THE ROYAL ENGINEERS JOURNAL

APRIL 1988 VOL 102 No 1

Guidelines for Authors

The Editor is always glad to consider articles for publication in the *Journal*. Guidelines for prospective authors are:

Subject. Articles should have some military engineering connection but this can be fairly tenuous, specially if an article is witty.

Length. Normally, chance of publication is in inverse proportion to length. More than 4500 words (5 pages of text) tends to lose most of our readers. Blockbusters can sometimes be serialised.

Clearance. Opinions are an author's own. The wise man clears an article with his boss on any policy matters. Security clearance must be obtained locally.

Copy. Ideally the text should be double space typed and include the author's pen picture and captions for art work.

Photographs, should be black and white but colour and transparencies can be accepted. Quality is essential. A head and shoulders photograph of the author would also be helpful.

Line drawings, if possible, should be drawn in proportion with the page (5.75in x 8.0in). Size is immaterial.

Rewards, can be generous. The committee has about £250 in prize money to allot for each issue plus the valuable annual prizes. All authors receive £5 to cover costs.

Pseudonyms, may be used. They will not be revealed by the Editor under any circumstances.

Contributions to the RE Journal *should reach the Editor by:*
mid January for the April issue
mid May for the August issue
mid September for the December issue
Submissions before the deadline will be particularly welcome.

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Editorial

TRAINING FOR THE JOB OR TRAINING ON THE JOB

Two articles on training, both by relatively junior officers appear in this issue. Training is not the most glamorous topic but history has repeatedly shown that it is an indispensable ingredient of victory in any war. The Army has made great strides in training since the 50s. Both the breadth and depth of skills that today's soldier must acquire greatly exceed those of the previous generation. Nevertheless underlying the two articles on specialist training for armoured engineer skills for officers and soldiers, there lies a fundamental question: should the Corps continue to train its officers and soldiers in a general range of skills or has the time come to train as specialists for careers in a much narrower field? Correspondence on this topic would be welcome.

The Publications Committee will also welcome reactions to the new style of the *Journal*. They are acutely aware of the disruption that the extra 10mm will have caused to the tidy collections of *Journals* on Sappers' shelves throughout the world. Their hope is that in time the new rank will become equally well dressed by the right; but as with any rank of soldiers on parade, the contents are more important than the looks; they therefore hope the *Journal* will not reach the shelf before becoming well thumbed.

One other small change calls for comment. The membership of the Council listed on the inside cover now reflects Council's decision to elect as their corresponding members, our own officers serving in far-flung parts of the world. Our traditional links with Commonwealth Sappers will continue however, as the countries with whom we normally maintain these have been pleased to accept the idea that the incumbents of certain posts in their hierarchy will hold associate member status in our Institution and receive publications and correspondence as before.

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Sir George Cooper GCB MC

Chief Royal Engineer

GENERAL SIR GEORGE COOPER GCB MC

GENERAL COOPER enlisted in 1943 as a Sapper of 3/- (15p) a day and after a wartime University Short Course at Cambridge, followed by basic training, he went out to India as an officer cadet where he was commissioned in 1945. He served with the Bengal Sappers and Miners, joining them at their Depot in Roorkee. After a few months he was sent to Calcutta and thence to Burma.

Life in Burma as a subaltern just after the war was fun, despite the isolation of Myitnge, 12 miles south of Mandalay, where 75 Field Company were helping to rebuild a massive bridge over a tributary of the Irrawaddy. He later joined 70 Field Company outside Rangoon, a unit composed of three platoons of mixed race, Muslim, Hindu and Sikh. In July 1947, they returned to India, under the command of the, by then Major Cooper, aged twenty-one; after Partition in August, the Company reformed, absorbing two other platoons of Muslims, and shedding their Hindus and Sikhs, eventually moving to Pakistan.

After his return from Pakistan in 1948, and his post-war Supplementary Course, he became an Instructor at the RSME and then went to Korea in 1952 as a Troop Commander in 55 Field Squadron. The Troop were heavily employed on the Hook, a company-size hill which, because of its position, was the vital ground for the whole of I (US) Corps of which the Commonwealth Division was a part. With the Chinese dug in less than 100 yds away, the fighting was intense and the shelling constant. Major battles, with shelling reminiscent of World War I bombardments, were fought by both the Black Watch and The Duke of Wellington's Regiment—after the last occasion the position was held throughout the daylight hours by two Sapper troops until the arrival of a relieving battalion from another Brigade. He was awarded the MC shortly afterwards.

A more peaceful tour followed in North Africa and after the Staff College in 1956, he became DAA&QMG of 39 Independent Infantry Brigade which had just gone to Northern Ireland; this was followed by six months at the Joint Services Staff College and a tour at the Royal Military Academy Sandhurst. After this he was appointed to command 26 Armoured Engineer Squadron, at that time an independent squadron.

He was then sent to the Staff College as an Instructor, was promoted Brevet Lieutenant Colonel and returned to BAOR as GSO1 of 1st Division. Command of 4 Divisional Engineers as CRE lasted only fifteen months before he was promoted again and became Col GS of ASD2 in the Ministry of Defence where he was responsible for the deployment of the Army worldwide. This was to be another short tour and the following year he went to command 19 Airportable Brigade at Colchester, where he had been a private soldier twenty-five years earlier. Taking the whole Brigade to Malaysia for Exercise *BERSATU PADU* in 1970 and then going to Northern Ireland the following year, the time soon passed and after two years he went off to the Royal College of Defence Studies.

After eleven months as Deputy Director of Army Training, followed by fifteen months as GOC South West District, he became Director of Army Staff Duties. A virtual double tour was rewarded with promotion, a knighthood (KCB) and command of South East District, but just as he was getting to know the District he was posted back to the MOD, where he took up the appointment of Adjutant General. He was appointed a GCB in 1984 shortly before retiring from the Army after which he spent two years with GEC as Director of Management Development.

In addition to being Chief Royal Engineer he is also Colonel The Queen's Gurkha Engineers and Chairman of a Charity for handicapped people (The Infantile Hypercalcaemia Foundation), as well as being on numerous other committees and councils. He is married with two children, a son and a daughter.

Engineer-in-Chief

MAJOR GENERAL R L PECK BSc(ENG)

MAJOR GENERAL RICHARD PECK took over as Engineer-in-Chief on 8 January 1988. He was born in 1937 and educated at Wellingborough School. He joined the Army in January 1956 and was commissioned from RMA Sandhurst in December 1957, winning the Institution of Royal Engineers Medal. During the next four and a half years he completed his YO course at Chatham, served an attachment with 36 Engineer Regiment in Maidstone, and read for his London University Civil Engineering degree at RMCS Shrivenham. He spent three years as a troop commander in 33 Independent Field Squadron in Cyprus, the highlights of which were running the Omorphita Police Station on the Green Line in Nicosia until the arrival of UNFICYP in March 1964; designing, and with his troop, constructing the extension to BRAVO Dispersal at RAF Akrotiri; and leading a joint Army/Cambridge University expedition across the Libyan desert as far as the Sudan in the South-East and the Tibesti mountains in the South-West. From July 1965 to December 1967 he was an instructor and College Adjutant at RMA Sandhurst. After completing the Staff Course in December 1969, he served as Brigade Major of 5 Infantry Brigade at Tidworth. In addition to the Brigade's role in the UKMF, he spent two emergency tours in Northern Ireland—in Belfast and Lurgan. This was followed by two years in commend of 23 Amphibious Engineer Squadron in Hameln and three years on the Directing Staff at the Army Staff College. Next he commanded 21 Engineer Regiment, which was a tour of immense interest and enjoyment, including his third operational tour in Northern Ireland. A tour in MOD as AMS MS(SB) followed before moving to command 19 Infantry Brigade, located in Colchester but roled with 1st British Corps. He attended the Royal College of Defence Studies in 1984 and was then, for six months, Director of Army Service Conditions before assuming the new appointment of Director Personnel on CDS's staff where he served for two and a half years before returning to the Corps.

He and his wife Liz have three children—a graduate daughter, a first son at Durham University and a second at Radley. His interests include cricket, rugby football, association football, golf, shooting, skiing, board sailing and travelling. A past Captain and Chairman of Army Cricket and a Combined Services player, he is now President of the RECC; he is also Vice Chairman of the Army FA; and a Fellow of the Royal Geographical Society.

Major General R L Peck BSc
Engineer-in-Chief

1987 Corps Annual General Meeting

ADDRESS BY ENGINEER-IN-CHIEF

Photo 1.
The Warrior APC.

AT the Annual General Meeting of the Corps, held on 21 October 1987, the Engineer-in-Chief, Major General C J Rougier CB, spoke on Corps Affairs.

INTRODUCTION

"Chief Royal Engineer, Gentlemen, there is little doubt that the most memorable events for the Corps in the last twelve months have been associated with RE 200 in general and Her Majesty's visit to Chatham in particular. But memorable and exciting as RE 200 has been it has occupied only a few days in the year, whilst Sappers have been doing their thing, and doing it very successfully, on every day of the year and round the globe. So pride of place must go to them and their work. Let me therefore report on some of the more interesting developments worldwide during the last year.

BAOR

"I start in Germany, because it is there that a development is taking place which could have the most far reaching effect on the role and organisation of the Corps in the future. As I explained briefly at this time last year, the introduction of the CHALLENGER tank and WARRIOR APC into 1st (British) Corps gives the potential for greatly improved mobility, fortuitously at a time when the likely future Battlefield is perceived as requiring a higher degree of tactical flexibility and mobility both in the conduct of operations in the forward areas and in the use of reserves. But without additional mobility support, the battle winning characteristics of these high investment equipments will be wasted. The mobility support provided by the Sappers at present relies on limited numbers of armoured engineer equipments which are held centrally. Some of them are two tank generations old and forty years out of date! It has now been accepted in principle that armoured engineer vehicles need to be modernised, increased in numbers and held within brigades to provide intimate mobility support. *Here the EinC outlined the main points about mobility support and the Chieftain AVRE covered in the series of articles published in the September 1987* Journal.

NORTHERN IRELAND

"Now on the rest of the world. I start in Northern Ireland. In the Army debate in January this year Mr Stanley, then Minister of State (Armed Forces) and now, of course, Minister in the Northern Ireland Office, detailed the work of the Corps in Northern Ireland, calling 1986 the 'Year of the Sapper'. In his summary he said:

'In the past year there is no doubt that lives have been saved and injuries prevented as a direct result

1987 Corps Annual General Meeting (1)

Photo 2.
Exercise *WATERLEAP*.

of the additional protection provided by the Royal Engineers. I know that the whole House will want to join with me in expressing our appreciation to the Royal Engineers for their life-saving work in Northern Ireland last year and in congratulating them on their 200th anniversary.'

"51 Squadron completed the last of the emergency squadron tours in June this year. Amongst their tasks were replacing two of the RUC stations blown up by the IRA, one at Rosslea and one at Plumbridge.

"Our force levels in NI are now down to 33, the resident squadron who have, as always, been heavily committed. One of their more interesting tasks was the replacement of an observation post and living accommodation in South Armagh.

Work Outside the United Kingdom

"In Canada 24 Squadron completed a successful Exercise Waterleap tour based at Gagetown. Their tasks included building two large underground water storage tanks, a steel framed, aluminium clad storehouse and a road renovation project.

"In Kenya 34 Squadron and a troop from the Gurkhas, built a guardroom, a water ring main and a road whilst their third troop, 400 miles away to the south constructed a causeway for the Kenya Wildlife Department across the Athi River at Cottar's Camp—not a bad job for a young troop commander on his first tour after the YO course!

"I should also mention that each of the three infantry battalions also takes a sapper troop to Kenya with them. I visited one of their sections at Dol Dol where they were building a new classroom block for the school there. This school, with 900 children some of whom you see here owes its existence entirely to the Corps who, over the last four years have built the whole school from scratch with a few hundred pounds from the hearts and minds fund—marvellous value for money.

"Next to the Falklands. The military presence in the Falklands has now moved lock, stock and barrel to Mount Pleasant. Last Autumn 25 Engineer Regiment from Osnabruck deployed to Stanley to recover the AM2 aluminium matting on the airfield there, and the Rubb shelters and all other signs of military activity, so returning the Stanley area to its pre-war shape so far as possible. They did a splendid job and were awarded the Wilkinson Sword of Peace as a result. Our force remaining in the South Atlantic, the Falkland Island Field Squadron, is a roulement squadron based on Mount Pleasant Airfield. Its primary role is Airfield Damage Repair (it provides two ADR troops) but also combat and construction engineer support for operations throughout the Islands and

Photo 3.
Disaster relief in Vanuatu.

they maintain an eight man detachment on South Georgia.

"Smaller peacetime project work also provides excellent training. Not only does it give an opportunity to all ranks to practise their technical skills in a 'real environment' but perhaps more important it allows young officers and NCOs to develop their leadership and management responsibilities in remote areas where they are genuinely 'on their own'. I take just one example.

"In November 1986 a field troop from 25 Regiment was deployed to South Georgia to replace a wooden jetty severely damaged in the previous year. The MWF design was for a 24m long 13m wide steel piled structure. As well as presenting formidable technical problems, the logistic difficulties associated with the project were challenging to say the least. The project stores, including a large hired crane, were supplied from UK and thereafter the only support came via the six-weekly ship from the Falklands. To add to the young troop commander's cares the weather conditions were unusually severe, and over the Christmas period winds of over 100 knots made construction work both difficult and dangerous. To the great credit of all concerned, the task was completed in February 1987 several weeks ahead of schedule.

"It is a most unusual year when Sappers are not called upon for relief of natural or man made disasters. You may remember last year I spoke of Mexico and El Salvador. This year the Queen's Gurkha Engineers have been to the Solomon Islands, the Cook Islands and Vanuatu, in the latter case to repair damage done by Cyclone UMA. I had a nice letter from Baroness Young, Minister of State at the FCO as a result, ending 'The successful operation has clearly been a credit to both Royal Engineers and Gurkha traditions, and to Britain'.

"Of course relief of disaster does not always call for engineering. In the ghastly affair at Hungerford a young member of the Corps, Lance Corporal Harries, distinguished himself and won high praise by tending the injured.

MACC

"On the other hand Military Assistance to Civil Authorities does not necessarily develop from disaster. In mid January after heavy snow the Corps assisted with snow clearance, mainly in Kent, and some units were involved in the clear-up operation in the aftermath of the October storm.

"In July 9 Parachute Squadron, re-inforced, completed the conversion of Rollestone Camp into a temporary prison in support of the Home Office.

"Scotland continues to be a valuable MACC training area for regular, TA and OTC units. We do about forty tasks there a year; mostly at troop level and mostly for the Countryside Commission, National Trust of Scotland or Local Authorities.

"Our work there is invaluable both for lower level management training and for the sticks and string engineering it provides. It is also greatly

Photo 4. Flush capping

appreciated and produces a most positive PR contribution for the Army in Scotland.

"Whilst I was in Scotland I also visited the ten sappers who are part of the twenty five man force on St Kilda, 70 miles off the Scottish mainland; the first EinC to do so, I think. They live in a rather desolate camp for six months and, are happy as sandboys, working in their trades, maintaining and running a power station and the electrical distribution system, (indeed they call themselves the KGB—Kilda Generating Board) and the water and sewerage system as well as maintaining the camp structures all in very harsh climatic conditions.

EOD

"A few words next about bomb disposal (or EOD), airfield damage repair (ADR) and the TA.

"The image of EOD continues to move up market and the high-technology role of high risk search in support of the police, particularly at royal and political events, provides an increasing challenge for members of 33 EOD Regiment. At the other end of the scale, the clearance by them of the 1000 Kg Hermann bomb at Bermondsey on 30 June, which I was fortunate enough to witness, received a good deal of favourable national and local comment and resulted in a civic reception by the Mayor of Rochester attended by about thirty-five members of the Regiment.

"And only last week they hit the headlines again in their clearance of gas canisters at the Old Ordnance Depot at Bramley.

"There are two important developments in the EOD world. First, because EOD has long been the Cinderella of the three services we have formed a central MOD Joint Services Policy Committee in the hope that this might provide the resources that we have been unable to secure on a single service basis; time will tell. Secondly, 33 Regiment now consists of three regular squadrons and four TA squadrons which is a larger burden than any CO should be expected to carry. We are therefore hurrying through our plan to split the regiment into two by hiving off the TA squadrons and forming a new TA Regiment on 1 June next year. Its HQ is likely to be in London and we plan to name it 101 Engineer Regiment or something similar, thus resuscitating the link between the Capital and the Corps that existed in the old 101 (London) Field Engineer Regiment TA.

1987 Corps Annual General Meeting (4)

ADR

"Next ADR, and another area which is gathering momentum satisfactorily. All the field squadrons (construction) are now permanently represented at their wartime bases in Germany by Forward Technical Teams, and the way is now clear for the basing in peace of 52 Field Squadron (Construction) at RAF Bruggen from mid 1989. In the Territorial Army all eight field squadrons (ADR) have formed and I am happy to say that the first of them, 277 Field Squadron at RAF Leuchars, was declared operational on 31 August this year as was 216 Squadron at Marham on 17 September. In another major field of support to the RAF 38 Regiment are taking an active part in the preparations for the introduction into service next year of the Harrier GR5. This aircraft will give the Harrier Force a greatly enhanced capability.

"There are also important advances on the equipment front. RARDE(Christchurch) appears to be succeeding where the rest of NATO, including the United States, has failed in developing a flush cap system for crater repairs usable by all types of aircraft. This represents the biggest technological jump in its field since the Royal Engineers assumed responsibility for ADR in 1966. So keen are the RAF to have this system, they are putting considerable funding into its introduction at a time when many other projects are being cut or cancelled. Other projects under way include interim and long term solutions to aerial and ground recce systems, and the ever pressing problem of EOD on airfields. Whilst EOD in these circumstances is an RAF responsibility, we are developing a Pathfinder vehicle to clear access to and around our worksites through the expected area denial weapons. This vehicle will consist of an add-on equipment to a piece of ADR plant, which is already in service.

TA

"I have already referred to the TA both in the EOD and ADR context, and I have visited a number of TA units during the course of the year. I should just say that I never cease to be impressed by the enthusiasm, professionalism and dedication of our TA sappers.

"There are two further TA developments of which you should be aware. First, in looking at the engineer contribution to the UKMF it has been decided that the greater part of 111 Regiment—our specialist TA regiment—could be more effectively used elsewhere. We are therefore renegotiating its deployment either to BAOR where there is an acknowledged deficit or to UKLF to bolster the engineer Home Defence organisation. Secondly, the island of Jersey has very generously offered to finance a contribution to the nation's defence and, after much deliberation, the MOD's recommendation is that it should be an engineer squadron. We now await the approval of the States of Jersey, but the prospect of raising an extra squadron in these hard times is good news indeed. (*This approval has subsequently been given-Editor*).

"In sum, I have travelled widely this year in search of sappers—to Norway, Kenya, Germany twice, America and Canada; my Deputy has been to Hong Kong, Nepal and Brunei and the Director of Engineer Services just about everywhere else! We have, as always, been immensely impressed with the work that the Corps is doing around the world and I think that you can be as proud of them this year as our forefathers were 200 years ago. *After outlining the situation on equipment developments largely covered, or to be covered in* Journal *articles, the EinC turned to policy, manning and Corps affairs.*

Policy

"I should mention one other area where I believe we have made some progress. For some time I have felt that although the individual bits of the Corps push ahead into the future as best they can, we have not got a system to produce the logical, progressive and coherent Corps policy for the future which we should clearly have. We now have a system which, based on the likely roles and tasks of the Corps, and taking into account the threat and likely tactical and technical developments, will allow us to analyse our requirements in the future so far as weapons, equipment, organisation, doctrine and procedures are concerned. And, so that we in the Corps orchestra all play the same tune, this policy is being distributed as it is formed to every serving officer in the Corps from major upwards in the form of Royal Engineer Policy Statements (REPS). In a similar but shorter term vein we are also producing Royal Engineer Briefing Notes designed to brief officers on subjects of current interest. The second REBN, *The Value of Mines* has just been issued.

Manning

"Our soldier manning position remains satisfactory in that we are fully manned although, as always, we would welcome a more generous manpower allocation. Our officer recruiting position remains extremely encouraging. Last year (1986) we recruited a record number of high grade officers into the Corps and consequently the YO courses at Chatham this year (1987) are running at full steam. Recruiting in 1987 has been equally good. Our proportion of undergraduate cadets and bursars remains very high. We continue to attract a good quality of engineering graduates although we are still short of electrical engineers. However, I should warn that the recruiting cloud which has been on the horizon in the shape of a reducing number of young men in the nation is approaching fast and the overall long term trend is less satisfactory.

"Our main problem at present remains the shortage of regular officers at senior captain and junior major level. We still need to recruit more officers on regular rather than short service commissions and to persuade good short service officers to convert to regular. We are making some progress but the problem is stubbornly resistant to solution. The existing black hole which has been with us for so long is now causing some problems in selecting suitably high quality officers at the squadron command level although in that area I am much heartened by the splendid performance of our officers leaving Staff College this year. A particularly lively bunch, two of them have been appointed as COS (BM in the old terminology) and three as DCOS (DQ) of all arms brigades—a quite remarkable record. In the higher echelons, we were all disappointed at the numbers promoted to lieutenant colonel and colonel this year. Having examined the figures carefully, however, we did get our fair share of a decreasing number of promotions across the Army, and Army wide we are still ahead of the game. At the top level we are still well ahead. We at last have a member of the Army Board again—Lieutenant General John Stibbon—and seven major generals including Major General Neil Carlier who is Commander British Forces Falkland Islands and Major General Leslie Busk who is Director Army Air Corps. Brigadiers Grove and Field both go to RCDS next January. We have another all arms brigade commander—Colonel Scott Grant—to add to Brigadier Geoff Hyde's appointment last year so that two out of the nine all arms brigades in BAOR will be commanded by Sappers, and we have a most impressive array of senior staff officers.

"I should add that Brigadier John Drake has been elected to the Council of the Institution of Civil Engineers, the first time for many years that a serving Sapper has been so honoured. And earlier this year senior officers in the Corps and the Master and Wardens of the Worshipful Company of Engineers held a joint dinner at which we exchanged gifts—ours to them a loving cup and theirs to us a new gavel for the Headquarters Mess—during which they were kind enough to invest me in the livery of the company. I mention these two events only because they emphasise the increasing links between the Corps and the civilian engineering fraternity which I believe to be so important to our Corps.

Sport

The EinC highlighted a few of the many successes the Corps has had in sport all of which have been well reported in Sapper *and then turned to Regimental Affairs.*

Regimental Affairs

"So far as the Museum is concerned, I am sure the President of the Institution will want to mention both its future management and development. Let me only say that, using our own tradesmen, the Museum has been further developed this year, and externally a new entrance and car park have been built and plans for roofing the courtyard are well advanced. Encouraging progress has also been made in fund raising under the direction of Colonel Peter Williams and we are already over two thirds of the way towards our initial target of £¾ million. The Museum was officially opened by HM The Queen on her visit to the Corps on 20 May.

"Which brings me to RE 200. After a press briefing which was mainly memorable for the Chief Royal's witty precis in ten minutes of the Corps history from 1066 to the present day—a masterpiece of condensation—many of you will remember our party for 5000 in the Albert Hall and the moving Service of Rededication in St Paul's followed by the reception at the Guildhall. Prince Philip launched *Right Royal of Upnor* on the second windiest day in 1987 and in early April we held the RE Games at Chatham

Photo 5. The Royal Tournament.

including all the major sports and most of the minor ones. Her Majesty's visit to Chatham was well covered in both the *Sapper* and the *Journal*. It was a very special day enjoyed as much, I think, by the Queen as by everyone else.

"Public duties came our way in June when the Corps Band and 9 Squadron—in an unusual role for them—provided the guard at Buckingham Palace—and very well they did it too, whilst at the Royal Tournament the Corps Band was the resident band and 220 recruits from 55 Training Squadron put on a quite brilliant and original display illustrating the Corps history by using bits of plastic water pipe to build a castle—and blow it up—an aircraft, a tank, a bulldozer, a landing craft and a bridge all in a matter of seconds. Without a doubt, it stole the show. At the end of July Her Majesty opened Park House on the Sandringham Estate—Princess Diana's birthplace which had been given by The Queen to the Leonard Cheshire Foundation and turned into a holiday home for the disabled. The house is now run by Brigadier Tony Kendall so it is no small coincidence that the Corps built a new entrance, including gates made at Long Marston, a new drive and a car park and provided £3500 towards the cost of the materials as our contribution to a right royal charity in our right royal year. And as cold and wet summer turned to cold and wet autumn the Survey Branch did their own thing at the Old Observatory at Greenwich, and the parachutists did likewise on Exercise *SEASPLASH* in Guernsey.

"This year has also seen a plethora of commemorative brochures, calendars, plates, maps and first day covers—stamps featuring the Corps have been produced by the Falkland Islands and Gibraltar, British Rail have named a locomotive after us and we have been granted the Freedom of Iserlohn. And there have been

many events at unit level throughout the world wherever sappers have been serving, the most memorable of which was perhaps the QGE non stop run across Canada in seventeen days, two hours, and twenty-seven minutes and then from Glasgow to Chatham in time to present a cheque for £52,000—the proceeds of their sponsorship for the RE Museum—to the Queen. I cannot leave RE 200 without paying tribute to all those who have worked so enthusiastically and tirelessly to make all the events the success they undoubtedly have been. And none deserves our gratitude more than the Regimental Colonel—Colonel Danny Dennison—who has been the inspiration behind the major Corps attractions and who has had to shoulder a burden that would have poleaxed a lesser man; he has done a remarkable job.

"Finally, you may know that on 21 December General Sir George Cooper takes over from General Sir Hugh Beach as Chief Royal Engineer and we welcome him wholeheartedly. Our Ladies Dinner Night at my Conference will be the appropriate time for those of us still serving to pay tribute to General Hugh and to Lady Beach who has supported him so wonderfully during the last five years. But in front of this distinguished audience may I just thank you, sir, for being such a warm, friendly, understanding, guiding and much loved father to every branch of the Corps family both serving and retired—we are all greatly in your debt".

Reunion

Twenty-four officers from the World War Two Guards Armoured Division Royal Engineers gathered with twenty-two of their ladies for a reunion and a celebration of RE 200 on 6 May 1987. The reunion, the inspiration of Major Tony Taverner who scoured every possible source of information over a period of nine months to make his contacts, took the form of a cruise on the Thames, which was enjoyed by all.

Reunion

Professionalism and the Corps

MAJOR B M SEMPLE BA MSc RE

Brian Semple was commissioned into the Corps in 1966 after reading Engineering at Cambridge. He served as a troop commander in 32 Engineer Regiment. A tour as GSO3 in ASD2 was preceded by two years as Adjutant of Welbeck College. He attended the Army Staff College in 1979 before commanding 29 Field Squadron in 1980/81. This was followed by a grade 2 appointment on the staff of HQ Berlin. After serving as Second-in-Command 39 Engineer Regiment, Major Semple spent a year as a post graduate student at the University of Manchester Institute of Science and Technology studying Management Sciences. He graduated as an MSc in 1987 and is now serving in Engr 3 at the Logistic Executive.

HIDDEN within the controversy which surrounded the recent publication of the anonymous preface to the Crockford's Clerical Directory there is an aspect of professional conduct rarely experienced publicly in the Army: that of peer evaluation. A fundamental examination of the development of professionalism is particularly pertinent as the debate about 'Professional Engineer Training' continues and by the renewed call for 'professional' status for military engineers. Various contributors to the *Journal* have written about 'engineering', military or civilian, and have readily linked with either or both the term 'professional'; C D Yule touched on the role of the voluntary institution in the quest for professional status (Yule (1987) p293) but this has been the only attempt in the *Journal* to examine a concept not widely understood. Although it has strong philosophical origins, the term 'professional' has developed a colloquial meaning which has debased the original concept of a profession. As I shall attempt to show, there are other reasons why, within the Corps and the Army, 'professionalism' has taken on a new meaning and has thereby lost much of the intellectual worth of the original concept.

In the book *Professions and Professionalization* (Jackson, 1970), Harries-Jenkins acknowledges that the Military is one of a group of four occupations which has generally been accepted from 'time immemorial' to be professions whose professional status is 'beyond question'. The other three occupations he names as the Bar, the Established Church and the lesser known group of Notaries (Harries-Jenkins (1970) p58). Although colloquially many people use the description 'professional' to describe their status, sociologists generally agree that there are clear parameters which must be applied before an occupation be considered a 'profession'. By stipulating such parameters there is recognition not only that Harries-Jenkins' four classical professions are no longer in a class of their own, but that there are clear distinctions between an 'occupation' and a 'profession'. Harries-Jenkins actually assembled a set of six constituent elements, divided into twenty-one sub-elements, by which he defined the process of 'professionalization', a concept which recognizes that a 'profession' may be achieved.

In 1972 the Army adopted the recruiting slogan 'Join the Professionals'. This emphasised that, unlike armies of conscripts, the British Army was a volunteer army of professional soldiers. However within an army there are many separate claims of what I call 'functional professionalism': the professional infantryman, the professional artilleryman, the professional helicopter pilot and of course the professional military engineer, whether he be chartered in one of the civilian institutes or not. As each function has developed so it has tried to assume the status of an individual profession.

Writing about the military's position in society, Van Doorn (1975) ascribes to a profession two fundamental characteristics which may be easily identified in the military officer corps:

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"(1) a special well integrated body of knowledge and skill, and a set of standards and norms, handed on by means of socialization of new members;

(2) a pronounced autonomy of the profession, generally with legal support, repelling the interference of others in the recruitment, selection and training of candidates, as well as in the occupational conduct of the professionals themselves." (Van Doorn (1975) p35).

Van Doorn further asserts that although professions cannot always be distinguished from occupations, professionalization as a process can be clearly defined with the raising in status of the expertise in question and the intensification of the identification of the professional with the profession. Downey (1977) defines three criteria to be met in order for a military system to be classed as professional: firstly, permanence, at least to the extent that a sizable full-time nucleus exists (this is presumably to differentiate a professional army from a conscript army or at least from a militia such as exists in Switzerland); secondly, a technical proficiency which is attained by study and experiment in peace and war; thirdly, a concept of service, that is, there must be some political authority reflecting the will of the people (Downey (1977) p8). As professional military men Downey and his co-authors are clearly keen to emphasize the legitimacy of the profession of arms in terms of service (for the benefit of the state) and the aspect of a full-time career. Notwithstanding this emphasis their definition is in accord with Van Doorn and Harries-Jenkins.

Against these definitions, some of the claims for full professional status from those functions within the Army which display what I earlier referred to as functional professionalization, appear strong. In Yule (1987) there is an examination of The Institution's role in this process and the extent to which it has failed to play as full a role as The Engineering Council would probably regard as necessary for professional status. The degree of functional professionalization varies between functions but at least some of the elements of Van Doorn's characteristics can be ascribed to each function within the Army as well as to the Army as a profession in its own right. It is interesting to note however, Jackson's assertion that status within the military profession is higher for the infantry and cavalry who have no utility outside the military sphere (Jackson (1970) p10). As groups they also have least claim to functional professionalization, although the infantry and cavalry have clear occupational distinction within an army. Alternatively the claim of other groups to be professional soldiers as well as professional specialists is based on their ability to act as soldiers (infantry) first and as specialists second. As a further complication, members of other professional bodies such as doctors and priests are recruited into the armed forces, for their professional abilities, some then tend to emphasize their first acquired profession and play down their acquired role as professional soldiers.

I have shown evidence for Army officers to be regarded as professionals in the classical definition but also that within the British Army the profession is not homogeneous, encompassing both military functional professionals and others whose first profession lies outside the Army. Feld (1968) introduces a new term to describe those whose professionalization is dependent on the organization in which they work—the ascriptive professional (Feld (1968) p56). Harries-Jenkins (1970) makes considerable use of this term to avoid the rather sterile debate which centres around the profession versus occupation argument when advocates of the classical school would deny occupations the professional status they seek. An ascriptive professional is defined as one whose work is performed within a monopolistic organisation which:

"determines his status, evaluates his ability according to organizational requirements and delineates through a process of selection and designation the precise area within which he will carry out his activities." (Harries-Jenkins (1970) p55).

