will to produce a superior thing" (Ruskin)

#### INTRODUCTION

RECORDS show that a high percentage of failures of defence equipment in Service can be attributed to shortcomings in the concept and design.

The aim of this paper is to consider what management procedures are needed to overcome this and to investigate the adequacy of design and of operational requirement statements in contributing to the achievement of an acceptable quality level and User satisfaction.

The paper therefore is concerned with:

(a) the clarity of the Operational Requirement (OR) statement on quality with respect to performance, availability and whole-life cost.

(b) the contribution of the project director to the achievement of overall quality across the major project interfaces, ie OR, Design, Trials, Production, Service Feedback.

(c) the manner in which quality may be assured during the design phase (which consists of the compromise between generally incompatible requirements).

(d) the methods of dealing with the designer's education and management to ensure that good value is achievable in the equipment which he designs.

As quality must be related to the desired level of performance, availability and cost, it may be inferred that value, which is quality per unit cost, is related to performance and availability and that for any particular cost level, trade-off will be necessary to optimise aspects of these characteristics during the development. Reliability, a vital part of availability, will only be achieved as a result of the selection of the correct quality level in the design phase and cannot be added later although it can most certainly be lost by bad management during subsequent stages.

Management is the process of planning, costing and controlling a project so that it meets the requirement and is completed to time and to budget. This meaning was clearly implied in the Raby Report<sup>1</sup> which contains the following statements:

"... a good quality product, is one that meets the requirements of the Service adequately, is available at the right time and which will be economical and reliable throughout its whole life".

"... what the Services need is to make sure the design is right; to translate that design into economical practical manufacturing instructions; to monitor the processes of production; to ensure speedy feedback of User experience to the designer ..."

The requirements of the Service is the starting point for all developments, and the feedback from the User provides the guidance which the designer needs although responsibility for the quality of a design must be the designer's.

## DISCUSSION Operational Requirements

Throughout the Ministry of Defence the basic course of action for the development and procurement of Service equipment is reasonably standardized, although procedures are not. After the staff target has resulted in a feasibility study, the operational requirement is stated and it is at this point that the quality level of the resulting equipment may be irrevocably decided. Therefore it is vital that the OR contains unequivocal statements of the requirement, as clearly defined as possible, with respect to performance, availability and some indication of a life-cost ceiling above which the staff do not consider the development justified.

The Mensforth Report stated "It is essential that a manufacturer at the outset of any programme chooses the right levels of quality to which he intends manufacturing and ensures that these levels are universally and consistently applied within his organization. In choosing his levels of quality, the producer will in general look to his customers for guidance".<sup>2</sup> In this sense, the guidance will originally have been established by the OR and if this is inadequate in respect of quality, it should not be surprising if the Designer/Contractor works at whatever level of quality suits him. Within the development and procurement system is the right of the designer to query the OR when he considers it unclear or unlikely to be attainable at economic cost, and this right should be exercised with respect to vagueness on quality, particularly as this affects the support services.

The order of priority of the requirements should be stipulated by the User from the beginning to avoid delay when the inevitable need to compromise arises and alternative standards of reliability should be given together with information on the methods to be adopted to prove that the requirement specified has been achieved. The priorities may have to be changed in the light of a new threat but requests for change in performance, stated environment or method of use during the project definition stage can only cause confusion and should be resisted or lead to a request for a new formal statement of the requirement. It must be recognized, however, that the period of gestation of a sophisticated new military system is often slower than the rate of change of the military scenario.

## Project Management

Apart from the obvious areas of responsibility of a project director, such as interpretation of the OR, designing what is required, testing what will be produced, producing what has been designed and analysing feedback from the Services; the most vitally important matters of his concern should be the major interfaces between these main phases of a project; the major interfaces should not be confused with the project interfaces between systems and equipments. Furthermore he must ensure that the designer through his education and support services is as capable of performing his task as it is possible to make him.

## Performance, Availability and Testing

Performance is obviously paramount in development and must weigh heavily in any trade-off exercise; certain factors can be considered by the designer, such as the considerable bank of data derived from similar developments as a result of defect reporting procedures, and he will know that it is uneconomic to design for zero failures since not all failures indicate the end of the useful life of the equipment or shortcomings on the part of the designer or operator; chance occurrences cannot be prevented though where a vital interest is at stake they may have to be met uneconomically, and a statistical evaluation within appropriate confidence limits should be undertaken where this is feasible. The report of the 4th UN Conference on the "Peaceful Uses of Atomic Energy"<sup>3</sup> recognized that the probability approach to safety is preferable to the catastrophic accident concept.

For some time to come the staff requirement must necessarily be vague when specifying reliability, particularly in the case of a novel development. However guidance will normally be given to the designer on the method of use of the equipment, the acceptable "down-time", the maintenance and repair effort available and, almost certainly, a percentage probability for completion of mission. The designer will interpret this information into the language of reliability (eg MTBF MTTR etc) and predict expected reliability from a knowledge of similar equipment based on analyses of service feedback; predictions have to be substantiated by realistic testing. Harrier was one of the first projects in which the OR contained a Reliability Evaluation and Assurance Programme based on experience resulting from the P1127 Kestrel development and whilst extra cost was involved to achieve the level of reliability specified, the level achieved after two years was the same as that which took considerably longer in the case of the Lightning in essentially the same environment. In the case of most complicated or large projects, such as a ship, the foregoing will apply generally to its systems and equipments. Awareness at the OR stage of the need for a Reliability Plan will produce a statement in the Feasibility Study and should lead to a formal plan in the Project Definition.

The high rate of failure of Service equipment, whether due to inadequacy of manufacture or design, would have been revealed and consequently rectified had suitable environmental trials been carried out. It cannot be emphasized too strongly that the planning of such trials requires considerable knowledge of all the design parameters likely to be affected in any way by the complete range of test conditions; the severity of these conditions requires expert assessment and specification. One major difficulty lies in conducting fully representative and timely trials on equipment made with production tooling, before full production has been authorized and is under way.

## Cost and Manpower

Estimates should be made by the User of various levels of availability so that the designer can explore cost-effectiveness. There is no doubt that the most significant contribution to the level of cost of satisfying any requirement is determined by the actions of the designer and cost models, not necessarily elaborate or detailed, will be used in the future to give quick readings of the financial effects of design changes. The purchase cost may be only one, and perhaps should be the least important of several considerations; the designer must be given basic information on component, process and in-service costs. The demand for skilled manpower may be directly related to the desired level of availability of equipment as, for example, a substantial part of a ship's complement is borne particularly in peacetime solely to carry out maintenance tasks, half of which may be classed as correction of defects. The Services rely heavily on skilled personnel to diagnose trouble and maintain equipment, and if, as expected, the number of such personnel falls, it will be necessary to design an even more reliable product in future.

## Design Management

Design as a creative process, is a combination of inspiration and expertise with practical investigation. The importance of the first of these is obvious when novel concepts are required to satisfy a new operational requirement while the latter necessitates a search for new materials and techniques. The cause of many serious failures has been traced to this area since too large a step forward in both material and process technology has been identified as one of the major causes of trouble in the past<sup>4</sup>. The use of new materials and techniques whilst normally introduced to give better performance, may also be used to improve safety, reliability and endurance.

Designer may mean a young inexperienced detail draughtsman and his contribution to the quality of the product will depend upon education, training, experience, creativity, general competence and ability to visualise how shapes and materials will behave under various conditions of loading, environment and use. The overriding virtue of a good design from a quality point of view is its simplicity; simplicity of operation to avoid the possibility of breakdown or malfunction and simplicity of assembly to save time and risk of error; to achieve this ideal, considerable supervision is necessary with suitable design check lists provided. Design does not lend itself to a rigid timetable but since resources must be allocated, it is apparent that compromise is necessary if the dates agreed are to be met. It is vital that at some well defined stage (Project Definition) an assessment is made of the design's completeness and acceptability with a reasonable attitude to the subsequent inevitable concessions and deviations. It is important that further design and development will only apply to later models and not to prototypes.

The effect of varying the level of availability should be explicitly explored in costeffectiveness studies as these methods develop. To enable these to be realistic it will be necessary for the User to stipulate varying levels such as "essential", "desirable" and "acceptable". The standard of availability is determined by the excellence, or otherwise, of the detailed design, since attention to detail affects the reliability of the equipment in-Service to an even greater extent than it affects the performance and its loss may be equated to loss in value. This is often caused by the introduction of small changes without thorough testing.

## Support Services

The experience of the User must be fed back to the designer so that lessons may be learned for the future as a result of defect and failure analysis. Without an efficient continuous feedback of information from the User on new and previous similar type designs, considerable abortive preliminary effort will occur and except in the case of completely novel design work, failure to use data banks drawing on past experience is wasteful. It is therefore vital that defect, failure and maintenance data, with supporting analyses, is recorded in a manner which is readily retrievable by designers.

Just as basic design sets the main parameters for reliability and maintainability so properly controlled design changes are the most effective response to shortcomings in-Service. The value obtained is in direct proportion to the speed with which such changes are introduced and whilst, therefore, it is important that feedback from the Services is on a quantitative basis such as that provided by CSDE and FORWARD, the danger must be avoided of waiting for an accumulation of statistically significant data where a remedial course of action is reasonably clear.

It is a fair supposition that lack of control of modifications, great and small, has contributed in no small measure to the escalation of costs in the design and production stages of past projects. Formal control is exercised well in some areas where a policy body approves the need for a specific modification and the good results so obtained suggest that a generally applicable system could be established. Configuration Control, the management of change, provides a discipline across equipment interfaces where errors can occur due to modifications on one side of the interface not being matched on the other side.

To enable the designer to decide the consequences of differing levels of availability, he must be in a position to assess the likelihood of achieving these various levels and for this he must know the general servicing and repair policy, the spares scales proposed and the methods of packaging so that he may contribute to finalizing the details of these and to ensure that the relevant handbooks will be available in good time.

## Specifications and Standardization

Considerable scope for improvement of quality lies in the writing of specifications. This, admittedly difficult operation, has tended, in the past, to suffer from vague imprecise wordings which were intended to act as a guide by the designer but in effect managed to confuse; it is vital that only precise measurable requirements are specified in these documents. Where a requirement cannot be stated with any degree of certainty, some research, intramurally or extramurally, must be undertaken during the feasibility stage. In the long term such study will invariably save time and money in development and in-Service. Specification of testing for reliability must be considered as important as material, process and performance specification. BSI PD 6112—"Guide to the Preparation of Specifications" gives a good indication of the type of specification needed from the designer.

## DESIGN PHASE OF DEFENCE EQUIPMENT

Another important way in which the achievement of the correct level of quality of design may be reduced in cost is by the reduction in the number of basic designs which the various developments generate; to achieve this the standardization of equipments and systems by all three Services would benefit in many cases from more serious consideration, although the designer's freedom of action should not be impaired unnecessarily.

## Value Engineering, Design Review and Audit

The purpose of value engineering is to identify and eliminate unnecessary costs by specifying the function of a component or part, and hence, how to provide that function at lowest cost. Experience has shown that responsibility for value engineering must be at the highest level of the project directorship along with quality assurance.

During the normal design process, formal occasions for the assessment of the manner in which the design is satisfying the requirement should be included with an examination of potential faults by the User and Specialists, in addition to the normal reviews by the design project leader. The American Space Administration's review procedure includes amongst other objectives, evaluation of the specification, identification of potential problems in production, inspection and material procurement, monitoring the configuration control, assessment of the possible advantages of using new materials and techniques and consideration of the effects on the proposed design of methods of assembly, transport, storage and maintenance. This represents a comprehensive design disclosure and the UK Naval Development Documentation System (or Design Disclosure Format) which is intended for continuous monitoring of the design with particular respect to reliability and maintainability is, consequently, more specialized but similar in intention.

In the case of particularly complex or crucial developments independent review would be beneficial. It is instructive to note that the report of the enquiry on recent steel bridge disasters, contains a recommendation that it is essential for an unusual design to be checked by an independent engineer.<sup>5</sup> The review of the bridge designs for this enquiry was carried out by designers from a quite separate branch of engineering, but with a fundamental understanding of the problems involved.

A quite distinct consideration is the audit of the whole design capability of a contractor or other design organization. There is a danger that design offices become insular and inward looking without input from parallel disciplines. Contractor assessment has now been introduced by the DQAB for potential defence contractors who aspire to be included in the MOD Defence Contractors List.

## Post Design Services

It is axiomatic that a post-design service should derive full benefit from the expertise generated during the development phase of a project. Whilst it is recognized that such expertise is dissipated over the years, its existence continues to be of great value, and specialist PDS contractors who do not possess it need the benefit of some form of design disclosure system.

## Education and Training

The standard of design is directly attributable to the quality of the designer. Apart from considerations of creativity which to a large extent are not amenable to training, the designers' competence is generally determined by the standard of his initial education. Unfortunately, such is the pace of technical development that periodic re-training is a basic necessity. However, very few formal refresher courses are made available to those at working level who can make a significant contribution to the standard of detail design.

It is of interest to consider the fate of the Feilden Report.<sup>6</sup> The amount of response so far to the fourteen recommendations has varied inversely with the degree of importance attached to them by the Committee. The first three which are listed below have made next to no impact. (a) To impress upon management the vital importance of the design function.

(b) To draw attention to the urgent need for more able people to train as professional engineers especially as designers.

(c) To increase the prestige of design and the status of designers.

Without the implementation of these three most important recommendations of the Feilden Committee, it is unlikely that the level of competence of designers of the Ministries contractors and indeed those of Industry, will rise of its own volition. An MOD reference manual of recommended procedures based on the many excellent publications in use, and maintained to keep abreast of new techniques would be a valuable aid to the designer. This should be non-mandatory unless specifically made otherwise by the provisions of a contract, and would be additional to the Project Officers' Handbook which is currently undergoing revision.

From the foregoing, it is apparent that the quality function is a major part of the project management responsibilities. There is no doubt that the responsibility for quality in design rests with the Project Director and with the R & D Establishments. It has been impossible in this paper to make as comprehensive a study as necessary of the procurement function with particular reference to the major interfaces and the manner in which the Project Director controls quality, but it is hoped that the nature of the problems can now be more readily appreciated.

## SUMMARY

(1) The achievement of quality depends on attention at all stages of a project but in particular on the clarity of the OR, the standard of the design, the conduct of environmental testing such as proving reliability, the adequacy of the support services and the control of the major interfaces between the main phases of the project's life, eg OR, Design, Trials, Production, Feedback.

(2) The OR must be clear with respect to the desired performance, availability and life-cost with scope for trade-off to optimise these conflicting requirements.

(3) Project management must be aware of the need to influence standards of design by means of design review and approvals, configuration control, design organization audit, value engineering, design disclosure and availability assessment plans and by the training and education of the designers.

(4) Environmental trials are vital for reliability and endurance and require expert planning, conduct and analysis.

(5) Support services such as provision of cost data, reliability and maintainability assessments, servicing repair and scaling policy, material and process technology and service feedback must all contribute to total quality and post design services should be in the hands of those responsible for the development.

(6) Specifications for all aspects (material, process and testing) must be comprehensive and compatible with the drawings and suitable for production; standardization must be accepted as contributing to quality by reducing the number of untried parts.

<sup>\*</sup> (7) Education and training are continuing commitments if designers are to maintain their competence.

## REFERENCES

<sup>1</sup> Defence Equipment Inspection Policy Committee Report (1969).

<sup>2</sup> Report on the Means of Authenticating the Quality of Engineering Products and Materials (1971).

<sup>3</sup> Journal, BNES, January 1972.

4 Elstub Committee Report on Productivity of the National Aircraft Effort (1969).

<sup>5</sup> Inquiry into the Basis of Design and Method of Erection of Steel Box Girder Bridges—Interim Report (1971).

<sup>6</sup> Report of the Committee on Engineering Design (1963).

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# Organization for the Eighties A Personal View of the Future of Divisional Engineers in BAOR

# CAPTAIN R I M MACARTHUR RE

## INTRODUCTION

IN 1969 the BAOR engineer organization was radically changed by the dissolution of the Corps Engineer Brigade and the integration of most of its component parts into the Divisional Engineer framework. We have now had five years to evaluate the new structure and are on the verge of receiving new equipments, vehicles and radios. It would seem a propitious time for a critical (but constructive) examination of our current organization and possible future options.

## PART I-THE BACKGROUND

It is generally acknowledged that the current organization is a great improvement on that which preceded it. Prior to 1969 the organization was as shown in Fig. 1.

The Divisional Engineer Field Squadrons were affiliated to the Brigades of that Division but this had given insufficient engineer support, so in practice for a number of years preceding 1969, Field Squadrons of the Corps Engineer Regiments had also been placed in support of these Brigades. The resultant command structure became complicated and invariably an "ad hoc" RHQ was formed to control the various Squadrons supporting any one Brigade.



The new structure dissolved the Engineer Brigade HQ, converted the existing two Armoured Engineer Squadrons into three smaller ones and established three new HQ REs at Divisions with Colonel CREs. The HQs of the Corps Engineer Regiments, Armoured Engineer Regiment and the old HQREs became the RHQs of the new Regiments. The outline current organization is shown in Fig. 2.

This organization has remained largely unchanged since 1969 with the exception of the expansion of the Amphibious Engineer Squadron into a Regiment and various internal changes in the Field Support and Corps Support Squadrons. The major innovation within the Engineer Regiment has been the formation of an HQ Squadron consisting of the old RHQ Troop (renamed Admin Troop) and the old Forward Support Troop (from the Field Support Squadron).

In the not too distant future new equipment is due to come into service. The Combat Engineer Tractor (CET) will replace and augment the light and medium



TECHNICAL CONTROL FIGURE 2
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wheeled plant in the Engineer Regiments. The previous range of Centurian based Armoured Engineer Equipments is being phased out. The Chieftain based Armoured Vehicle Launching Bridge (AVLB) replaces the bridge-layer and the ARK but there is no replacement for the AVRE which will be effectively replaced by the CET and an increased scale of ARVs. All of the Ferret scout cars are due to be replaced by CVR(T) (Scorpion) and CVR (W) (Fox) derivates. A new range of radio equipment which is easier to tune and works over greater ranges is also due in service in the near future.

The task of Engineer units has been defined as "to create mobility for our own forces whilst denying it to the enemy". The means by which we are likely to do this has changed. With the advent of the Amphibious Engineer Regiment with its M2B rigs the remaining regular Engineer units of BAOR no longer maintain any more than a contingency residual wet bridging capability. The primary roles for which the BAOR Field Squadrons are trained are demolition, minewarfare, dry bridging (MGB) and expedient route maintenance.

For the purpose of this paper it is assumed that the Brigades we support are not likely to change radically apart from the introduction of the same new CVR series vehicles and radio sets, and a general increase in weapon capabilities. Reductions in the forces of any European NATO country would tend to lead to our Brigade areas becoming larger still.

There will thus continue to be an operational requirement for the completion of various obstacle plans followed by more intimate support to other Arms, and the ever present contingency infantry role when our other tasks are either completed or we no longer have the engineer resources to carry them out. All of these operations are likely to be carried out under an adverse air situation where movement over long distances becomes fatal and decentralization a virtue. This then is the pattern against which we should consider our options for the future.

# PART II-CONVENTIONAL OPTIONS

Retention of the Existing Structure. The first option to be considered is whether there is any need to change at all. It is, as previously mentioned, generally accepted that the 1969 reorganization was a very satisfactory solution and it has worked well since then. A more detailed look at this organization within the Division reveals the structure shown in Fig. 3.

This provides a permanently attached HQ RE at Divisional HQ to give engineer advice and control Divisional Engineer resources. The Engineer Regiments are normally retained under the command of HQ RE but placed in support of a Brigade thus providing for the normal affiliation (and tactical co-location) of an Engineer Regiment HQ to each Brigade and thence a similar degree of advice and control. The Field Support Squadron provides a central Divisional pool of engineer resources and plant with the Regimental Support Troops providing a similar function at Brigade level. The Engineer Regiment HQ is capable of commanding a variable number of Field Squadrons, and re-grouping within the Division, or even within the Corps, is possible to provide a tailor-made Engineer force for the particular requirements in that Brigade area. At the extremes therefore an Engineer Regiment HQ in support of a Brigade in a reserve role could therefore have no Squadrons at all under command (they having been detached to forward Regiments) and merely be used in an engineer intelligence and planning role for future operations. At the other extreme a Regiment whose Brigade area has particular engineer problems could well command a force of up to four Field Squadrons together with up to Squadron levels of Armoured and Amphibious Engineers. In the same way that HQ RE retains command of its Regiments so do those Regiments normally retain command of all engineer units placed in support of the Brigade. The Engineer Regiment HQ can then control its sub-units directly as they work on a higher formation obstacle plan or place elements in support of Battle Groups and Combat Teams if appropriate. It can be a very flexible and effective organization.

One problem arises from the role of the Armoured Engineer Squadron. The Troops and Sections of these Squadrons exist to provide intimate engineer support to Battle Groups and Combat Teams in the Forward Edge of the Battle Area (FEBA). Due to the distance involved and the high degree of risk attached to all unnecessary movement on the modern battlefield, Armoured Engineers should invariably be deployed very carly in the battle and not held back in centralized Squadrons. Whenever they are fully deployed they will therefore be spread along a Divisional front under command of Engineer Regiments and in support of various forward elements of the Brigade. The Squadron HQ becomes superfluous in this circumstance. Theoretically they provide specialist Armoured Engineer advice to the Brigade and technical support to their detached Troops and Sections. In practice with the distances involved they could not do so and this function would have to be processed through the nearest engineer unit. No other sub-unit commander in the Division is faced with such a dispersion of his unit as is the Armoured Engineer Squadron Commander. It is this anomaly which has largely led to various reappraisals of the current organization.





Adoption of the German Solution. The German Army has an independent Armoured Engineer Company (by our standards a composite Armoured/Field Squadron) as an integral part of each Brigade. It then has a Divisional Engineer Battalion including specialist bridging and support elements. Translated into our structure a possible option is at Fig. 4.

As can be seen one of the Engineer Regiments has been disbanded and one of the Field Squadrons dismembered to produce Field Troops in the Armoured Engineer Squadron. This Field Squadron HQ is used to produce the second Armoured Engineer Squadron HQ. The Armoured Troops each consist of two AVLBs and supporting equipment. It is probably highly desirable that the manpowersaving in the dissolution of one RHQ be used to produce one extra Field Troop thus providing four Armoured/ Field Troops to an Armoured Engineer Squadron and thus the capability of providing one Troop (probably composite) to each Battle Group of the Brigade. The two Support Troops of the Armoured Engineer Squadron could remain independently under HQ RE or probably more desirably be placed under command of the Engineer Regiment (which will incidentally give the latter its own plant and resources capability without further fragmentation).

Although the Bundeswehr use independent Armoured Engineer Companies directly under Brigade Command their total command and control philosophy is different to ours in that they have no Arms or Service Commanders at Brigade or Divisional level and thus all troops who work with a Brigade belong to it. It is probably desirable that these new Armoured Engineer Squadrons should have the same relationship to their Brigades and HQ RE that the Regiments have now.

This solution certainly provides armoured engineer support to Brigades with a sensible level of command for such elements. Attractive as this is, it is not without penalties. The level of engineer advice at Brigade level would be diminished, not necessarily because a Squadron Commander cannot give as satisfactory advice to the Brigade Commander as a Regimental Commander but because the former will not have the time to do so. One of the most satisfactory aspects of the 1969 reorganization was the establishment of a co-located RHQ at Brigade level to give engineer advice and make engineer plans. The Squadron HQs of the Regiment could then be located where their work was and not tied to Brigade HQ. The Squadron Commanders of the pre 1969 Divisional Engineers invariably found that the difficulty of being always available to the Brigade Commander as his engineer adviser and simultaneously exercising effective command over their squadron led to a degradation of one or the other. A Squadron HQ is just not big enough to cope with this dual role and what had been possible over a Second World War Brigade Front became very much more difficult over enlarged BAOR frontages.

A second problem arises from the operational command structure. It is part of

current BAOR Operational philosophy that all engineer units in a Brigade area should normally be under the command or operational control of the Engineer HQ affiliated to that Brigade. A Brigade Commander thus has to deal with one Engineer Commander only. This philosophy is also true of the other supporting arms (artillery and aviation) and of the supporting services. Regardless of the fact that the Divisional Engineer Regiment would tend to work mainly on higher formation obstacle plans the scene of this work would normally be in the Brigade operational areas and the resultant command arrangements with a lack of single engineer control could be as unsatisfactory as they were prior to the 1969 reorganization.

The third major problem in this solution would be the lack of tactical flexibility. At present all of the Field Squadrons of the Corps are available to work on obstacle plans prior to any more detailed support of their affiliated Brigades. Under this proposal one quarter of these squadrons would be converted to a primary role of supporting armoured Engineers. Whilst obviously this difficulty should not be exaggerated as the Troops concerned could obviously be regrouped initially, their training will tend to have been directed into different aspects of combat engineering and this, together with the more complex command arrangements required, tends to militate against this solution.

Integration of the Armoured Engineer Squadrons. The last major option within the current overall outline is to integrate the Armoured Engineer Squadron into the existing Engineer Regiment structure. Fig. 5 illustrates this option.

All of the existing advantages of the present structure would be retained. The Field Support Squadron keeps its role of providing a Divisional pool of plant and resources. The existing HQ Squadron is expanded on a one or two Troop basis with HQ elements available to provide the increased overheads required in the expanded Squadron.

Tactically the Field Squadrons would continue to operate as present and the Armoured Troop (or Troops) would be placed under command or in support of a Battle Group/Combat Team as appropriate for the operation in hand. The Armoured Troop Commanders would become key appointments filled by experienced young officers in a similar fashion to the Infantry Battalion Mortar or Anti-Tank Platoon Commanders. Sections or Troops from the Field Squadrons could operate with the Armoured Engineer Troops as required to provide Combat Engineer support. If a



FIGURE 5

requirement for increased Armoured Engineer support in a particular Brigade area arose, then it would not be too difficult to attach a number of Troops from adjacent formations who could operate under the command of any convenient Field Squadron. This type of re-grouping is normal to Infantry Battalions and Armoured Regiments.

Were this solution to be adopted it would be essential for Field Squadron and Field Troop Commanders to be as capable of properly utilizing Armoured Engineers as their opposite numbers in the infantry and RAC are of utilizing their support weapons.

The effectiveness of HQ Squadron under this solution would be greatly improved as the extra "management" available from the old Armoured Engineer Squadron HQ would enable a very strong SHQ to be established, capable of providing a properly constituted A2 Echelon as well as a Plant/Resources organization (now being referred to slightly inaccurately as an A1 echelon in most Regiments).

# PART III-A RADICAL RETHINK

The Basis. The previous options have looked for solutions which accepted the existing pattern of Troops, Squadrons and Regiments and reshuffled them. An alternative method is to re-appraise the requirements from the most basic level upwards.