This definition fits the British Army Officer well and, as Harries-Jenkins points out, because there are certain aspects of the 'organizational requirements' which undermine the classical definition of professional, the officer corps is tending more to ascriptive professionalism rather than achievement professionalism. In particular, the demands of the bureaucracy which interprets the organizational requirements has all but eliminated peer evaluation of professional competency and replaced it with hierarchical evaluation. As Feld points out:

"the ability to fill some organizational requirement may, of itself, be enough to lead to the granting of promotions and commissions to individuals otherwise academically untrained and socially unqualified. Officer status is a result of organizational fiat, and may be withdrawn as arbitrarily as it is conferred." (Feld (1968) p56).

The complete fusion of profession with organization in the Armed Forces has resulted in a situation which Downey (1977) describes as 'closing ranks'. As a result of this, military officers who are members of both the profession and the organization set common aims for themselves and the system. Because of this, Downey suggests that there is a situation with which "most military men would agree" that change can sometimes be resisted to the point of inefficiency. (Downey (1977) p193).

Harries-Jenkins (1971) observes that the desire to produce an homogenous organization discourages self analysis and hides what he sees as strains between ascriptive and achievement professionals. Although the study from which he drew this observation concerned engineers in the Royal Air Force, similar patterns of behaviour can be identified in the Army. He writes:

"The importance of these strains in the military organization cannot be minimised. Internally, strains and dysfunctions derived from the presence within the same sub-system of ascriptive and achievement professionals may have negative consequences for the performance of the organization". (Harries-Jenkins (1971) p163).

Harries-Jenkins suggests that although similar strains may be present in local government and in the Civil Service there are some factors peculiar to the military. The significance of the strain within the military establishment is accentuated by the inability of the bureaucracy to accommodate conflict. The military organization: "relies on highly developed centralised control to mitigate its effects".

One factor on which the Army relies in order to reduce internal strains, whether by intention or not, is the almost absolute lack of mobility that exists for officers to leave and then rejoin the active list. Although we have seen within the Corps an attempt to encourage retired officers to return to full-time service this move does not really challenge the bureaucratic control which prevents 'professional dissent' either in the Army generally or within the Corps in particular. Hierarchical evaluation ensures that 'professional competence' is measured by those who also control 'professional' advancement, and because the Army has a monopoly of employment of the military and the military engineer it is neither possible to express dissent within the organization (other than superficially and then only subject to the sanction of being a non-person), nor is it possible to leave the organization and remain a 'professional'.

If the Army is so controlled by its hierarchical and bureaucratic structure that it has ceased to be a profession, except within the limiting definition of Feld's 'ascriptive professionalism' is it necessary that the Corps should inexorably follow the same path? A letter in the June 1987 *Journal*, rightly spoke of the Corps as being a team and of the need for a multi-purpose Corps of military engineers. However the writer also suggested that:

"...if there are any doubters I suppose they can always put themselves on the transfer list..." (Cooper (1987) p152).

This is an unfortunate proposition as it is contrary to the historic traditions of the professions in which the values of self-criticism and self-regulation are fostered. Rather it is similar to that sometimes light-hearted dictum of the tactics class that 'tactics is the opinion of the senior officer present!'

Unfortunately the professional status which was historically accorded to the military but which the military has all but forfeited, must also be forfeited by the Corps if it allows the 'military' aspect supremacy over the 'engineering'. Within the Institution of Royal Engineers there is no apparent distinction between those whose careers emphasise (or have emphasised) the military and those whose careers emphasise the engineering. But elsewhere in the Corps, even when it need not be subject to such pressure, the Corps has allowed contemporary military attitudes to displace the influence of 'professional' engineers. Although, in order to survive within a military environment of decreasing resources, the Corps cannot afford to disregard entirely contemporary military attitudes and requirements, I suggest that our professional future would be better served by returning to the traditional values of the professions.

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An African Interlude

MAJOR A D WILSON RE

Major Andy Wilson was commissioned into the Corps in June 1975. He has served in BAOR and UK as a troop commander, in HQ 3 Armoured Division as an IO and in NI as Adjutant 74 Engineer Regiment (V). He is currently SO3 Engr at HQ 1 Armoured Division. From May to November 1986 he deployed to Uganda as part of the British Military Advisory and Training Team (BMATT). He now commands 44 Field Support Squadron.

Following the coup in Uganda in January 1986 the new President, Yoweri Museveni asked Britain for assistance with training a cadre of instructors for his army. Under the sponsorship of the Foreign Office a thirty strong team deployed to Uganda in May 1986 to reinforce the small existing British Military Team. Having successfully run a series of instructor courses the team withdrew from Uganda in November 1986.

"Of course the biggest problem in most of the settlements is the provision of water. I believe we can help. I would like to construct wells where possible, but particularly at Ruamondo and Kibuye. Andy, I would like you to take this on. Let me have your ideas as soon as possible." "Yes, Brigadier" said I.

Evening 'prayers' over we retired to the mess for the post mortem of the Commander's briefing. Having been in Uganda as a team for about two months this was already a tradition. I had expected to be ribbed about my newly acquired task, but instead discovered that as one of only two engineer officers on the team—the other, Captain Peter Jones, was fully committed to his duties as team adjutant—I was considered the obvious choice. Having had my morale boosted by this 'all arms' acceptance of my engineering ability, I settled

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down with my White Cap, pencil and fag packet to list all I knew about digging wells. Some time and two beers later with not a single note made, I realised I was in trouble. At about this time I was told to stop being boring and leave the report until tomorrow (report! tomorrow!). Making a mental note to write to Chatham about the obvious gap in my YO training and that I desperately needed help if I was not going to let myself and the Corps down, I temporarily abandoned the project in favour of a discussion on parachuting into Lake Victoria.

With the sun the next morning dawned a bright idea. Aid teams from both America and Britain were already running water supply projects in the country. The simple solution was to get them, in essence, to dig my well for me. We would almost certainly be able to pay for it and, after all, they are the experts. Feeling a lot happier I winged a quick signal off to HQRE 1 Armoured Division (where I was supposed to be SO3 Engr) asking for information on well drilling and settled down to the problems of instructing a guerilla army in the art of peace time staff work. A quick phone call at lunch time earned me an invitation to drinks with the local area organisers of UK Water Aid.

Armed with suitable gifts and maps of the areas I was interested in I duly arrived for drinks at the appointed time. By a stroke of luck the area organisers had staying with them a hydrogeologist from England who was female, attractive and an expert on hand dug wells. Unfortunately I was not able just to hand over the project as I had hoped. The Water Aid organisation was not operating anywhere near the area I was interested in and could not divert from their own tight programme. I was, however, given some extremely sound and practical advice on where to look for water and how to go about digging wells. In return I managed to persuade the Area Organisers and (a real coup) the hydrogeologist to attend the next mess BBQ. The Brigadier must have been impressed with the progress I was making. It is worth producing here a few of the more important notes I made during our discussions:

1. Get hold of the book *Hand Dug Wells and their Construction* by S B Watt and W E Wood, printed by ITDG. This book is really the bible of low technology well drilling and an absolute must for anyone setting out to dig a new well.

2. Locating water:
   a. Look for previous boreholes and wells.
   b. Study local geology (look for fault lines).
   c. Talk to the local population.
   d. Look at existing water sources and courses.

3. Siting the well:
   a. Where do the villagers want it?
   b. Who owns the land?
   c. Keep specified distances from sources of contamination.

4. Constructing the well:
   a. Use local labour—the villagers must effectively build their own well if it is to be looked after.
   b. Assess availability of resources.
   c. Run a hygiene and well maintenance programme to ensure that the well is looked after properly—this can take as long or longer than actually building the well.

Having armed myself with a little knowledge (and being fully aware of how dangerous this can be) I next set about organising recces of the potential well sites. This had to wait until a suitable gap appeared in our training programme as all the Commonwealth Servicemen's Settlements which we aimed to help were some distance away across difficult country. In the meantime I pestered everyone I could think of for information about all aspects of well construction from the provision of pumps to the local manufacture of bricks. My increased vocabulary (caisson, cutting ring, steining etc) ensured that everyone thought that I was getting to grips with the problem and on with the job. The Brigadier seemed happy, anyway, especially when I could baffle him with some well chosen technical clichés.

My initial visits to three of the settlements were a turning point in the project for me. At Kibuye I watched a small girl collecting water for her family from a shallow excavation at the base of a dry, natural spring. She had to dig a scrape in the insect infested, animal contaminated soil, wait several minutes for it to fill then transfer the filthy water to her container. This meagre supply of water served a population of over 200. At Ndaigo the villagers had to walk seven miles for water and then carry it back up a steep escarpment (a climb of some 600 feet) to the village. Although all the

settlements had a water supply, albeit from surface drainage for some of the year, they all, for at least three months each year suffered terribly at the height of the dry season. The project for me, from being a chore which detracted from my sailing and fishing at weekends, became one which was extremely important to complete.

Having done the recce, read the book and designed the tee shirt it was time to get down to some serious planning. The Brigadier, after all, was still waiting for his report. It was apparent that timing, resources and manpower were the key considerations.

Ideally, wells should be dug at the end of the dry season before the rains saturate the aquifer and limit the depth of excavation. Time on site had to be fitted into the training programme. The distance of the settlements from Jinja (our base) had to be taken into account.

The cost obviously had to be kept to a minimum. Bricks, stone and sand could, in all cases, be locally procured and we had access to supplies of cement and reinforcing rods. Whichever type of well we chose, all of these resources would be required. Other resources varied with the well design. Those wells lined with reinforced concrete, which are then capped and fitted with a pump, are only really economical to construct as part of a large well drilling project. This is principally because of the re-usable construction equipment required such as headframes, shuttering and SWR. The provision of suitable pumps also looked like being a major problem. With cheaper designs the penalty was that clean water could not be guaranteed.

Local labour was not a problem. In all of the settlements we visited, the ex-servicemen and their families were desperately keen to dig a well, providing the expertise and resources could be made available. The critical manpower was that which had to come from the team to supervise the construction, without interfering with the work load in Jinja.

My eventual recommendation was that only one well should be attempted, at Kibuye, the worst off of the settlements. The basic plan was to hand dig to the aquifer, build a brick caisson on top of a cutting ring, excavate into the aquifer allowing the caisson to sink as we went and then backfill behind the brickwork with gravel. The well would be finished by constructing a reinforced concrete headwall and apron with a simple roller beam for lifting the water and a basin for pouring it into the "AGIP" cans used as water containers. The project would require two of the team to be on site for three weeks and would cost the charity about £250—£300. A sketch of the proposed well is at *Figure 1*.

I submitted my report to the Brigadier. He approved it and was keen for me to start. Money, time and manpower were all set aside and it looked as if 'Wilson's Well' would become a reality.

Postscript. It did not. The National Resistance Movement (NRM) Government, by witholding permission, prevented us from starting work.

It would seem that by preventing us from digging the well and undertaking some of the other charity work, the NRM were "shooting themselves in the foot". To them, however, this was not the case, for a combination of reasons. BMATT Uganda was a large (30 man) professional military team and although deployed purely to assist the new Government, was seen by some as a threat to the nation's sovereignty (far more than any charity organisation). The NRM wanted to be seen as the benefactors of the people (they told us that they would be quite happy if we gave them the money, in foreign currency, to build the well on our behalf). They also argued that many more recent war veterans needed more urgent help than those who fought for the Commonwealth in the two World Wars. In effect, by assisting the Commonwealth War Veterans we would apply unacceptable pressure on the Government to help the veterans of more recent wars. It must also be remembered that the NRM Government had been in being for only just over six months and because of the revolutionary nature of the January coup had little infrastructure on which to base itself. On the other hand, the authority for us to dig the well may simply have gone by default as a result of slow and bureaucratic processing.

I was of course disappointed that we were not able to help the people of Kibuye, but hope that the Government of Uganda or one of the Water Aid organisations will do so instead. The project, although it did not come to fruition taught me two important lessons. Firstly, that a Sapper in an all arms team is automatically assumed to be the expert on all engineering matters and will achieve results no matter what his personal

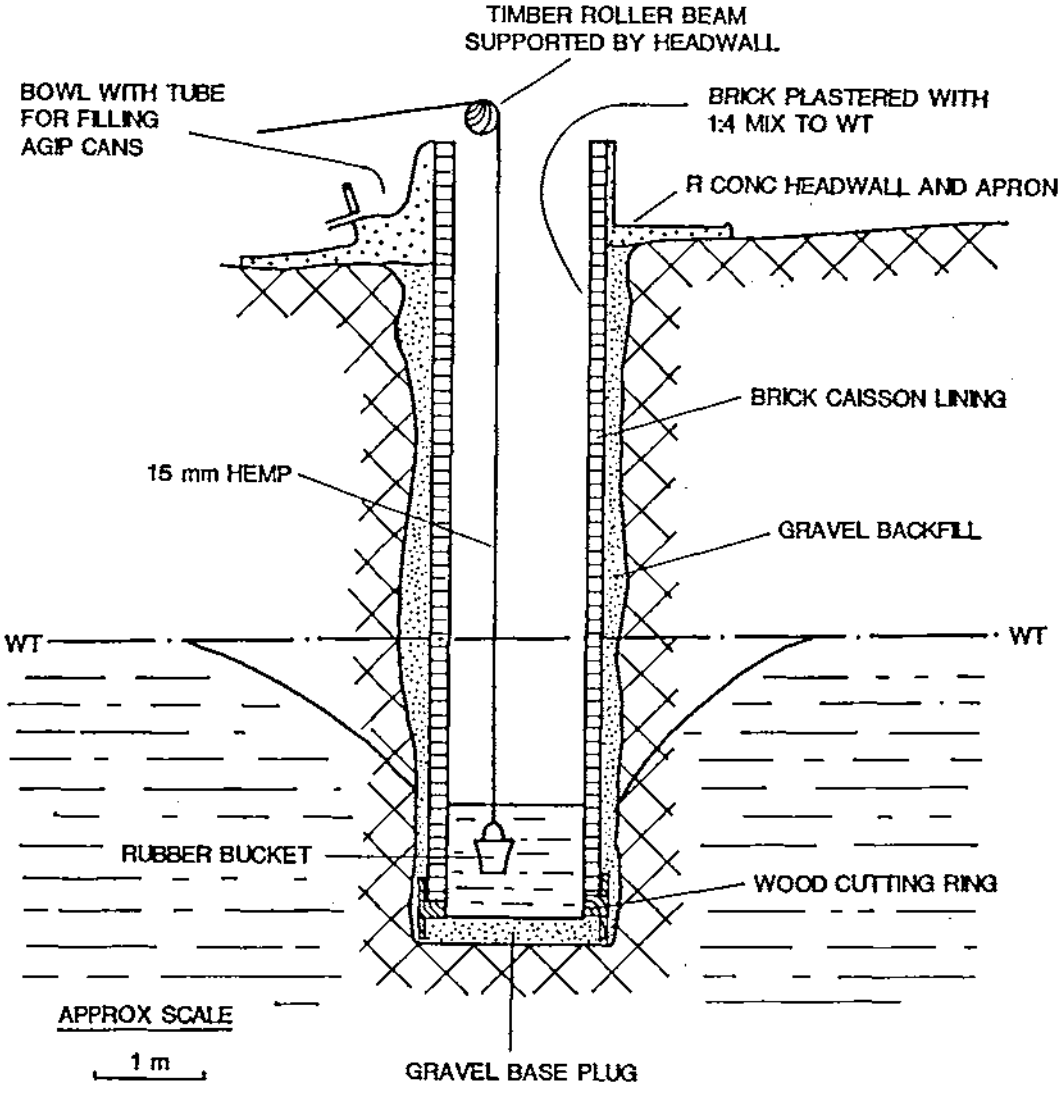


Figure 1. Kibuye Well sketch diagram.

background. This reputation has been earned by the Sappers in the past and must be maintained by us in the future. Secondly, however desirable a project may seem, it will fail without the support and sanction of the executive authority (in this case the NRM). Close liaison and understanding is essential. In emergent nations this is often likely to be the most difficult part of the project to get right.

The Life and Work of General Sir Arthur Cotton KCSI

MAJOR GENERAL R M RAU AVSM

Major General R M Rau, AVSM was born at Visakhapatnam in Andhra Pradesh on 29 October 1924. He was commissioned into the Royal Bombay Sappers and Miners on 4 December 1943. He saw operational service in Burma as a platoon commander in 30 (Royal Bombay) Indian Field Company in 1944/45, as part of 36 British Division. He served in Malaya and Siam from September 1945 to March 1947 initially as a platoon commander in 30 Field Company and later as Second-in-Command of 485 (Royal Bombay) Indian Field Company.

After 1947, he commanded a Field Company in the Jammu and Kashmir operations (1947-48). One of his officers, Second Lieutenant R R Rane won the Param Vir Chakra (the Indian equivalent of the VC) in April 1948, the only one awarded so far to the Indian Corps of Engineers, for clearing mines and road blocks. General Rau was himself mentioned in dispatches.

General Rau was attached to the Airborne Forces Depot, Aldershot in 1950/51 for three months which included a parachuting course. He was in UK again as Staff Officer (Engineers) at the Military Adviser's office in the Indian High Commission from 1954 to 1956.

He commanded an Engineer Brigade in the 1965 Indo-Pak war and was a Staff Officer at the Engineer-in-Chief's Branch during the 1971 conflict.

He retired from the Indian Army on 25 October 1976, and was awarded the Ati Vishist Seva Medal (AVSM) for distinguished service of an exceptional order. He is a Fellow of the Institution of Engineers (India).

GENERAL Sir Arthur Cotton was born on 15 May 1803 at Combermere Abbey. At the age of fifteen, he obtained cadetship for India and joined the military academy at Addiscombe, near Croydon, where the cadets intended for the Artillery and Engineer arms of the East India Company then received their education.

Arthur Cotton was only a boy of sixteen and a half, when towards the end of 1819, he left Addiscombe. Second Lieutenant Cotton was stationed at Chatham but he was not allowed to remain long at the Depot. In a short time, on 31 January 1820, he was posted to the Ordnance Survey of Wales. In May 1821, having been appointed to service in India, he embarked for Madras, at which city he arrived in September.

After an attachment of one year to the office of the Chief Engineer, Lieutenant Cotton received the appointment of Assistant to Captain Fullerton, Superintending Engineer of the tank department, Southern Division. In 1824, he joined the expedition that took part in the First Burmese War. He was associated for some time with the gunboats, reconnoitring, fighting and eventually with the storming of the fortresses of Mergui and Tavoy. He was engaged in defending Rangoon, and afterwards took part in the assault of the stockades of Kakien. Here he distinguished himself by taking the lead as the only engineer officer with one of the columns of the main army. He led the storming party against seven forts and stockades; he served also in the trenches, and was engaged in all the most notable actions of that time. Lieutenant Cotton returned to Madras after the end of the Burmese Campaign, having earned a reputation for bravery of the highest order.

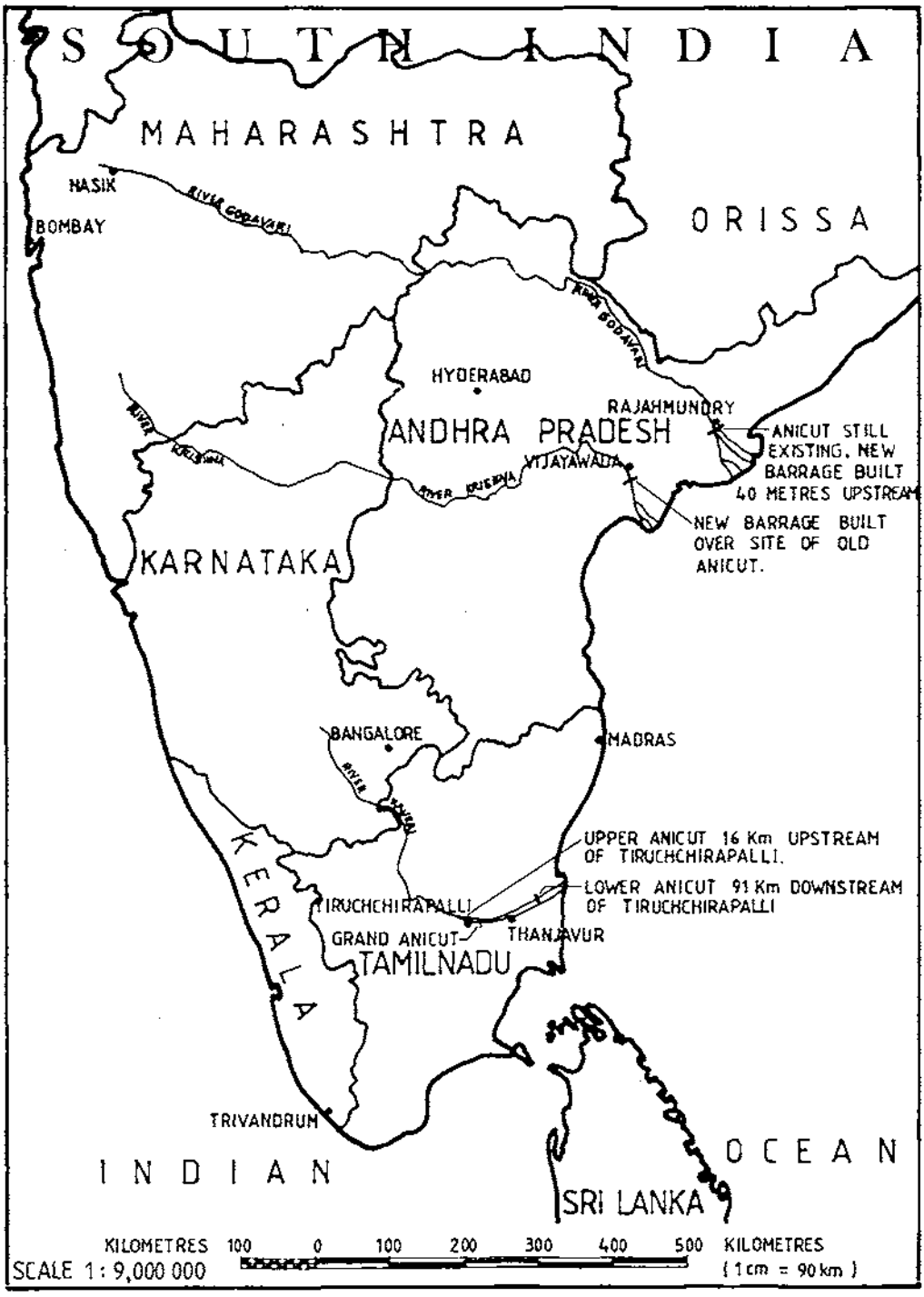
Major General R M RAU AVSM
The Life & Work of General Sir Arthur Cotton

Captain Arthur Cotton in 1836 stood at the threshold of the most distinguished part of a great career. In Tanjore, he devised a scheme for controlling the river Cauvery and saving its almost priceless water from running to waste, by building an anicut (weir). Arthur Cotton's next work was the construction of a short railway from Madras to the Red Hills, a few miles distant for the transportation of road material to the city. The Red Hills Railway was the first railway made in India, although the first run on commercial lines for passenger and goods traffic was the one constructed later between Bombay and Thane. After some time, Arthur Cotton came to feel that, when once huge capital was expended on railways, there would be no chance of the country having the cheaper water carriage, which would be less costly for the transport of its products over the great distances they would be required to be moved. However, railways won out in the end, and there is very little water transportation of goods in India these days. Cotton later built a church and constructed groynes on the beach at Vizagapatam (Vizag), now known as Visakhapatnam.

When Cotton was working at Vizagapatam, the potential for irrigation of the River Godavari came to his notice, especially as the people of Rajahmundry district, as it was then known were at the mercy of the vagaries of the monsoon, which caused frequent famines. For example, a terrible famine ravaged the coastal districts in 1832-33, and the country had only partly recovered from the effects of this disaster, when the three unfavourable years 1835 to 1838 were followed by the calamities of 1839 to 1841.

The decreasing population and dwindling revenue now forced the Government into action and in 1843, it sent one of its ablest servants, Sir Henry Montgomery to inquire into the causes of the rapid decline of the district and to advise as to remedial measures. In March 1844, he sent in his report in which he mentioned amongst the causes the ''neglect of the existing works of irrigation and the absence of improvement''. Fortunately Sir Henry Montgomery had been collector of Tanjore, where he had seen the blessings bestowed on the district by the irrigation from the river Cauvery and the astonishing improvement which had followed the building of the Coleroon anicuts in 1835. He, therefore, when dealing with the remedial measures required for the Rajahmundry district, strongly urged the thorough examination of the Godavari delta by an experienced Engineer, with a view to the development of its irrigation resources. He further added that ''The presence in the Northern Circars of Captain Arthur Cotton, whose acquaintance with the management of river irrigation on an extended scale has been successfully applied to the southern districts, seems to afford an opportunity

Photo 1. This statue of Sir Arthur Cotton was unveiled on 2 November 1986 at Hyderabad, the capital of the state of Andhra Pradesh in Southern India. It is one of thirty-two statues erected along a stretch of road two kilometres long on an embankment, holding the waters of the Hussain Sagar Lake in the centre of the city. All the statues are of past eminent Andhras (the people who speak Telugu) and the fact that Sir Arthur Cotton's statue is one of them, shows the respect and reverence he inspires amongst the Andhras, even after 124 years after he left India in 1863. Sir Arthur Cotton's great work, the Godavari Anicut which brought prosperity to the coastal districts of East and West Godavari, was completed in 1852 and was serviceable till recently when a new barrage was built and named after him. Even now, the old anicut is proving its usefulness as a back-up to the new barrage, as a breach which occurred in the anicut in 1986 is being repaired at great cost. Cotton had predicted that the anicut would last for a hundred years, which period it has far exceeded.



Map 1. South India showing the areas of Sir Arthur Cotton's principal works.

deserving of being embraced by the Government to obtain a satisfactory opinion on this subject".

The Madras Government at once acted on this advice and by August 1844, Major Cotton had sent his report. Eight months later he sent his second report in April 1845. He urged taking up of the Godavari delta anicut scheme. The Chief Engineer had also advocated execution of the project in April 1846. The Government of Madras brought the subject to the notice of the Court of Directors in September 1846. The Court of Directors communicated their approval in their dispatch of December 1846 and no time was lost in commencing operations. In the working season of 1848 the work was pushed on.

Major Cotton, exhausted by unremitting work and anxiety, had now to go on leave, handing over the work to the charge of Captain Orr[1], who had from the first been his most able lieutenant and to whom much of the credit of the successful completion of the works is due. Captain Orr carried on the works with great zeal inspite of great difficulties till July 1850. Soon after this, Colonel Cotton returned from leave and again assumed charge of the work.

The Godavari anicut was completed by 31 March 1852, from the report sent by Colonel Cotton in April 1852. The anicut was 4,200 yards long and cost £47,600 - not a great sum of money for a work of such magnitude even at that time. Soon after the completion of the anicut, Colonel Cotton became Chief Engineer of the Presidency and the charge of the Godavari works was assumed by his brother Major F C Cotton. Captain Orr, who had been the Chief Executive Officer in their construction, went to carry out the construction of the Krishna anicut.

Sir Arthur Cotton also played a prominent role in taking up the Krishna Delta Works. The idea of utilising the waters of the Krishna for extensive irrigation had been receiving considerable attention for some years but it was only due to the persistent efforts of Sir Arthur Cotton and the completion of the Godavari anicut, which spurred the Government to take up the construction of the anicut across the river Krishna.[2] From the foregoing, it is obvious that the driving spirit behind the Krishna delta works also was Sir Arthur Cotton, though the actual execution was left to Captain Orr, Sir Arthur Cotton's valued assistant.

Colonel Cotton went on leave in 1853 on medical advice. After his return to Madras, he did not again occupy the post of Chief Engineer, to which he would have been entitled by seniority, had not the organisation of the department of public works been altered. Colonel Cotton consequently became Commandant of Engineers without any special functions and an informal adviser to the Government on engineering subjects.

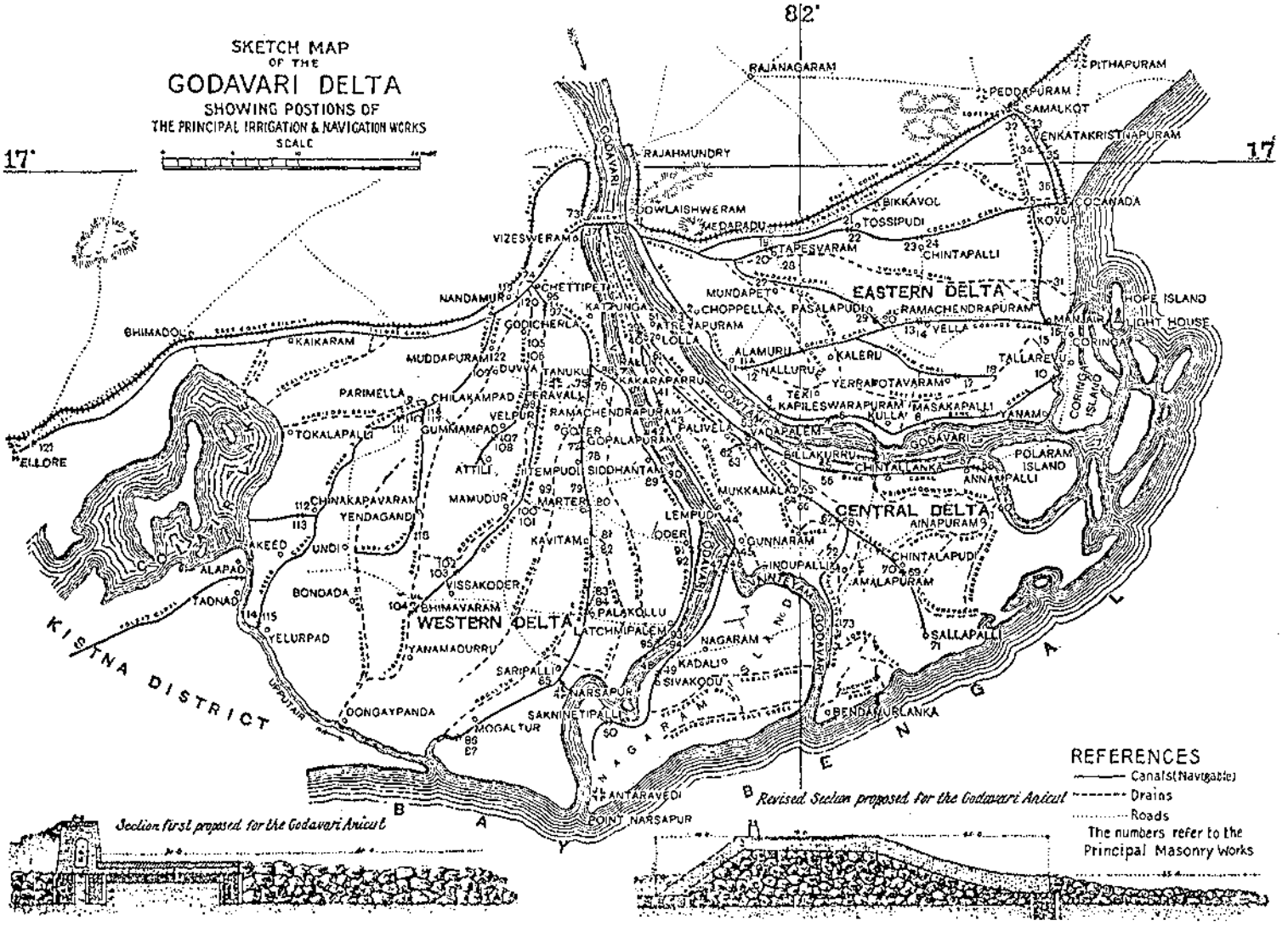
Although now Commandant of Engineers and greatly occupied with military duties, Colonel Cotton was admitted to be the chief authority on all matters connected with irrigation. He reported to the Government on the project of irrigation in the province of Orissa which had been suggested by himself and entrusted to the Madras Irrigation and Canal Company. He also visited Calcutta and gave lectures on the subject of a dam across the Ganges at Rajmahal and a canal there, for irrigation, navigation, and the supply of water to Calcutta and subsequently reported on this subject to the Government. Later on, he reported, at the request of the Irrigation and Canal Company, on the Ganges canal, with a view to a new project to be connected with it.

Sir Arthur Cotton left for England in 1860 and returned to India in 1862. He investigated the

[1] Later Major General C A Orr.

[2] Both of these schemes are of great magnitude, requiring much care and skill in their construction. Shortly described, they consist of gigantic weirs across rivers from one to four miles wide with sandy beds, rising in times of flood from 30 to 40 feet at the site of the weirs, which become submerged from 14 to 18 feet. From the weirs very large main canals, adapted for both irrigation and navigation purposes, are led, and throw off minor branches, from which, by a careful system of distributaries, water is led on to the land, while the surplus is carried off by drainage channels. From the Godavari 720,000 acres are irrigated, and navigation is carried along 500 miles of inland canal to the port of Cocanada now known as Kakinada. In an extract from the Minutes of Consultation dated 15th May, 1858, the Government of Madras, under Sir C Trevelyan, closed with the following paragraph:-

"If we have done our duty, at least to this part of India, and have founded a system which will be a source of strength and wealth and of credit to us as a nation, it is due to one master mind which, with admirable industry and perseverance in spite of every discouragement, has worked out this great result. Other able and devoted officers have caught Colonel Cotton's spirit and have rendered invaluable aid under his advice and direction, but for this creation of genius we are indebted to him alone. Colonel Cotton's name will be venerated by millions yet unknown when many who now occupy a much larger place in the public view will be forgotten; but although it concerns not him, it would be for our own sake a matter of regret if Colonel Cotton were not to receive due acknowledgements during his own lifetime".



Map 2. The Godavari Delta in the late 19th century (reproduced by courtesy of Hodder and Stoughton). This illustrates the benefits brought to the region not only from irrigation but also by the provision of navigable waterways supported by Sir Arthur Cotton as the most economical means of transport in the region.

Photo 2. The Dowlaiswaram anicut in the late 19th century (photo by courtesy of Hodder and Stoughton).

Bihar project of irrigation and navigation in the valley of the Sone river under the orders of Government, and having made a highly favourable report on the project, sent the same to the East India Canal Company, who published it. In 1862 during his visit to Orissa, he made wise comments and judicious observations to improve works in Orissa.

The only occasion on which Sir Arthur Cotton visited India after his retirement from the service was in 1863, when, at the request of the Directors of the East India Irrigation Company, he investigated the great works then in progress under the management of Sir Probyn Cautley. Sir Arthur's Report to the Directors was printed for private circulation, and a copy was placed in the hands of Sir Probyn.

The nearly forty years of arduous toil in India were matched by an almost equal period of so-called retirement to England, and the enjoyment of well-earned leisure. Sir Arthur Cotton's notions of retirement and leisure accorded with some men's ideas of a busy career. He was always occupied in furthering some beneficial project or other.

After a fruitful life of 96 years, General Sir Arthur Cotton died on 14 July 1899.

AFTERNOTE

The Sir Arthur Cotton Barrage

The new Sir Arthur Cotton barrage was completed in 1983 some 40m upstream of the original anicut completed 131 years earlier. In 1986 devastating floods in the Godavari region damaged the old anicut in a number of places. The following extract from a Hyderabad newspaper *Newstime* explains the importance of the old anicut in the new scheme and reports graphically on the urgency of the work to restore it and protect it from further damage:

"The anicut which was built between 1847 and 1852 was retained as a protectionary structure when the new barrage was built on Godavari just upstream with a view to stabilising the irrigation potential of the canal systems. The new barrage was completed in 1983 after the project was dragged on for an unreasonably long period by financial stringency. Since the old anicut was to be part and parcel of the new barrage in that it acted as a downstream protection, the cavities and

General Sir Arthur Cotton (2)

Photo 3. An undamaged stretch of the old anicut. The new Sir Arthur Cotton barrage is in the background (courtesy *Newstime*).

Photo 4. Work in progress on repairing the damaged section of the original anicut (courtesy *Newstime*).

General Sir Arthur Cotton 3,4.

hollows detected in it at several places by geophysicists after every flood in the river, had been causing great concern to the authorities. Sand grouting as a precautionary measure was being carried out from time to time.

"In spite of all the precautionary measures, the anicut breached on a massive scale during the August floods, causing a serious threat to the system that supplied water to Andhra Pradesh's most fertile stretch of land. In the wake of the mishap a Technical Advisory Committee appointed by the state Government suggested the reconstruction of not only the Dowlaiswaram arm but the other three arms of the old anicut, Ralli, Maddur and Vijjeswaram, also. The reconstruction work on the Dowlaiswaram arm was taken up on a war-footing and according to the Chief Engineer of the Godavari Delta Irrigation System, Mr P Madan Gopal, the work at this pace could be completed before the scheduled time of June 1988.

"The Chief Engineer also said since the damage caused to the old anicut could have had its effect on the new barrage also, since both are a single structure technically, electro-analogic tests were conducted on the structure by technicians from Pune to detect hollows or sand wash-outs if any. The test is internationally accepted as the most foolproof and the barrage was found in good health after thorough checking."

The Sir Arthur Cotton Museum

In October 1987 *Newstime* also reported the establishment of a Museum as follows:

"The government has decided to set up the Sir Arthur Cotton Museum-cum-model room at Dowlaiswaram and to develop the institute named after Sir Arthur Cotton, who helped to harness the waters of the Godavari and prevent them from running waste into the sea, into an engineering research centre. This fully equipped institute, a unique one in the whole country, is expected to prove a boon to all engineering students. The Godavari delta Chief Engineer, Mr P Madan Gopal, has said that the government has taken this step to accord a fitting tribute to the memory of Sir Arthur Cotton but for whose initiative and untiring efforts the Godavari waters would have been running waste leaving the two Godavari districts barren areas. The idea of the great change brought about in the place by the work of this foreign engineer could be had from the fact that till recently some of the older generation used to keep Cotton's picture in the *pooja griha* (prayer room) and add his name to the role of sacred personalities while chanting the *Gayatri Mantra* (a prayer used commonly throughout India at prayer time).

"In the museum would be displayed some of the instruments used during the construction of the anicut. Models of various prominent river projects in the state and elsewhere in the country, paintings of Godavari delta region would be on show.

"According to the engineers, Mr A V Appa Rao and Mr P Ramaraju, no effort is spared which would make the museum a centre of interest and edification to the public."

Mr Robert Cotton, a descendant of Sir Arthur, inaugurated the working model of the barrage in the Museum during a visit in November 1987.

* * * * * *

Follow The Euro NATO Sapper
Part I—Singing the Same Tune

LIEUTENANT COLONEL G D BAILEY MI PLANT E MIHT

Lieutenant Colonel Bailey was commissioned into the Corps in 1956 and started regimental duty with 38 Engineer Regiment on Christmas Island. After a tour at the Army Apprentices College, Chepstow he was seconded to the Malaysian Engineers. He has since served with 21 Engineer Regiment and 32 Armoured Engineer Regiment and commanded 33 Field Squadron when it was at Longmoor. Staff appointments have included a UK District Headquarters, AG 7 and HQ BAOR. More recently he has been a DS at the Nigerian Armed Forces Staff College, an engineer staff officer at HQ AFCENT, and British Liaison Officer to the German Army Engineers and Deputy Director of the Euro NATO Training Engineer Centre in Munich

THIS is the first of three articles which attempt to give some personal thoughts on combat engineering in NATO, with particular reference to the Central European theatre. A theatre in which the Corps plays its full role alongside engineers of several other nations, and where the diversity of equipments and procedures presents a challenge to all who become involved in joint operations.

Most officers in the Corps have their daily lives filled up with matters concerning our own Army whether they be on the staff of a headquarters or with a unit. A few, like myself, have been drawn away from this familiar hothouse environment to the rarified atmosphere of NATO. The NATO structure embraces a multitude of individual, but interrelated bodies and organisations, which all have one thing in common. They provide a totally different environment for all those who are fortunate enough to serve there. I say fortunate, because if nothing else it provides one with a new perspective of one's own forces and way of doing things, and teaches one to appreciate the strengths and weaknesses of our allies.

Whatever these might be we cannot do without each other. While this is widely understood there is much dismay that after more than thirty years the member nations provide such a hotch potch of forces in their efforts to deter potential aggression. Soon after arriving in my new NATO appointment and finding it all totally nebulous, I happened to express my gloom at the prospect of three years working in an organisation which had the consistency of toffee. I was sharply told that it was the only alliance we had got and I would have to get on with it. So get on with it I did, and three years later I had far more faith in the organisation coupled with a determination to help to try and make it work better—no matter how naive a notion this might be. I was either brainwashed or enlightened but probably both. I have coined the phrase EURO—NATO Sapper to describe those who have undergone a similar process albeit perhaps to a lesser degree.

What follows are some personal thoughts and ideas on how the combat engineers currently stand and how we might get better as allies. After all, the great dawning is upon us and indeed has been for some years, that as more and more restrictions on manpower and the purchase of new equipment

Lieutenant Colonel G D Bailey
Follow the Euro Nato Sapper

NATO CHAIN OF COMMAND

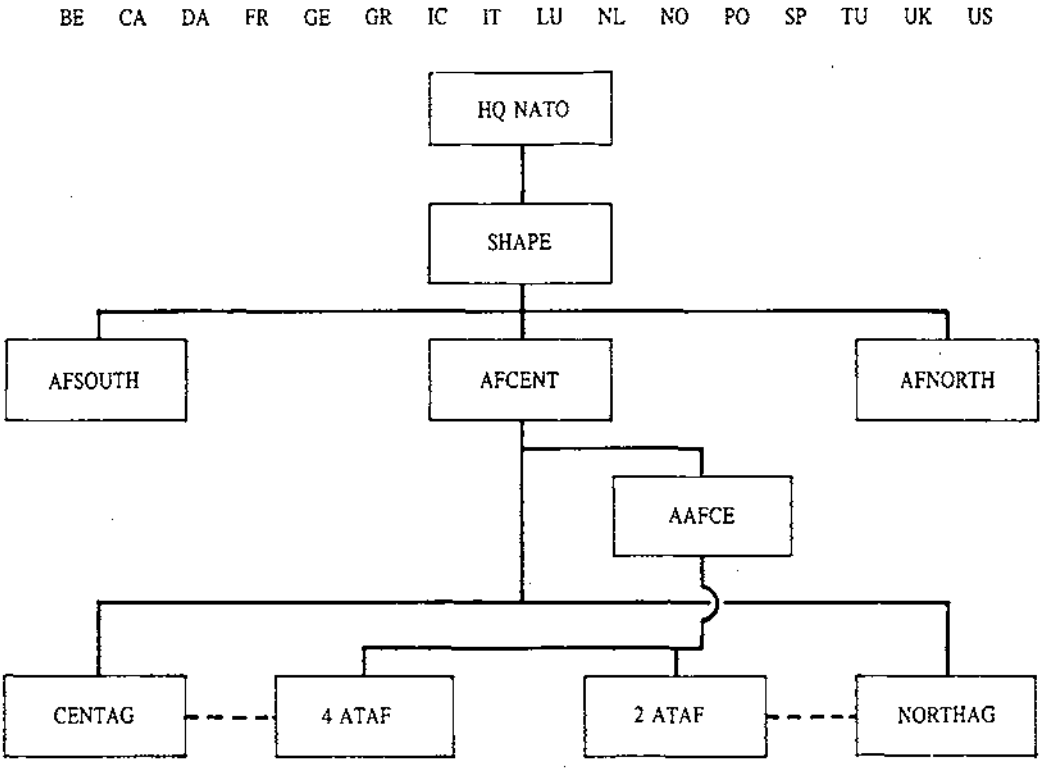


Figure 1. One can see that it is comparatively neat, but once at Corps level, and also taking into account the German territorial Commands, the picture is much more complex, particularly in peace when national interests predominate (see *Figure 2*).

take effect, the more important it is to explore avenues for more unity with our allies.

I will begin with a simple reminder of the NATO organs of command as they affect the Central Region.

The engineer command can be summarised as follows. Each Corps has a national Chief Engineer normally in the rank of colonel, so do each of the two German Territorial Commands which equate to Corps.

Chief Engineers NORTHAG and CENTAG are both German full colonels with each nation in the army group represented on their staffs. At AFCENT there is a small engineer cell in Operations Division as part of Land Operations. There is a larger group of infrastructure engineers in Logistics Division. Combat engineers are not represented at SHAPE and when necessary the AFCENT engineers take on this function. No combat or combat support arms are represented at AFCENT, NORTHAG or CENTAG, other than engineers. So the importance of engineer operations and their careful coordination at the highest possible level has been accepted for some time.

Nevertheless, the engineer staffs at AFCENT and Army Group can be frustrated in peacetime in their coordination efforts by the fact that each Corps Chief Engineer has to answer to the Corps Commander who in turn is answerable through his national chain of command to those who provide him with the men and material to fight the Corps

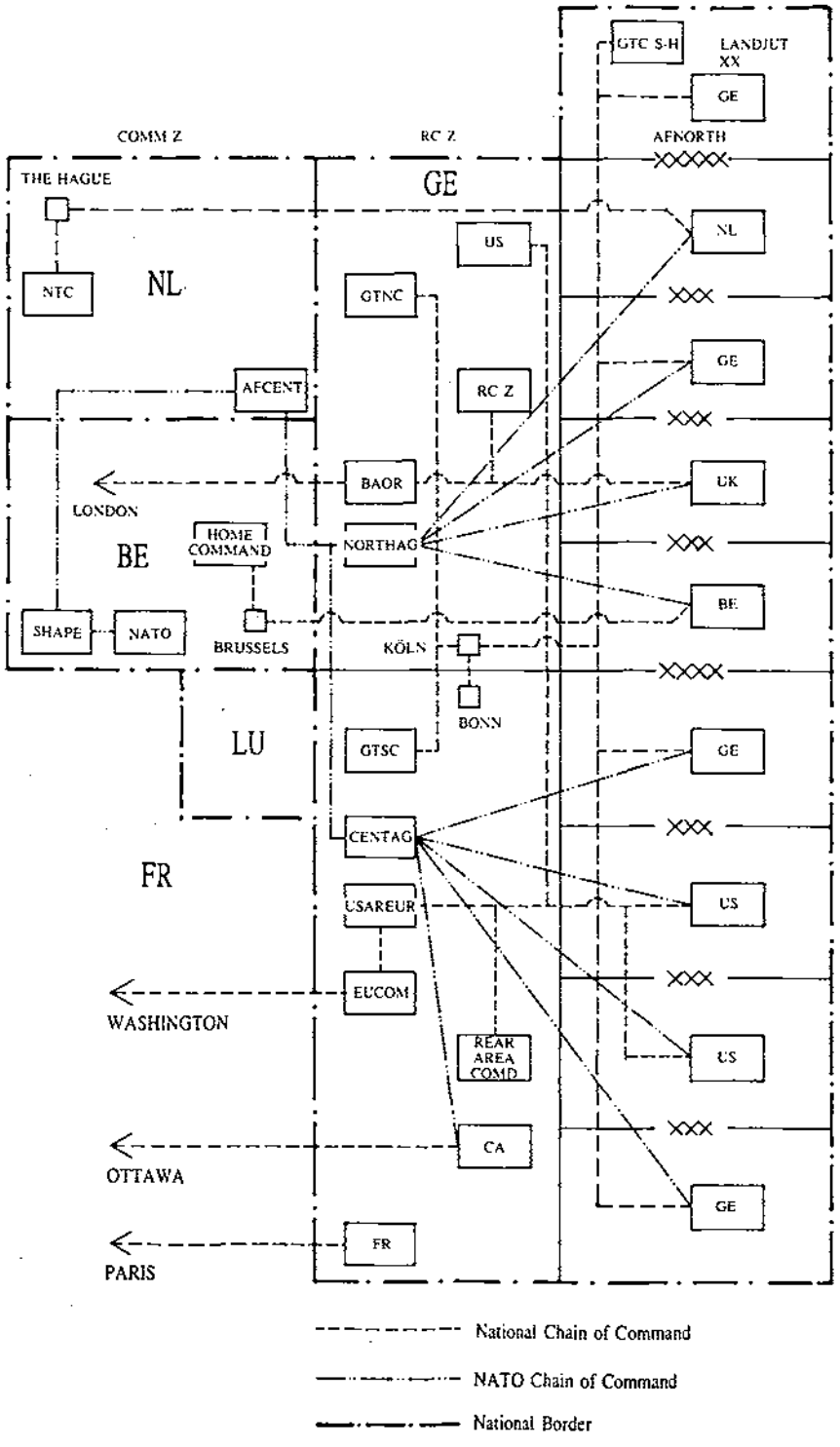


Figure 2. Central Region Land Forces Chain of Command.

battle. This is a fact of life and an expression of the much cherished national sovereignty that individual nations continue to maintain within the alliance. Nevertheless, it does result in a different outlook between those engineers who work on NATO staffs and those who belong to national staffs. To take the point further, most of the time a Corps engineer staff has only to contend with its own national formation organisation and equipment, whereas a NATO engineer staff deals with several of these. In some respects the differences are very great.

Coupled to this are a variety of engineer doctrines covering every phase of war, plus different levels of training governed largely by the degrees of conscription present or other motivating factors; a seemingly chaotic picture which has been recognised by some for many years. A brilliantly far sighted Chief Engineer NORTHAG for instance set up Exercise *MAKEFAST* thirty-five years ago in order to provide a forum to make this diversity more interoperable. In spite of this foresight however he could be justifiably depressed at the situation thirty-five years on.

He was not alone however and succeeding Chief Engineers and formation commanders of all nations have seen the need to overcome the fractured nature of the Central Region forces and try to get themselves out of the tunnel vision whereby they would stand at the Channel ports and see only their own ill-defined target up near the Inner German Border, believing what goes on to the left or right to be no business of theirs. There has indeed been considerable success in this, in some respects.

MAKEFAST itself is considered popular, worthwhile and a great deal of fun. It is also an immense amount of work for those who lay it on, and it is just as well it only comes round once every four years for those who do (five if III (US) Corps could find a means of taking its turn).

Like most study periods however, a lot of good things are said, but few firm conclusions are drawn and there is little to follow up. Problems are examined, probably not for the first time, everyone has a better understanding of each others way of doing things, but it is doubtful if we are that much more interoperable as a result.

CENTAG do not have the equivalent of *MAKEFAST*, but they do have an equally good exercise called *CETEX/GENEX*. This is at troop and section command level whereby young officers and NCOs from the four CENTAG Corps, 4 Canadian Mechanised Brigade Group and 1 (FR) Army get together for a week and run short courses on each others' mines and explosives. The social side is not neglected either and many ideas are put forward and friendships made over a beer. This exercise really gets down to interoperability, and ideas have actually been taken up by the CENTAG engineers and found their way into NATO and national channels.

CETEX spawned the embryo Euro NATO Training Engineer Courses (ENTEC). This again was a brilliant idea whereby the Chief Engineer CENTAG and the Chief Engineer USAREUR through the good offices of the Euro NATO Training Group, an inter-national military committee that furthers commonality of training methods, set up the courses in the German Army Engineer School in Munich which will be described in the next article.

General Blanchard, a former COMCENTAG, was instrumental in the setting up of ENTEC, and gave it the motto "Interoperability is a Question of Attitude". The NATO Glossary of Terms describes interoperability as:

"The ability of systems, units or forces to provide services to and accept services from other systems, units or forces and to use the services so exchanged to enable them to operate effectively together."

This just about describes most people's understanding of the word and is therefore difficult to improve on, but a certain attitude of mind is undoubtedly needed to carry it through.

Another interface for Central Region engineers takes place at AFCENT each year. A two-day conference is held in Brunssum for senior engineer commanders and staff officers. This conference has grown in stature over the years and has established itself as a focal point on Central Region Combat Engineer matters. To back the conference, a small steering committee was set up in 1981 to discuss combat engineer matters on a region wide basis, areas of difficulty and to allocate priorities to initiate ways of improving them. Its most ambitious task so far was to set up an inter-national working group to establish guidelines for the crossing of water obstacles; ambitious, not just because it is a complex operation involving all arms and services but also because nations have been trying for many years to get some agreement on this most difficult and complex operation of

war. This guidance was published in 1986 and a NATO Standardisation Agreement (STANAG) will most likely follow in its wake.

The opportunities for progress in the interoperability field are still manifold for engineers although it is frequently said that we are way ahead of anybody else. I am sure we are in many respects, but with the amount of effort that has gone into it over the years it would seem we have a bigger problem than anybody else. The impact on national attitudes is not very great, and it seems that all the good intentions by those who have contributed have fallen short of their goal. It seems the task is so great that it is beyond one's grasp. There is so much to learn about the others that it would be at the expense of training on one's own equipment and procedures, if one gave it the full effort required.

For interoperability to succeed, the level of standardisation has to be raised. The gaps have to be narrowed in the way engineers carry out their business so that they can become a more cohesive and effective combat support arm throughout the theatre. Full standardisation is beyond reach, is not essential, and in some ways is undesirable, but there are many ways in which more standardisation could reduce the present interoperability needs. Indeed, there are two types of standardisation that can be achieved, one in the field of equipment and munitions and the other by having standard procedures. I will leave equipment until later and discuss only the way procedures can be standardised at this stage. Below Corps level, Standard Operating Procedures (SOPs) suffice and are relatively easy to produce, but once into the NATO command it is more difficult. Army Group headquarters can influence procedures by issuing their own SOPs in their efforts to add to the cohesiveness of their forces, and so can AFCENT. SHAPE exerts little influence on engineers but HQ NATO can through STANAGs.

NATO's Military Agency for Standardisation (MAS) produces STANAGs. It consists of a number of standing working parties of which the Combat Engineer Working Party (CEWP) is one. Belgium, Canada, Denmark, France, Germany, Italy, Holland, Norway, Portugal, Spain, United Kingdom, the United States and SHAPE are permanent members. As SHAPE is represented by AFCENT with NORTHAG and CENTAG as observers, plus ENTEC which has also gained a place, the weight of Central Region opinion on combat engineer affairs in NATO has become considerable. It is a slow bureaucratic process, but it is the only way of getting all nations to agree to anything in the field of military procedures. CEWP has taken on a new lease of life in the last four years or so, having produced two more agreements from scratch and launched four more which are now in process, including a most ambitious project of producing a manual of engineer doctrine, on which the UK (RSME) is leading.

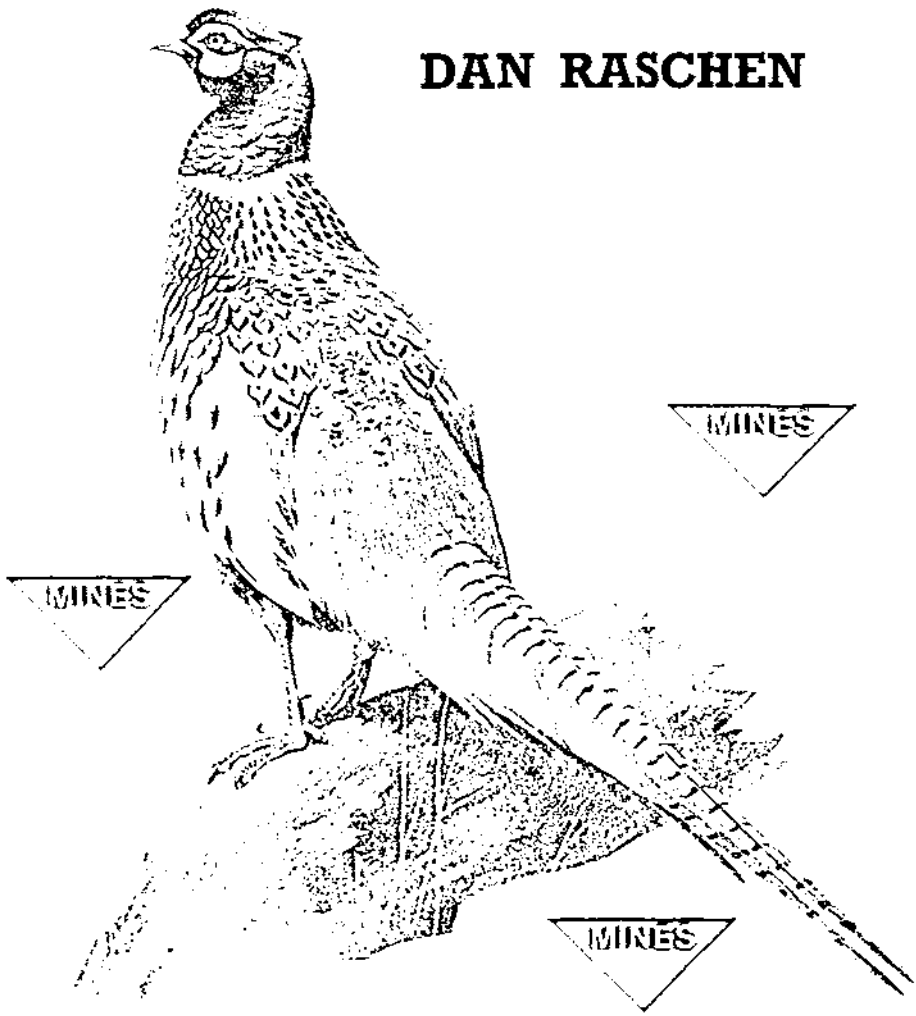
STANAGs are rarely seen outside MODs but their contents are transcribed into national field manuals as doctrine. However, it is the length of time to produce an agreement or even change an existing one that makes MAS a subject for great cynicism. Added to that is the time taken to amend national manuals. COs can rewrite their SOPs many times over in the time it takes to effect a small amendment to a STANAG. Nevertheless, they are authoritative and nations which have agreed to them are obliged to ensure their troops abide by them, for this reason alone they are invaluable.

There is a feeling among some field commanders that the more STANAGs there are the less freedom of action they will have. To some extent this is true, so one must be very careful in selecting subjects for standardisation. They must be seen by all as a true aid to the commander in the field. Such aids to an allied commander enable him to carry out operations across Corps boundaries, with every one "playing from the same sheet of music". What has to be overcome in the first instance is the attitude of disenchantment generated by the process of negotiating taking so long, but NATO needs its SOPs just as any other level of command.

AFCENT produces directives where no STANAG exists in order to coordinate activities in the Central Region. A small number have been developed by engineers. These are incorporated in Army Group SOPs and so on down the line. This is an important point, because just as STANAGs and their accompanying publications are meant to be incorporated in field manuals, the process of incorporation should apply to directives or SOPs also to avoid Corps being inundated with literature. It is important too that the engineer schools are kept up to date on NATO and Central Region matters and teach courses accordingly,

SEND PORT & PYJAMAS!

DAN RASCHEN



SEND PORT AND PYJAMAS!

by Dan Raschen

"Send Port and Pyjamas!" was Dan's message when he was briefly detained in a "MASH" in the Korean war. The bottle arrived, but without a corkscrew! As a young officer in the Royal Engineers, he had volunteered for Korea in the hope of pheasant shooting. If that reason was unusual, so is this an unusual war book.

Upon joining the intelligence staff of the 1st Commonwealth Division, Dan appreciated that his duties could be made to coincide with pheasant shooting. Thousands of anti-personnel mines had been laid to deter the Chinese, but were proving a menace to our own troops. Dan checked the minefields whilst carrying a shotgun, pheasants were plentiful, and senior officers requested his services as a shooting guide.

The author was in Korea for half of the three-year war. His light-hearted account of his experiences makes an interesting and wide-ranging contribution to the history of the time.

Following Wellington and Peterhouse, Cambridge, Dan's early service was with the Indian Army at the end of the Japanese War, as is recorded in **"Wrong Again Dan!"** (Buckland Publications, 232 pages, hardback, £8.50). Despite the disasters he initiated, wide acclaim of the book included "a masterpiece" (Stephen Pile, *The Sunday Times*) and "hilarious" (Geoffrey Armitage, *The Field*). Both Dan's books are highly suitable for a plane trip, the bedside, or to give as a present.

Dan left the Army, after 33 years, as a Colonel at the Royal Military College of Science at Shrivenham in Oxfordshire, where he continues to work as a scientific civil servant. He and his wife live in the village and have two sons.

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adhering strictly to STANAGs, AFCENT Directives or Army Group SOPs.

So far I have discussed primarily the Forward Combat Zone of the Central Region, but what of the Rear Combat Zone(RCZ) and Communication Zone(CommZ)? Firstly one must be careful if one refers to these as "the rear areas". In the eyes of NATO, but more importantly of our Host Nation, Germany, the term "rear areas" covers Corps rear areas and even further forward. So I restrict these next remarks to the RCZ and CommZ.

Here the responsibilities of the Host Nations predominate. Their support to the allies is defined in many bi-lateral agreements concluded within the overall scope of agreements with SACEUR. Nevertheless, engineers with missions in this part of the theatre have many anxieties. For one thing they are mostly reservists and have less chance to carry out national training, quite apart from training with their allies. What is more there are very large numbers of them, particularly German and US units. Our own TA sappers are well aware of this, and in fact have an excellent liaison with their German and US counterparts. Enormous strides have been made in recent years by the engineer staff at HQ BAOR to foster this process, and with the Dutch and Belgian engineers too.

However, unlike the FCZ, where there is a clearly defined chain of command, the RCZ and CommZ has no equivalent command structure. So in this vital region which contains our supply arteries, airfields, depots and so on, coordination of engineer effort is less easy to execute. The large array of engineer forces, whose job it is to minimise the effects of damage due to hostile action, has probably more interoperability problems than their comrades further forward. Nowhere is the need for well coordinated engineer resources of manpower, equipment and machines more important, so the scope for progress in this region is even greater than in the FCZ.

Before summing up it is worth saying that a new attitude to NATO has been developing over the last two or three years among the British Land Force commanders as a whole. At all levels one hears it being said with great conviction that joint operations must be feasible in every way, but regretably the matter is not so simple, for politics and economics win the day. However, if the Land Forces want to be able to fight together efficiently, they must first of all want to train together efficiently, and this means taking every opportunity at every level. There is no reason why the sappers should not continue to take the lead in this.

I have spoken of interoperability and standardisation, two inescapable features in an alliance so inherently diverse as NATO. Both factors can only be developed if all those who have any contact with allied engineers play their part. These contacts cover the complete network of engineer activities in the Central Region, and indeed, the Northern Region too. Italy, Greece, Portugal, Spain and Turkey are rather more remote. The opportunities to progress are still enormous. The greatest problem is how to tackle the lack of standardisation of equipment and this will be discussed later.

Progress on standardisation procedures is easier and is continuing, albeit slowly. It slightly lacks coordination here and there, and the dreadfully long time factors involved partly due to bureaucracy and partly due to lengthy consultation procedures must be accepted, NATO is simply that big and complex an alliance.

Interoperability has certainly taken a hold in the field of mines and explosives, and could be expanded elsewhere. ENTEC is the focal point of this training and has been a most successful innovation. Finally and most importantly, interoperability is not just a question of attending *MAKEFAST, CETEX* or a nice course in Munich. It has to go on everywhere, at every opportunity, and good ideas must be followed through to their final conclusion. It all boils down to a question of attitude, and the Euro NATO Sapper invariably has that attitude.

(Part II of this article deals with ENTEC and will be published in the August 1988 issue)

Pakistan Revisited

COLONEL W G A LAWRIE MA C ENG FICE FIL FRSA

After the RMA Woolwich the author was commissioned into the Corps in 1934. Following Chatham and Cambridge he was posted to India and spent the next fifteen years with the Bengal Sappers and Miners, including Waziristan Operations, the Middle East, the Staff College and Military Adviser to the Indian States Forces. He commanded 4 Training Regiment in Aldershot and was later Defence Attaché in Jordan and Ghana before retiring in 1966.