The Section. Our smallest unit is the Field Section whose strength is nine and whose vehicle is an APC. It is of interest that the Infantry with a ten man section have extreme difficulty in squeezing these plus their weapons and personal equipment into their APCs. An Engineer Section APC contains racking inside for G1098 equipment (as well as boxes on top) which occupies at least the space of two men. Our absolute maximum Section strength should therefore be eight men.

The Troop. We currently operate on four Sections to a Troop. Historically Engineer Units have worked on the standard three Section Troop (as UKLF units still do) but BAOR moved to four Sections on the introduction of the APC as the alternative was to reduce Section sizes. The necessity for a large Troop arose from the equipment of the time. The manpower required to construct the previous range of Wet and Dry Bridging equipments or to operate the old Mechanical Minelayer Train all militated against any reduction in Troop size. The advent of the Bar Minelayer, MGB and the new range of demolition equipment removes this injunction.

A Field Troop HQ consists of the Troop Commander and Recce Sergeant in Ferrets, the Troop Staff Sergeant in an APC and the Troop's STALWART containing combat supplies and Troop Reserve G1098 stores. The practice of Engineer Troops having a second SNCO for reconnaissance arose when engineer tasks in BAOR were more varied, equipments more complex and radios less in both efficiency and number. There has never been a really satisfactory role for a second SNCO in the Troop in barracks and the advent of the Section APC with its own radios so that every element of the Engineer Troop became perfectly capable of both reconnaissance and disseminating the intelligence obtained, has made the Recce Sergeant a superfluous luxury. In times of manpower shortages where we need to make every man effective there is no real justification for the continuance of this post. Similarly a Field Troop used to need an APC as its HQ because the Troop Commander could not really plan or control an engineer task from a Ferret. The Ferrets in the Field Troops are due to be replaced with SPARTAN (a CVR(T) APC derivate) which is ideally suited as a command vehicle. With the Recce Sergeant removed, the Troop Commander and Troop Staff Sergeant could operate from the two SPARTANS which would still give the Troop a very satisfactory command and recce capability. The STALWART should remain as present.

The Field Squadron. When one examines a Squadron HQ one is struck by its size compared to equivalent sub-units. An Infantry Mechanized Company HQ consists of three Officers and twenty soldiers. An Engineer SHQ is four Officers and forty soldiers. Our Squadrons are in fact still established as semi-independent units (this being reflected in their having Squadron rather than Regimental Establishments) despite the fact that in BAOR we have been working tactically as Regiments rather than Squadrons for five years. In days of unlimited manpower this would not matter but today it is obviously of paramount importance to use every man economically. The duplication of administrative capability at Squadron and Regimental level in BAOR leads to us having less soldiers where they count, in the Field Troops and Sections.

A New Structure. If one then re-assesses the best of the conventional options described earlier (integration of the Armoured Engineer Squadrons into the Engineer Regiment) and applies the above criteria a new and very attractive option emerges, Fig. 6.

In this option the Field Section has been reduced to eight men, the Field Troop to thirty-two and the Field Squadron to 122. A major saving has been achieved by the removal from the Field Squadron of those elements enabling it to be an independent sub-unit and thus the reduction of the SHQ to a similar size to that of an Infantry Mechanized Company or Artillery Battery. Some of these administrative personnel are transferred to HQ Squadron together with the majority of the administrative transport. The remainder are absorbed in the new third SHQ. The HQ Squadron is reshaped to provide a Command Troop (Regimental Tactical HQ) and separate Administrative and MT Troops. The HQ and the latter two troops form all of the echelons required by the Regiment for its operational support. The Armoured Support Squadron has a small SHQ and commands two Troops, an Armoured Troop (containing 4×AVLBs and their reserve bridges) and a Support Troop (containing reserve CETs, Tippers and an engineer resources capability). The expansion to the three Squadron Regiment has increased the number of Field Sections from twenty-four to twenty-seven and the number of Field Troops from six to nine. The actual total number of men in the Field Sections has not been altered but by reducing each Section by one man, paring off one Section per Troop and redistributing the old Troop HQ and fourth Section APCs, a very substantial increase in capability and tactical flexibility has been gained. It would have been possible to create a similar effect without forming a third SHQ (ie by having four or five Troops per Squadron) but there would not have been the same degree of tactical flexibility. This reorganization can be achieved with no increase in overall manpower, a slight rank adjustment (three officers' posts being created from soldiers) and the total increase in vehicles of three CVR. series vehicles and two STALWARTS per Regiment. It is significant that the Engineer Regiment strength in this or the best of the conventional options is in the





order of 575 (without the forty-five strong REME Workshop). Our conventional option gives a three Squadron Organization (including the HQ Squadron) but Artillery and Armoured Regiments with very similar strengths of 605 and 563 respectively organize themselves on a four Battery or five Squadron organization and Infantry Battalions with a strength of 700 are on a six Company basis. Whilst we should not slavishly follow their example, we should closely examine our penchant for large sub-units and if they are found to be an anachronism created by the necessity to have large numbers of men to perform manual construction tasks then we should not hesitate to move to an organization more in keeping with the times.

Tactical Operation. Tactically the new style Regiment would be far more flexible than the old. With three Field Squadrons covering a Brigade area the Troop and Squadron areas of responsibility are likely to be smaller and thus more easily controlled. In the event of destruction of an SHQ a degree of tactical flexibility is retained that would have been lost before. It would still be perfectly possible to regroup Squadrons between Regiments as they would merely latch on to the centralized administrative system of their new Regiment in the same way that all of the other "Teeth Arms" do at present. The practice of placing Mechanized Companies and Armoured Squadrons under command of a Battle-group Headquarters of a different Formation is a well tested one. The Administrative echelon system being centralized would work on the same efficient system as the other units in the Brigade Area. The Armoured Support Squadron would be located in a central position in relation to Squadron tasks and would provide engineer support by detaching elements to Field Squadrons in an analogous way to that in which an Infantry Support Company provides support weapons elements to the Mechanized Companies of the Battalion. It would also control engineer resources in the Brigade Area.

The RHQ may be used particularly flexibly. The reorganization would produce a fourth APC for the tactical HQ and thus a fully "Stepped Up" HQ (of Engineer Operations and Intelligence vehicles in each pair) could be co-located with the Main and Step Up elements of Brigade HQ in a similar way to at present. An attractive alternative would be to leave two Command APCs co-located with Brigade HQ Main and Step Up, crewed by the Intelligence Officer and one other officer to provide Engineer Intelligence and advice to the Brigade. The Commanding Officer would normally also be based here. The remaining two Command APCs could then form the Regimental Tactical HQ, manned by the Regimental Second-in-Command and Adjutant and possibly co-located with or near to the Armoured Support Squadron HQ centrally in the main area of engineer operations. Since the command element (as opposed to the advisory elements) of the Regiment would not be tied to Brigade HQ they would be in a much better position to properly control their Squadrons from a forward position without the risk of dislocation due to a Brigade HQ move during a particularly critical phase of an engineer operation. This latter system is of course identical in effect with that used by the Artillery Close Support Regiments of the Brigade at present.

The suggested separation of the HQ Squadron and Armoured Support Squadron has the disadvantage of a slight increase in overheads. These two elements do however have quite separate functions to perform and have to operate separately in the field. It would therefore seem better if they were to form separate sub-units at all times. This again is the system currently adopted by armoured and infantry units with their separate Command, Support and Administrative sub-units.

The Effect on Organizations Outside BAOR. So radical a reorganization is bound to have wide ranging repercussions. An obvious one is the effect on Strategic Reserve airportable engineer organization. There is no overriding requirement for UK based Units to emulate BAOR as our roles are different and we do not "Arms Plot" in the same way that armoured, infantry and artillery units do. UK based Regiments do not suffer from the lack of balance of BAOR Regiments in that all of their Regiments are currently organized on a three Field Squadron basis. In principle however there is merit in some communality of organization. The case for engineer reorganization in UK would have to be the subject of a separate study as to whether a greater quantity of smaller squadrons would be more or less suited to the types of tasks encountered in the airportable role. It would probably be essential for UKLF Squadrons to retain more autonomy than BAOR ones. In view however of our National Defence priorities it would seem that, unless it was positively detrimental to their role, then UK based units should follow to some degree the trends of BAOR. There are many ways that this could be achieved. One possibility is that a case could be made for more engineers to be permanently assigned as UK Divisional Engineers. If an extra UK Engineer Regiment was so assigned it would be possible to reorganize the six large Field Squadrons into nine smaller ones on the proposed BAOR lines thus providing one three Field Squadron Regiment per Brigade of the Division. The remaining Field Engineer clements of the Engineer Brigade could be reorganized into two general purpose Engineer Regiments and an Airfield Construction Regiment all of three smaller Field Squadrons. There would thus appear to be no factors emanating from UKLF to prevent or militate against a BAOR re-organization.

The Manning Implications. There would be manning implications in this radical re-organization not present in the previous options which do not significantly alter the present structure. If only BAOR re-organizes there would be a need for more commanders at all levels from Section to Squadron. If UKLF airportable units followed suit this pattern would include more Regimental Commanders. This change would be most felt amongst officers and certain key warrant officer posts such as SSM. Since our proportion of officers to soldiers in field units at present is considerably lower than that of the other Teeth Arms this could be a welcome step in the right direction enabling us to follow the armoured and infantry pattern of Squadron Command at an earlier age with the possibility of second tours as Squadron Commanders for a proportion of officers in the Corps. A leavening of a few highly experienced Squadron Commanders throughout field units is bound to increase overall professional ability. There would be likely to be shortages of Junior Officers in such a re-organization. This would tend to lead to the occasional expedient of a Warrant Officer Troop Commander giving a good young QMSI command experience. If we were compelled by overall Army Manning policy to make compensating rank reductions to justify our extra Squadron and Regimental Commanders it is fairly certain that a number of posts of the correct ranks could be found in some of our static establishments which could be willingly traded for increased Field Commands.

### CONCLUSION

Of the conventional options before us it would appear to be far better to integrate our Armoured Engineers into the Regimental structure rather than keep the present organization or move into a Germanic solution. The time has come for all of the engineer elements directly concerned with support to troops in the Brigade area to be integrated under the command of the Regiment affiliated to that formation. A mere reshuffling of the existing Troops and Squadrons into a new structure will not necessarily however produce the best blueprint for the future. It is the advent of new equipment which has been the catalyst for this proposed change. The reduction of tank mounted engineer equipments to the AVLB only and the introduction of the CET to replace the functions of a number of other equipments in the forward areas points to a regrouping of engineer support equipment. New radios giving better communication and the introduction of the CVR series (enabling commanders to plan engineer tasks from the same vehicle they travel in) point towards a re-assessment of our command and control structure and thence the release of a number of APCs. Assuming that for reasons of manning and balance between arms, one is to have an Engineer Regiment of 500-600 men as the basic engineer task force in BAOR it would seem logical to organize the Regiment internally to produce the most flexible, economic and viable organization possible. The present two Field Squadron Regiment is not flexible, not economic in manpower and would not be very viable in case of war.

The historical reasons for large semi-independent Field Squadrons in BAOR no

longer exist and they have become an expensive luxury which damage our tactical flexibility. A transition to an organization based on the Regiment as its basic unit will enable the Cotps in BAOR to better carry out its traditional function to provide mobility to our own forces whilst denying it to the enemy.

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# What? When? Where? Which? Who? Why? W<sup>6</sup>? Problem 2

THE photograph depicts an incident at the beginning of this century. You are invited to solve the problem.



# So Now You Know!!

MR RON ZIEGLER, the White House Press Secretary under former President Nixon received a "Gobbledygook Award" for:

"I would feel that most of the conversations that took place in those areas of the White House that did have the recording system would in almost their entirety be in existence but the Special Prosecutor, the court, and, I think, the American people are sufficiently familiar with the recording system to know where the recording devices existed and to know the situation in terms of the recording process, but I feel, although the process has not been undertaken yet in preparation of the material to abide by the court decision, really, what the answer to that question is."

COLONEL DAVID HOPPER, an Air Force Press Officer, received a "Misuse of Euphemisms Award". Referring to US bombing raids he complained to reporters: "You always write it's bombing, bombing, bombing. It's not bombing! It's air support."

HEARD at Royal Engineer Association AGM 1974: "On the point of attracting support to the Association, the stickers ('Join the REA') for cars are not very welcome in Belfast. We do not have any trouble in getting rid of our cars!"

# What When Where Which Who Why

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# It Must Be Right A Proposal to Reorganize the Sappers in BAOR

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DESPITE years of reorganization and change in BAOR—many think that the present organization of the Sappers in Germany is less satisfactory than the previous concept of brigade field squadrons and corps engineer regiments. If this is so, what is wrong? How can it be put right?

It can be argued that the weaknesses of the present organization are apparent at almost every level. A field squadron cannot be deployed to provide troops to either every combat team or to every battle group; its headquarters has no "slot" in the command structure when its troops are deployed in support of a brigade, and it has no real means of keeping in contact with its troops when they are so deployed. At regimental level, the RHQ is so large as to be an embarrassment at brigade headquarters, and the span of command-one full headquarters to two field squadrons-is uneconomic. At divisional level the CRE tries to mix his advisory function with that of commanding the field support and armoured engineer squadrons; for this he has less information than he would like and poor communications. There are other shortcomings. Although the present regimental system is well suited to the initial phase of the battle (when the engineers are busy preparing the divisional obstacle plan) it breaks down to some extent when the squadrons revert to their role of supporting the battle groups. At this stage of the battle there is no real reserve for specific divisional tasks. Thus, any operation, such as the approaches for an M2 bridge or the preparation of new obstacles, usually leads to a need to withdraw troops supporting the brigades, to concentrate them for the new task. This in turn could leave the brigade devoid of engineer support at what could be a critical phase of the battle.

The present organization has other weaknesses which are less obvious but equally fundamental. The engineer regiments are often located in different garrisons from their brigades. They train as regiments, live as regiments and work as regiments. There is a risk therefore that they could become remote from their brigades, armoured regiments and infantry battalions, only coming together for FTXs and—at command level—for CPXs. This could lead, and probably has led on occasions, to a lack of contact over a number of years so that neither the Sappers nor the arms they are supposed to support are necessarily familiar with one another nor, indeed, are they in full social contact. The Corps in BAOR is, as a result, tending to become isolated and introverted.

Before suggesting a solution it is necessary to examine further the problem at brigade level. Today, once the obstacle plan is completed, a brigade is supported by an engineer regiment of two APC field squadrons, each of three troops of four sections. Plant is held centrally in the forward support troop at regimental level, and the squadrons are on the engineer command radio net (C42 No 2). The regimental tactical headquarters is located at brigade headquarters, and it also has C42 No 3 (secure communications) on the brigade command net. A squadron headquarters must remain on the regimental net, and it has its own C42 squadron net. The deployment within the brigade will depend upon the tactical situation. Some engineers may be left manning reserved demolitions and it is not uncommon to find a troop supporting a battle group, in which case the troop commander travels with the battle group commander, and his small tactical headquarters joins the battle group headquarters. This works well; the troop commander and his sections can be on the battle group and their respective combat team radio nets, and their small "force" integrates effectively. However, under these circumstances, the squadron headquarters is usually left "in limbo". Its troops, in support of the battle groups, move rapidly over large distances and are often out of radio contact. The squadron commander could ask a battle group commander to accept him in a battle group's tactical headquarters, but there is no real place for him and he would not fit into the organization easily. If, on the other hand, he deploys on his own he becomes dependent upon his regimental headquarters for tactical information, and this is invariably sparse. Under these circumstances he is almost reduced to controlling his own echelon, his troops taking their combat supplies from their battle groups!

Problems can arise when a special operation has to be mounted and troops have to be concentrated. The battle groups often lose their engineer support in the middle of the battle, and the troops brought in could be tired and ill-prepared for the new task. The seriousness of such a situation should not be underestimated. In peacetime, "Sapper Play" on exercises is often inconvenient and time consuming, but a battle group commander would be most unhappy if he was expected to operate without close engineer support in war. It would also be folly to expect Sappers withdrawn from the battle to be able to redeploy, without pause, onto a bridging operation or some other set-piece task. The soldiers would not only be tired, but they would probably not have time for the preparation and briefings required. The need for proper preparation must never be glossed over; it is, for example, easy to underestimate the problem of M2 approaches, but an ill prepared and unpractised section could take up to twenty minutes to lay a single roll of class 30 trackway. This is the recipe for disaster!

How can we overcome these shortcomings with our present limited resources? Any solution must be realistic; money is short and there is no point in seeking more men or more equipment, or in recommending sweeping changes which require costly works services to implement them. A fundamental reorganization within these constraints is possible.

The basic requirements are:

(1) The Sappers must be capable of deploying and completing the divisional obstacle plans as quickly as possible.

(2) After completing these plans it must be possible to provide constant engineer support to the battle groups and, simultaneously, to maintain an adequate reserve capable of undertaking special engineer tasks without having to degrade that support.

(3) Engineer headquarters and commanders at each level must fit into the tactical command organization and be able to keep up to date with tactical information and intelligence.

The organization proposed in this article is designed to meet these criteria.

It is suggested that, once the divisional obstacle plan is complete, each battle group should normally be supported by an engineer troop of four APC sections. This would give each combat team an element of engineer support, and the battle group commander's engineer adviser would be the field troop commander. It has already been shown that this organization works well now, provided it is not necessary to remove the engineer support for specific tasks.

This leads to a requirement for four troops in a brigade, and it is proposed that the APC squadron should consist of four troops, and that the squadron headquarters should replace the present regimental headquarters at brigade level. A squadron "tac HQ" is smaller than the regimental equivalent, and is probably more appropriate to this level of command. The system worked well in the past under the "old" brigade field squadron concept, except when the squadron commander was required to take command of another squadron for a specific operation. In addition to his four troops, a squadron commander would require some plant at squadron level. The present centralized system, in which the forward support troop is at regimental level, may be sound in peacetime for it has simplified operator training and machine maintenance. However, it makes less sense in war since the ability to deploy plant quickly is essential.

The Combat Engineer Tractor (CET) should therefore be held at squadron level, and it is proposed that the Brigade Field Squadron should have a headquarters troop which includes a CET Section.

The Brigade Field Squadron would provide the brigade commander with the immediate engineer support and advice he required. What problems remain at divisional level, and how can they be solved?

The difficulty of providing engineer reserves has already been mentioned. There are other potential weaknesses at divisional level. The support and armoured engineer squadrons, like the field squadrons, can be "out on a limb" when deployed tactically. They are commanded by the CRE at divisional headquarters, but his communications to them are relatively poor and neither he nor his staff are really geared to this command task. The CRE's prime task must be to advise the divisional commander and to control the overall engineer resources within the division. The creation of the requisite divisional reserve of field engineers would exacerbate the problem and there would appear to be a need for a proper command element outside HQ RE.

If this is accepted, then the proposed solution is:

(1) To form a Divisional APC Field Squadron to provide the engineer reserve. This Squadron would be identical to the Brigade Field Squadron and, with its four troops, would be capable of the larger tasks such as M2 approaches, MGB (including MGB with pier) and barminefields. It would also be able to man reserved demolitions, and to fire preliminary demolitions after the brigade engineers had reverted to their brigades, that is, on completion of the divisional obstacle plan.

(2) To group this Divisional Field Squadron with the existing Field Support and Armoured Engineer Squadrons to form a Divisional Engineer Regiment. The headquarters of this regiment would command the division's engineer resources and would also take operational command of amphibious engineers allocated to the division. The headquarters would plan and execute divisional engineer tasks and would be under the control of CRE.

The benefits of this organization are clear; the CRE would be provided with a proper command structure for his divisional engineers, and the armoured engineers and Field—or Divisional—Support Squadron would be served by a full headquarters and echelon. Brigade Field Squadron commanders would not be worried by the addition of extra resources which would distract them from their primary tasks, since all the necessary planning and control of special operations would be undertaken by the Divisional Regiment.

The proposed organization is shown in Figure I, and Table I highlights the main changes in strengths. The outline communications are shown in Figure II; the need for engineers in BAOR to have VHF communications at all levels is now generally accepted, and this can be achieved from within existing resources except for a small increase in C42 No 3. Table II illustrates the different roles of the Brigade and Divisional Squadrons. It is suggested that HQ RE is strengthened by the addition of a GSO 1 which would enable HQ RE to co-ordinate the training of the Brigade Field Squadrons in peacetime. A potential weakness of the "old" brigade field squadron concept was that the squadrons—while enjoying considerable independence—could be somewhat neglected compared with the Corps Engineer Regiments, and they lacked the facilities and expertise to plan all the necessary training. The task of the GSO 1 would be to assist and supervise the Brigade Squadrons in their training.

The Brigade Squadron is larger than the present field squadron, and the unit would become self-accounting. However, the new organization would make considerable savings in manpower elsewhere by reducing by three each the number of regimental and squadron headquarters in BAOR. It would, therefore, be possible to provide the new Squadron with the additional manpower and expertise it would need to enable it to cope with its extra tasks; it was a weakness of the previous brigade field squadron that its administrative organization was not strong enough, although the addition of administrative officers led to a considerable improvement just before the last reorganization. The enlarged Brigade Field Squadron would certainly be a challenging







FIGURE 2. PRINCIPAL RADIO NETS



	Regt HQs	APC Fd Sqn	Fd Troops	Lieut-Cols	Majors
Present	6	12	36	6	12
Proposed	3	6xBde \ 9 3xDiv (	24 x Bde $3612$ x Div $536$	61	9
Change	-3	3	No change <sup>2</sup>	No change	

TABLE 1-Summary of Main Changes Leading to Manpower Savings

<sup>1</sup> Reduction of three command appointments; increase of three GSO 1 appointments.

<sup>2</sup> No reduction in overall working strength.

TABLE II—Typical Tasks to Illustrate the Division of Responsibilities of Brigade and Divisional Squadrons

Brigade Squadrons	Divisional Squadrons
Support of brigade units:	M2 bridge approaches
Route clearance	MGB including multi-span
Mine clearance	Divisional minefields and major obstacles
Demolitions	Water supply
Defence Works	Reserved demolition firing parties
etc, etc.	Reserve defensive positions
Support of APC swimming	Route maintenance
	Minefield breaches

and rewarding command, and would provide very suitable experience for our most promising officers.

Perhaps the main weakness of this new organization lies not in what it proposes, but in what it saves. There is a reduction of three command appointments—although the rank cover is required for the GSO 1 posts at divisional headquarters—and a reduction, without replacement, of three squadron command posts. The latter may not be serious; it is understood that the Corps has recently experienced some difficulty in finding enough suitably qualified majors for all the squadron command appointments, and this reduction would ease the situation. The loss of three regimental command appointments should be viewed against the overall benefits and savings arising from the reduction of six headquarters. Even after taking manpower for the new field squadrons to enable them to handle their wider commands, there will be a saving of a large number of officers and men. Some of the manpower saved could be used to establish regimental police and the host of other posts which are normally "milked" from squadrons to the detriment of their main raison d'être.

All the above proposals fall within the principles adopted; they fall well within existing manpower ceilings and, except for a small number of radios, do not require new equipment. It only remains to consider peacetime deployment and the command, employment and control the Brigade Field Squadrons during the initial phase of the battle, when all engineer effort is concentrated on the Obstacle Plan.

The Obstacle Plan would be the responsibility of the Divisional Engineer Regiment, and the Brigade Field Squadrons would be placed under operational command for this phase. The grouping should not be difficult; the Brigade Squadrons would have the necessary radios to join the regimental net and, being self sufficient, would not impose a great burden upon the regimental organization. The divisional plan would thus be controlled by one headquarters as opposed to two at present. Once the preparatory work was completed the Brigade Squadrons would be released to their parent brigades, and the firing parties on reserved demolitions would be provided by the Divisional Field Squadron and Armoured Engineers. The Brigade Field Squadron would probably remain responsible for firing some of the preliminary demolitions in the brigade area, since the timing of these would be closely allied to the tactical situation.

It would not be appropriate in an article of this nature to discuss the detailed deployment of the proposed organization to barracks in Germany. The Divisional Engineer Regiments should be grouped as units in their own barracks, and space probably exists to do this in the existing engineer regimental barracks-for example, in Hameln and Osnabruck. The location of the Brigade Squadrons requires further study. It is important that these Squadrons train regularly with their brigade units, joining them at Hohne, Soltau, Sennelager and in Suffield. Troops should have permanent affiliations to battle groups and every opportunity should be taken to train together. All this could best be achieved if the Squadrons lived in their brigade garrisons, although it is not realistic to expect either a major redeployment to make room for these Squadrons, or any new barrack builds. In some garrisons-such as Osnabruck-there would be no problem, and the Brigade Squadron could share the barracks with the divisional engineers. This has the added advantage in that the Squadron's engineer training could be carried out jointly with the Divisional Squadrons; a nice co-ordination task for the GSO 1 at Divisional headquarters! Elsewhere it may be necessary for the Brigade Squadrons to be located outside their parent brigade garrisons, probably with the nearest Divisional Regiment. This solution, while less than ideal would be acceptable.

The new concept described above is based on the principle that the organization should be tailored to provide the required engineer support at brigade and divisional level in the most effective way possible. It uses some principles which have already been proven and proposes changes which—although reducing the number of command appointments—make savings in manpower which will adequately cover the reorganization. We should not allow a natural determination to maintain the existing number of command appointments (and hence the promotion "structure") preclude these proposals being considered further. There are shortcomings in the present organization; it is in the best interests of the Corps that they be considered and, where necessary, put right—now.

# The Indian Sappers and Miners Some Aspects

# PART IV

# COLONEL P A EASTON OBE

THE earlier articles on this subject may have left the impression that the three Corps of Sappers and Miners in India had continued to draw recruits from those regions in India that were associated with their titles: Madras, Bengal and Bombay. The fact that for many years the Headquarters of these Corps had been located at Bangalore, Roorkee and Kirkee may have increased this impression. Since the early days when the three Presidencies had occupied comparatively small areas of the sub-continent, and were thereby limited in their choice of areas for recruitment, the British Raj had occupied the whole country from Cape Cormorin to Afghanistan and from the Indian Ocean to the Bay of Bengal. Large tracts remained nominally under the rule of Indian Princes, who paid homage to the Crown, but the remainder was truly British India. It was these latter areas which provided large and productive recruiting fields in addition to the original enclaves of the three Presidencies. This widening of areas effectively expanded the scope for recruits to the three Corps. The Madras Corps continued to take recruits from the Madras Presidency and South India but from an extended area: Tamils and Telegus, Indian Christians and Mohammedans. Recruiting areas for the other two Corps widened in scope to include the Punjab and the North West Frontier Province. In addition to enlisting Hindustani Hindus as in the past, the Bengal Corps now included Dogras, Sikhs, Pathans and Mussulmans from the Punjab. The Bombay Corps retained old associations by continuing to recruit Mahrattas from the Deccan and the Konkani Coast and now included Sikhs and Punjabi Mussulmans. From time to time the proportions of each class were varied in each Corps to meet current policies.