"A fair land, a most beautiful land is this of Hind—and the Land of the Five Rivers is fairer than all." *Rudyard Kipling*

I HAD not been in Pakistan for forty years and was delighted to have the chance to go there again last year. The occasion was the Centenary of the Guides church in Mardan, where a member of my family had been killed in 1856. The church is still in use and well maintained and the Guides are very proud of it. The West window is in memory of Quintin, Wigram and Fred Battye, three of the Fighting Ten, forebears of the late Major General Stuart Battye. The service was attended by the Governor of the NWFP and eight retired Pakistani generals, all wearing the red and yellow tie of the Guides. The sermon was given by the Bishop of Peshawar in Urdu and afterwards there was a buffet lunch for about 200 guests with the Regimental band of the Punjab Regimental Centre playing on the lawn. I had with me *Canals and Campaigns* by Major General Sir George Scott Moncrieff [1] whose first posting in 1877 had been to build the Upper Swat Canal, and it was interesting to drive back to Peshawar along the bank of this very canal and to see how he had overcome various problems, such as water courses running beneath the canal. Back in Peshawar I looked through the Visitors' Book at the Peshawar Club to see the signatures of every RE officer who had been there in the last fifty years.

In August 1947 I had been Brigade Major of one of the infantry brigades in the Punjab Boundary Force attempting to keep order in the chaos resulting from the Partition of India. We tried to protect the long columns of dejected Muslim refugees from India making their way to the Promised Land of Pakistan a few miles along the road to Lahore. From my point of view the future of Pakistan looked anything but rosy. It seemed that they had come off worst in the division of assets. Kashmir's accession to India posed enormous problems and East Pakistan was another headache. However in spite of the terrible and unnecessary slaughter of innocent people I am now convinced that it has all been for the best. A firm and farsighted government policy has welded the diverse races of Pakistan into a homogeneous nation with one religion and an intense feeling of patriotism. It was an exhilarating experience to visit a country filled with a sense of purpose and bursting with pulsating activity.

They are worried but undaunted by the machinations of world politics which have taken

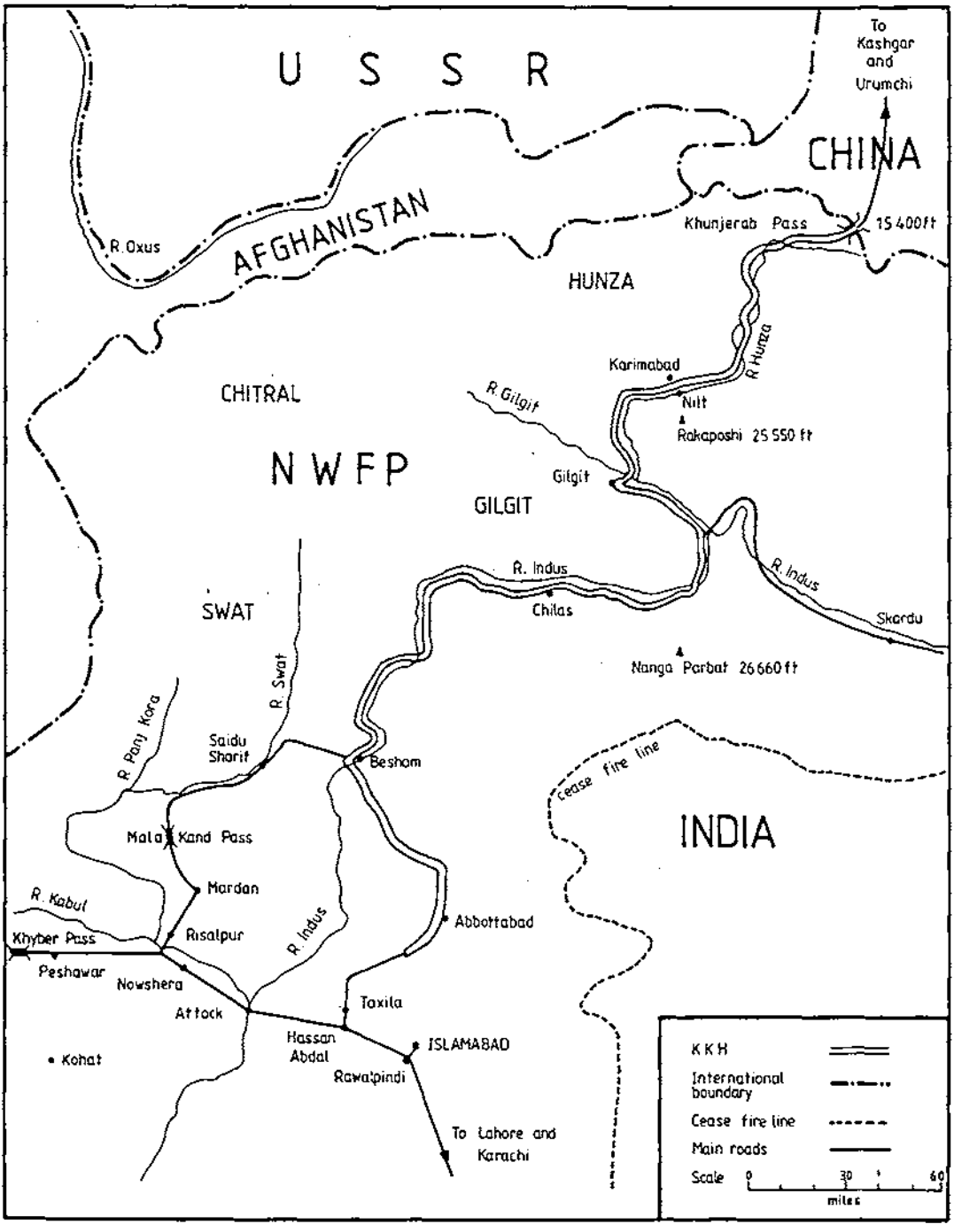
[1] Reviewed in the September 1987 *RE Journal*.

Colonel W G A Lawrie
Pakistan Revisted

Photo 1. The Guides Church, Mardan.

place in recent years, placing Pakistan in an extremely delicate position, sandwiched between Afghanistan, struggling to avoid being swallowed up by Russia, and India whose military strength is backed by Russian equipment. However because of her situation Pakistan is being given aid on a colossal scale by countries and organisations who disapprove of Russian involvement in Afghanistan. This would never have come about if Pakistan had still been part of our old Indian Empire.

Pakistan now has about five million refugees from Afghanistan and long convoys arrive every day from Kabul. I drove up to the Khyber Pass but was stopped by troops from going any further. The refugees are welcomed with open arms, given rations and pocket money, and allotted a piece of land for every group of five thousand. Pakistan supplies materials for them to build themselves a village. They start by putting up an eight foot wall with no windows but watch towers at each corner and one large gate. Five villages constitute an Area, which has schools, a mosque, a hospital and a shopping precinct. Many European countries have taken whole Areas under their wing, providing doctors and other administrative personnel, so that many refugees are better looked after than they were at home, and in fact better than many Pakistanis. Many of them have been in Pakistan for five or six years. They have intermarried with Pakistani Pathans and have been encouraged to start up their own businesses. Many have managed to bring money with them and I saw them in the Peshawar bazars, carrying Russian sub-machine guns over their shoulders, loading up tongas not only with charpoys and cooking pots but also luxuries such as electric fans and thermos flasks. Some I spoke to were happy and relaxed but showed me their scars from shrapnel wounds. Pakistan hopes that they will eventually go back



Rough Sketch of Karakoram Highway

Photo 2. Pakistani truck on the Karakoram highway with "We trust in Allah" over the cab.

home, but it may not be easy to persuade them to leave their safe and comfortable life there.

In addition to these refugees Pakistan has also accepted four million people from Bangladesh, who were not happy there, and many thousands of families from Iran who did not want their sons to be conscripted for the Iraqi war. Pakistan had always been regarded as the granary of the sub-continent but with all these extra mouths, food is going to be a problem. At Partition the population was 35 million; now it is 97 million and the latest demographic forecast estimates that it will reach 200 million by the year 2020. This problem is being tackled by the UN. The British-designed canals which have done so much to make the Punjab even more fertile have been leaking steadily. This has raised the water table to such an extent that twenty per cent of arable land has been destroyed by salinisation. Various solutions are being tried such as sinking boreholes to pump the water out. New dams have been built, but these are already silting up owing to the erosion of hillsides by goats. The UN are planting millions of trees to stop erosion, and many new dams are projected and actually marked out. The UN are also financing farm-to-market roads, and building a network of roads, in Waziristan for instance, providing labour for the Pathans and pushing on with the Forward Policy of the British.

Besides getting billions of dollars worth of military aid from America, Pakistan is being greatly assisted by China. The Chinese have not only supplied heavy equipment for the Army, but also road-making machinery and complete heavy rebuild workshops to maintain and repair these items. I also noticed other Chinese factories for chemical fertilisers and light manufactured goods. I spoke to members of a Chinese delegation who told me that they now look on Karachi as the closest port for the export of the output from western China. Chinese engineers helped with the building of the new Karakoram Highway which runs from near Abbottabad right up to the Chinese frontier. It took the Pakistan Engineers twenty years to hack and blast a 500 mile road through some of the toughest country in the world, a fantastic achievement which cost over 400 lives from accidents and rock falls.

I was determined to see this road and drove up from Peshawar over the grim, treeless Malakand Pass, the scene of General Sir Bindon Blood's campaign of 1897. A sangar near the top is clearly marked Churchill Picquet. This is where young Winston who was attached to the force as a newspaper correspondent got involved in hand to hand fighting with the Pathan rebels, which he seems to have enjoyed as he had been public schools champion with the épée. Coming down

Photo 3. A polo match in Gilgit.

the Pass the next obstacle is the river Panjkora and Bindon Blood is full of praise for the crossing under the orders of Major Fenton Aylmer, RE. A few years earlier Aylmer had won the VC in Hunza when he had blown in the gates of the fortress of Nilt. The fuze had gone out and he had dashed forward under intense fire to relight it. He later became General Sir Fenton Aylmer [2].

I drove on through the delightful valley of Swat and had tea with the *Wali* in his attractive Palace where the Queen has stayed, and on to watch a polo match in Gilgit. This is a ferocious six-a-side game with no chukkers, played on a rough stony ground with considerable skill. Further up I came to Hunza, which must be the original Shangri La, and saw the gun presented to the *Mir* of Hunza by Lord Kitchener in 1904 after a month-long trek through the mountains from Srinagar.

The Karakoram Highway follows roughly the line of the 2000 year-old Silk Route along which not only silk but also jade, tea and procelain were imported into India in exchange for gold, jewels, ivory and spices. Now there is a two-way traffic of heavy lorries probably carrying much the same sort of goods. Lord Curzon called the Indus valley Nature's Workshop and the highway has been literally blasted through the debris, using 8000 tons of explosives and 80,000 tons of cement. Most of the bridges were built by Chinese engineers but I saw one Bailey suspension bridge and two other Baileys built by the Sappers. All this dynamite has so shaken the mountains that huge boulders keep rolling down and the Sappers have to maintain dumps at intervals along the road with stocks of bulldozers and bridging materials near helicopter pads in case the highway is impassable. In one place near the Chinese frontier the road is cut right through a moving glacier and has to be cleared every year. In another it runs across a wide river bed and has to be rebuilt each year after the spate has washed it away while the river changes its course.

The highway runs under the huge bulk of Nanga Parbat which has claimed the lives of over 30 climbers, some of whom are buried in the British cemetery in Gilgit, and then past the shimmering pinnacle of Rakaposhi. The official guide book still quotes Lieutenant G C Clark RE as reporting in 1930 that the name means 'necklace of clouds'.

In this part of the world distances are huge. It is still another 3000Km from the Khunjerab Pass to Urumchi and the Chinese have 20,000 coolies working on this stretch to bring it up to the standard of the Karakoram Highway. But even that

[2]His medals can be seen in the RE Museum.

Photo 4. The Commandant's office, Pakistan Engineer Centre.

is nothing much. I saw a milestone reading 'Pekin 5425Km'. Inside Pakistan they are building a new super highway—1733Km from Peshawar to Karachi, which is due for completion in five years. This now runs along the old Grand Trunk Road as far as Lahore, which is a very different affair from the romantic but sleepy road I remember fifty years ago with a few pedestrians walking along in the shade of the trees and creaking bullock carts down the middle.

Pakistan's Islamic connections have been most valuable. Saudi Arabia has provided vast sums by way of aid, mostly as far as I could see towards the restoration of old mosques and the construction of new ones. The new mosque in Islamabad is quite spectular—built of white marble in the shape of a tent. It has no central support but can take 10,000 worshippers. In the North the people are mainly Ismailis—followers of the Aga Khan, who visits them frequently to check on the effects of the Aga Khan Rural Support Programme, which provides hospitals, schools and agricultural research stations. But Pakistan's own GDP grew over 7% last year, the highest figure in Asia. Apart from exports of foodstuffs and textiles, most of which go to the Gulf States, Pakistan has many new light industries making consumer durables such as electric fans and washing machines which I saw at an industrial fair in Islamabad.

What I found very satisfactory was to be assured on all sides that Pakistan fully appreciates all the British did for their country in the hundred years that we ruled it, particularly the irrigation canals, railways and education systems. The army went out of their way to be friendly, especially the Pakistan Engineers. Although the officers I met had not even been born in 1947, they were very conscious of the debt they owed to RE officers in the past and particularly to the few who remained on in Pakistan after Partition. I was invited to spend a day at the Engineer Centre at Risalpur. Security went by the board and I was treated like one of themselves. I could go where I wanted, talk to anyone I liked and take as many photographs as I wished. They really wanted to show me what they had achieved, which was a great deal.

I was welcomed into the Commandant's office which was air-conditioned with thick carpets and soft lighting—far more glamorous than what we had in Roorkee. The sappers were as smart and alert as ever, from exactly the same villages and tribes as in our day, but better educated. They do not recruit from the Muslims who came from India in 1947. The Centre is beautifully laid out with lots of lawns, trees and flowers. I was taken to the Workshops and inspected it shop by shop. As I had once been Chief Instructor, Workshops in Roorkee, I knew what to look for and saw at once

that standards of workmanship had fallen off since the days of their grandfathers. I am sure that this is due to the lack of detailed supervision by the RE NCOs we had in Roorkee. In October 1947 when the Mohammedan troops were split off from the Bengal Sappers and Miners in Roorkee and sent off to Pakistan I was actually Acting Commandant and responsible for seeing that the assets of the Corps were fairly divided. We sent off half the workshops machinery to Pakistan, including some items which were out of action due to the non-availability of spares during the War. I came across these very same machines in Risalpur, still out of action. As they all came from this country I said I would try to see if any spare parts can be found.

The Military College of Engineering is conveniently on the same campus. That seemed to be going strong and is now running post-graduate courses with the help of civilian professors. They accept officers for training on various courses from some fifteen other countries in the Middle East and Africa, all the instruction being in English. It was remarkable that although none of the officers I met had ever been to England, they all spoke perfect English, learnt in mission schools. I could not help thinking how nice it would be if some sort of exchange postings could be arranged to keep the link going between Chatham and Risalpur. Another thing I noticed in the MCE was the library which had come from the Superintendent of Instruction's office in Roorkee. It is really of no interest to Pakistan, being mostly biographies of long dead RE officers and accounts of old campaigns. It should by rights be in the Corps Library and I would like to get it swapped for some modern technical books which are urgently needed in Risalpur.

I saw the new Anwar Auditorium which had recently been opened by retired Major General Mohd Anwar Khan whom I remembered as a second lieutenant in Roorkee long ago. This is a most impressive building which can take 500 officers for a lecture or presentation and has a VIP lounge, conference room and facilities for refreshments. They are also about to start on a new Mess which can seat 450 officers which they need when they have three YO courses in residence at one time. I saw all the familiar pieces of silver which had come from Roorkee plus some very fine new pieces which had been presented by officers taking part in the three 'wars' against India in 1947, 1965 and 1971, which both sides bitterly regret and hope will never happen again. I was able to help them in identifying a large painting of the crossing of the Tigris in 1917—an action in which the Sappers and Miners had played a major part.

I will long remember that wonderful day with the Pakistan Sappers. The only sad thing was that I did not meet any of the men who served under me in the past. They were all either dead or too old to come and see me. But I did meet two splendid old men—the chowkidar at the Peshawar Club who had started there as a ball boy in 1928, and the tennis marker at the Nowshera Club, old Adam Gul, who had been marker there since 1919 and still plays tennis and squash every day.

Religion plays a big part in the life of the nation. Every street corner in the bazars has a poster saying 'remember to say your prayers regularly' and even in the Sapper workshops is a large sign reading 'Pray to Allah to guide your hand straight'. I listened to an impressive speech by President Zia addressing a joint session of both Houses of Parliament. After a long prayer by a mullah, the President began by saying "as it is Easter Sunday, I would like to wish a Happy Easter to all our Christian brothers" and everyone banged their desks. Perhaps this is a prelude to Pakistan's application to be readmitted to the Commonwealth, which may be raised at the next Commonwealth Conference. The President went on to talk about the current Five-Point Development Programme which aims within five years to complete the electrification of every village, to provide pure water for everybody (at present 80% of the water supply is contaminated), to achieve a 90% literacy rate throughout the country, to provide adequate accommodation for the poor and to find good jobs for the many young men with degrees. Judging by what I have seen I expect they will succeed in carrying out this programme.

It is a historical fact that during the British time in India we fought fierce campaigns against the Bengalis, Marathas, Gurkhas, Sikhs and Pathans, but the Punjabi Mussulmans have always been our staunch friends and allies. I hope that this relationship may long continue and flourish.

1 Construction Engineering Unit

MAJOR S J PEARCE BSc (ENG) MICE C ENG RE

The author was commissioned into the Corps in 1973. After a tour as a troop commander with 31 Armoured Engineer Squadron in BAOR and NI he took a civil engineering degree at Shrivenham. From 1978 to 1980 he was a troop commander with 53 Field Squdron (Construction). During this tour he commanded a ceasefire rendezvous point in Southern Rhodesia (now Zimbabwe) on Operation AGILA *and took part in Exercise* WATERLEAP 80 *in Gagetown, Canada. A tour as Second-in-Command 44 Field Support Squadron in BAOR followed. In 1982 he attended the Long Civil Engineering Course and was attached to the John Holland Group in Australia. After a year as Second-in-Command 527 Specialist Team he commenced his current tour as the first British Exchange Officer to serve with 1 Construction Engineering Unit in Canada. He has been selected to command 6 Field Support Squadron in 1988.*

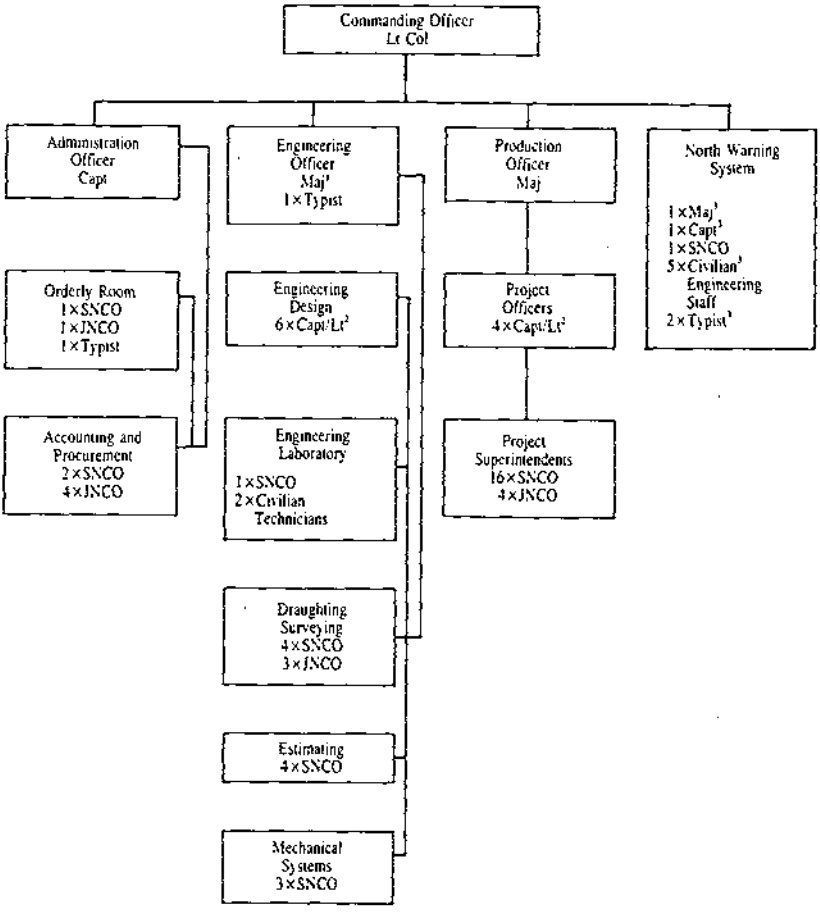
WINNIPEG, a city located in the heart of the Canadian Prairies, is land alongside which the Fens of Ely would look positively mountainous. In the summer the temperature occasionally exceeds a warm +38°C, but in the winter it can drop to a bone chilling -40°C which, combined with frequent high winds, result in conditions as severe as those encountered in the high Arctic. Yet it is home for 600,000 people including a unique organization within the Canadian Military Engineers (CME), 1 Construction Engineering Unit (1 CEU).

The CME, like the Royal Engineers prior to 1959, are responsible for the development and maintenance of the Canadian Forces (CF) infrastructure worldwide. To achieve this a large Construction Engineering (CE) Works organization has been established. This organization operates in a similar fashion to our PSA, completing both regular maintenance and new construction. Each CF base has a CE section commanded by a Military Engineer (normally a major) with a small military staff, mainly in supervisory positions and civilian tradesmen. Whilst the CE section completes a fair proportion of the work itself, it also arranges contracts with civilian organizations to complete the balance or, if the task is suitable, requests 1 CEU's assistance.

1 CEU is an independent unit controlled directly by National Defence Headquarters. The unit is a direct descendant of the Royal Canadian Air Force Construction and Maintenance Units which came into being during World War II and remained in existence, while changing their role and organization to satisfy changing requirements until the present unit evolved, twenty-five years ago. The unit is commanded by a Lieutenant-Colonel and is established for fourteen officers, thirty-two SNCOs, twelve ORs and four civilians. The officers hold degrees in the various engineering disciplines and about 50% have completed post graduate studies resulting in MScs or equivalent. The SNCOs are mostly the equivalent of RE Clerks of Works, however their general level of construction experience is much higher, though few have any combat engineering experience. The ORs are predominantly artisan tradesmen. In addition, there are two civilian construction materials technicians and two typists. An organization chart is at *Figure 1*.

1 CEU's role is officially defined as: "to provide a quick response capability to perform construction and/or maintenance supervision and engineering assistance, as and where required, and to provide the organizational nucleus for a mobile works force". As this definition indicates, the role involves two main areas of concern: engineering

Major S J Pearce
1 Construction Engineering Unit



[1]Currently occupied by the RE Exchange Officer
[2]The RE Exchange position (Capt/Lts alternate between engineering and production projects)
[3]Excess to establishment

Figure 1. Organization Chart.

assistance, and construction and/or maintenance supervision (abbreviated to "Production").

1 CEU production projects are implemented in a number of ways. The majority involve the unit providing a supervisory cell consisting of a project commander (lieutenant or captain), a project superintendent (SNCO) and various trades supervisors. Civilian tradesmen from the local area are then employed to carry out the work. When the project location is remote and civilian labour is not available, the unit is augmented by military tradesmen drawn from units across Canada. Alternatively, it is occasionally more convenient to use a civilian contractor to complete all or part of the project work, in which case the unit arranges and supervises the contract. An ongoing project, which typifies the challenging work undertaken by 1 CEU, has been carried out at Canadian Forces Station Alert. At 82°30'N 62°20'W, on the northern tip of Ellesmere Island only 700 kilometres from the North Pole, Alert is the world's most northerly permanently manned settlement. The original buildings at this Station were temporary structures, erected in the 1950s, which were energy inefficient and required replacement. As a result a programme of reconstruction and modernization has been undertaken, by 1 CEU, over the last ten years.

The unique location of Alert has led to the adoption of certain engineering principles for all designs. All material must be transportable by Hercules aircraft, the only viable means of communication. The facilities must be energy efficient as every litre of fuel must be flown in. The systems must be simple to maintain and withstand the hard climatic conditions. The underlying permafrost must be maintained in a frozen state to prevent foundation settlement. All buildings must be designed for ease and speed of erection since the construction season is very short (June-September). The criterion of paramount importance, however, is reliability; the nearest hardware store is 4,200 kilometres south.

Over the last twelve years 1 CEU's work in Alert has resulted in the reconstruction of a large proportion of the Station. Excluding transportation, equipment and fuel costs, in excess of $30 million has been spent and an average of 700 tons of material per year consumed. The work has been almost entirely completed by military engineer tradesmen attached to 1 CEU.

The $800 million North American Air Defence Modernization Programme, a US/Canadian venture, has had a big impact on 1 CEU. Essentially the project involves upgrading the existing Distant Early Warning (DEW) line system, in the Arctic, by constructing eleven manned long range radar sites and superimposing thirty-six unmanned short range radar sites between them. 1 CEU will be heavily involved until at least 1992 and hence has adjusted its organization by forming a Northern Warning System cell.

1 CEU has been tasked as the design manager for the thirty-six short range radar sites and a prototype facility to be constructed in the south. So far only a preliminary concept of the arctic radar sites has been developed. They will have a 60 metre high radar tower with a 9 metre dome, a facilities building, a transient shelter, communications dishes and a raised helicopter pad. The radar itself is to be provided by the Americans. In addition to the design work, it is anticipated that 1 CEU may construct these facilities on some of the more challenging sites.

From the previous description, the value of the PQE exchange appointment with 1 CEU should be apparent. No doubt PB7 will be inundated with posting requests from suitably qualified officers. However, future exchange officers should be aware that although 1 CEU is a military unit, it is not exclusively an Army unit. Canada's recent return to tri-service uniforms has resulted in 1 CEU being 50% light blue. Its role, however, remains unchanged.

1 CEU is a proud unit of the CME. Its functions have evolved in response to specific needs and in its production and engineering roles, it has the capability to go anywhere and do almost anything. 1 CEU's main territory is traditionally from Newfoundland to the Queen Charlottes and from the Niagara Peninsula to the high Arctic, but increasingly it is being used worldwide. In its field the unit is second to none and it is a source of great pride and value that a Royal Engineer is now numbered in its ranks.

The engineering role may be further subdivided into preparation for the unit's production projects and engineering studies. In preparing for production projects the engineering section operates in a similar fashion to a civilian consultant engineer or, for that matter, the Military Works Force. This involves detailed site reconnaissance, design, specification and planning for the ensuing tasks.

The engineering section also completes thirty-five to forty engineering studies per year. Studies in the field are undertaken involving site investigation, topographical surveys, thermographic surveys to determine the efficiency of insulation, quantity surveys and building rehabilitation surveys. Special engineering studies are undertaken such as permafrost investigation, pavement strength and fatigue analysis and various studies in the electrical, mechanical and environmental fields. Feasibility studies in relation to the selection of site, including the type and method of construction are also undertaken and this frequently involves the completion of preliminary designs, specifications and cost estimates. In addition, the unit operates a very well equipped laboratory capable of completing a large range of soil, concrete and asphalt construction materials tests.

Perhaps the most challenging engineering study undertaken, in recent years, has involved destructive testing of the 34.14m span timber Warren roof trusses of a hangar at Canadian Forces Base Greenwood, Nova Scotia. The CF owns some 250 of these hangars, spread across Canada, which were originally constructed during World War II and now require considerable

Photo 1. Gold dredge and surroundings. Bonanza Creek, Yukon.

Photo 2. Construction work at Alert, 1986.

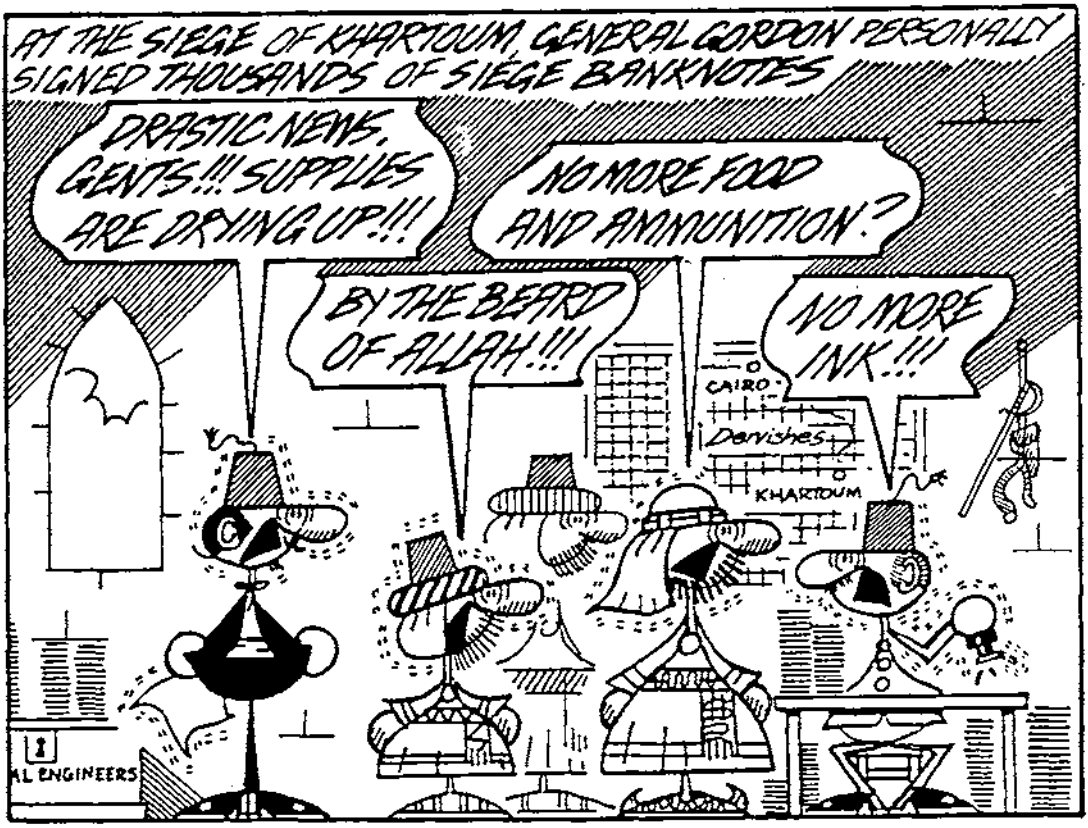
1 Construction Engineering Unit (1,2)

maintenance. 1 CEU are the CF analysts and repair specialists for these roof trusses. To confirm the current analysis and streamline repair methods the eighteen trusses of a surplus building were fully instrumented using computerized equipment and then loaded to failure. This $400,000 project, conducted at the leading edge of existing technology, has provided some excellent data.

Another unique engineering study in progress involves determining a method to recover a 3,000 ton wooden hulled gold mining dredge at Dawson City in the Yukon, 300 kilometres south of the Arctic Circle. The dredge was constructed in 1912 and was the largest of its kind in operation in North America. It ceased operation in 1959 and has subsequently sunk, silted in and frozen. Parks Canada wish to raise the dredge, to preserve it and use it as a museum. Hence, they have asked the military engineers for assistance.

In the production role the unit annually completes approximately twenty projects, with a total value of $8-10 million. The CF have a policy of supporting civil industry, where possible, so the type of projects given to 1 CEU are limited. Projects are undertaken in remote areas which, because of their size or location, are difficult to contract; typically Arctic projects fall into this category. Projects are undertaken where urgency precludes formal engineering studies, drawings and specifications being made in advance. Projects where it is impossible to determine the extent and details of the work, or where security implications limit the use of contractors, are similarly undertaken. Projects are also completed for other government agencies, occasionally involving work in Canadian embassies behind the Iron Curtain. Finally, the unit completes less exciting, though equally important, major annual sewer cleaning and runway painting programmes.

KNOW YOUR HISTORY



History Rewritten—The RE HQ Mess

LIEUT COLONEL A H BLANFORD BA

Lieut Colonel Blanford is a retired officer working at the RSME as an Author. This article was commissioned in 1987 by the Commandant and the author is grateful to the people who contributed to it.