Such mixtures of men of different creeds, customs and habits, as well as coming from widely separated tracts of the Country, might well appear to cause difficult problems relating to administration and organization. In this respect the Madras Corps was fortunate as all classes mixed and ate from a common cooking pot. In the other two Corps the situation was similar to that which existed in many regiments and battalions of the Indian Army and was resolved by units and sub-units containing men of only one class. A field company was equipped so that at any time it could send out sections (troops of today) on an entirely independent basis even to cooking arrangements, which in the case of Indian units were extremely simple. The solution lay in all men of each section (troop) of a field company in the Bengal and Bombay Corps being of the same class and the three sections in each field company being composed of different classes. As far as possible barracks in Unit lines were organized on this principle. Normally each of the Bengal and Bombay Corps field companies were composed of Punjabi Mussulman, Hindu and Sikh Sections. Problems did occasionally arise in small headquarters, especially in war, but normally were overcome by good sense and spirit of co-operation and partly as the result of training. In one division in Burma the Headquarters of the CRE and the CRIASC were considered to be one unit for the issue of rations including meat. As "meat on the hoof" one goat was issued for consumption by the very mixed small unit. How was this goat to be slaughtered in order that its eating should be lawful both by Mussulman and Sikh? The former killed their meat by cutting its throat and the latter by cutting off its head at one blow. "Sahib", said a Mahratta havildar of high caste reporting the incident, "as soon as the Mussulman had cut its throat the Sikh butcher cut off its head and I shouted 'Combined Operations' and all are happy." India had solved its own problem.

This small but important incident leads to the matter of "Class" and "Caste" as used in the Indian Army. Explanation of the former is easy as in the main it refers to men from different regions but of the same religion, eg Punjabi Mussulman, Madrassi, Tamil, Dogra, Mahratta, Sikh and so on. As regards the word "Caste" more caution is necessary.

The system of "Caste" originated among the Aryans from the type of occupation of individuals. The priest or learned man became the Brahmin; rulers or military leaders were obviously of a governing caste and so became the Rajput or Kshatrya; the trader and the agriculturist made a third occupation and became the Vaisya and, lastly, the more humble folk-the labourer and similar types-formed a bottom layer of the system, the Sudra. But there were still many who were not covered by these four main occupations, the semi-wild men of the jungle and those unfortunates, who by their calling, were considered as having been defiled; the workers in skins of dead animals, the sweeper and many others of very lowly occupations. These were "outcastes" and, according to the Abbe Dubois in his "Hindu Manners and Customs", the very touch of a "caste man" by an outcaste would so defile him that many strict observances were required before he could be made clean. Also for an outcaste to touch a Brahmin meant instant death. Of course, Caste was not a simple matter of four distinct social strata; there were sub-castes and sub-sub-castes. A British Officer would also be considered to be unclean and for one to venture too close to his men's cookhouse might be the cause of considerable offence.

With such strict observance of "Caste" the matter of cooking and handling of food and the drawing of water was important and both the cook and the drawer of water therefore had to be a high caste man.

The matter of caste was not entirely restricted to the Hindu. As has been seen in an earlier article, when the invasion of India by Moslem tribes took place, there was wholesale forcible conversion of inhabitants to the new faith. Many entire tribes were

thus converted and still to this day retain their old caste as well as following their old customs to some degree. Thus one tribe of Punjabi Mussulman would consider itself to be superior in every respect to another. However, this high regard for social status, brought about by their previous religion, did not enter the cookhouse where all Mussulmans fed together.

Among Sikhs, too, caste prevailed. In the fifteenth century a pious sect of Hindus followed the teaching of the first Guru or Teacher, Guru Nanak. There was then a succession of teachers or Gurus until the tenth, Guru Govind Singh, who bound the Sikh community together by the introduction of two sacraments, a baptism and a communion rite, specially designed to break caste. All followers of the tenth Guru, added the name Singh to their own name. Still; there also remained followers of the first Guru who continued their earlier beliefs without following the rules of the more militant followers of Guru Govind Singh.

The Sikh religion (that is that of the tenth Guru), eventually formed a great Sikh Kingdom in the Punjab and naturally eventually included men of many castes. In addition to the original Jat Sikh there were to be found lower castes, such as the Ramdasia and the Mazhbi, which were recruited into the Army. In fact; in the Army the word Sikh really applied only to the followers of Guru Govind Singh.

From the system of Caste, initiated by the Aryans and varied over the years there sprang up a Military Class among the many classes that were engaged in the armies of the warring Indian Princes and later in the Indian Army. From the earliest times the carrying of arms had been an honourable profession, which brought much prestige to the individual, who normally was a land owner, either the proud owner of countless acres or the possessor of a mere "cabbage patch". These men formed the "Military Class", a term often condemned by the politician. They possessed an individuality, almost an independence, which was reflected in their bearing and approach. When "off parade" they would converse in the friendliest of terms with a British Officer, often on a man-to-man basis, different from what the reader would believe from the semi-feudal system that at times, and in some places, appeared to exist. In fact some more senior officers, arriving in India for the first time, would frequently find this more intimate approach difficult to understand.

But in days gone by, a member of the military class was only engaged to fight. His was not the task of cooking, cutting fodder for animals, drawing water, mending saddlery and the many other domestic duties that are necessary for an army at war. So each army was followed by a great swarm of followers for these duties, by the wives of the fighting men, the wives of followers as well as women with other pursuits in mind. Even the army of Arthur Wellesley was followed by many followers. But the great Mahratta leader, Shivaji, had other ideas. "No man in the army is to take with him his wife, mistress or prostitute; any who infringes this rule will lose his head."

Even in recent times the Indian Army included "Followers" in its establishment. The permissible number was clearly stated as were their duties, which were at each end of the scale: to cook and to draw water and as sweepers for latrines. In fact each section of a field company carried three on its establishment, a cook, a bhisti or water carrier and a sweeper. They received no promotion and were seldom transferred between units, so it was not uncommon to find that the "oldest soldier" in a unit might well be the sweeper. They were entitled to be awarded campaign medals. Great was the dilemma of a Divisional Commander in Burma when a unit sweeper carried out an act of extreme bravery involving the utmost danger to his own life and so preventing loss of life to men in the immediate vicinity. What would be the most appropriate award?

The word "Recruiting" brings to mind the Army Information Officer, Recruiting Sergeants and even Press Gangs. Over the years the three Corps had built up strong associations in the various regions that had been allotted for obtaining recruits. So strong became family traditions that sons followed fathers, nephews followed uncles and fellow villagers would follow their friends. Recruiting in peacetime was therefore a relatively easy matter. The Corps Adjutant would inform the Subadar Major, the senior Indian Officer, that on a certain date so many recruits of each class would be required. The Subadar Major would have also "worked out his sums"; and on due date the correct number of young "hopefuls" would be paraded for inspection each accompanied by a sponsor, relative or fellow villager, who would be serving at the time. Most, if not all, of these young men would have been inspected earlier by senior Indian Officers and it was seldom that any failed to pass the final test. On occasions British Officers might tour recruiting areas, visiting the villages of their men. Before going on tour they would have been told if they could approve recruits for final enrolment and be given a number up to which they could submit names. On such occasions great was the demand to be enrolled and frequently great would be the pressure by relations and village elders to enrol relatives and favoured young men. Frequently such requests and beseechings became so emphatic that final decisions were embarrassingly difficult to make. However, such "catch-as-catch-can" methods would be inadequate for war and in the thirties a recruiting organization was established throughout India. Upsetting as this new organization may have appeared to the "old brigade", a compromise was soon established for times of Peace and the new organization was proved to be efficient in producing the large numbers of recruits that were required for the tenfold expansion in World War II.

Reference has been made to the terms "Viceroy's Commissioned Officer", "Subadar Major" and "Indian Officer" without explanation. In the various armies of the Indian sub-continent there were, of course, officer ranks. Those with the rank of Jemadar commanded companies, battalions or even brigades. In the army of Tipoo Sultan a Jemadar would command either a company of infantry or a formation of cavalry. The method of promotion is not clear but in his novel "Tippoo Sultan" Meadows Taylor, a great authority on India of his day, shows the progress of his hero from a very lowly rank to that of Jemadar, where the increase in prestige was clearly tremendous. According to this author, even the ranks of thuggee included Jemadars as the chief of one of their marauding gangs and they in turn were always addressed with respect due to their rank, despite their murderous calling.

As the armies of the three Presidencies expanded "Native Officers" were brought in to the system and formed a grade between the sepoy and the British Officer and in turn this term was altered first to "Indian Officer". On the introduction of the Indian Commissioned Officer another term for this grade was essential and the term "Viceroy's Commissioned Officer" was substituted. When full Indianization was first contemplated and initiated the rank of warrant officer was introduced on the understanding that there would be no VCO's. After trial this rank proved to be a failure and was never tried again, VCO's under the title of Junior Commissioned Officers are still retained in the present army of India.

There was more than one rank of VCO. The jemadar was the platoon, or section commander in the case of Sapper units. In war there would be a British section officer but all orders were passed through the jemadar. Above the jemadar would be the company subadar, wearing two pips, and on him fell the responsibility of being the confidential adviser to the company commander on all matters affecting the men in the unit. With men from more than one class in the unit his task was no sinecure. In each Training Battalion would be found a subadar major, wearing a crown as his badge of rank. Finally in the Headquarters of each Corps would be found a much be-medalled subadar major, the senior Viceroy's Commissioned Officer in the Corps. On him fell the responsibility of being the adviser to the Commandant on all matters affecting the welfare and discipline of all men of the corps. The onus of responsibility was great; his influence was vast. Frequently as a reward for their services senior Subadar Majors would be awarded the rank of honorary Licutenant and even honorary Captain before retirement and their prestige expanded accordingly. Great as was the prestige of a VCO within his unit, this respect was probably even greater in his village, and there is really no comparison of this very great rise in social status elsewhere in the world. In durbar or in the village council he would be offered a chair by right of his rank, He would be addressed as "sahib". The Deputy Commissioner or the Collector might well seek his advice on a village problem.

Promotion to this grade of officer was from the ranks and from the more senior non-commissioned officers, the havildar or the havildar major, for there was no warrant rank. This was no automatic promotion. Because of his heavy responsibilities the greatest care was taken in selecting not only an efficient man but also a man with powers of discrimination, tact and leadership.

The recruit to the three Corps was enrolled on first arrival and undertook to serve for a period of fifteen years, part of which might be on the reserve. Not being enlisted, ie not having taken the oath of attestation, he could be discharged by his commanding officer should he not reach required standards during his period of training. Attestation was a solemn affair. Each Corps had its own ceremonial for this important moment in the young sapper's career, the least of which was repeating the loyal oath before the units at Headquarters drawn up on parade. Promotion would be first to lance naik and then to naik, corresponding to corporal; (The rank of naik being taken from the commander of small units of ten or more soldiers in the early Indian Armies). The next step was to havildar or sergeant, again an old term, and then to company quartermaster havildar and havildar major, which were of NCO grade.

In an earlier article it was seen that in the latter part of the nineteenth century British NCO's were brought from Chatham for the purpose of Trades Training. As such they formed "H" Company RE, the only RE unit with a permanent posting in India. In each Corps was a detachment of this company, holding all British Warrant Officers and NCO's in that particular Corps. Up to World War II, when expansion made it impossible, each unit of the three Corps held two or more BW and NCO's. Normally there were to be found in a field company a CSM, a sergeant and a lance sergeant, who gave training in Trades as well as assisting in the administration of technical equipment. Theirs was rather an anomalous position. Enlisted under the British Army Act they had no powers under the Indian Army Act and so could not command Indian Sappers. Their status vis-à-vis Viceroy's Commissioned Officers was also anomalous. Much depended on the character, personality and the ability to "give and take" on both sides. It was an interesting discussion between Subadar and CSM that the author once overheard just before a unit was due to set out for manoeuvres. Which was going to be responsible for the whisky and which for the beer? A technical question indeed.

Generally a British Officer would be posted to India for a period of five years. He might be posted to one of the three Corps of Sappers and Miners, to MES, to Survey or to the Railways. Some might serve a term in MES and then transfer to one of the three Corps. Some might serve the whole of their service in India in one Corps. Some might serve for five years with one of the Corps, revert to the UK establishment and return to their old Corps after their term of Home service had expired. In the case of the "old sweat who had soldiered on in the same Corps" or in the case of the Officer, who returned to his old Corps after a period in the UK, there grew up a great camaraderie, enhancing the family spirit that existed in each of the three Corps.

The impact of World War II fell heavily on the three Corps. After an initial inertia in India, when little expansion took place, more and more field units were required and from a peace establishment of one training battalion in each Corps there was an expansion to three training battalions, each of about three thousand men, a depot battalion and a battalion for forming up new field units. Wider training areas had to be found and additional workshops to be built.

Vast as was the expansion of the three Corps it was only able to compete with the problem of providing Field Units. New establishments would be required for the raising and training of technical units of the L of C such as Mechanical Equipment Units, E & M Companies, and so on. And it can here be mentioned that the raising of such units would also mean the recruiting of classes that hitherto had never been enrolled into either of the three Corps. Some years earlier, as has been mentioned in an earlier article, a Corps of Indian Engineers was established when Indian Commissioned Officers were brought into the three Corps of Sappers and Miners. There

was therefore no obstacle to the establishment of new formations and the enrolment of recruits for them. It was therefore decided to establish a number of Groups of the Indian Engineers and at the same time the term Sappers and Miners would be dropped in favour of this new word "Group", a decision that stunned many an old Sapper and Miner. These new Groups were therefore completely independent of each other and of the three Corps, (now Groups), who merely assisted in initial organization by the provision of small cadres of VCO's and men to enable the new Groups to start to function. All Groups, old and new, were entirely independent of each other but had the common bond of being Groups within the Corps of Indian Engineers, to which the title of "Royal" was conferred after the war. The answer to the question posed in Part I of this series should now be clear. An individual, officer or man, who had served entirely in one Group of the Corps of Indian Engineers, had no call on the funds of another Group.

The end of World War II marked a new era in India and clearly the Groups of the Indian Engineers would be affected. The war-time Groups were disbanded and the three Corps-as that is what they will continue to be called in this article to avoid confusion-began a big demobilization programme of units and men, subject to certain conditions to cope with the existing post-war situation in the Far East. In India Dominion Status for India and the new State of Pakistan appeared to be just round the corner. With this possibility in view, early in 1947 the Bengal and Bombay Corps began to reorganize their units in order that each would be composed of entirely one class, eg Punjabi Mussulman, Sikh, and so on. As it became more clear that there would shortly be two new Dominions, all soldiers in the Indian Army were called upon to state in which Dominion they would wish to serve, in India or in Pakistan, and a special room was set aside in Army Headquarters in which results were displayed. Soon it was evident that all Pathans, Punjabi Mussulmans and some others would wish to serve in the new Dominion of Pakistan, which would not only have the advantage of being a Moslem State but also be so much nearer to their homes. When "Partition" was ordered Sapper units were ready. Units and sub-units, complete with equipment in accordance with a condition made as part of the Partition agreement, moved to their correct side of the boundary between the two Dominions. As well as being pleased to be serving in the future near to their own homes there was a sense of sadness. Many of the pre-war soldiers as well as those of war-time recruitment were sad at leaving old associations and parting from old acquaintances from other classes within their old Corps.

On a hot day in July 1947 two British Officers and a number of senior Indian Officers gathered round a table in Army Headquarters. Their faces were grave and all appeared to be worried. The British Brigadier outlined the reason for the meeting. All private funds of the three Corps of Sappers and Miners were to be considered and a decision was to be made regarding what of these funds should be passed to a new Corps of Pakistan Sappers and what to be retained in the three old Corps in India, which would remain in the new army of India. Several lakhs of rupees would be involved. Each of their particular Corps. Every fund was considered. There was no air of bitterness, merely one of sorrow. As one Indian Colonel remarked, "I never thought that it would come to this." Eventually a decision was made and a statement prepared. The meeting broke up; there was an ominous feeling of finality.

The three Corps of Sappers and Miners still live albeit under slightly different titles, in the Madras Group, the Bengal Group and the Bombay Group of Engineers of the Army of India, all three pay tribute to their historic beginnings. The spirit of the three Corps under the British Raj also continues in the guise of three associations of British Officers in the UK who had served with the three Corps. Annually dinners are held when old times are remembered and when cordial messages of greeting are exchanged between the Old and the New. The title of Sappers and Miners may have altered but the spirit remains the same.

\* \* \* \* \*

# **On Plant Policy**

# S R ARNOLD BSc (Eng), MICE, MIHE

THE article which appeared in the September 1974 *Journal*, "On Plant Economics" by Captain Hulton, does indeed raise some most interesting points. The application of cost-benefit analysis to plant purchase is problematic when one is dealing with factors which are, to say the least, difficult to quantify.

However, these problems should at least be considered and the plant policy be compared with that of other organizations to see if parallel conditions exist in the Corps.

Captain Hulton demonstrated that by using a simple Operational Research approach, it could be cheaper to ask civilian firms to hold equipment for the Army rather than for the Army to buy. There are other benefits which could accrue from this policy which can best be described as adding flexibility during peacetime operations. For peacetime operations, the question is whether it is better to buy equipment for projects or to hire. Most civilian firms will buy only what they know they will use more or less continuously and few firms buy equipment which will stand idle for half the year. Having purchased what might be described as their "basic" plant needs, production peaks are met by plant hire firms which may be sited close to a contract and a long way from the firm's own plant yard.

Another interesting fact emerges from the policy of companies with their own plant hire divisions. Consider such a firm which may be based on, say, Wolverhampton and with a contract near, say, Cheltenham. The contract agent may require a dumper which he knows he can hire from his own company for  $\pounds X$  a day. However, if he finds a local firm which will hire him the dumper for  $\pounds X-1$  per day, then he will go to the local firm rather than his own. This reduces the costs to be set against his contract and, more important, leaves a dumper in Wolverhampton to be hired out still at  $\pounds X$ .

Sapper projects overseas, such as those often described in the Journal, represent for the Corps peaks of plant demand. Furthermore, these peaks occur in localities far removed from a central depot. Unfortunately, the Central Engineer Park cannot act as a plant hire depot so the latter part of the argument in the above paragraph does not strictly apply, but there may be another unit wanting that plant in the UK near to the depot and so the principle stands. Certainly one should consider the relative costs of moving plant out to Cyprus against hiring in that country. Perhaps the day will come when Central Engineer Park will quote a Squadron Commander a price for supplying a concrete mixer and the Squadron Commander will decide whether or not to accept the price. Such an exercise would be a useful academic test for the validity of the conclusions of the Lindsell Report if nothing else.

Plant economics should not be considered in isolation. The economics behind the selection of a particular piece of plant can only be related to the given project for which it is being considered. The project may be foundations for a hutted camp and on that basis, a machine of a given type purchased. However, the next hutted camp may be sufficiently different in terrain and ground conditions to make that piece of plant unsuitable. Furthermore, foundations constitute only one part of the project excavation and could, indeed, be a minor item compared with sewer and storm water trenches. Hence, it is dangerous to consider one task, or one aspect of one task, in isolation when so many factors can affect economic choice. Purchase imposes a lack of flexibility which can result in an unfortunate Commander being landed with a piece of plant which is uneconomic to operate and not suited to the project at hand.

Much of the plant held by the Corps is used so seldom that it is often out-of-date long before it has reached the end of its useful life. Many contractors hold back on the purchase of concrete pumps because the technology of concrete pumping is moving so quickly that a pump purchased now could be obsolete next year. They would sooner, for the moment, hire a pump in the same way one might hire a colour television set hoping that next year's model will be better and cheaper. Recently, a contractor from Carterton had to lay several kilometres of 3 m wide farm access road in concrete. Normally, ready mixed concrete would be cheapest but careful analysis of the whole contract operating cost revealed that by hiring his own self-loading truck mixer, he could halve his concrete cost. His hired truck mixer had a 2 cubic metre capacity which exactly matched his demand for this small project. Overall, the use of 6 cubic metre trucks would have been uncconomic for both contractor, who would have had to provide an access road for the trucks, and the ready mixed company who would have experienced long waiting times.

The reaction of many reading an account of this truck mixer may be that this would be a perfect item for the Corps to purchase and hold in stock. There is one argument against this and it is that next year will probably see a better and improved version, and unless the plant can be economically used in that time, it is not worth buying. Technology of plant has seen vast strides in the field of concrete paving machines in the last two years. It is an awe inspiring experience to see a gigantic machine gobble up concrete as quickly as it can possibly be fed to it and extrude behind it a three lane width of finished motorway, without formwork having to be placed in front of it. The paver train (purchased by the Corps) is fast giving way to the slipform paver and certainly the paver train cannot compete in terms of output per man employed.

This aspect of flexibility can be extended even to the purchase of such small items as concrete vibrators. In his excellent book *Vibration of Concrete*, D A Stewart gives guidance regarding the selection of the correct size of poker vibrator head for any given task. The ideal solution for a given situation may be a 100 mm or a 25 mm vibrator head. What then if all one has in stock is a mass of vibrators all with a 50 mm head? Admittedly, one can now purchase a vibrator and flexible hose to which there is a coupling to take any size of head from 25 mm to 100 mm, but the principle stays the same.

Reading reports shows the extremely wide range of tasks undertaken by the Corps in peace. The Corps is possibly the only true general "contractor" left with all civilian firms becoming more and more specialized. The nature of these tasks is not the only aspect to vary. A road in the Scottish Highlands will have different plant needs from a road in Hong Kong. Hence there is a full range of variability embodied in the basic concept of Civil Engineering—that every task is unique in some way and no two contracts are ever *exactly* alike. A specialist contractor, such as a roads and sewers man, can afford to buy his necessary specialist equipment, but the general contractor cannot. The items of plant he will purchase are few but the items he will hire are many.

The points outlined above do not, it is considered, detract from the factors raised by Captain Hulton but are complementary to them. Together, they add up to an argument in favour of reduced plant holdings which, according to Captain Hulton, reduces costs and according to this article, add flexibility to the operations of the Corps in peacetime and increase the options open to the Project Officer and the STRE Commander. They would give plant operators experience on a wider range of plant and enable Commanders to take more account of plant and project economics to the benefit of all concerned.

This article has not considered the question of plant required for a wartime role. For limited war, the argument holds true that most of the necessary items are held by squadrons and a system which amounts almost to compulsory purchase of contractors' plant could be made financially acceptable to all sides. In the situation of all out conflict, the 1st Wimpey Mounted Foot, the Tarmac Hussars, the 5th McAlpine Fusiliers and 2nd French Kier Lancers would report to their TA units along with dozers and mess tins. Under such circumstances, the Army would obviously take what they needed and no hardship would be caused as plant operators would be enlisted complete with plant.

On plant economics and on plant sense, it is proposed that a re-appraisal of policy should be made. This should aim at reducing the holdings of plant and the training of plant operators on a wider range of equipment obtained, on hire, for the purpose.

# An Amateur with the Professionals

LIEUTENANT I WELLS, RE (TAVR)

"IF you want an interesting hobby with adventure, travel and pay, then why not join the TAVR"—or so we told the officers of 34 Field Squadron on Exercise Waterleap 74. Perhaps I should explain . . .

One day in May I was sitting, quite peacefully, behind my desk at a large well known engineering firm, when I received a phone call—"Helio Ian, would you like to go to Canada this summer?"

Me: "!"

Caller: "You'll be commanding 2 Troop I think".

Me: "!!"

Caller: "Well, I'm on the advance party and we're going out in a couple of weeks. Can you confirm that you're going by the weekend—I'll send you joining instructions and a kit list. Cheers".

This naturally left me rather startled-what had I done wrong?

Anyway it sounded rather interesting. Problem one: how do I get time off work? As an exercise in initiative, resourcefulness and low cunning this is the best!—it should definitely be part of the TAVR officer selection procedure.

Eventually armed with my latest works report-three days early-an expensive pack of cigarettes and a talk helped by "Good Management Training" I went to see the boss who, to my surprise, agreed.

After three weeks of burning the midnight oil to leave everything tidy, I was ready to go to Tidworth armed with my joining instructions and as much kit as I possessed in accordance with the kit list.

Here was mistake number one—I had actually read the kit list. After five years in the TAVR I should have realized that some things are only put in because some paragraph in "Staff Duties" says they should be.

However with the word "Regulars" flashing before my eyes I arrived at Tidworth laden with as much of the equipment on the list as I could muster, only to find that apparently regular officers go on exercise with their Mess Kit, No 2 Dress less Sam Browne, No 1 Dress Hat and dinner jacket. This brought me back to my senses and after a 250 mile round trip I returned to Tidworth with my usual kit plus some extra socks and a realisation that perhaps being a real soldier was not exactly what I had imagined it to be.

This was confirmed when I eventually got my troop on parade, or what was left of it when you take off those on advance party, rear party, regimental duties, courses, attachment and retirement. The twenty-three men, including five TAVR men, were slightly fewer than I expected, but I did feel more at home as that is about the number of men who usually attend from my troop on a TAVR weekend.

The flight out was, as usual, uneventful. When we touched down at Quebec Airport—the ATLO had kindly told me where in Canada we were going—we were greeted by two old "TA" men; the Squadron Quartermaster—ex Adjutant 73 Engr Regt (V) and an SSVC officer—ex 575 Field Squadron RE (V)—my squadron. Having at last been introduced to the OC 34 Field Squadron who no doubt (?) was pleased to see what he was getting as a troop commander, it soon became apparent that the squadron was already used to the vagaries of TAVR officers and the transition was therefore made easy. With officers' painting parades and roofing parades to make the mess habitable I soon got to know the others.

I had now, more or less, completed the mental shakedown period that I am sure all part-time officers go through at annual camp and was, I think, beginning to "Think Military". The physical shakedown was more difficult, being normally in a sedentary occupation, and in fact it took about a fortnight before I ceased waking up stiff and sore from trooping around site the day before. The project itself, the "Sapper Highway", while it was a much larger road than 1 had previously been involved with, was at least a task which I knew something about and as my CO's wife's brother-in-law was the project officer I had no choice but to try to do a good job.

The details of the task itself have, I believe, been covered at length in other articles so suffice it to say that, apart from the weather, everything went well.

The main problem that I encountered was that of long term planning, a thing that we, the TAVR, do not do enough of. The concept of having to think about running a troop continuously for two and a half months was somewhat daunting, there being no possibility of telling the people in the office that "if its the 'TA' on the 'phone then I'm not in!"

The day to day running of a troop for that length of time requires the use of all those things on man management and admin that we part-timers learnt during our basic training and have never had the need or the opportunity to use since.

Anyhow, back to impressions of life as a real soldier. It soon became obvious that the practical joke department (PJD) had been at work again as we were never going to get an opportunity to wear the mess kit and dinner jacket that we had brought with us. We did actually use our strange version of No 2 Dress, but this confused me as, it seems, officers are expected to dress alike. Despite a major effort on the first occasion this proved impossible to achieve and from then on I was allowed to dress as per "Regimental Custom".