Introduction

History is usually rewritten for one of two reasons, either because historical facts do not support a modern political creed or because new evidence comes to light which indicates that some historical "facts" are inaccurate or wrong. In this case it is the latter reason, and the new evidence concerning the RE HQ Mess is in the form of plans dated 1872 which the Property Services Agency have recently uncovered (PSA plans). The building on the west side of the Mess complex currently consists (at ground level) of the Dining Room, North Annexe and South Annexe, and many members will remember having read in the articles in the *RE Journal* by Colonel B R Ward published in October 1908, and Colonel J M Lambert published in March 1957, that the present Dining Room including the South Annexe but exclusive of the North Annexe was built in 1861. A brief glance at the PSA plans, however, immediately throws doubts on these statements, and further examination of documentary evidence leads to the need to re-write some of the history of the RE HQ Mess. Nevertheless, as some historical "facts" are corrected other questions are raised, and one of the purposes of this article is to highlight these and invite members to supply the answers.

Early Days

As the new evidence does not affect events in the first half of the last century it would be unnecessarily repetitive to cover again all the early history of the RE HQ Mess. Most members already know that the Mess was first built in 1807, shared between the Gunners and Sappers, and that it consisted only of what is now the Main Ante-room with kitchens below. The plan of the Mess in 1814, reproduced at *Figure 1*, is currently held by the RE Museum. Members will note that the House numbers differ from those used today. In fact they have changed more than once over the years, but since about 1883 seem to have settled to the current numbering. This changing of House numbering has not helped when trying to identify past events. In this article, for consistency, the 1814 House numbers marked on *Figure 1*, will be used. In those days Houses 18 and 20 were not part of the Mess but occupied by married officers, for no separate married quarters were provided before 1864.

In September 1848 the Gunners departed and Brompton became an independent RE Mess, the reasons why being well recorded by Colonel Ward. Slightly earlier the Mess had started its first expansion, into the ground floor of House 20 which became an Ante-room and a Breakfast room. There was a connecting door into House 20 in the north west corner of the Mess Room (now blocked up). It is about this time too that the library of RE Professional Papers became a factor. In 1849 they were allocated a room in House 15 but when the Director of the RE Establishment moved there in 1851 the Papers were moved to the first floor of House 20, into the room over the Ante-room at the north east end of the building.

New Mess Room

By the end of the 1850s the Mess Room was proving too small, and in 1860/61 a new dining room called the new Mess Room was built, designed by Captain Francis Fowke RE, and this is where we start to rewrite some history. The plans of 1872 are shown in *Figure 2*, and as can be seen they belie the statement that the present dining room and the South Annexe were built at the same time. An examination of the architecture also indicates different building dates. Moreover the CRE's Letter Books over that period (before typewriters recorded carbon copies) never mention the South Annexe, and some of the details that are mentioned are such as to preclude its existence.

At this point it should be stated that although the PSA plans, copies of which are held in the RE Library, are dated 1872 they appear to be copies of earlier plans. In October 1865 the Letter Books

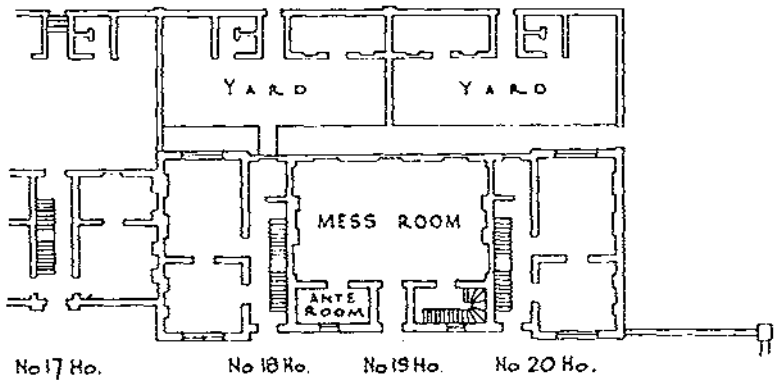


Figure 1. The Royal Artillery and Engineer Mess, Brompton Barracks in 1814.

refer to some plans being sent to the War Office and their description tallies closely with the PSA plans. Also, the PSA plans show House 18 as the Director's Quarters whereas that appointment ceased to exist when the Engineer Establishment became the SME in August 1869. The plans shown in *Figure 2* have had to be redrawn as their state prevents their reproduction with clarity but there is no reason to doubt that the portion of the plans showing the new Mess Room record what was actually built, and that they show the buildings as they were, probably in 1865. The plans of the Second Floor and of the Basement, the latter showing the lower part of the Mess Kitchen and adjacent rooms, have not been included here.

The contract for the new Mess Room was awarded to Mr Stump of Garden Street, Brompton. Although the building was finished for the most part by September 1860 due to small changes in design as construction proceeded it was not completely finished until some time in 1861.

The plans of the building can be seen in *Figure 2* (note that the points of the compass are not necessarily accurate, being drawn to aid description only). Immediately apparent is the absence of the North and South Annexes and the existence of the Orchestral Gallery at the east end. The area beneath the Gallery is divided into sections, the centre section containing the lift for bringing food up from the kitchens below. The new Mess Room was joined to the old Mess by a covered way and there is no sign of the Conservatory having been built, contrary to the statement of Colonel Lambert.

At the west end of the new Mess Room, leading from the bay where Gordon's throne is now located, are stairs leading down to a Coffee Room and Billiards Room on the Lower Ground Floor. (At this period a billiards room had become an important adjunct to an officers mess). The title of that room is confusing in that on the PSA plans *(Figure 2c)* it is marked as a Breakfast Room, however the Letter Books record (May 1860) that the stairs were the only practical direct communication between the new Mess Room and the "Coffee Room" below, and later (February 1864) there was concern lest the smell of smoking should percolate up from the "Billiards Room" below. The room continued to be used for billiards until the new Billiards Room (or Lower Billiards Room as it is still known to many officers, now the Conference Room) was built, probably in 1866. It then appears to have been taken into use as a Breakfast Room in place of that in House 20 (see later), presumably because it was a larger and more convenient room, and so it is marked as such on the PSA plans which are dated after this changeover had taken place.

Heating the new Mess Room turned out to be a problem. The first effort was by two grates in the south wall, the flues being located in the central pilasters, but probably because the flues were long and cold the fires smoked and failed to heat the room effectively. The proposal to have two additional grates on the other side of the room was deemed not to be economic as they also were likely to smoke. Instead the recommendation was made to replace the existing grates with "Pierce's Pyropneumatic stove grates". It is not clear whether this proposal was followed through, or whether the two "Hall stoves with ash pans", ordered in July 1862 for the Mess Room, were for the new Mess Room or the Billiards Room below, but by the end of 1868 a different method was being tried

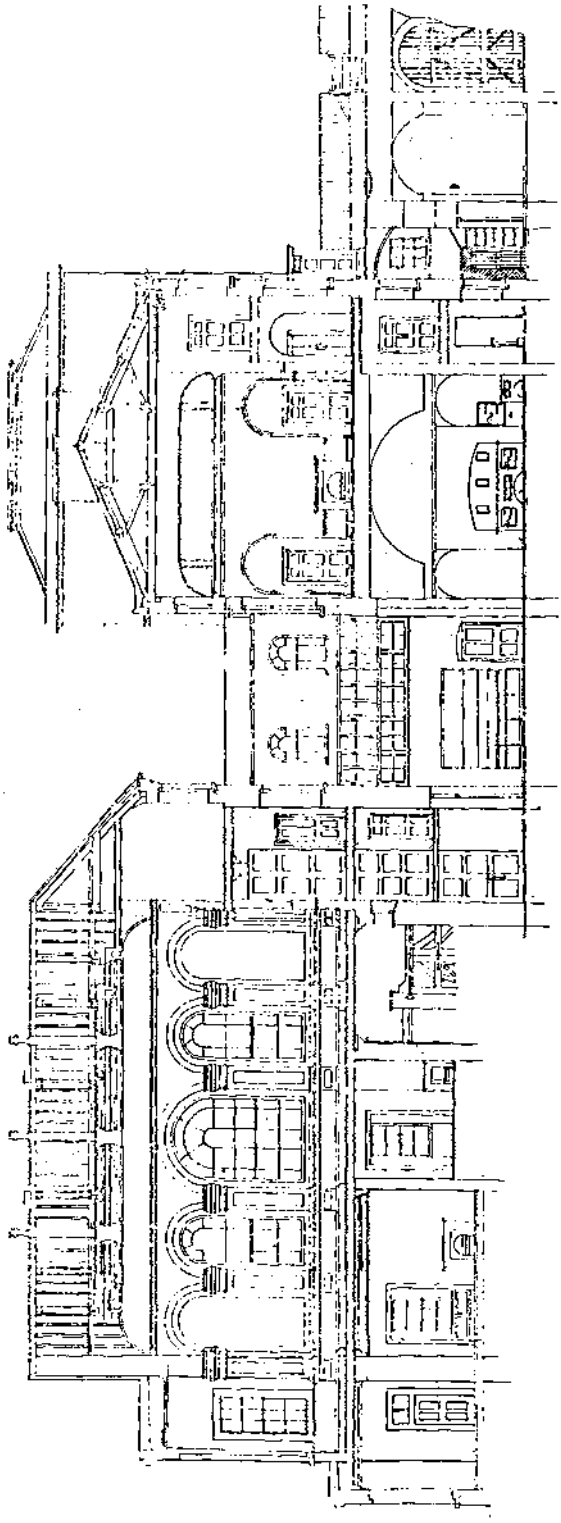


Figure 2d. RE HQ Mess, c1865, part section I-K.

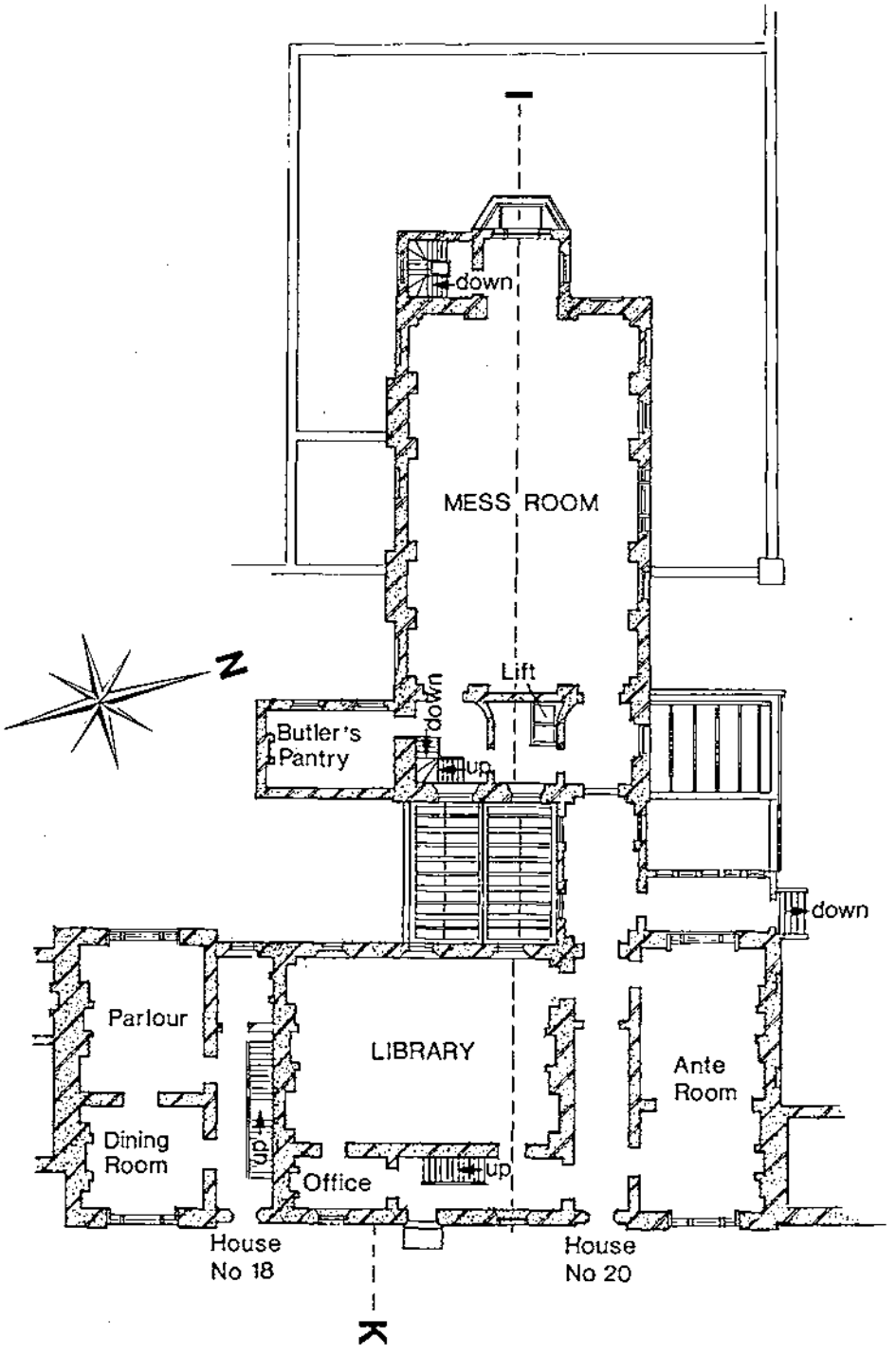


Figure 2a. RE HQ Mess, ground floor, c1865.

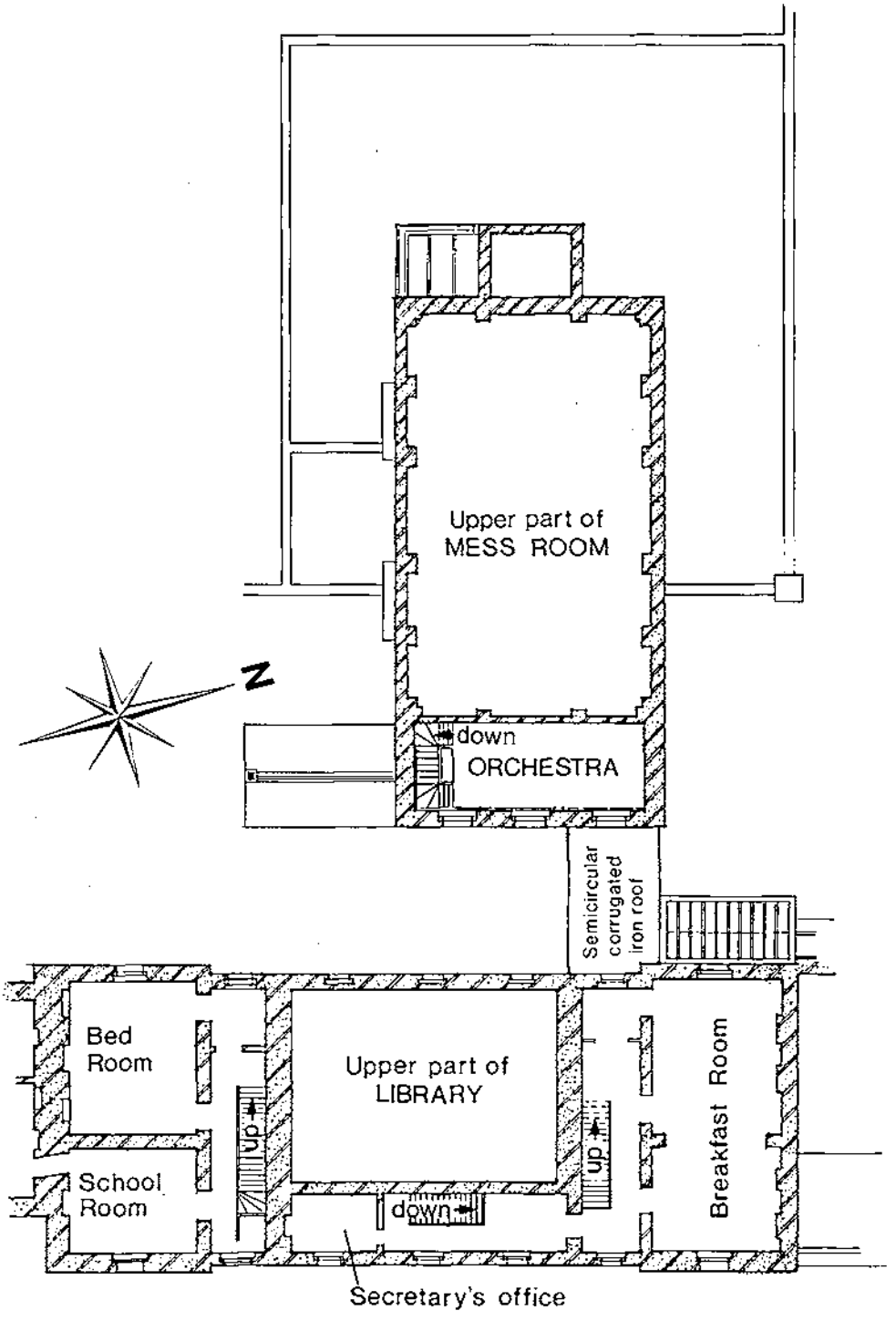


Figure 2b. RE HQ Mess, first floor, c1865.

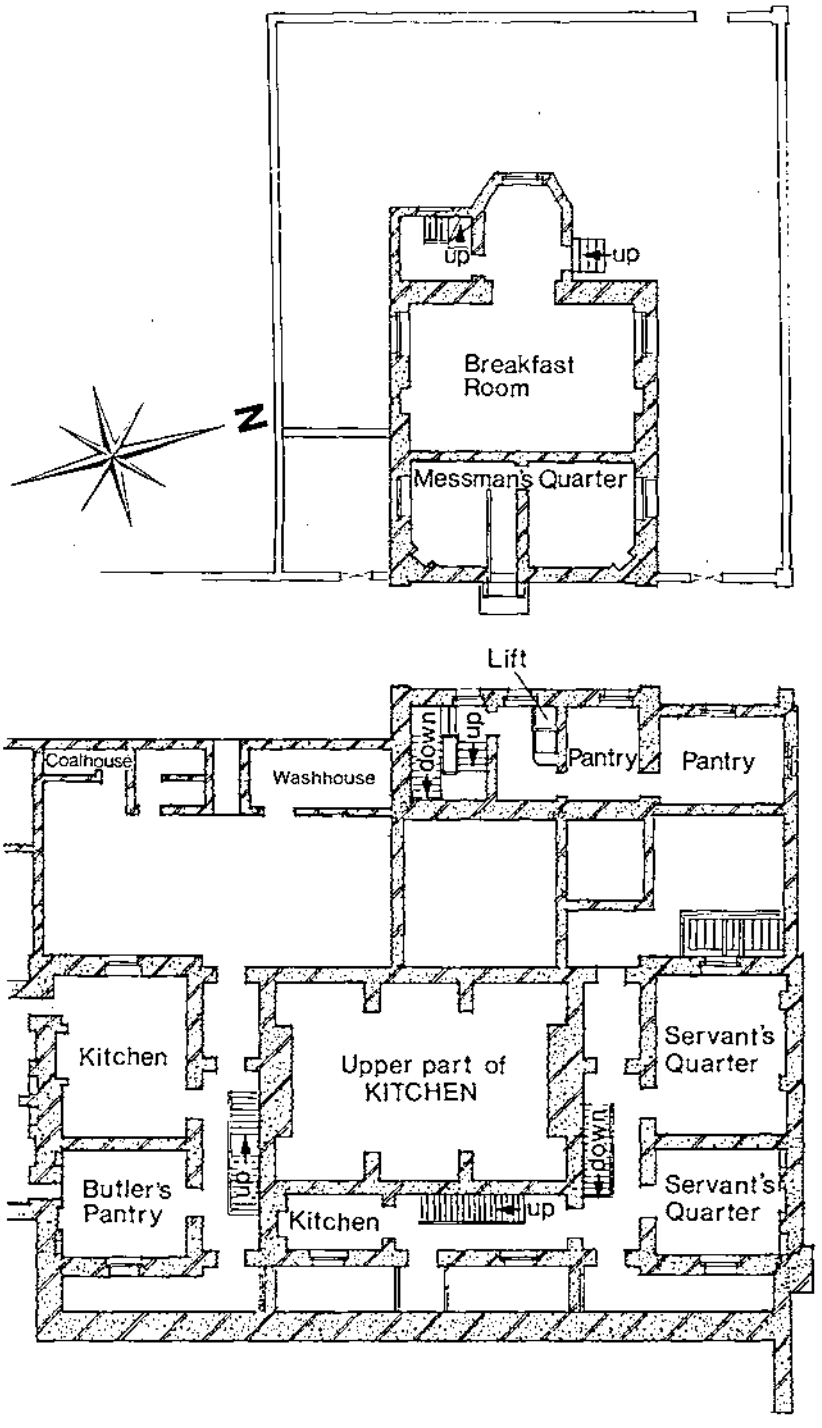


Figure 2c. RE HQ Mess, lower ground floor, c1865.

Photo 1. RE HQ Mess, west end of the dining room, c1873.

and hot water central heating was being installed with pipes laid around the room.

The new Mess Room seems to have been brought into use in the middle of 1861, and it was intended at the same time to turn the old Mess Room into a Library, but this plan was not completed until late 1863, perhaps because money was short. The PSA plans *(Figures 2a* and *2b)* show this as having happened, and likewise show House 20 as being fully part of the Mess, with the ground floor being the Ante-room and the first floor being the Breakfast Room. The Letter Books record (July 1863) that turning the upstairs room into a Breakfast Room was deemed not to be interfering with its intended use, that is to say the reading of papers on professional subjects, and that having the use of a separate room for breakfast and lunch would "reduce the wear and tear on Mess furniture".

South Annexe

The date when the South Annexe was built is still unknown. There is no mention of it in 1868 when the central heating was being installed in the new Mess Room, so it appears to have been built after that date. The first accurate record is a photograph in the *RE Journal* in January 1886 in which the South Annexe can be seen, but it was probably built many years before that date.

When first built the South Annexe was divided into three, with only the central section having entry into the dining room. The end sections were a pantry and a servery, with the middle section referred to as a Band Room. The original purpose of the middle section, while the orchestral gallery still existed, is open to conjecture but later there are many references to its use by the Band at dinner and for concerts.

Mess Expansion

During the period 1872-85 there is a dearth of accurate information about the Mess for the last of the CRE's Letter Books end in mid-1872 (with a proposal to build the water closets in the space to the north of House 20) and the first available record of Mess Committee Meetings is dated July 1885. It was during this period that the old Mess

Photo 2. RE HQ Mess, north annexe, c1890.

Room, which had become the Library (see *Figure 2a*), was reincorporated into the Mess as the Ante-room (or Main Ante-room as it is known today). The Ante-room on the ground floor of House 20 continued as such, being referred to as the "Small Ante-room" and sometimes the "Smoking Ante-room", while the old Breakfast Room on the first floor became the Card Room or Whist Room (closed on Sundays!). House 18 was also absorbed into the Mess at this time, with the offices of the Mess Secretary and Treasurer on the ground floor and the Library on the first floor.

Perhaps the biggest event during this period was the fire that broke out in the new Mess Room on 15 July 1874 and badly damaged the roof. There is a graphic account in the *Chatham News*, repeated in part in the *RE Journal*, but this seems to be the only record and may contain journalistic inaccuracies. *Photo 1* shows the new Mess Room as it was at the time, it was probably taken in 1873 just before the fire.

With the enlargement of the Mess the entrance lobby had become too small, for the entrance led almost directly into the Ante-room. Colonel Lambert gives the date of 1883-84 as being the time when the new entrance hall was constructed, designed by Captain Clayton and built by Lieutenant Ferrier, both serving in the SME. The result of their work was much as it is today.

North Annexe

Corps History (Volume IV) tells us that the North Annexe was built 1887-88 by Captain Renny-Tailyour of the SME, and this is repeated by Colonel Ward and Colonel Lambert. However it is almost certainly inaccurate. The Mess Minutes tell us that a dining table was ordered for the "New Gallery", as it was called, in May 1887 and that lunch was served there from July 1887, and although there were complaints in August that year about the unfinished state of the end of the new Gallery it seems that 1886-87 would be a more accurate date for its construction.

When first built the North Annexe was separate from the dining room and used as an Ante-room and where light lunches were served. It is not clear how it was partitioned off from the dining room for at different times there are references to screens, doors and curtains. The pillars in the North Annexe, which are made of scagliola, had

been painted over at some time but have recently been restored to show their original surface and colour. *Photo 2* shows the North Annexe at that time, probably in 1890 but perhaps later.

Conservatory

This history of the Conservatory is another area of uncertainty. Although Colonel Lambert states that it was built at the same time as the new Mess Room (1861) his source of information is not known and the PSA Plans indicate that it was not so. When the new Mess Room was built the area between the kitchens and the new building was covered over, by "Hartley's patented rolled glass", but there is no indication of when the Conservatory was first built over the top although it existed by July 1887 (Mess Committee Minutes). The report of the fire (1874) includes the statement that the Conservatory was also damaged and a large proportion of the glass was broken by falling slates. Was this the Conservatory that we know, was it a different conservatory, perhaps a lean-to, or could it have been Hartley's glass that got broken, for we are told that the Mess Master's store was also slightly damaged, wherever that may have been?

Mess Alterations

The years 1887-89 were full of activity as far as the Mess was concerned. In 1887 the Commandant proposed, in his annual Report, the move of the SME Library from the Institute building to the Officers Mess so that it would be more readily available to officers. Accordingly by the middle of 1888 the top floor of House 17 was incorporated into the Mess for this purpose.

In November 1887 the Mess Committee Minutes record concern over the state of the lift from the kitchens and propose that it should be moved from the east end of the dining room, below the Orchestral Gallery, to the south west corner where the pantry was. (It appears that by this time the kitchens had been moved from below the Ante-room into what had been the Breakfast Room below the new Mess Room (see *Figure 2c*)). The fact that a Ladies Dinner in December 1888 was cancelled due to alterations in the Mess, and that it was recorded in April 1889 that the Ball proposed for 24 May would only take place if the alterations to the Mess were finished (they were), indicates that some major work was being undertaken. This work would have been the relocation of the lift and the building of a new pantry and serving room at the south west corner, and almost certainly the removal of the Gallery. Although Corps History states that the Gallery was removed at the same time as the North Annexe was built it is inconceivable that the Gallery was removed before the lift. The work may also have included the installation of the doors between the Conservatory and the new Mess Room and perhaps improvement (or initial construction) of the roof over the Conservatory. Whatever happened the Mess Committee decided that year to improve the Conservatory, for they decided to purchase some shrubs (February 1889), some cane furniture (May 1889), and in September of that year they decided to have the sash windows between the Ante-room and Conservatory replaced with glass doors. It is perhaps noteworthy that a proposal (November 1888) to remove the wall between the Band Room (centre of the South Annexe) and the dining room was not agreed.

Incorporation of the Annexes

The dates when the North and South Annexes were incorporated fully into the dining room are not known. The three rooms of the South Annexe may have been made one during the alterations of 1889, and in spite of the views of the Mess Committee the wall between the Band Room and the dining room may have been removed at the same time, for there is a reference in March 1892 to the "curtained arches" of the Band Room. However the first reference to the South Annexe by name is in July 1894, when the Mess Committee were considering its furnishing. Similarly the North Annexe was still in use as some sort of ante-room, screened off from the dining room, in the middle of 1895. Nevertheless the plans of the building dated 1897, held in the RE Library, show that both Annexes are fully incorporated.

Conclusion

There is no reason to believe that the history of the RE HQ Mess this century contains any inaccuracies, and so it has not been re-examined here. What this article has done is to re-examine the history during the latter part of the last century and drawn attention to certain errors and misconceptions. However in several instances the correction of these errors has led to new uncertainties and queries. Any evidence that will lead to further clarification and definitive answers will be welcomed.

Troop Commander Training in the Royal Engineers

CAPTAIN N H SMITH BSc RE

Captain Smith was commissioned into the Corps in April 1985. After attending the YO course and the Armoured Engineer Commanders' Course, he was posted as a troop commander to 32 Armoured Engineer Regiment in February 1986. Since October 1987 he has been the Engineer Intelligence Officer in 3 Armoured Division Headquarters.

Introduction

The role and organisation of the Sappers have changed little in the last twenty years; correspondingly, the training of RE troop commanders has remained essentially the same. The forthcoming reorganisation of Engineers in BAOR represents the biggest change for many years. Such a development implies that now, for the first time in decades, major changes in the training of troop commanders may be necessary.

At present, the RE Young Officer or YO course provides a thorough all-round training which equips the field troop commander well to fill his post. By contrast, armoured and amphibious troop commanders must largely learn their jobs through experience in the unit. This state of affairs will apply to close support troop commanders (CSTCs) to a large extent if the training system is not changed. The importance of this point is shown by the approximate eventual breakdown of potential first tour troop commander appointments, as follows:

Close Support and Armoured	30
BAOR General Support	30
UK Field	30
UK Field (Construction)	15

59 Commando, 9 Parachute, 24 Field and 69 Gurkha squadron appointments are included in the UK Field Squadron total. 38 (Berlin) Field Squadron appointments are included in the BAOR General Support total.

The Present Training System

The present training system is summarised in *Figure 1*. The system comprises five components:

The YO Course. The YO Course involves twenty-nine weeks instruction, and is designed to enable YOs to be employed in any of the four types of squadron being considered. The subjects covered are shown in *Figure 1*. Three YO courses are run every year, starting in April, June and September. Not more than three courses per year can be run, not more than two courses may overlap, and the number of YOs on each course must be between fifteen and thirty. *Unit Attachments*. These attachments are generally used to attend the likes of P Company, the Commando course and diving courses. The attachment period can also be used to fill in time between RMAS and the YO Course. Now that YOs are theatre posted whilst still at RMAS, the attachment will be to a unit in the same theatre as the YO's eventual posting. At present, less than half of all YOs complete unit attachments. *Courses at the RAC Centre*. These comprise the AFV Management Course and the Armoured Engineer Commanders' Course (AECC). The

Captain N H Smith BSc RE

SERIAL	SUBJECT		TROOP COMMANDER EMPLOYMENT											
			UK FIELD			UK CONSTRUCTION			BAOR GENERAL SUPPORT			BAOR CLOSE SUPPORT		
			Training	Trg Provision		Training	Trg Provision		Training	Trg Provision		Training	Trg Provision	
			Requirement	Present System	Proposed System	Requirement	Present System	Proposed System	Requirement	Present System	Proposed System	Requirement	Present System	Proposed System
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)
1	General	Regt Duties, Welfare etc	X	YO	YO	X	YO	YO	X	YO	YO	X	YO	YO
2	Combat Engineering	Basic Cbt Engr (ropes etc)	X	YO	YO	X	YO	YO	X	YO	YO	X	YO	YO
3		Mine Warfare	X	YO	YO	X	YO	YO	X	YO	YO	X	YO	YO
4		Demolition	X	YO	YO	X	YO	YO	X	YO	YO	X	YO	YO
5		Route Clearance and Denial	X	YO	YO	X	YO	YO	X	YO	YO	X	YO	YO
6		Fieldworks	X	YO	GS	X	YO	GS	X	YO	GS		YO	
7		Water Supply	X	YO	GS	X	YO	GS	X	YO	GS		YO	
8		Equipment bridging: EWBB, HEB	X	YO	GS	X	YO	GS	X	YO	GS		YO	
9		Equipment bridging: MGB	X	YO	YO	X	YO	YO	X	YO	YO	X	YO	YO
10	Armoured Engineer Equipment and its use	CET: D & M Systems	X			X			X	AFV	AFV	X		CS
11		AVLB: D & M Systems										X	AEC	CS
12		AVRE: D & M Systems										X	AEC	CS
13		AVRE: Tube Gunnery										X		CS
14		AVRE: MG Gunnery (.30 .50)										X	AEC	CS
15		Giant Viper										X	AEC	X
16		Mine Plough										X		CS
17		Armd Gap Crossing: Br/dozer/fasn										X		CS

18		Armd Mfd Breaching: GV/Plough										X		CS
19		Maint Procedure & Documentation										X		CS
20	AFV Management	FV432/CET/CVR (T)							X	AFV	AFV			
21	Plant, Roads and Airfields	Engineer Plant		YO		X	YO	CON		YO			YO	
22		Road Design & Construction		YO		X	YO	CON		YO			YO	
23		ADR		YO		X	YO	CON		YO			YO	
24		Harrier Support	X	YO	GS	X	YO	GS	X	YO	GS		YO	
25	Light AFVs	CVR (T): D & M Gunnery							X	AFV	AFV	X	AEC	CS
26		FSC: D & M Gunnery	X										AEC	
27	Tactics	General Tactics	X	YO	YO	X	YO	YO	X	YO	YO	X	YO	YO
28		Extra BG Tactics (BAOR)										X		CS
29	Signals	Basic Signals	X	YO	YO	X	YO	YO	X	YO	YO	X	YO	YO
30		AFV Radios & Extra Sigs (BAOR)										X		CS
31	Civil Engineering	Improvised Bridging	X	YO	GS	X	YO	GS	X	YO	GS		YO	
32		Construction Management		YO		X	YO	CON		YO			YO	

NOTES

1. *Key*
   a. YO: The YO course, present or proposed.
   b. AFV. The AFV Management course/module.
   c. AEC: The Armoured Engineer Commanders' course.
   d. CS: The Close Support Troop Commanders' course (proposed).
   e. GS: The General Support Troop Commanders' course (proposed).
   f. CON: The Construction Module (proposed).
   g. X: Subject identified as trg requirement for particular tp comd employment.
2. True abbreviations are only entered in the present system return if it is considered that the subject in question is covered in sufficient detail.

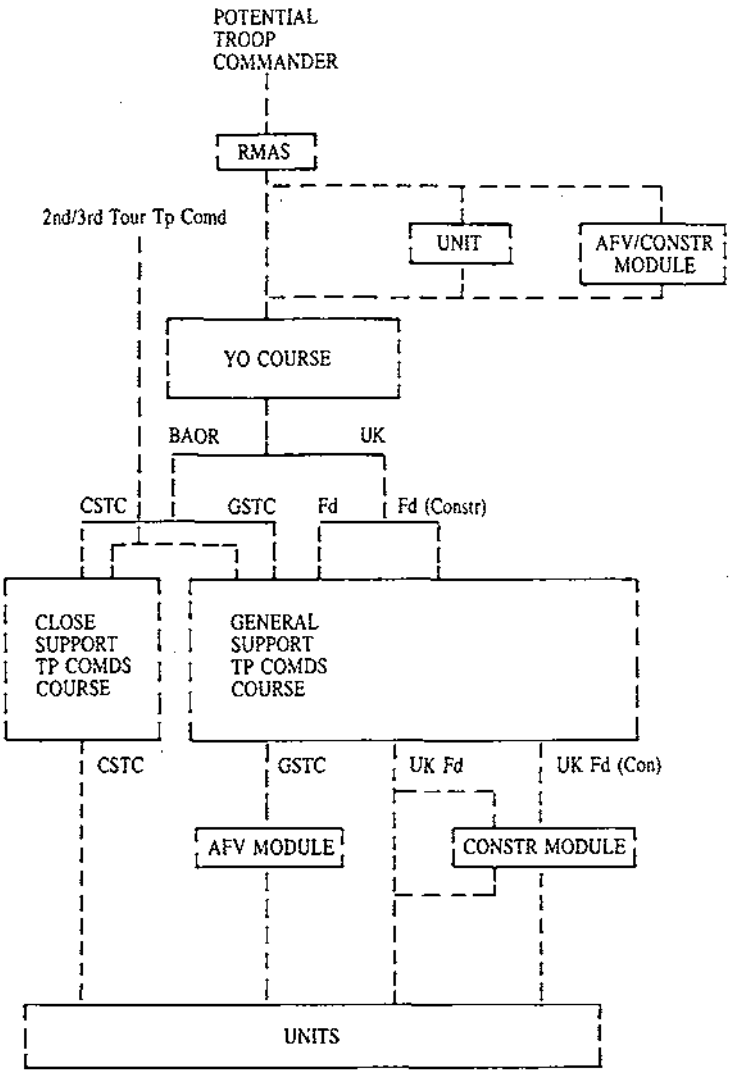


Figure 2. The proposed training system.

AFV Management Course is for BAOR field troop commanders and teaches a week of driving and maintenance (D&M) on each AFV found in a field squadron. The AECC is six weeks long and is for armoured engineer troop commanders (and SNCOs). It teaches a week of D&M on each AFV found in an armoured engineer troop, a week of machine gun and giant viper, and briefly touches on such subjects as recce and maintenance documentation.

The CSTC Course. This lasts five days, and was run for the first time in November 1987 at Munsterlager. Two courses will be run each year. The course consists of syndicate discussion, field training and a battlegroup-type trainer. No additional funds or resources have been allocated to the running of this course.

Shortcomings of the Present System

The present YO course fulfils the training requirements for both categories of UK troop commander. With the addition of the AFV management course it meets the requirements of the future general support troop commander, although much of the construction management taught at present is not essential. Furthermore,

for the graduates, who now make up over 50% of young officers, much of the instruction at the Civil Engineer, E&M and PR&A Wings is duplicated.

However, as *Figure 1* shows, a large proportion of the present YO course is not essential for either the CSTC, or for the armoured engineer troop commander. Nor does the present system adequately cover many important subjects regarding the CSTC. These include equipment management, recce for armoured engineer equipment and tactical doctrine for engineer operations at battle group level. Additional short courses do not fill the gap; the AECC teaches and tests students only on technical matters (mainly D&M) and the new CSTC at Munsterlager lasts only five days.

There is also the problem of course programming. The new RMAS course system, and constraints at RSME on the programming of YO courses means that even under the latest system, a YO does not take over his troop until thirty to forty-five weeks after leaving RMAS, much longer than his contemporaries in other arms. This is demoralising for a YO who is well motivated on leaving RMAS.

Methods of Correcting the Shortcomings of the Present System

There are effectively three ways in which to improve the system. Firstly, train all troop commanders to fill all appointments. This would mean, of course, training UK troop commanders in BAOR close support engineering. Whilst this would maintain the present tradition that every sapper officer should be a 'jack of all trades', it would mean a forty-three week long YO course, which would be even more difficult to programme. The large numbers of SSC officers in the Corps would also spend a large proportion of their service in the training system.

Secondly, the system could be maintained in its present form but with the CSTC course extended from five days to at least three weeks. This would involve few modifications to the existing system, but much of the YO course would still not be directly relevant to the needs of first tour troop commanders, and the problem of time spent between RMAS and joining a unit would be aggravated rather than solved.

Thirdly, the system could be reconstructed to include a shorter YO course covering only the material which is common to all four requirements, followed by a series of special-to-role modules, one of which would be completed immediately after the YO course. Although this would be contrary to Corps tradition and would introduce complications in the posting of officers for second and subsequent tours, training would be more relevant to an officer's immediate employment, and therefore more effective. Furthermore, training time would be reduced and course programming simplified. Even though major changes would be required to the training organisation, the benefits would be such that this emerges as the most attractive solution.

A New Proposal

A proposed system for training troop commanders is shown in *Figure 2*. Its first component is the YO course. This would be no more than twelve weeks long, teaching only that material which is a common requirement for all troop commanders, as shown in *Figure 1*.

This would be followed by a GSTC or CSTC course. The GSTC course, no more than twelve weeks long, would be attended by UK and BAOR GS troop commanders. It would be followed by an AFV Module for BAOR GSTC, four weeks long and similar to the current AFV management course, or by a construction management module for UK troop commanders, also four weeks long. The CSTC course, no more than fourteen weeks long, would of course be attended by BAOR CSTCs. The subjects taught on all these courses are shown in *Figure 1*.

Training Organisation

Accommodation of Courses. The YO course, GSTC course and construction management module could be accommodated at RSME with no requirement for additional funds or resources. The AFV module could be accommodated at Bovington, or in BAOR. There are two options for the location of an expanded CSTC course. The first is to set up a Close Support Training Centre in BAOR, with its own vehicles, buildings, hangar space, instructors and facilities. This would provide something akin to the Bundeswehr's Panzerpionier Lehr Kompanie, which is used for training, trials and demonstrations. The second is to run the course at Bovington and RSME, the tactics and signals being taught at RSME, or possibly in the respective wings in the RAC centre.

Projected RMAS Output of RE Officers		Proposed YO course dates and loading		
December	9	January	10	(incl 1 overseas student)
April	47	April	30	
		July	19	(17 carried forward from April, 2 overseas students)
August	28	September	30	(incl 2 overseas students)

Figure 3. The proposed YO course programming plot.

Armoured engineer support to all arms courses could be provided, which is surely desirable if the Army as a whole is to be made aware of the reorganisation of the Corps.

Programming of Courses. The YO course poses the main problem; a proposed course programming plot is shown in *Figure 3.* At present, a course of only ten students is unacceptable, though on occasion in the past courses have been supplemented with course support personnel for certain parts of the training. The plot shows only seventeen YOs being 'carried forward'; these would use the lag time to complete the likes of P Company or, if suitable, they could be posted as troop commander straight from RMAS and attend the YO course two months later.

Conclusions

The need to train the future CSTC adequately for his demanding appointment, together with the need to reduce the time an officer spends between RMAS and beginning troop commander employment, suggests that there is a need to re-examine the present system for training RE troop commanders.

The present system does not match the training requirement of future RE troop commanders. A better training system, more closely matching the requirements of UK and BAOR troop commanders, would consist of a short YO course followed by either a General Support or a Close Support Troop Commanders' course. Despite the difficulty involved in restructuring the training system, and some loss of flexibility in the posting system, this is considered to represent the best long term solution.

(This article was seen by HQ EinC before publication, their comment is as follows: This article highlights some of the problems that we have faced with YO training for many years. Some ideas have been examined and tried before; getting the balance between a broad YO course and more specialised, shorter courses is very much a hardy annual. With the introduction of close support regiments in 1(BR) Corps we are again looking at YO training. *Correspondence on this topic would be welcome—Editor).*

More Mechanisation—Can We Meet the Training Challenge?

CAPTAIN A R BALL RE

Captain Rob Ball was commissioned in 1977 and has been a troop commander in 38 Engineer Regiment and 73 Independent Field Squadron. He went to Shrivenham in 1980 and returned to regimental duty with a dog, a wife and a degree in Civil Engineering. From July 1985 to February 1987 he was Second-in-Command of 31 Armoured Engineer Squadron and the article he has written is a result of his work there. Captain Ball is now a fieldworks instructor at Field Engineer Wing, RSME.

In the Engineer-in-Chief's address to the 1986 Corps Annual General Meeting he spent some time talking about "Engineer Support to 1(BR) Corps". In this part of his address he stated "1(BR) Corps see the Brigade Engineer Squadron in the early 90s being much more equipment intensive with armoured engineer equipment an integral part of the squadron". The amount of armoured engineer equipment in 1(BR) Corps will probably increase and so will the amount of manpower required to be armoured engineers. To meet this increase it will mean a large training commitment and the present organisation is already overstretched. I believe the time is ripe to review the training of our armoured engineers.

Firstly a look at our training, its organisation and problems. The present career streaming within the Corps is for every man to be dual trained. For most combat engineers this means a Combat/Artisan career stream and for the majority of armoured engineers an Armoured/Combat career stream. A sapper who embarks on a normal combat engineer stream should, having completed basic training, serve a two to three year tour of regimental duty followed by his 0-2 artisan training lasting 26 to 34 weeks. Whilst he is on his artisan training he will be placed on the establishment of the training organisation and should be replaced in his old unit by a new sapper. To follow the combat engineer stream he will probably not undertake any further artisan training. (I wonder how many field squadron sergeant majors are Artisan Class 1? I doubt many are). Subsequent career courses are Combat Engineer Class 1 (10 weeks), Field Section Commander (6 weeks) and EPC (4 or 8 weeks) prior to promotion to sergeant. These are followed by Field Sergeant (9 weeks) prior to promotion to staff sergeant and EPC(A) (4 or 8 weeks) and QSMI (4 weeks) prior to promotion to WO2.

The normal armoured engineer will be posted to 32 Armoured Engineer Regiment from basic training. He will be placed on his Armoured Engineer 0-2 course at Bovington (11 weeks) as soon as possible after arrival in the regiment. He will also require to pass a Radio User course run by the unit (2 weeks) and an additional week may be lost due to flights from Hannover being on a Tuesday or Thursday. Whilst on the 13 weeks training he will remain on the establishment of the regiment. To follow the Armoured/Combat career stream he will do all the courses mentioned for the Combat Engineer; however, additionally he will have to attend further Armoured Engineer courses. Prior to being a fully qualified corporal crew commander he will have to attend Armoured Engineer Crew Commander (4 weeks) and Armoured Engineer Driver Mechanic Class 1 (7 weeks). These additional courses are normally attended whilst the soldier is in the lance corporal or corporal rank, ie a junior tank commander, and it is not unusual for a tank commander to spend 24 weeks of a three year tour on courses. The problem is made worse if a second tour armoured engineer returns to the unit without having attended a Combat Engineer Class 1 course. The tank commander is a vital member of the armoured troop and his enforced absence has inherent problems of lack of continuity and poor maintenance of the tank. The armoured engineer training organisation is based at the RE Wing RAC Centre Bovington, about 600 miles away from the unit it supports. It is under extreme pressure to try and keep up with the demands the unit places on it. Last year saw the re-role of 73 Field Squadron to armoured engineering; this meant that RE Wing Bovington had to run five Armoured

Engineer 0-2 courses exclusively to man the squadron. The overloading at Bovington has been so great recently that they have been unable to run an Armoured Engineer Crew Commanders' course between November 1985 and April 1988.

32 Armoured Engineer Regiment has sappers who were posted there in January 1987 who will be unable to attend Armoured Engineer 0-2 training until at least April 1988 because courses until then are full, the consequences of this are far reaching. An untrained sapper cannot drive the tank, fire the gun or possess the knowledge to maintain the tank efficiently. He is used as an extra man who can assist the fully trained crewman. If sappers are only to become trained by mid-tour they will be unable to attend class 1 training by the end of their first tour, thus causing more pressure on the system when they return to armoured engineering at a later date. The inability to gain trade training is not good for the morale of the sapper. Firstly he feels as though he is being used as a general dogsbody, commanders are more inclined to use untrained men for the extra duties that abound in all regiments (eg, RP Staff, Yacht Club GD men, BATUS, SIMCAS exercises) than the trained man who can maintain the tank. Secondly an untrained sapper is paid Band 1 Class 3 as opposed to the Armoured Engineer Class 2 sapper who is paid Band 2 Class 2. This means a difference of £4 per day or an increase of around 25% in gross pay, it is easy to see why he is downhearted. 32 Armoured Engineer Regiment is fully aware of the problem and ran Armoured Engineer 0-2 courses in 1986 and 1987. The regiment however is not established for a training wing of the size needed to run the course and support comes from the squadrons who are already heavily committed.

What can we do as a Corps to alleviate these problems?

One solution is to train our recruits as either armoured or combat engineers as the primary trades and then to allow them to follow the normal career streams open to the combat engineer at present. Class 3 training would be carried out in the UK followed by an in-unit Class 2 upgrading after twelve months in the unit. The recruit would thus arrive at the unit fully trained. By cutting out the Combat Engineer Class 1 and the Field Section Commanders Course a JNCO would spend more time with the unit, although the present Crew Commanders Course would have to be changed to include more leadership skills as taught on the present Field Section Commanders Course. I believe that the Field Sergeants Course should be replaced by an Armoured Sergeants Course of equal length and that the Combat Engineer QMSI Course should be adapted for an Armoured Engineer Course but should only last three weeks. The aim would be for an equal system with each stream doing some training relevant to the other at all levels. The RE Wing at Bovington should be relocated to BAOR now that there is soon to be no need for gunnery ranges. The new training centre would perform a role similar to that of CETC at Hameln. The staff could perform a valuable war role by assisting in the call forward of reservists and armoured engineer WMR equipment. To change to the two career streams would need a radical change in direction for the Corps from its Sappers being multiroled to becoming more specialist. In the past this has suited us well but in today's equipment intensive army I believe the time has come for our soldiers to change from "Jacks of all trades" to "Masters of one". The present training organisation for armoured engineers is mislocated and overstretched and armoured engineers spend too long away from the unit on training courses. The longer we wait to address the problem the worse it will become. With the possible re-role of our Brigade Field Squadrons we must not miss the opportunity to review our training.

RAF Fauld

MAJOR A P BURNSIDE BSc(Eng) C Eng MICE RE

The author graduated from Portsmouth Polytechnic with a degree in Civil Engineering in 1974. He then joined a large civil engineering company and worked on a variety of construction projects throughout the UK before being commissioned into Royal Engineers in 1978. He served as a troop commander with the Queens Gurkha Engineers, 2IC 6 Field Support Squadron and then attended the PET (C) course, with an excellent secondment to a company in Australia, before joining 527 STRE (Works). He took command of 70 Gurkha Support Squadron in December 1987.

A "REQUEST" for assistance by the RAF resulted in 527 STRE (Works) being tasked with an interesting feasibility study. The RAF required an assessment on the extent of the engineer work involved in gaining access into the collapsed gallery system of the derelict bomb storage facility at RAF Fauld (situated close to the villages of Hanbury and Tutbury). A major accident occurred at the Ordnance Store on 27 November 1944 when about 3,500 tons of HE Bombs exploded causing over 100 deaths, many injuries and devastation to the local area. It was the largest single explosion in the United Kingdom and left a yawning crater some 300m wide by 35m deep, covering an area of twelve acres.

HISTORY

THE Air Ministry acquired the disused gypsum mines beneath Stone Pit Hill in 1937 as part of the rapidly developing requirement for ammunition storage space. The Fauld mines were 30m below the surface and large enough to accommodate up to 10,000 tons of HE Bombs. There was room for further expansion and they required only the minimum of conversion work for their new role. The gypsum deposits had been worked out on what is known as a pillar and post system, which entails leaving the inferior material undisturbed to form roof supporting pillars at approximately 6m intervals. The conversion work involved the construction of a 16m thick barrier to isolate the proposed incendiary storage area from the HE store, the erection of internal 5m thick walls and the provision of a light railway link with the main line at Scropton (approximately 1.5km north). The construction work was completed for the official opening in June 1938.

In 1941, a decision was taken to open unused parts of the mine to accommodate an additional 10,000 tons of HE Bombs. A haulage road was driven through the 30m thick unworked gypsum pillar (below Castle Haynes Farm) to service the new area and the western boundary wall was constructed to act as blast protection on the working side of the mine. The extension was completed in October 1942. The separate sections of the store were known as the Old and New Stores, shown on the Mine Workings plan.

The explosion occurred in the New section of the store and is believed to have been caused by malpractice. The last person to leave the underground workings before the accident, testified at the official inquiry, that he had seen one of the armourers using a brass chisel to remove a damaged exploder from a returned

Major A P Burnside
RAF Fauld

Photo 1. An aerial photograph taken a short time after the accident, showing the extent of the fallout.

jettisoned 1000lb bomb. A practice to which a 'blind eye' had been turned, due to pressure on the unit to outload greater numbers of bombs, to satisfy the needs of the war in Central Europe. Although the explosion only lasted a few seconds it was reported to have seemed long and drawn out. The initial explosion caused a chain reaction; as the ordnance exploded throughout the New section of the store the force of the explosion intensified and culminated in a violent eruption. The entire surrounding area was transformed into a battlefield-like shambles. Haynes Farm was completely destroyed and the local villages of Hanbury and Tutbury were damaged extensively. Debris was reported to have been thrown many kilometres from the crater.

Although the Old Store was filled with debris and fall material it was relatively undamaged. The massive dividing wall between the Old and New sections of the store had taken the main force of the explosion and prevented sympathetic detonation of the ordnance. When it was cleared the Old Store continued to function. It was in use as recently as 1973 for the storage of US ordnance.

On completion of clearance of the Old Store mining engineers inspected the entrance into the New Store and considered that the gallery system was too unstable to attempt ordnance clearance. The central barrier wall was sealed and a secondary boundary wall constructed parallel to it to prevent access in the areas considered unsafe.

Requirement

The uncertainty over the quantity of ordnance remaining in the New store and crater face is preventing disposal of 500 acres of agricultural land surrounding the crater. Due to the present pressure to sell unwanted MOD land, the RAF requested assistance from the RE to assess the feasibility and costs of engineer work associated with the EOD clearance task. The client required advice on the most suitable method and associated costs and timescale of removing soil from within the crater to enable unexploded ordnance clearance to be completed by the RAF.

Site Investigation

A site investigation was undertaken by 527 STRE (Works). It included:

a. A topographic survey of the crater, tying into the National Ordnance Survey Grid and the co-ordination of its position in relation to the gallery system of the ordnance store below. The aim was to determine the area of the New Store that remained.

b. A survey on the North and South sides of the crater to assess the condition of the surrounding galleries.

c. A geological survey of the area based on

RAF Fauld (1).

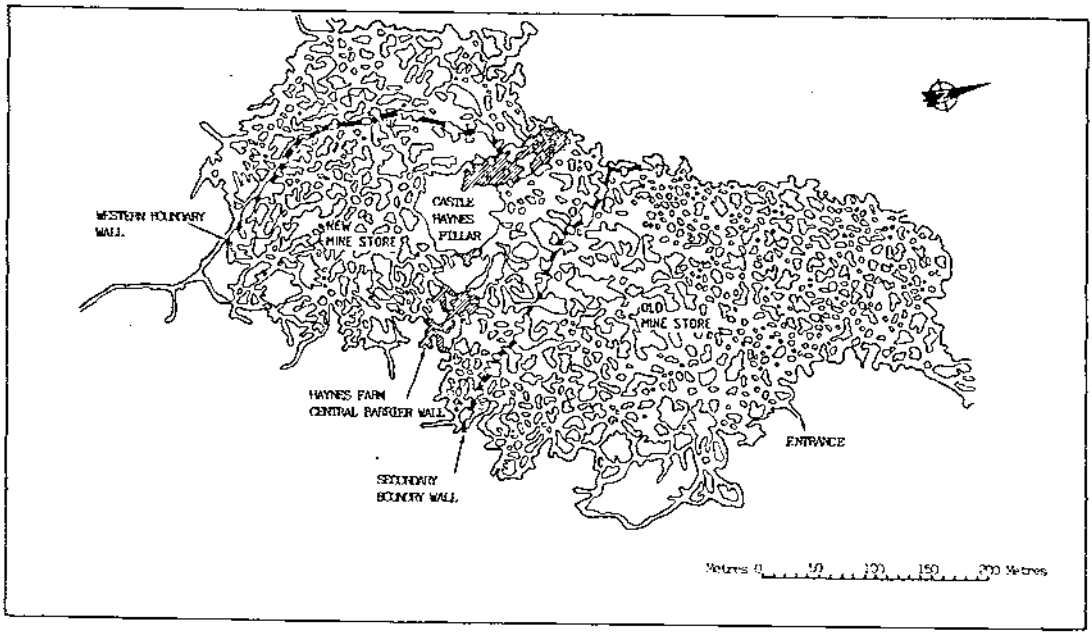


Figure 1. Plan of mine workings.

borehole logs provided by the Geological Survey and British Gypsum.

d. A soil survey of the crater face to assess its stability.

The conclusions of the site investigation were:

a. Access to any unexploded ordnance remaining in the New Store could not be gained through the gallery system. Any remaining gallery system would be unsafe and filled with ejecta from the explosion and running sands that had since flowed in.

b. The deepest part of the crater, and assumed centre of the main explosion is 2m below the level of the gallery system and close to the centre of the western boundary wall. The cross section through the crater showed the relationship between the gallery system and the crater.

c. The majority of surface materials on the face of the crater are redeposited ejecta, to an unknown depth. The sides of the crater are unstable and have all been subjected to

Figure 2. Cross section through crater.

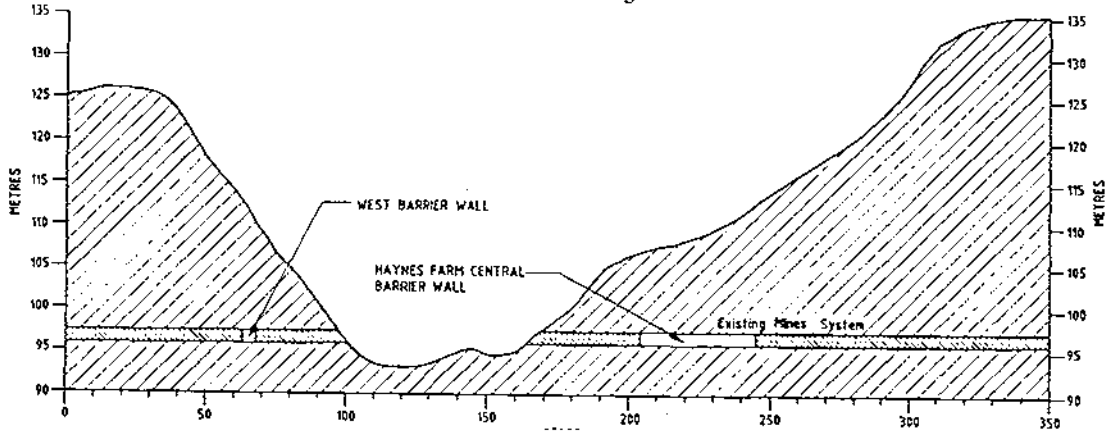


Figure 3. Ordnance holdings New Store.

rotational failure at some time. In most cases the failures are still active.

d. Before major excavation work could proceed at the level of the tunnel system it would be necessary to bench back the sides of the crater to their safe angle of repose, about 1 in 2.5 for the glacial soils present in the area.

Ordnance Holdings

The only remaining ordnance storage plan for Faulds is dated 1938. Although it had been updated on several occasions the revisions to the drawing were undated. The amended plan included ordnance holdings in the New store but there was no way of authenticating the accuracy of the

Photo 2. View of the collapsed state of the tunnel system of the Old Store believed to have been taken after the accident.

RAF Fauld (2).

drawing. The drawing showed that the main concentration of ordnance in the New store was in the north west corner and that the southern side of the store was unused.

Although it is possible that other areas of the store were utilised it was considered unlikely as the existing rail system of the store only extended to the known used area. Thus, for planning purposes the amended plan of the store was assumed to be accurate.

The exact quantity of ordnance in the New Store at the time of the accident is not known, but is estimated to have been 5,000 tons. There is some debate over the feasibility of calculating the quantity of explosives required to create a crater of this size, and thus estimating the quantity remaining intact. This course of action was not pursued; it was considered that there were too many variables and that the results could be misleading.

However, the shape of the crater and the fact that the ordnance in the Old Store remained intact indicate that it is probable that there is a significant quantity of ordnance in the remaining gallery system of the New Store. For example, had all the ordnance in the north west corner of the store exploded, it would be reasonable to expect the crater to be deeper in this area. Also, there are many passages in the store which could have shielded ordnance from the full effects of the explosion.

Scope of the Works

For the purpose of planning the excavation it was assumed that the gallery system was in a collapsed state and that bulk excavation of the ground above would be required to enable EOD clearance to proceed. Bulk excavation techniques, common to open cast mining, would have to be employed down to a depth of 29m, about 6m above the level of the tunnel system, followed by the detailed excavation of the remaining material, at the pace of EOD clearance. In addition the whole area would have to be "swept", to give EOD clearance down to a depth of 1.5m, before work could start on site and ahead of plant during the bulk excavation. On completion of EOD clearance excavated material would have to be replaced and the site landscaped.

The task is enormous. To satisfy the slope stability requirements of a long term excavation of this nature close to 270,000 m^3 of material would have to be excavated and hauled on average a distance of 200m. Using military plant only, it was estimated that the bulk excavation would take an RE plant troop three years, based on a nine month working year. The RAF advised that it would be difficult to estimate timings for the detailed excavation and EOD clearance, but based on previous experience they advised that they would expect the task to take an RE plant section and an RAF EOD team between four and a half and six years. The backfilling and landscaping of the site on completion of the EOD clearance would take an RE plant troop about two years. Thus, with the phasing of the work so that the detailed excavation began nine months after the start of the bulk excavation, the total RE requirement would be a plant troop and a plant section for five years, over a project period of nine years.

Certainly, the timing for the bulk excavation could be reduced if specialist plant was purchased for the task. However, the pace of the work would always be dictated by the EOD clearance, initially clearing ahead of plant during the bulk excavation phases and subsequently during the detailed excavation.

Conclusions

It is probable that there is a significant quantity of unexploded ordnance remaining within the collapsed gallery system of the New Store. The ordnance has remained in a stable condition for the past forty-four years since the accident and the RAF EOD department advised, after careful and deliberate consideration, that it is unlikely that it will cause an explosive ordnance hazard in the future if it continues to remain undisturbed.

There has not been a positive reaction to the Initial Reconnaissance Report at the time of writing but it is felt that the estimated fuel costs, of a little over half a million pounds, will make the project uneconomic. Especially if the aim of the EOD clearance is purely to increase the value of the surrounding land. It would be more economical to continue to lease the land to the local farmer or to reduce its sale value.

The project would offer good trade training for RE plant operators and management during the initial stages but has little long term value to the Corps.

Although the project was an interesting one to be involved with at the reconnaissance level it is not one that could be recommended as a suitable RE task.

The Quest for *Pandora*

COLONEL JOHN BLASHFORD-SNELL MBE DSc(Hon) FRSGS

John Blashford-Snell has pursued adventure since he joined the Corps in 1957 and being Adventure Training Officer at Sandhurst (1963-66) began to involve more and more young people in expeditions as a means to developing leadership. His earliest exploits, as the Diving Officer with 33 Field Squadron in Cyprus, searching for the lost port of Paphos, in no way diminished his love of this exciting side of modern exploration which is very much part of a Sapper's trade. Today he is the Commander of Operation RALEIGH, the largest youth leadership expedition ever, involving over 4000 young men and women of fifty nations.

"Never fear my boys, we'll all go to hell together". These words of encouragement growled by *HMS Pandora's* Master-at-Arms early one August morning in 1791 were almost the last that fourteen mutineers from the *Bounty* ever heard. However, as their prison began to slip down to a watery grave on the Great Barrier Reef, the Boatswain's Mate opened the grating in the roof of their wooden topside cell allowing most of the luckless men to scramble out and plunge into the foaming ocean.

This great saga of the sea had begun in 1787 when *HMS Bounty* was sent to Tahiti to collect bread fruit plants for transport to the Caribbean as a new food for the growing slave population. Finding the attractions of the Tahitian ladies more to their liking than service under the now infamous Captain William Bligh, the British sailors seized the ship and started the most notorious mutiny in sea history.

Led by Fletcher Christian, the mutineers put Bligh and eighteen loyal crew members in an open boat off the island of Tonga. Then they sailed back to Tahiti where sixteen of the 'Pirates' rejoined their 'live-in' girlfriends, many of whom were now well and truly pregnant. However, Christian, with eight shipmates plus a number of local men and women sailed to Pitcairn Island. Then uninhabited, and as the ring leader knew, incorrectly marked on the charts. The chances of being found were slight, nevertheless they fired the ship and as far as the world was concerned disappeared to found their own colony.

Amazingly, Bligh successfully navigated *Bounty's* launch 3618 nautical miles through terrible seas and the Great Barrier Reef to reach Timor in forty-one days. This is still a record! On return to England he acquainted their Lordships of the Admiralty with the news of his ship's fate. They were not amused.

Meanwhile, Fletcher Christian's demi-paradise had turned sour. Quarrels with the Polynesian men led to fighting and all save two seamen were soon dead. By 1808, when the first ship called in only one Englishman remained, however, he was surrounded by a large 'family' of women with numerous descendants of his shipmates. These people were the founders of the colony that exists to this day and to whom Operation *RALEIGH'S* flagship *Sir Walter Raleigh* brought much needed supplies and fuel in August 1986.