All too soon the project began to draw to a close and then the PJD played its final joke—all flights cancelled till further notice. This caused something of a stir among those who had to be back in their jobs or risk losing them. However, the OC, under continual pressure to put the "dreaded" (V) after 34 Field Squadron, saw a golden opportunity to get his squadron together without the influence of the "civilians" and arranged for us to be flown home by a civilian airline.

So ended an extremely enjoyable and enlightening experience which I am sure would have been of immense benefit to any junior TAVR officer. I am most grateful to OC 34 Field Squadron and his officers for making me so welcome.

If any of them are ever looking for a job . . .!!

#### \* \* \*

# WORK OF THE ROYAL ENGINEERS IN THE EUROPEAN WAR 1914-1919

THESE eight books present a series of records of works, prepared by those who had taken part in them and whilst the memory of them was still clear. As such they are of tremendous interest and value and very readable.

The titles are self explanatory, except for "European War" and "Miscellaneous", when one remembers that they were written in the early '20s.

Although the concentration is on Europe other theatres are not completely neglected and the term "European War" would now be "World War I". Miscellaneous", the last book of the series deals with Organisations, Engineer Intelligence, Camouflage and indeed everything not covered in the other seven, including the Training Schools set up in the B.E.F.

The books are not a "set" in the sense that Corps History is a set and can only be sold as individual books. However a 10% reduction on listed prices will be made for orders of 4 or more books.

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# Correspondence

Captain J W Bradford RE (retd) 15 Basingbourne Road Fleet Hants

## THE LATE BRIGADIER P F FOLEY CBE

Sir,—I was extremely sad to see the notice in the *Supplement* of the death of Brigadier P F Foley CBE, and I hope I may be allowed a few words in the *Journal*, which will be different from the usual tributes which appear.

I had the honour to be a Sapper in the 22nd Coy RE in Hong Kong in 1935 when Brigadier (then Captain) P F Foley was Company Commander. I have never met a finer gentleman, nor kinder officer in my army career. He was at all times ready to hear the difficulties of the lower RE rank, at all times considerate and calm. It was a pleasure to play cricket when "P F" was captain, these memories I will always carry of him.

Later, after his retirement, I heard from him in Ireland; I shall always treasure the memory of this fine officer and gentleman.—Yours faithfully, J W Bradford.

Major H Charlesworth MBE ERD 2 Eastheath Gardens Wokingham, Berks

### W<sup>6</sup>? PROBLEM 1

Sir,—Congratulations to Dick Hough for his nearly correct solution to Problem 1. May I suggest that the bomb could be a SC 1,800 kg "Satan" and not as stated a "2,000"?

Some UX Satans fell in the Croydon-Wallington area, the "splash" crater at the point of entry was often incorrectly diagnosed as an exploded 50 kg by the Civil Defence. They were subsequently dug up by 2 BD Coy. Some had penetrated 40 ft in chalk and presented quite an engineering problem. A Satan, measuring 9 ft long  $\times$  2 ft 2 in diameter with a further 5 ft of tail fin (sometimes still attached), at the bottom of an 8 ft  $\times$  6 ft shaft was quite a sight, resembling a one man submarine!—Yours sincerely, H Charlesworth.

> Lieut-Colonel G H McCutcheon MA BAI c/o Box 753 Airport Road Riyadh, Saudia Arabia 25 January 1975

## **DECEMBER 1974 JOURNAL**

Sir,—The juxtaposition of Major Harry Johnson's letter with that of Brigadier Mike Steven's in your December issue is intriguing. With respect, I believe you should have reversed the sequence. First Brigadier Stevens plea "But can't we have more challenging subjects?" and then Major Johnson's—and your own—introduction of politics into the Corps Journal.

I am sure Harry Johnson will forgive me for suggesting that the retailing of other men's opinions is perhaps a fair example of moral cowardice!

I feel certain this gentle remonstration itself will not strain the moral fibre of the present Council as did some of my previous contributions on Corps and Army matters.—Yours faithfully, G H McCutcheon.

# Memoirs

### BRIGADIER H H BATEMAN CBE DSO MC Born 3 July 1888, died 6 May 1974, aged 85

HAROLD HENRY BATEMAN, Whites, Cheltenham College and RMA was commissioned in 1908. In WWI he went to France and was there for most of the four years. He was awarded the MC in 1915 and the DSO and Belgium Croix de Guerre in 1918. After the war he commanded the Experimental Bridging Establishment and in 1931 he was sent to Bermuda as CRE and, for part of the time, was acting Governor with the rank of Brigadier. In 1934 he retired from the Active List and joined the Prison Commission as Director of Works.

World War II interrupted his civilian career, he was recalled and went to France



# Brigadier H H Bateman CBE DSO MC

### MEMOIRS

with the BEF as a Colonel. Evacuated from the Brest area he moved into the field of Bomb Disposal. Most Members will remember him from those days, Serving first under General Sir G Brian Taylor who was IF and OBD he eventually took over from him in 1942 as Director of Bomb Disposal, an appointment he held until succeeded by Dudley D'Eath in 1945. He was awarded the OBE and was later raised to CBE. As OBD he was a great driving force and was responsible for the Research and Development of all the bomb disposal equipment used by BD units during the war and postwar years and also for the BD Manual which was the BD officers' bible. He was known to remark on one occasion that a great number of casualties could have been avoided by closer attention to the relevant precepts and instructions in the Manual. This is a statement with which most war-time bomb disposal officers would undoubtedly agree. At the end of the war we had equipment which could deal with every known type of German fuse and booby trap. This was a great achievement. Because he was so intimately connected with the development of BD equipment he was a formidable "inspecting officer". When visiting units he was often more familiar with the latest item of equipment and its detailed technical use than the poor unsuspecting officer who was demonstrating it. After the war he was President of the BD Branch of the REOCA for some twenty five years. All who served with him, and not least those in Bomb Disposal, will remember him with respect and admiration.

## RDF writes:

"Brigadier Bateman was Director of Works at the Prison Commission (now the Prison Dept) from 1945–53. Like many others in the Prison Service he was a Royal Engineer, in a distinguished line running from the first Chairman of the Directors of Convict Prisons, Sir Joshua Jebb, and the first Chairman of the Prison Commission, Sir Edmund du Cane, each of whom also bore the title of Surveyor-General.

"Bateman was a big man in every way, there was nothing mean about him, and even his rages were on a big scale, but so was his generosity. Others will write of his courage in War; I can only tell of his modesty in peace. We never heard of his work on bomb disposal in WW2, of his DSO in WW1 or of his Belgian and American decorations. What was past was past.

"He came back to direct the Works side of the Commission when it was coping with War-damaged premises and a rising population, together with the emergence of a policy which wanted sites for open establishments. At the subsequent public inquiries he was a magnificently solid witness. Neither of us was a lawyer and the Inspector in charge of the Inquiry would usually let us get away with murder! Opposing counsel would sometimes begin, 'Brigadier Bateman, you will admit . . .'. 'No, Sir, I will not', would come the thundering reply. Leyhill Prison in Gloucester, Bela River near Carnforth, Eastchurch on the Isle of Sheppey and not least, East Sutton Park, the delightful Borstal for girls near Maidstone in Kent, are some of the open establishments which Bateman found and adapted. It is beyond dispute that without Bateman's energy the present Prison Department would have lacked some of its more notable and successful establishments.

"Bateman's handwriting was almost undecipherable, his outward manner fierce, but once you got to understand him, you discovered his real generosity of spirit and sense of humour. He was one of those more than life-size characters in which the Prison Commission was so rich, all of us will remember him with affection."

### J J C writes:

"When Teddy Bateman was a very young Subaltern, his CRE, Colonel Glubb, advised him never to refuse responsibility and this was a precept to which he always adhered throughout his public and private life. He undoubtedly joins that select number of Royal Engineers who have added technical lustre to the Corps."

# BRIGADIER W G R NUTT CBE MC Born 4 September 1897, died 17 August 1974, at age of 76

WALTER GORDON ROTHERY NUTT, Cheltenham, RMA and Jesus College Cambridge was commissioned to the Corps in 1915 and saw action in the Western Front, where he'was awarded the MC. Between the Wars he served in the Gold Coast, Sierra Leone and Malta. He went to France with the BEF in 1939, was evacuated through Dunkirk and in time became Chief Engineer in both Gibraltar and Burma. It was the result of his work in Burma that he gained his CBE. After the War he became Chief Engineer FARELF, his last major appointment before retirement.

### LWN writes:

"I first met Rothery Nutt when he arrived in Gibraltar in January 1943 to assume the duties of Chief Engineer where, in taking over responsibility for all aspects of RE work on the Rock, he soon displayed a keen interest in personnel matters. He, of course, fully appreciated the importance of things but he was even more conscious of the multigenerous interests of people. He was well able to delegate authority and his particular form of approach, so appropriate at that time, was appreciated by all with whom he came into contact. He got to know his colleagues at work and at play and developed a keen interest in sailing. He was frequently a member of the crew of the RE Yacht Maglona and played an active part in the life of the Royal Gibraltar Yacht Club. Indeed it was this interest in sailing which prevailed well into his retirement that reunited us some years after the war, and I recall very happy times with him and Robin his wife, not only at their delightful home in the New Forest but at the premises of and on the waters adjoining, the Royal Lymington Yacht Club."

## WGF writes:

"My first glimpse of Rothery Nutt was at the Scottish Command Athletic Meeting in the late 1920s. As a Major he represented RE Scotland in the mile, cheerfully but unsuccessfully. Much later, when he was a Brigadier and CE FARELF, I knew him well from my subordinate post of CE Singapore District. I found him a wonderfully well-balanced capable superior. We were dealing with large and urgent projects where all Engineer staff had to put forth very great efforts to show real progress against the 'spanners-in-the works' activities of Finance and heavy 'get-on-with-it' pressure from HQ. He was a master of Works detail and took a vivid interest in engineer problems, but he was able to distinguish clearly between helpful comment and unhelpful interference. He left us the clearest possible field in these large projects, being content to judge things on the final result achieved. Regimental games roused his keen enthusiasm, and he took a personal part in the active sailing-dinghy races at Singapore. He was always one of the helmsmen in the REYC team against FARELF and Royal Singapore YC."

#### GN McM writes:

"Rothery Nutt was CE FARELF from July 1948 to May 1951 during a period of great activity when the ravages of Japanese occupation were being made good and a big programme of new major post-war works was getting into its stride. His exceptional knowledge and experience in this branch of Sapper activity gave great impetus to the work and allowed it to proceed with smoothness and with a minimum of interference from higher authority, to the satisfaction of HQs and Sapper Works Staffs, who held him in high esteem. Although a moderately strict disciplinarian, he was essentially a warm-hearted man, always ready to listen sympathetically to the difficulties of his subordinates. After retirement he worked as a consultant to a firm specializing in prestressed concrete construction—a part-time activity which he continued up to the time of his final illness. Rothery Nutt's main recreation was sailing and he was a keen racing man. Despite a severe physical handicap in the form of a badly damaged right shoulder, he was an able single-handed sailor in his Seagull sloop, *Kittiwake of Lymington*.

"He is sadly missed by all his sailing friends in Lymington."

# COLONEL J B MARKS OBE FRICS Born 4 May 1892, died 8 August 1974, aged 82

JOHN BARKLEY MARKS will be remembered with great affection and admiration not only by "Works" officers but by all who had the privilege of knowing him.

Within the history of the Royal Engineers, the RE Surveyors of Works (later to be known as Quantity Surveyors RE), have an honourable place. John Marks was "at the helm" for eight years, as the first and only Chief Surveyor of Works and then the first Chief Quantity Surveyor. The change from Surveyors of Works with their historical connotations, to the professionally qualified Quantity Surveyors was largely due to his untiring efforts. This is no place to describe his full service career (*Surreyors* of Works, Royal Engineers, Their History and Development, by Brigadier C F Atkinson gives much of this), but mention must be made of his efforts when, at the end of World War II, he envisaged the formation of a Club to perpetuate the many friendships which had developed during the War between Surveyors of Works, especially those between regular soldiers and those about to return to civil life. Thanks to his inspiration the RE Surveyors of Works Club got off to a flying start and has prospered ever since.

## HEH writes:

"For the last three and a half years of the War JBM was my Chief Surveyor of Works. I was immediately impressed by his bearing and quiet confidence and soon learned that these qualities were backed by considerable professional competence.

"During this period the Works Services expanded more rapidly and bore a greater work load than at any time in their history. At an early stage it was decided to restore and maintain conventional systems of competitive tendering including Term Contracts. This involved standardization of Bills of Quantities and the complete re-writing and pricing of the voluminous War Office Schedule of Prices. At the same time a large number of professional quantity surveyors had to be recruited and trained in the military applications of their art.

"The success of the organization of these activities was due entirely to the abilities of JBM or 'Marco' as he was affectionately known on the Directorate. The success of our efforts to regrade the rank of CSW from Lieut-Colonel to Colonel was greatly helped by JBM's bearing and personal reputation, not only in the Corps but in the Royal Institution of Chartered Surveyors of which he was a Fellow.

"Marco was never ruffled. If in disagreement with his seniors he was politely firm. On the rare occasions when he was over-ruled he was thoroughly loyal in execution. He was undoubtedly the right man in the right place at a crucial and successful period in the history of the Works Services."

## AFM writes:

"My old friend and business partner, John Marks, founded our civilian practice in 1949 and quickly established a firm reputation for integrity and professional competence. In a few words it is not possible to catalogue all the projects with which he was involved in his second career as a professional quantity surveyor. Army and Royal Air Force installations were constructed or extended (his service experience was invaluable in these projects), but his favourite job was probably the Yvonne Arnaud Theatre at Guildford. He retired from the practice in 1964 but I continued to enjoy his friendship and his invaluable help and assistance in his capacity of Consultant until the day he died.