It was a strange fact that as our gleaming white 2000 ton exploration vessel rode at anchor in the turquoise seas off the tropical isle, it was linked through history to the wreck of the *Bounty*, 50 feet below. The home port for both ships is the City of Hull.

However, back in 1790, the Royal Navy had come to investigate the disappearance of their ship. *HMS Pandora*, 24 guns, under Captain Edward Edwards arrived at Tahiti in November of that year, and found fourteen mutineers who had been foolish enough to stay in their love nest. Some, it is said, believing themselves innocent, surrended voluntarily. But they were all seized, dragged aboard *Pandora* and clapped in irons before

Colonel John Blashford-Snell MBE
The Quest For Pandora

Photo 1. The brigantine *Zebu* and the SES *Sir Walter Raleigh* (Photograph courtesy of Operation Raleigh Promotions Ltd)

being incarcerated on deck in a hastily created wooden cell 18ft x 11ft with only two small scuttles or gratings secured by bolts. Midshipman Peter Heywood, one of the prisoners later to be pardoned recorded; "The heat was so intense, that the sweat ran in streams to the scuppers and soon produced maggots ..." It was nicknamed 'Pandora's Box'.

They had little chance to bid fond farewells even to their women and children who stood in canoes holding their babies aloft, howling with grief as the man o' war sailed for England and the inevitable court martial. The only sign of *Bounty* was an anchor that Edwards had hauled aboard as evidence. After three fruitless months searching the South Pacific, the search was abandoned and Captain Edwards decided to return to England.

It was late in the day and almost 4000 nautical miles westward whilst *Pandora* was seeking a passage through the Great Barrier Reef near what is today Cape York in Northern Queensland when she struck. Efforts to save her during the night failed and when two of the four ship's pumps broke, they were doomed. She sank at sunrise, but by good fortune, ninety-nine survivors, including ten mutineers, reached a nearby sand cay where tents were erected from sail cloth to give protection from the relentless sun. However, the mutineers, their skin lily white from five months confinement in Pandora's box, were granted no such luxury. Peter Heywood recounted: "We had to bury ourselves up to the neck in the burning sand which scorched the skin entirely off our bodies..."

However, like Bligh, all ninety-nine rowed to Timor and eventually reached England where the court condemned six mutineers, of whom three were hanged at the yardarm.

In 1977 Australian divers aided by RAAF anti-submarine aircraft using an aerial magnetometer, located the wreck in 100 feet of water and the Queensland Museum's energetic Curator of Maritime Archaeology, Ron Coleman, followed up the discovery. The site became officially listed as an historic wreck, and initial investigation proved beyond any doubt that this was the *Pandora* and brought up incredibly well preserved artefacts, including Surgeon George Hamilton's watch, one of the earliest to have a second hand and a stop-

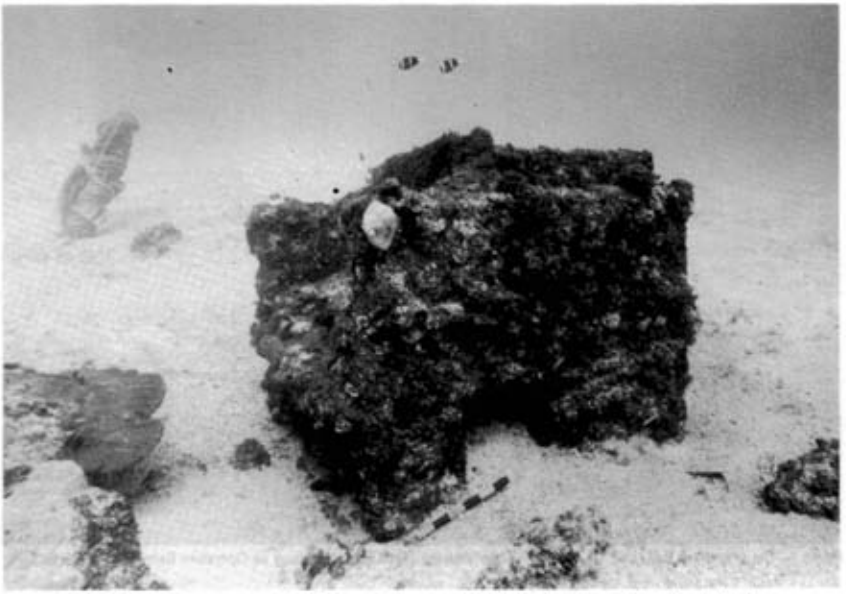


Photo 2. The *Pandora's* oven "where 18th Century sailors once dipped for choice morsels of salt pork" a large moray eel now stands guard. The oven, an advanced item of 18th Century technology could also be used to produce distilled water for the surgeon.

watch control. It is now restored to near working order.

For a much bigger expedition in 1986, involving over forty divers, a large vessel with a recompression chamber was needed, and we decided to cooperate with the museum in this exciting venture.

So for six weeks our flagship *Sir Walter Raleigh* was the centre of archaeological diving activities and also scientific studies for the Queensland National Parks on nearby cays. The vessel, equipped with a hospital, three laboratories, two 11 ton water jet powered landing craft and a full computer system was ideal for the purpose.

The crew, including young men and women from Operation *RALEIGH*, plus some US Navy personnel and a Royal Australian Navy underwater medicine specialist, needed all their skills to handle this project. Also supporting the expedition was our brigantine *Zebu* with sixteen Venturers and nine crew. This beautiful vessel was a great attraction for divers weary of their work in the deep. The last Baltic trader to be built she had been a gun runner taking arms to the resistance fighters in Norway during World War II.

Strong tides and some bad weather added to our difficulties and of course there was no shortage of predators, including a 20 foot monster whale shark, fortunately harmless. In fact Nellie, as she was known, fell in love with the all important *David Gestetner*, a 26 foot Avon inflatable diving tender, slightly to the consternation of its helmsman! On this craft two pumps thumped away driving an air lift system which sucked up sand and debris on the wreck 15 fathoms below. It was simply a giant underwater hoover.

Sadly the otherwise highly successful venture suffered a tragedy when the ship's popular Able Seaman, Neil Carmichael, from the Isle of Lewis, Scotland, disappeared on a calm, warm night whilst on anchor watch. Inspite of intensive searching, no trace of him was found and it can

The Quest For Pandora (2)

only be assumed that he fell overboard whilst attempting to adjust a mooring line on a boat secured astern.

Ron Coleman with eyes agleam describes how the *Pandora's* officers were obviously enthusiastic souvenir hunters for many stone implements, wooden clubs, cowrie shells and carved fishing lures have been found by divers excavating their quarters at the stern of the vessel. "This is the finest collection of datable ethnographic material from the Pacific" he claims.

But from the area of Captain Edwards' cabin we have also brought up parts of octants, hour glasses and what appears to be a complete flintlock pistol. Bottles, plates, wine glasses, utensils and a stone water purifier are filling the conservation boxes on *Sir Walter Raleigh's* deck. Remains of the thirty-five men who drowned when the *Pandora* went down have also surfaced and human bones are amongst the collection. Much of one skeleton was found in the area of surgeon Hamilton's cabin and it may be that this was a sailor killed by a runaway cannon or a falling spar when the ship first hit the reef. It is surmised that his body was carried below.

On the seabed there is the *Bounty's* anchor, that was to have been used in evidence and there is also the massive galley stove, sitting square on the foredeck area. Here sailors once dipped for lumps of salt pork and now a large moray eel stands guard.

All finds were photographed in their original positions before lifting and to ensure that the camera was located vertically above, a unique mercury mirror was used.

Margaret Rule of *Mary Rose* fame says that *Pandora* is the most significant wreck in the southern hemisphere and Ron Coleman agrees: "We are only just scratching the surface of this remarkable wreck which will give us an unrivalled collection of late 18th century Naval artefacts and enable us to know much more about shipboard life of the period."

However, whilst the archaeologists were busy, other scientific teams were also hard at work. In shade temperatures over 100°F, they studied the wildlife of this remote area. Three thousand Booby birds were checked for tags and used their sharp beaks to repel handlers—with painful effect. Over

Photo 3. Divers testing the mercury mirror, a photogrammetry aid used to ensure vertical photos.

ten thousand Green Turtles were counted as they lumbered ashore at night to lay their eggs in the warm sand. This was much to the onsternation of the Boobys, screeching and squawking in defiance at the 400 pound amphibious intruders, whilst in the shallows, scores of bronze whaler sharks cruised waiting to snap up weaker animals. At times the whole beach was alive with turtles. It was a fantastic sight.

But all this was due to the great support of many people in Queensland and especially the Queensland Tourist and Travel Corporation, who gave the venture generous assistance and backing. Operation *RALEIGH* has now moved on to new areas and fresh challenges but still needs more Sappers to direct the work.

The Quest For Pandora (3)

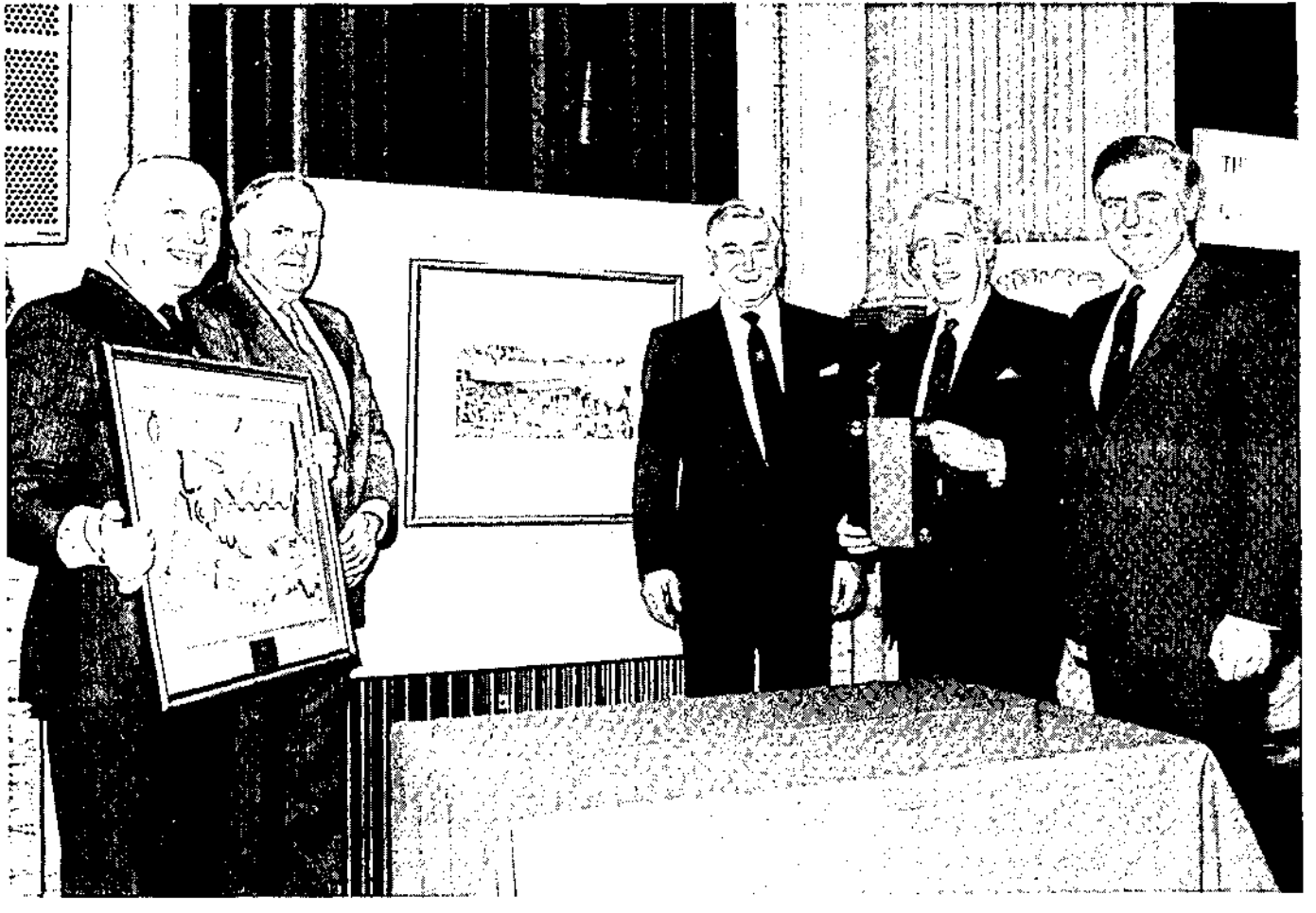


Photo 1. *(left to right)* Mr J C McKenzie, Secretary the Institution of Civil Engineers; Mr G Hornby, Assistant Secretary; Mr H W A Francis CBE, President; General Sir George Cooper GCB, MC, Chief Royal Engineer; Major General R L Peck, Engineer-in-Chief.

Barge No AC1320

THE Corps were guests at a reception given by the Institution of Civil Engineers on 12 January 1988 to commemorate the 200th Anniversary of the Granting of the Royal Warrant to the Corps. The President of the Institution of Civil Engineers, Mr H W A Francis CBE, who is also a lieut colonel in the Engineer and Transport Staff Corps, presented a picture of Barge No AC1320 to the Corps. The picture is a tinted photograph from the archives of the Institution illustrating a little-known event from Sapper history. In return the Chief Royal Engineer, General Sir George Cooper GCB, MC presented the Institution with a copy of the limited edition Commemorative Map of the Great Lines at Chatham.

AT the time of the construction of Barge No AC1320 (1917 and 1918) electric arc welding was still a relatively new technique. It was in use in the munitions industry and experiments were in hand at Portsmouth Dockyard. The use of the technique was actively encouraged due to an acute scarcity of oxygen gas used in oxy-acetylene welding.

James Caldwell, who was tasked with the construction of the barge, was born in 1882 and studied engineering at Glasgow and West of Scotland Technical College. He later became a consulting engineer specialising in electrical engineering. He became a member of the Institution of Civil Engineers in 1919, and he was awarded the Telford Premium in 1919 for a paper on "Electric Welding Development in Great Britain and the United States of America" in 1918/1919.

His war service commenced in 1915 when he was commissioned into the 6th Battalion of the Argyll and Sutherland Highlanders. In 1917 he transferred to The Royal Engineers, becoming Resident Engineer at the Inland Water and Docks Depot at Richborough. Later he was appointed Deputy Assistant Director of Materials and Priority at the Admiralty as a captain, Royal Engineers, with particular responsibility for the Electric Welding Section. Following the end of the war, James Caldwell retired from the Royal Engineers as a major and returned to the practice of a consulting engineer. He was chairman of a number of companies and continued to concentrate his efforts on the development of electric welding. It is believed that he died in 1968.

In October 1917 it was agreed that James Caldwell should organise and supervise the construction of the first all electric arc welded ship in the form of a 125ft long cross-channel barge. The vessel had a beam of 16 feet and displaced 225 tons. It was calculated that 245 man hours were saved by using this technique when compared with the normal riveting process. The total cost of welding was £301 which compared with a range of £389-£453 for riveted assembly.

AC1320 was constructed at Richborough, near Ramsgate. In view of the congestion at the original Barge Depot at Dover, it was decided in January 1916 to develop Richborough as a Barge Depot. By 1918 it had become a large and well equipped sea port with building yards and workshops for the supply and repair of barges and small vessels. In all, it covered 2000 acres and had a 2300ft long wharf for the cross-channel barge service. The port handled 30,000 tons of traffic per week and some 240 barges up to 1000-ton capacity were in use. Amongst the Sapper units based there, were the following companies; workshop and shipyard, construction, marine, traffic, train ferry, stores and an accounts company.

In James Caldwell's notes on the construction, he mentions the following officers and men of the Corps as having contributed to the success of the project:

> Majors Hamilton and Hamblay, Lieutenants Hawkins, Saunders, Mavor and Scharina, Corporal Bell, Sappers Baxter, Brown, Cricks, Curran, Grassmeder, Keith, Primrose and Sturgeon.

Memoirs

GENERAL SIR CHARLES JONES GCB CBE MC

Born 29 June 1906, died 4 January 1988 aged 81

This Memoir is the text of the address given by General Sir Hugh Beach at the Memorial Service to General Sir Charles Jones at Chelsea Hospital on 18 February 1988.

IF Christianity has anything to teach us about the nature of humankind then it must be the uniqueness, the unique value of every man and woman. And yet one must admit, in defiance of theology and good usage, that there are some human beings who strike one as being very much more unique than all the others. Charles Phibbs Jones—and it is both the first and the last time in my life I call him that—was pre-eminently such a one. We are here this morning for the happy purpose of rejoicing in the Lord, as that beautiful anthem has just reminded us, rejoicing and giving thanks for the most unique person that many of us here have ever known.

He was born on 29 June 1906, a Kerryman from Kenmare in the far South West of Ireland. He went to school at Portora Royal, near Enniskillen in Fermanagh, which he loved. He got an excellent grounding in Latin and Greek, Rugby and Cricket, but little Mathematics. I expect it was due to this weakness in maths that he passed into the Shop rather badly—eighteenth out of fifty. Up to that time he had never been to England. One who travelled with him from Woolwich station to the "Shop" in the same taxi said he seemed like someone out of the jungle: but very good company from the start.

My generation had always supposed that the

General Sir Charles Jones GCB CBE MC

nickname "Splosh", by which he was universally known, originated from some bridging disaster like the one which spectacularly overtook the Festival of Britain bridge in 1951. But we were wrong. *The Times* obituary gave the name a metaphorical connotation, from the habit of landing with both feet into trouble. There is much better authority for the *Daily Telegraph* version: that he got the name from a boxing bout in which he was paired off, by weight, against a tall and gangling youth called Stack. Stack was christened by the spectators "Spider", and Jones, being shorter and more rotund, became "Splosh". Both names stuck for life. Splosh worked very hard at the Shop, passed out top, gained the Pollock Medal and thus became head of 14 YO Batch. Elated he carried his ancient bicycle up onto one of the two high towers, part of the central facade of the Shop buildings overlooking the parade ground, and wildly cast it over the parapet onto the hard below, where it disintegrated in a shower of sparks.

The next three years were spent on engineering courses at Chatham and at Pembroke College, Cambridge—where he was once gated for a fortnight for some misdemeanour in the company of "Tiger" Urquhart. His first posting, at the end of 1928, was to the Bombay Sappers and Miners at Kirkee. He joined the Bombay Defence Light Section, then became Assistant Adjutant—no doubt in the rank of subaltern; he was to serve on the staff in every rank up to full General—then as a company officer with 17 Field Company first at Kirkee then in Quetta. By now he was an excellent horseman and became a dashing figure in pursuit of jackal with the Quetta Hounds; despite his pony, which he later sold to a brother officer, being described by the latter as a psychiatric case with suicidal tendencies. Splosh lived during 1933 in what is variously described as a large bungalow or row of single officers quarters, with two other sapper and miner captains—John Cowley and Charles Richardson—both of whom also finished on the Army Board as MGO. A co-incidence maybe? The Pakistani engineers put it all down to the climate and the altitude! Splosh spent five years with the Bombay Sappers, held the soldiers in high regard, loved the opportunities for shooting and riding, and would have gone back for a second tour had the war not intervened.

He left India for good in April 1934 and was posted as Adjutant to the Engineers of 42nd East Lancashire Division, a Territorial formation with Headquarters at Preston. He married Ouida Margaret Wallace, also from Ireland; known to us all, and loved, as Peggy. They settled at a house in Green Walk, Bowden, Cheshire. There was then no strong sense in the country that the army might again be needed. A TA unit like 42 Division RE was completely run down, and had become a foyer for reminiscence and conviviality. The Adjutant's effect on it was revolutionary. His enthusiasm; his terrific drive, cheerfulness and optimism; his proficiency in tennis, golf and horsemanship all helped in his approach to youngsters then entering the Corps. He was the live spirit in mess evenings. He was also a demanding disciplinarian, who hired and fired young officers in his own right, and once sacked one on the spot for smoking a pipe in the ante-room before dinner. The average age of the officers dropped by about fifteen years. He also worked hard at "horrid detail" like teaching book-keeping by double entry. He put senior officers through their mounted drill at riding school. Before the Armistice Parade in Manchester he marked out the spots and lines around the cenotaph in person, using a cart GS with two horses and a tub of whitewash. He had the reputation, on parade, of being more effective than any RSM who served under him. But how would one rate the chances these days of an officer who spent the first fourteen years of his commissioned service on courses, with native troops and in the Territorial Army?

In 1939 he went to the Staff College as a student and was there when war broke out. The Commandant Paget got them all into the Rawlinson Hall for a rather heavy patriotic speech. Halfway through there was a loud crash at the back. Splosh, attempting to open a window, had fallen and gashed himself. He had to walk out, clutching his wrist, pouring blood—a good start to the war! He was posted back to the 42nd Division, still a captain as GSO3, while Peggy and the boys stayed on in Camberley, on the corner of The Avenue and Southwell Park Road. Four months later Splosh was in France, still in the same division, as Brigade Major 127 Infantry Brigade. By then it was the spring of 1940. On 29th May they were on the Yser, German tanks had broken through and were outflanking brigade headquarters. The Brigade Major, with great coolness, improvised defences, mounted an anti-

tank rifle in a truck, stopped two German tanks in their tracks personally and thus bought precious time for the retreat. He was rewarded by an immediate MC and the Belgian Croix de Guerre. He had also revealed his rare talent for war.

A flurry of short postings followed. In June 1940, back to HQ 42 Division as GSO2; in September to Staff College as an instructor; in the following May to Washington as a member of the British Staff Mission; in September to GHQ Home Forces as GSO 1 Training. A year later he returned to regimental duty and dropped a rank to become OC of 353 Field Company, his only command in the rank of major and very short lived, for soon after that he was made CRE of 79th Armoured Division. All this, in a sense, was marking time. In April 1943 he became CRE of the Guards Armoured Division and took them to war in North West Europe fourteen months later. Here his fame began.

If the Household Division were quick to take to their hearts their tireless and ebullient Colonel Splosh, his effect upon the sappers was again electrifying. I hope I am hurting no-one's feelings if I say that when he took over they were not in the best of heart. Splosh, as one of them has said, knew what war was about and devoted his considerable talents and energy to preparing them. They lived on a diet of richly deserved rockets, one every working day and two on Sundays. "For the rest of my time as a soldier" this account goes on, "every other rebuke was an anticlimax compared with the blasts delivered by Splosh. Yet life was far from grim as he had the most marvellous sense of humour. Also he well knew when to use the soft pedal." When they did go to war they were as ready as it was possible to be, and it is a matter of history how highly the Guards came to rate their sappers.

After Arnhem he was on the move again, and saw the war out on the Staff of 30 Corps, first as GSO 1 and then from January 1945 as BGS. Here the stage management of the Rhine crossing at Rees on 23 March was his great achievement and ten years later, when he was Commandant at the Staff College, he and his Corps Commander from that time, General Sir Brian Horrocks, used to re-enact it as a playlet for the river crossing exercise. Two months after the surrender he went as Chief of Staff of the 14th Army, soon to become Malaya Command; then home again in April 1946 to be BGS Western Command, and in 1947 he was rewarded by a year at the IDC.

1948 gave him his first all-arms command; the 2nd Infantry Brigade, which held Jerusalem up to the end of the British mandate. It gave him his last taste of action, somewhat similar to his first. Arabs couldn't be permitted to slaughter Jews, however much the latter might seem to be asking for it. In one episode the Brigade Commander personally mustered a troop of armoured cars with mortars and machine guns, and swept the arab positions to save the lives of some beleaguered zionists. In 1949 the brigade moved on to Salonika. Four years earlier the British had defeated ELAS and saved Greece from communism. A British garrison remained thereafter as a stabilizing presence, preserving calm though taking no part in the civil war. Splosh was renowned by the tactical exercises that he ran for all comers, until the brigade was pulled out early in 1950. For a few months in 1951 he was Director of Plans at the War Office (being his fifth job as a brigadier) and was then given command of the 7th Armoured Division in BAOR.

This provided the second climax to his career. A sapper had never commanded an armoured division before. His predecessor had been sacked, after a divisional exercise, most unfairly as the division thought. The core of up-market cavalry regiments who had fought through Africa and North West Europe were less than keen on a sapper who believed in short haircuts; until it was clear who held the winning hand. They then gave him their undivided loyalty, respect and affection; and thereafter always gave him a cavalry officer as his ADC!

He commanded the Staff College for three happy years, did a tour as Vice Adjutant General at the War Office, (being by then a bit impatient to be getting on and up) and went in 1959 on promotion as the Director of the Combined Planning Staff for the ill-starred Baghdad Pact—later the Central Treaty Organization. In Ankara he pulled rank to acquire a Mark 7 Jaguar as his staff car, and drove it the length and breadth of Turkey as proud as Toad of Toad Hall!

During the 1960s he went right on to the top: Corps Commander in Bielefeld; Army Commander in York; Board Member as MGO. What a career! I make it twenty-eight different jobs in nine different countries. Sappers who become MGO are ten a penny, as the coincidence at Quetta shows. No other has commanded an Armoured Division, a Corps and then an Army.

In all of them he was loved. Indeed he was a natural head of clan; of the family after his elder brother died; of 14 YO-batch whose fortunes he ever thereafter followed; later as Chief Royal Engineer, as Governor of Chelsea Hospital, as National President of the Royal British Legion, as Captain of the Rye Golf Club. He had a matchless touch with people, not least by dint of the sheer hard work of learning and remembering all their names. His home life was of the very happiest.

As the trumpets sound for him on the other side, for what shall we most remember him? I remember him as the only person who always called me "Hughie"—a diminutive that my own parents stopped using when I went to prep school—which shows for how long he had known me!

One who describes herself as a very lowly member of the Royal Hospital Staff says that she was always so impressed and appreciated that the Governor could take time to send a postcard, from wherever he was on holidays, to the Great Hall Staff. "A touch of pure genius" she says; "it would be hard to find one so great in heart and mind now."

One who served under him in the TA before the war, a civil engineer by profession, has written: "Without the inspiration he gave me, and the technical know-how both of military matters and a wider view of life, I should never have gone so easily through the war nor had such a satisfactory life since. I think it is not often that a younger man influences an older in this way. I can never pay that debt but at least I have acknowledged it".

A regular officer who served under him in Guards Armoured Division, and went on himself to become a major general writes: "He was a great man and I owe him more than I can say."

The Times obituarist said: "He had all the Irishman's charm, gaiety and wit, but underlying it was complete dedication to his profession. He sincerely believed that soldiering was fun. Others did not find that easy as few were endowed with his seemingly inexhaustible capacity for work."

The subtitle said simply "Fearless fighting sapper' which is not a bad epitaph.

BRIGADIER K M PAPWORTH OBE MC FRICS

Born 20 September 1897, died 14 October 1987 aged 90

KENNETH MACAULAY PAPWORTH was educated at Felsted School and was commissioned into the Corps in 1915 where he acquired the nickname George by which he was subsequently known to his contemporaries in the Corps. He served in various units in World War One but was wounded while with 70 Field Company at Arras where he won the MC. After the war he spent two years in 54 and 55 Field Companies in the Army of the Black Sea and in 1921 went to Cambridge University for the one year Supplementary Class. A number of Survey appointments then followed and apart from a tour as a company commander in the Training Battalion he spent most of the inter-war years overseas; in Malaya (as Chief of the Colonial Survey Section) and later, from 1932 to 1935, in Iraq at Air Force Headquarters, engaged on desert survey.

He returned to England in 1935 to command 56 Field Company and in 1937 went to British Guiana in charge of the boundary commissions. For this work he was awarded the OBE (Civil Division).

World War Two brought Papworth a number of survey staff appointments in the United

Brigadier K M Papworth OBE MC

Kingdom, the Middle East and Africa and in Italy. He was Deputy Director General of Ordnance Survey from 1945 until his retirement from the Army in 1949. He then took up the civil appointment of Director of Ordnance Survey, Northern Ireland in Belfast. This came at a time when the organization was severely run-down partly as the result of the Second World War. The Base mapping of the Province—1:2500 County Series—was very much out of date, the small scales mapping was pre-war, the levelling information fifty years old with neither a fundamental benchmark nor a tidal station in Northern Ireland. Apparently undaunted by the size of the task he set up a development programme and embarked on a continuous training process for staff recruited as school leavers. The long term goal was to replace the County Series Mapping with a new National Series based on the Irish Grid and to re-survey the Greater Belfast Area and other urban centres at a scale of 1:1250.

When he retired in 1957 Brigadier Papworth had seen 1:1250 maps of East Belfast reach publication and work in progress on 1:2500 Irish Grid Mapping in Co Fermanagh and the number of staff in the organisation more than doubled to 125.

His relatively short stay in Northern Ireland transformed the Ordnance Survey both in outlook and technical competence and laid the foundations for the undoubted progress the organization has achieved in the succeeding thirty years.

From 1965 to 1968 he was a member of the Court of Arbitration for a boundary dispute between Chile and Argentina. The appointment was by the Foreign Office but he worked with a team of Sappers who carried out the Survey work.

From 1967 onwards Brigadier Papworth did much original research to provide subject matter for his very substantial contribution to *A History of the Ordnance Survey*, published in 1980. His three chapters covering the geodetic basis of our national surveys from the end of the eighteenth century until 1921 show the ample extent of his knowledge of geodesy and, in general, the scientific side of surveying.

After Belfast he moved to Haywards Heath and finally to Hove, Sussex. Here "George's" kindness and sparkling sense of humour was greatly appreciated by all with whom he lived. He was a keen gardener, particularly for roses, doing much of the work himself, in spite of being increasingly afflicted with arthritis. Historical records and classical music were both of continued interest to him. An abiding hobby was astronomy and he became Chairman of the Brighton Astronomical Society for some time.

He never married but his care and concern for all his family is remembered with great affection by his nephews, one of whom served in the Corps, and his niece who now lives in Lewes.

KMR JSOJ MJDB

BRIGADIER LORD NAPIER OF MAGDALA OBE MICE

Born 16 June 1904, died 29 October 1987 aged 83

ROBERT JOHN, LORD NAPIER OF MAGDALA, grandson of Field Marshal Lord Napier who led the celebrated expedition to Magdala in Abyssinia in 1868, was educated at Wellington and the Shop and commissioned into the Corps in 1924. He was posted to the Bengal Sappers and Miners in 1926. After a year as Assistant Garrison Engineer in Razmak he spent four years based in Roorkee with 1 Field Company.

Two formative years then followed in command of the Chitral Section (1932 to 1934) during which they spent three months of 1933 at Ayun between Drosh and Chitral, building a

Brigadier Lord Napier of Magdala OBE

140ft span reinforced concrete bowstring girder bridge.

Reinforced concrete was new to Chitral, since all cement had to be repacked into 80lb ghee tins for transport over the Lowari Pass by pack animal: so this was an experimental design, against the time when the pass would have at least a jeep track over it. Ayun bridge was reported to be still in use after forty-five years by a CMS missionary who visited Chitral on leave from Pakistan some ten years ago.

The Section later spent three and a half months of 1934 on the construction of the Dir bridge, something of an engineering challenge with one reinforced concrete and one steel span, the latter involving the driving of 2000 rivets.

In 1936 Napier took command of 8 Army Troops Company engaged in extensive construction tasks at Wana and was mentioned in despatches for this work. He took part in the 1937 Waziristan operations with his Company, working on the road up the Iblanke Sar from Dosally to Coronation Camp. He returned to England in 1938 as Adjutant of the Depot Battalion and graduated from Staff College in 1940 to go to the War Office as GSO3 Staff Duties.

In 1942 Napier was appointed AQMG Combined Operations Headquarters where he played a major part in the invention and the development of the Pluto pipeline (for which he received an award). He then went to North Africa and was Principal Military Landing Officer for 1 Canadian Division in Sicily and Italy. He was awarded the OBE for these operations, returning to Algiers as GSO1 SD before going to Italy in command of a regiment reconstructing bridges, reopening roads and generally restoring the infrastructure in Italy. He was wounded in November 1944 while carrying out a forward recce.