"His memorial is the wonderful example of professional conduct, warm friendship and personal integrity that he has left to inspire everyone who had the privilege to know him."

\* \* \* \* \*

# MAJOR-GENERAL J E C McCANDLISH CB CBE Born 11 October 1901, died 26 August 1974, aged 72

# ES de B writes:

"WHEN fire destroyed a wing of Wellington College in 1918 Blucher and Orange Dormitories, the counter-part of houses in other schools, were thrown together in crowded uncongenial and unfamiliar conditions. "Candles'" firmness and tactful judgment as head of Blucher were respected by Orange, in which I held a junior rank, as well as by Blucher. This leadership was a major factor in our happy co-existence for about a year. Though in a different term at the Shop and a different Batch at Chatham his presence was always felt and he made his mark as a UO and on the Rugger Field.

We met again on 29 January 1927 in SS *Kinfauns Castle* which carried the HQ Shanghai Defence Force and 2nd Bn Coldstream Guards to Hong Kong, where 'Candles' made a brief stay to help an over-worked staff. He later joined us in Shanghai, where we shared a billet for a while, and where we worked in the same half of the city. As two of four GEs responsible for housing an Infantry Division which poured into the city very quickly we worked closely and at hectic pressure. Besides doing work in the field he was responsible for the design of the hutting which we used eventually.

"It was during this shipboard and working association that I came to appreciate fully his humour behind a severe mion; his ability; and his inexhaustible capacity for work. Fearing that he would drive himself too hard, we tried to restrain him a little, when a traffic accident paradoxically set him up by giving him a saving, enforced, short rest.

"When I was invalided home he cheerfully shouldered his share of the extra load and comforted me in my chagrin. He later showed me great kindness and I remember him with admiration and gratitude."

### NW writes:

"Candles' was quite one of the most conscientious sappers it was ever my good fortune to work with. He worked hard and played hard. It was always a source of wonder and amazement to his friends how he was never without his monocle. A plain lens with no frame or string or visible means of attachment—but always firmly in place whether at work or play. We always suspected he slept in it?

"I was with him in Shanghai in the days of the Shanghai Defence Force. There he was a keen supporter of the Shanghai hounds—a kind of drag hunt across country and irrigation ditches after a paper trail."

### Sir FEWS writes:

"He was a man I liked, steadfast and of great integrity."

### REB writes:

"Many will probably remember him best for the sharpness of his mind, his capacity for work, and for his liveliness and sense of fun. Those who needed some stimulus to gaiety will recall that he would outshine them all on a glass of water. The Draghounds flourished under his Mastership and demonstrated well and widely the sporting side of Sapper life. He was always a stimulating companion and he showed up as a personality in any company.

"From 1937 'Candles' was concerned with the 'A' Staff, in Middle East (AAG, ADAG, Brig A (O)), War Office (D D of O), and as DAG 21 Army Group and D of O War Office. Indeed he became a specialist in this branch of Staff work."

## GNT writes:

"I was a close friend of John McCandlish at the Shop and at Chatham (JJO). At both places I came out first—'by an acid drop'—and he was second. At both places he was outstanding in every way. I had the highest regard and great affection for John."

## RHH writes:

"He was one of those rare people who excelled in both work and games without any touch of 'side'."

## **RKM** writes:

"John McCandlish and I were together at the Shop, Chatham and Buiford for nearly six years. After that we never served together again and unfortunately only met on rare occasions. He was a most delightful companion, with a very strong character and sense of duty; but he could relax, and with his keen sense of humour and personality would hold the floor in the mess on many occasions. He had the enviable knack of bringing the best out of everybody with whom he associated at work or play. The son of an Edinburgh Writer to the Signet, he inherited many of the best characteristics of the lawyer and consequently the making of a sound appreciation of the situation was to him a natural accomplishment. Imperfect eyesight prevented him from taking part in many forms of sport, but he was an excellent and tireless forward in the Shop and RE XVs in his day and a good half-miler. Just as at duty he was incapable of slovenly or mediocre work, so on the field he never played a poor game or ran a race below form. He excelled at organization and administration and delighted in supporting his facts with figures which he worked out in detail at great speed. He was a man of outstanding character and ability, a true and loyal friend and always ready to assist anyone who sought his help or advice."

### E McD writes:

"John McCandlish and I knew each other fairly well by reason of having been room mates at the Shop and the SME. The only subsequent occasion that we ever met was at a War Establishment Board meeting in GHQ MEF in Cairo which I attended as pleader for the amendment or axing of an existing unit. My pleading was perhaps especially outrageous and evoked some caustic comments from members of the Board. Then a spectacled Brigadier whom hitherto I had not observed spoke up in a dry Edinburgh lawyer's tone, 'Gentlemen I know this officer well. We served together for four years. He may not have put his case very tactfully but I can vouch for his sincerity.' With that perhaps rather back-handed compliment—from John McCandlish—I won my plea!"

\* \* \* \* \*

# **Book Reviews**

## THE PAN/BALLANTINE ILLUSTRATED HISTORY OF WORLD WAR II (Published by Pan Books Ltd, 33 Tothill Street, London SW1)

Michael Calvert has written two books for this very extensive history of the Second World War, entitled *Slim* and *Chindits Long Range Penetration*. The price of each book is 50p.

The copies of these books, sent us for review, have most kindly been autographed by the author. They both make fascinating reading and are profusely illustrated with photographs, maps and scale drawings of the aircraft and weapons used by the Chindits in the Burma Campaign.

Mike Calvert draws a splendid word picture of Field Marshal Slim's military career from his days as a cadet in the Birmingham University OTC to his final appointment as Chief of the Imperial General Staff in 1948. It tells the story of his life as a young officer in the Royal Warwickshire Regiment in the Dardanelles and Mesopotamia during the First World War and his service in the inter-war years with the Gurkhas, as a student at the Indian Army Staff College Quetta, as an Instructor at the Staff College Camberley and again as a student at the Imperial Defence College, his return to India to command a Gurkha battalion before being given command of the 10th Indian Infantry Brigade which appointment he held on the outbreak of the Second World War. The major portion of the book is devoted to the part Slim played in that war, particularly as the Commander of the XIV Army in Burma-which turned "Defeat into Victory" despite being last in the queue for men, weapons, planes and landing craft, the extraordinary difficulties presented by the terrain, the monsoons and tropical diseases and being faced by a fanatical enemy who, in Slim's own words, invariably defended a position "to the last man and the last round". In his foreword to the book Lieut-Colonel A J Barker described Slim as a British Bulldog and wrote: "whether anyone, other than Slim, could have managed that master of unorthodox soldiering Orde Wingate, maintained the respect of that toughest of nuts, the American General Vinegar Joe Stilwell, and remained so unswervingly loyal to his dashing and elegant superior Lord Louis Mountbatten, is questionable. Inevitably there were disagreements but he was far too loyal and soldierly a man to reveal them publicly." Thousands of those who served under him, British, Indian, Gurkha or West African will remember Slim as one of the greatest Generals the Second World War produced.

In his second book Calvert writes with particular authority since, at the age of 31, he was a Brigade Commander of Chindits and served with them until their disbandment. This special force was raised and trained in India by Orde Wingate. It took its name from the legendary lion "Chinthe"—the Protector of Pergodas—and Wingate chose this lion as the force's Formation Badge.

A brigade of Chindits was first employed in the Arakan in 1943 where territorially they did not achieve any great visible results. However they destroyed the main railway on the Japanese lines of communications in a number of places, fought several minor actions, marched some 1,500 miles behind the enemy lines and gained valuable intelligence information. Above all they proved that, given air superiority, maintenance by air in the jungle was practicable as was close air support and the evacuation of wounded. They developed advanced methods of signalling, the use of pack mules in the jungle, medical precautions and suitable diets and rations. One third of the brigade was killed or captured and the survivors had all suffered from malaria, dysentry and malnutrition. However their morale was high. They had proved themselves equal to the Japanese in jungle warfare and destroyed, once and for all, the myth of Japanese invincibility. The first step from Defeat into Victory had been trod.

Later a second, much larger, Chindit Force was raised in India by Wingate consisting basically of a headquarters and signals establishments, six brigades, each of four battalions, four companies of British and Indian Engineers and an American Air Commando of transport aircraft and gliders, light aircraft, medium bombers, fighters and a few experimental helicopters. The force was trained for an air-landing operation in the North Burma Plain to be maintained and supported entirely by air.

Mike Calvert tells the story of the fortunes of his brigade during this operation and how in March 1944 Wingate installed 12,000 men "in the guts of the enemy" who cut communications, destroyed dumps, and absorbed the strength of two Japanese divisions which otherwise could have reinforced the offensive against the hard pressed XIV Army positions at Tiddim, Imphal and Kohima and General Stillwell's Chinese/American Force on the Ledo Road.

On 24 March Wingate was tragically killed in an air crash and, with his death, the Chindits lost an irreplaceable leader. His brilliant unorthodoxy was mistrusted by many, but Wavell, Mountbatten and the American Chiefs of Staff recognized his genius. Moreover he had direct communication with Churchill from whom he asked for three Dakota squadrons with which, he said, he could take the north of Burma in a few months. The squadrons did arrive but not until after Wingate's death and they were not employed in the role he had intended. Indeed within a few weeks of his death an uncommitted Chindit brigade was retained by XIV Army and the sole task of those remaining operating in North Burma was limited to help Stilwell's advance on the Northern front.

The last chapters of the book recount the sad experiences of the Chindits under Vinegar Joe, the battle casualties they suffered and the debilitation from cerebral malaria, typhus, anaemia, prickly heat, foot rot and septic sores. They became eventually medically unfit for further fighting and were withdrawn to India where they were disbanded. Mountbatten paid them the following tribute: "It was the hardest duty in my life to agree to give the order to break up the Chindits. But now that the whole army is Chindit-minded there is no need for the Chindits. We are all Chindits now," A fitting epitaph to British, Indian, Gurkha and West African galant soldiers who fought with the legendary Chindits.

### BOOK REVIEWS

## COMPOSITE STEEL AND CONCRETE CONSTRUCTION

#### P R KNOWLES

# (Published by Butterworth & Co, 88 Kingsway, London WC2B 6AB. Price £5:00)

"The aim of this book is to provide both the theoretical background and the practical design information needed by the Engineer who wishes to use composite construction in bridges or buildings. It should be of use to practising civil engineers, final-year undergraduates and postgraduate students in structural or bridge engineering." This is a very broad objective aimed at a wide target population. The extraordinary thing is that the author is generally successful in achieving every aspect of his aim in a compact volume of only 200 pages.

This publication collects together, probably for the first time, most of the research and design information available on composite design. Any engineer who is contemplating a composite design is well advised to obtain a copy of this book. It is a first class companion to *CP 117 (Composite Construction in Structural Steel and Concrete)*. It provides all the back-ground information required for a good understanding of the theory behind the changes in the code. It also contains a very good section on the properties of the materials used. The book presents information with great economy of words and space. The examples provide a good "feel" for the subject, but the reader is not spoon fed. There is little room in such a short volume for repetition to emphasize a point but it is suitably referenced to source should further details be required.

RCO

## THE INDIAN SAPPERS AND MINERS BY LIEUT-COLONEL E W C SANDES, DSO, MC

THIS 700 page well illustrated book covers the period 1759–1939.

It is a very readable narrative which will appeal to any student of Indian history, whether soldier or civilian. One of the main attractions of the book is that the sketch maps (well over 40), are included in the appropriate Chapter and were drawn by the Author. The labour must have been great but is justified by the resulting facility in finding the locations of any places mentioned.

A limited number of these books are available to Members at £2.25 each.

## PORTRAITS AND SILVER OF RE HQ MESS PUBLISHED BY INSTITUTION OF ROYAL ENGINEERS PRICE £1-50

THIS beautifully illustrated book contains the photographs and descriptive details of fifteen Mess portraits and forty-one pieces of Mess silver. It is a fascinating reference book on the familiar items we have seen and on which our knowledge, (for most of us to say the least), is sketchy. Which portrait was the first to be acquired by the Mess? Which piece of silver is the most valuable? Who was Ko? Who was the first engineer officer to command a British army in the field? The answers to these questions and many others are yours for the asking price.

## "ENGINEERS IN THE ITALIAN CAMPAIGN 1943-1945"

OBTAINABLE FROM INSTITUTION OF ROYAL ENGINEERS—PRICE £0.25 MAJOR-GENERAL COXWELL-ROGERS in his foreword emphasises that this is not a complete history of engineer work during the Italian Campaign. It does not describe the great achievements of the American Engineers nor does it include an account of the work of engineer units of the Survey and Transportation Directorate.

It does give a general picture of the tasks which confronted British, Canadian, South African, New Zealand, Indian and Polish Engineers and describes in some detail certain of the more interesting episodes.

The book is a "paper back" with over 60 photographs and sketch maps. Although essentially factual it makes very interesting reading particularly when concentrating on local production of engineer material.

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ON 22 May 1975 the Institution of Royal Engineers will celebrate its Centenary. To mark the occasion a specially designed Commemorative Cover will be issued showing the "Institute Building 1875", and the Forces Postal Authority have authorized the use, on this day only, of British Forces Postal Services Handstamp No 1487.

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Brigadier J H S Lacey, CBE a former Secretary of the Institution, is writing a short history of the Institution and this will be included as an insert to the Commemorative Cover.

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