After the war he returned to India for two years and then in 1948 was appointed CRE in the Mackinnon Road Stores Depot Project in East Africa. He is remembered for the way in which no aspects of the construction or the welfare of the men escaped his meticulous attention to detail. He personally supervised the complexities of the allocation of skilled labour to the various components of the project in a memorable weekly meeting conducted in trying circumstances and so ensured the accurate and regular progress of the project. Despite the pressures of the work he also created a vast range of extra-mural activities from football and hockey to big game trekking and flying and with his brimming enthusiasm persuaded volunteers to run them successfully. He was in Africa for a year at the peak of the construction activity until finally returning to Europe in 1950. There then followed a series of appointments in Germany and UK culminating in promotion to Brigadier in 1956 as Chief Engineer Scottish Command.

In 1959 Napier retired from the Army and joined James Miller and Partners becoming Manager of their Civil Engineering Branch in 1962, responsible for a number of major bridging and other contracts. He was also involved with the opencast mining division giving advice on civil engineering and muck shifting problems and was the driving force in introducing critical path network to both the civil engineering and building divisions. He finally retired in 1973.

From 1960 to 1967 he was Honorary Colonel of Tyne Electrical Engineers. Typically, he undertook the task seriously and assiduously, helping steer them through the 1960s' reorganisation of the Territorial Army.

Throughout his life John Napier had been a splendid family man whenever the exigencies of service permitted. His natural love of outdoor sport, especially shooting, fishing and ski-ing (which he originally learned in Chitral) was spread unstintingly not only to his children and grandchildren but to nephews, nieces and great nephews and many of their friends. He was also a great lover of dogs. Indeed "he was a rare and original character whose tremendous energy and kindness shone out".

Brigadier Lord Napier is survived by his widow Elizabeth, whom he married in 1939 and their three sons and two daughters.

WFA ISK JRH WSG RAN

W N C van GRUTTEN OBE MC MA Hon FRZS

Born 9 June 1895, died 24 October 1987 aged 92

W N C VAN GRUTTEN will be remembered by many generations of Sappers who were at Cambridge between the wars. As a result of his distinguished contribution to their education he was elected to be an honorary member of the Institution.

Van Grutten was, in fact, a gunner in World War One who served with great distinction being five times mentioned in despatches and winning the MC in 1915 and Croix de Guerre. He was also awarded the OBE.

He was the son of Lucien S L van Grutten of Portscatho in Cornwall and attended Cheltenham College. He was admitted to King's College Cambridge in 1914 but did not go up until after the war when he read Mechanical Sciences. On graduating he joined Sir Alexander Gibb and Partners in 1921 and while with them he built Little Brook Power Station, and later, the Aquarium at London Zoo for which he was made an honorary fellow of the Royal Zoological Society. In 1925 he joined the staff of the University Engineering Laboratories and remained with them until 1939. During World War Two he worked at the Admiralty returning to Cambridge after the war to serve on the University Appointments Board until he retired.

Throughout his life his great pleasure and interests were his family, Cornwall, sailing and the friendship of visitors for whom open house was kept in Cornwall and Cambridge. His wife, Enid, whom he married in 1918, died in 1977. Their son John was a Sapper but died in 1980 as a result of his service in World War Two.

MVG REJ

MAJOR A E FRANKLAND

Born 4 March 1929, died 15 August 1987 aged 58

TONY FRANKLAND was educated at Cheltenham and commissioned into the Corps in 1949. ASH a fellow YO remembers "We went to Ripon to do our YO training—the SME had not fully returned to Chatham. Those were particularly happy days with the then Colonel E A Browning as Commandant and Lieut Colonel M C A Henniker as Chief Instructor in the Field Engineer School. I can particularly remember Tony Frankland dressed with some disregard for the niceties of the Corps regulations, causing a measure of consternation. Later when our paths

W N C Van Grutten OBE MC MA &
Major A E Frankland

rossed, Tony was always the same. He had a very trong streak of common sense and a highly leveloped sense of humour".

The majority of Tony Frankland's service was pent overseas in Germany, North Africa and the ar East. He returned to UK in the late 1950s and erved until 1968 when he took early retirement o start a second career: in industry.

He worked for Plessey Telecommunications for nany years where he made many friends and earned great respect from his colleagues. He was always greatly concerned for the jobs and careers of others and he will be remembered particularly for this.

Tony Frankland personified what is truly meant by the word gentleman. Those who served with him in his younger and perhaps wilder days will remember that he refused to suffer fools gladly and was forthright in all that he said and did, but still displayed kindness and patience to those who genuinely wished to learn. Above all he was a devoted family man.

He is survived by his wife, Bridget whom he met and married in Singapore in 1957, and their five children one of whom is now serving in the Corps.

ASH AJF

BRIGADIER R E WOOD CBE

Born 14 June 1897, died 9 July 1987 aged 90

RONALD ERNEST WOOD was born in Witley, Surrey and went to the Royal Grammar School Guildford and the Shop, being commissioned into the Corps in 1916. He served in Salonika in 99 Field Company until the end of the war and in 1919 joined the Madras Sappers and Miners in Bangalore. He had two years in Iraq in command of 64 Field Company with the difficult task of maintaining water supplies in the very hot summer of 1920 during the Arab Revolt.

Wood returned to England in 1922 for his Supplementary Course at Cambridge and Chatham and returned to India where Bangalore became home station for him for the next ten years or so. This period included an eighteen month tour in Razmak and a staff appointment in Simla and Delhi. He was appointed DCRE in Chatham on promotion to major in 1934 but this tour was interrupted by the outbreak of war between Italy and Abyssinia and he was sent to Alexandria in charge of Engineer Services in an Army contingent attached to the Royal Navy the aim of which was to provide anti-aircraft defences for the Mobile Naval Base Defence Organisation.

As World War Two loomed, Wood was posted to the War Office as Deputy Assistant Director Field Works involved in the preparations for the construction of hutted camps in Southern England. After a few months in command of a Scottish TA field squadron he was appointed CRE 5 Division after its evacuation from Dunkirk. This division became known as the "Globetrotters" having been sent to meet a series of threats in Ireland, India and then Persia in 1942. It finally went back into action in Sicily but by then Wood had been

promoted and he remained in Persia as Chief Engineer Paiforce (Persia and Iraq Force). MGS, his IO at the time recalls "he seemed to have exactly the right touch, he got the best out of us all. He was adept at teaching the young. He was never roused to anger but would occasionally indicate displeasure by a gentle whistling through his teeth. We were all sorry to lose him on his promotion and would have liked to have had him as our CRE in action".

Wood remained with Paiforce until the end of the war maintaining routes and camps in support

Brigadier R E Wood CBE

of the programme of aid to Russia. For this work he was mentioned in despatches and received the Russian Order of Kutuzov.

He returned to England in December 1945, being reunited with his family for the first time in nearly four years. He was based in the War Office but was tasked with reporting on German designs and fortifications and spent much time travelling throughout Europe visiting the various sites including U-boat pens in Germany and the big gun emplacements at Calais.

This brief reunion with his family was again interrupted when he was appointed Chief Engineer of the Mackinnon Road project in 1947. He was in Kenya for a year, before spending the last eighteen months of his service in Fayid where his family joined him until his retirement from the Army in 1949, in which year he was also awarded the CBE.

His busy life was to continue, however. After leaving the Army Brigadier Wood became Director of Public Works in Cyrenaica under Foreign Office administration and spent three and a half years restoring the war-shattered public services. On returning to England in 1953 he was re-employed by the Ministry of Defence on works planning in Southern Command until finally retiring in 1961. He then continued to serve the community in many fields being active in local government, Community Association and British Legion affairs. During this time his wife Olwen became very ill and he withdrew from his local government world and settled in New Milton. After the death of his wife in 1979 he devoted himself to the affairs of his daughter, son and four grandchildren all of whom survive him.

DCTS MGS AGP

BRIGADIER B CHICHESTER-COOKE CBE TD DL

Born 12 June 1902, died 1 July 1987, aged 85

IN the uneasy years before the Second World War the War Office, faced with the urgent need to strengthen the air defences of Great Britain, decided in 1936 to convert some Territorial Army infantry battalions to the anti-aircraft searchlight role, and re-badge them into the Royal Engineers. One of the battalions selected was the 20th London Regiment (The Queen's Own), which became the 34th (Queen's Own Royal West Kent) Anti-Aircraft Searchlight Battalion, RE. At that time Basil Chichester-Cooke was serving as a captain in the 20th London, and he now found himself as a Sapper, promoted major in command of 337 AA Searchlight Company. So quickly did he adapt to his new role that he was soon given the task of raising and training for war a new company, 338. In the words of OS "his magnetic enthusiasm, inspiration and ceaseless energy resulted in his company being the first in the battalion up to establishment, accomplished in the span of a year. When war came, 338 was deployed over a large area, including Romney Marsh, virtually in the front line in the event of invasion".

In 1940 he was promoted lieutenant-colonel and given command of 33 AA Searchlight Regiment at Stansted. Such was his grasp of the air defence business that two years later he was promoted again, this time to command 57 AA Brigade, with the responsibility of defending the industrial Midlands. A prime task was the protection of Sheffield against the possibility of flooding by the destruction of reservoirs in the hills to the west of the city. The defences included an original

feature, an extensive perimeter of electrically controlled smoke generators sufficient to black out the target from aerial observation. While commanding 57 AA Brigade he became a member, and later President, of the Inter-Services Scientific Committee. In 1944 came the new threat of the flying bomb, and Chichester-Cooke was brought south to command the Flying Bomb Defence Force. At his suggestion the mobile 3.7in guns in this Air Defence Group were replaced by more stable static Mark II HAA guns, mounted on the specially designed "pile platforms". These, deployed along the Kentish coast line, made a major contribution to the destruction of this new weapon.

After the war he commanded 64 AA Brigade, operating from the Duke of York's Headquarters in Chelsea, during which time he was appointed a Deputy Lieutenant of the County of London. As time went on he became convinced that the future of anti-aircraft defence lay with radio controlled rockets, and in 1951 he retired from the TA and returned to the City. However he maintained close links with his old Regiment, and was for many years a member of the Regimental Museum, and Officers' Club, Committees of the Royal West Kent Regiment. Although never a Gunner, he was of couse closely associated with the Royal Regiment as an Anti-Aircraft Brigadier, and shortly after the war he was invited to serve on the Master Gunner's Committee, of which he was a member for twenty-five years. He later wrote an article on searchlights which was published in the *RE Journal* in 1985. His business interests took him frequently to Finland, and for some years he was a leading member of the Anglo-Finnish Trade Association.

In 1939 he had married Betty Ogle, daughter of a Sapper, Brigadier A B Ogle who had once worked with Louis Brennan, and on retiring from business they left Blackheath and made their home at Upnor. Their yacht *Seabird* was a familiar sight on the Club moorings, to be followed by the equally well known *Penlena*. The Brigadier took an intense interest in Medway and East Coast sailing, and he played a major part in the re-establishment of "Medway Week", a regatta organised jointly by the REYC and the Medway Yacht Club, in 1957. One of the East Anglian Offshore Racing Association trophies, Jane's Cup, was presented by him in memory of their younger daughter, who died aged ten. Holland was a favourite cruising ground, and he and Betty had many friends in the KNZRV (Royal Netherlands Yacht Club). In 1962 their other daughter found a cannon ball in the mud near Upnor Castle. Research established this as a ball fired by one of Admiral de Ruyter's ships attacking Chatham in 1667. The Brigadier had it mounted on a block of yew from the grounds of Upnor Castle, and presented it to the Royal Netherlands YC, "from a group of Medway yachtsmen of the REYC, RNSA and MYC", for annual competition between teams of Dutch and British yachts in Dutch waters. Five years later he proposed and masterminded an event in which a whole fleet of Dutch yachts visited the Medway to commemorate de Ruyter's invasion three hundred years before. Some forty Dutch yachts responded to the invitation and the event was a great success. He was elected to the Royal Yacht Squadron in 1971.

Basil Chichester-Cooke had the good of the Corps and of its members always deeply at heart. An unswervingly upright and straightforward man, he recognised and abhorred any trace of insincerity or humbug in others. At the same time, for those at least who knew him after retirement, he was excellent company and an entertaining host. His lively mind and highly-developed sense of the ridiculous were well matched by his accomplishment as a raconteur. He will be remembered with affection by his friends at home and on the continent, by generations of REYC sailors for the great contribution he made over the years to the well-being of the Club, and with admiration by those with whom he made his distinguished career in the TA.

RHYC OS MBHW JVC OMR GWD EH

Correspondence

Combat Earthmoving—Are We Really Serious?

From Mr G K Booth, BSc, MICE, MBIM, MIStructE

Sir,—At Christchurch we read Major Banks' article in the December *Journal* with interest as it comes from a User, whom we serve, and one who is also an enthusiast. Christchurch was the Design Authority throughout the development of the Combat Engineer Tractor (CET). The throw-away criticism of the design and the designers was unworthy of a good article.

The CET project started at Christchurch as far back as 1963. At that time there was real doubt whether all the requirements of the Staff Target could be achieved in one machine. Protection, flotation, internal space, airportability and limited load classification conflict as does being a fast mover having good cross-country mobility with earthmoving which requires completely different torque, transmission, suspension and track characteristics. That the CET entered service in 1978 and has still not been matched by any overseas competition is a tribute to the designers of this unique machine and the lead they gave to the UK in this specialist field and of course to the vision of the Corps. Reliability is a problem for a limited run of special vehicles. Requirements to cover reliability have been improving for some time now but it can be expensive to establish. Accessibility is dictated by the design compromises arising from the wide range of roles of CET.

The ergonomics were the result of a dialogue between the designers, the RE Trials Team and the Army Personnel Research Establishment to cover the impossible set of conflicting needs set by the Staff Requirement and necessary safety considerations.

As far as earthmoving performance is concerned CET generously exceeded the minimum requirement but of course it stood no chance of meeting the 300 m^3/hour with a 100 m haul that was inadvertently printed in the production specification: this would involve 35 km of travelling apart from winning and dumping. The error was recognised some time ago but amendments must still be on the way.

In 1971 Christchurch did say that "CET should be presented to the User as a compromise machine able to undertake many tasks but whose performance in some may fall short of the specialist plant to which he is accustomed."

A recent investigation into the development of the CET and future alternative designs, with over twenty years hindsight and advances, has shown that if the requirement is the same the result would in dimensions and configuration be very similar to the present vehicle and it is not possible to produce a "cheap and cheerful" version. I think the original designers and developers did produce an optimum design.—Yours faithfully, G K Booth.

Superintendent Engineer Equipment and Head of RARDE Christchurch

From Major J A Jennings-Bramly MA, C Eng, MICE

Sir,—I was very interested to read Major Banks' article on the CET in your December issue. I have never had the task of managing the equipment, though I would have thought he must be correct in almost all that he wrote. He may be correct in his relatively mild complaint about designers and consultants.

My involvement was before the design stage in 1964 in the writing of a 'Concept Design Study' under contract to MEXE Christchurch while working for an excellent small firm called 'Norris Bros, Research, Design and Development'. The firm undertook a number of concept studies for MEXE and FVRDE (both now part of RARDE) amongst others. MEXE let similar contracts to other firms with a view to comparing ideas.

The point of writing is to highlight the difficulty of starting on a new concept. We were of course given a brief which had all the hallmarks of design by committee. I am working from memory but the following requirements were included:

Earthmoving capacity of a Size I dozer (Caterpillar D8)
40 mph on roads
30mph across country
6 kts in water
A 'good climbout capabililty' (from rivers)
Air portable
Air droppable

Multi-fuel engine
NBC protected personnel cab
Radio comms

We thought the idea of a fast, buoyant, air droppable 'D8' (from then current aircraft) was rather far fetched. Now the list looks rather less daunting. The concept study had to study concepts rather than design.

Most earthmoving equipment relies upon being massive to create the necessary traction. MEXE had a prototype 'Light Mobile Digger' which offered an alternative approach—substitute mechanical power for weight. But the Light Mobile Digger was hardly light in proportion to the amount of muck it could shift in an hour. Nevertheless we looked at the practical difficulties that may lie in fitting a chain saw to the edge of a bucket or blade (the equivalent of a hot butter knife rather than a mincer). We looked at fitting pneumatic road breaker bits in place of the teeth on a bucket. We thought about using a backacter as a pusher for climbing out of rivers. We considered walking machines (as we had done for a robot for Harwell), and the Americans are looking at this possibility more seriously now that control can be computer aided. We had ideas too wild and far too numerous to mention. The aim was to allow one's imagination to run a little wild and then to rationalise.

The rationalising resulted in a proposal for a tracked vehicle with a bucket at one end that would travel on roads with the bucket at the rear. A report was written and the firm's commercial artist drew a picture for effect from his own imagination, based upon the text of the report. I can only say it looked remarkably like the CET as we know it. It even had two cupolas, one behind the other and a sloping deck to give driver vision. But it was not yet designed, and it was not thought possible to meet the specification. Is it possible that the CET was made to look like the sketch because it 'looked right'?

I believe that the CET meets the specification as given to us as well as one could have hoped. The designers should be congratulated. Major Banks is obviously not convinced that the reliability problem is due to poor design rather than poor maintenance.

But what about that specification? Members of the committee that assembled the list will have known that it was a tall order; each probably wanted less than the whole list. 'The earthmoving capacity of a Size I dozer' is pretty woolly. But I do not remember any more specific instruction such as 'Dig *n* Tank positions of ?? dimensions in ? soil in *m* minutes'. MOD PE has changed since 1964 and probably since 1984 when I left it. The CET is the child of a system of procurement. It could be a lot worse, and if better, better at what? If you were to say 'just in reliability', then consider that the designer's brief called for much greater capability too. I believe he did well, in the first of a new breed —Yours faithfully, J A Jennings-Bramly.

24 Mallings Drive, Bearsted, Maidstone, Kent ME14 4HF

From Major A J Loch

Sir,—It is refreshing to read an article in the *Journal* about an in-service equipment and its problems (Combat Earthmoving—December 1987). The history of the CET may explain some of the reasons for the problems.

The Light Wheeled Tractor entered service in 1960, when I was sponsor for earthmoving plant in the War Office. The opinion of BAOR was that, while it was an excellent item of plant, it could not provide the close support that would be required by their field squadrons when they were mounted in APCs because it was not armoured, it could not swim and it did not have the cross country mobility of the tracked FV432. MEXE, as the Christchurch Establishment was known then, showed that the first two drawbacks could be overcome by fitting an armoured cab and by supporting the tractor on two assault boats using the wheels as paddle wheels. It swam remarkably well for such an ungainly machine but this was not the answer. It was obvious that BAOR needed something different.

At that time the Americans were trying to sell the concept of their Universal Engineer Tractor (UET) which was a self-propelled, tracked, armoured, swimming scraper with a dozer blade. This was not the answer either because the combination of scraper and dozer were not right for combat engineering support, but it did suggest the name Combat Engineer Tractor for the British solution.

It was decided to try and obtain authority for the development of a "military special" which would be basically an armoured, tracked, swimming LWT. A strong case had to be made justified by a new essential operational task that

could not be done by any other equipment. Such a task had just arisen. The FV432 could at that time swim but was not good at climbing the far bank of the river. The case for the CET was therefore the need for a vehicle, with the same cross country mobility and armoured protection as the 432, that could be first across a river, could climb steep banks and improve the water exits and which could also set up and operate a fixed ferry system for the APCs in fast currents. Obviously its swimming and bank climbing ability were very important.

A General Staff Target was agreed in 1962. Two machines were delivered in 1968 for concept trials. In 1969 a General Staff Requirement was issued with a contract for seven prototypes being placed in 1970. MEXE was the design authority and ROF Leeds the manufacturer. To keep the price down the designers were told to use standard commercial components wherever possible. Did the gearbox come out of a London bus and the final drive out of a railcar? The prototypes were delivered for trials in 1973-4 and the CET was accepted in 1975. Production started in 1977 with the first machine delivered in 1978 and the last in 1981. Its development was frequently under financial pressure and to save money and time the normal procedure of producing a few pre-production machines for trials was omitted. Some people believed this was the cause of many of the current problems. The pathfinder role for an APC swimming river crossing was not deleted until a late stage so the current role of combat earthmoving was not the primary consideration in the design stages. The number of machines produced was less than had been intended because of financial restrictions.

In the mid-70s PRA Wing made a strong case to be involved in the training of CET crews but this was rejected, mainly on the grounds that the CET is similar to the 432 which was taught at Bovington and there were not enough CETs to have training machines in two locations. PRA Wing also proposed a special two week course in CET unit management for the officers and senior NCOs who would have to oversee the tasking, maintenance and continuation training of the crews. At some stage it had been decided that the CET would be crewed by combat engineers so the PRA Wing suggestion that the logical crew was a POM and an armoured engineer was not accepted either. Was this because POMs were often considered, erroneously, to be construction engineers and not trained for combat engineering tasks? It is interesting to read now that the officer with probably the greatest experience with CET agrees with PRA Wing's opinions of a decade ago.

As to output, I did a few digging trials with CET at the RSME in the mid-70s. On the "Ponderosa" with an experienced crew its output was comparable with the Allis Chalmers MWT. I think it took 18-20 minutes to dig a vehicle pit. The 1979 REPB gives the Allis Chalmers MWT a maximum output of 120m³/50 min hr on a 50m haul and suggests an overall correction factor of 0.5, so the achieved outputs in the article are not too bad allowing for no haul. PRA Wing did know in the mid-70s what the realistic outputs of the CET were likely to be but were told not to interfere.

I do not believe that the CET should become a C vehicle. It is much more akin to an A vehicle and so are its repair and spares systems and the unit management, but if the Corps is to use it to anything like its full potential it is essential that plant experts are involved in the basic and unit continuation training.

Major Banks is quite right in saying that the CET, for all its problems, is a first class machine if properly crewed and managed. It should be crewed by a POM and an armoured engineer and there must be properly trained unit management. Perhaps every unit should be established with a senior NCO with prime responsibilities for CETs. As the original sponsor of the idea and the inventor of the name Combat Engineer Tractor, I hope units come to grips with the problems and make a success of their only combat engineering vehicle.

Readers must agree that the CET took far too long to come into service, however the UET, now called the M9 Combat Earth Mover, which started the idea had not begun production in 1981 when all the CETs had been delivered. Maybe we are not the only army Engineers who have difficulties in convincing their General Staff of the need for specialised vehicles.—Yours sincerely, A J Loch.

Andrews Cottage, Bentworth, Nr Alton, Hants, GU34 5LB

The Bailey Story

From Brigadier S A Stewart, CBE, MICE, FIStructE

Sir,—I read with much interest the letter from Mr J Richardson in the September *RE Journal* about the tests on the Hamilton bridge carried out at the Experimental Bridging Establishment in 1937. I remember these tests quite well. They were done by our experimental officer, Alfred Jarrett-Kerr (now Brig (Retd) CBE) and the late Donald Bailey (later Sir Donald Kt OBE) and I watched them closely.

The static tests were as described by Richardson, but there was a further trial which he has not mentioned—a live load test which contained some unusual features which might be of interest. This was needed to see if the bolted joints in the bridge would stand up to vibration, and the problem was to find enough heavy vehicles which were sufficiently mobile to give the bridge even a partial test load. No tanks of sufficient weight then existed of course.

We decided to use steam rollers—it was before the days of diesels—and we found that we could just get six of these (totalling about 80 tons) on to the 140ft span, which if run at 6ft intervals nose to tail could just remain mobile. Hampshire County Council produced them, and they arrived from all parts of the county, towing their caravans behind them. The drivers were all of the 'old Bill' type and were not accustomed to being asked to drive to close limits at their maximum speed, which was about 5 mph, but they were very willing.

The rollers had no brakes except for a handwheel which took about ten seconds to apply, and they had at least a full turn of backlash in the steering. Their idea of an emergency stop was to slam the regulator into reverse, with consequent anxiety for those behind. There were quite a few accidents until they learned to do this gently but they soon became expert.

We then made things more difficult by fixing 1in battens across the deck to increase the impact, but the rollers made rather heavy weather of these as of course they had no springs and even a 1in obstacle was enough to make them hesitate without a run at it, for which no space was available. The driver had to open his regulator at the precise moment, but the air was filled with crashing noises until he learned to do this.

We made the convoy do 1000 crossings which took about three days. It was an impressive sight to see these cumbersome vehicles, snorting fire and smoke with whirling flywheels and frequent minor collisions, but as speeds were very low, no serious damage resulted. The bridge passed this test without difficulty.

However we did not repeat the experiment when we came to test the Bailey three years later!—Yours sincerely, S A Stewart (Superintendent EBE 1936—41). *Fridays Farm, Warninglid, Sussex RH17 5SN*

Wider Institution Membership

From Colonel J E Kitching, BA, FBIM

Sir,—Looking through the Corps *List* when it arrived, I could not help but notice that the Retired List appears to contain a large wartime and National Service officer element. If my observation is correct then over the next twenty years we can expect that the number of retired officer members of the Institution will decline as these members, many of whom are already elderly, will have no successors. Only the ex-regular and TA element of the Corps will then form the Retired List.

It seems to me that as membership declines, not only will this create an uncomfortable situation for the Institution, but for the Corps as a whole. The Corps today owes a great deal to the influence of its ex-wartime and National Service officers, to the links they maintain in the civilian world and the goodwill that the Corps enjoys as a result. To some degree the TA will continue to provide contacts but, in the face of growing lack of civil awareness of the military and increasing belief in the unlikelihood of war, we need to ask ourselves will they be enough?

Now is the time, I believe, for the Corps to be considering the value of its current links with the civil world and how these are to be maintained. One suggestion might be to open the membership of the Institution to non-military members in some way by offering perhaps associate status to civilian engineers working for the MOD or PSA or in defence industries. One could compare this idea with the Society of American Military Engineers in which civilian engineers who work for the US Army and Air Force are full members in what is a highly active and influential organisation.—Yours faithfully, J E Kitching.

Old Meadows, Pitton,-Salisbury SP5 1DH

Responsibilities

From John Richardson BSc FICE FI Mech E FIEE FBIM

Sir,—1987 was the 150th Anniversary of the Electric Telegraph. Cooke and Wheatstone's patent being dated 1837.

Having had some involvement with associated events, I came across a reference to an amazing level of responsibility placed on Lieutenant Douglas Galton RE in connection with the International Electric Commission.

In 1851, Prussian, Belgian and French telegraphs were in government hands, whilst the government of Great Britain wished to keep the development and its costs with private enterprise.

Lord Palmerston, Foreign Secretary, was insisting on maintaining policy control and told the Committee of the Privy Council for Trade that he had appointed Lieutenant Galton as British commissioner. On the 20th March 1851 he wrote to Lieutenant Galton, "You will address your reports as to the objects of these meetings and as to the proceedings of the Commissioners to me".

In June 1851 Lieutenant Galton prepared a long memorandum in which he is seen as having set out with considerable perspicacity the situation as he saw it albeit that he considered that government aid would be necessary to lead to the fullest development.

This memorandum and the initiative of other members of the Commission brought the Foreign Office to give the matter serious attention. Lord Palmerston had a letter drafted, which, whilst not taking up the point of involvement of the Post Office then, did express that it was desirable to remove all obstacles in governmental support in view of the potential benefits.—Yours sincerely, John Richardson.

Elm Cottage, Salmons Lane West, Caterham, Surrey CR3 5LT

Operation CROWN

From Captain W Boldock RE

Sir,—I read with great interest and fond memories Colonel Stevens' article on Operation *CROWN*. There can be few presently serving who took part in the project which took several years to complete and involved hundreds of sappers. I as a lance corporal plant operator spent my nine months as part of the Howard Train soil stabilization team and later operated a Bray LWT stripping up the blacktop which had taken hundreds of hours to lay, in preparation for the SGME concrete plant to place the rigid pavement.

Relaxation after work for most soldiers meant a visit to the local village and the Paradise Bar, Sawadee Bar or taking comfort in "Mamasan's" and despite the ban on drinking MeKong Whisky vast quantities were still consumed.

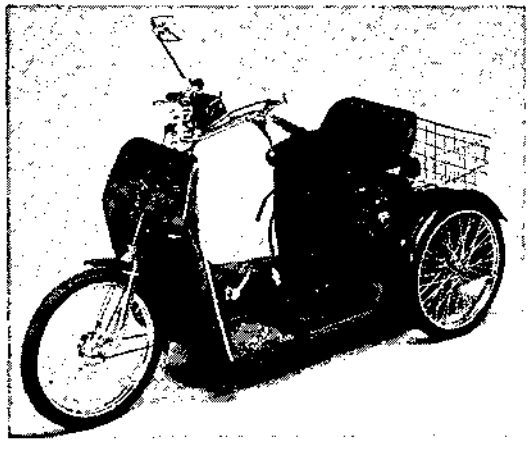
If my memory doesn't fail, the "Polaris Silos" were constructed by the Australian field troop attached to 11 (Independent) Field Squadron and I like many others spent as little time as possible sitting on them plagued by flies and the oppressive heat performing a natural function.

I believe that "Foxy" was a Sapper Fox (Crane Operator) in 54 (FARELF) Support Squadron or was it 59 Field Squadron?

Happy days.—Yours faithfully, W Boldock.

410 (BAOR) Plant Troop RE(V), 43 Plant Squadron, 25 Engineer Regiment, BFPO 36

The Further Development of the Batritrike



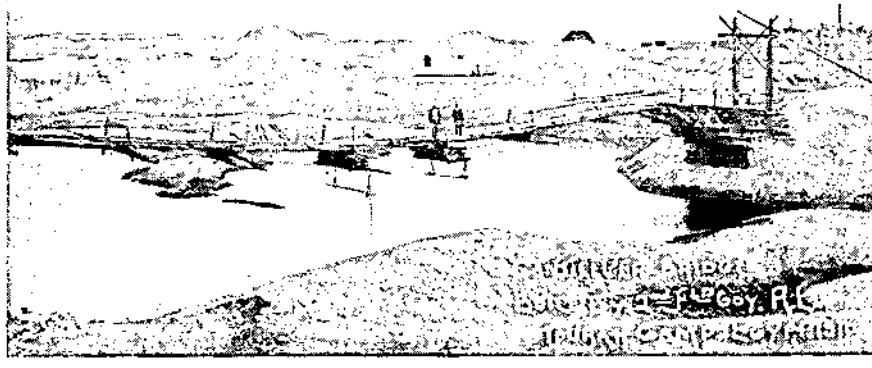
From Brigadier H G W Hamilton CBE DL

Sir,—In the article that I wrote in the *Journal* in 1983, I described the development of the Mark I version of the electrically assisted pedal tricycle, the Batritrike, and the difficulties that had had to be overcome with the Department of Transport over the drafting of the Regulations. The original design was based on fitting an electric motor to a standard tricycle and was not really satisfactory, so once the Regulations had been approved a completely new version was designed and developed from scratch. The photograph illustrates the Mark II Batritrike,

which is based on an underslung tubular steel frame, which has allowed a very much lower centre of gravity, and has a differential and disc brake on the rear axle. This has greatly increased stability and manoeuvrability. A fibreglass shield and body has been added with an adjustable and comfortable seat but the basic motor drive and electronic control remain the same.

Unfortunately Mr Sinclair brought out his Sinclair C5 vehicle based on the same regulations at the same time at a price which was only half the cost of the parts of the Batritrike, and as the C5 proved a complete failure, the mass market for electric tricycles was ruined and it became difficult to find a firm to take on the Mark II Batritrike. I have however made ten of the new machines myself for particular customers and friends, mostly disabled or elderly all of whom seem highly satisfied. I am still hopeful that I will be able to find someone to take it on commercially.—Yours sincerely, H G W Hamilton.

Covert House, East Haddon, Northants NN6 8DV.



Following our publication of the article "Collecting Sapper Postcards" by Major G C Jones TD a number of interesting postcards have been received. We are indebted to Mr J Grassom for the above dated 1910.

September 1987 Journal Awards

THE Publications Committee announces the following awards for articles of special merit published in the September 1987 *Journal*.

"The Chieftain AVRE Project" by Lieut Colonel J F Johnson OBE, £25
"Breeding Beautiful Butterflies" by Lieut Colonel J A Thorp MBE, £20
"The New Concept of Providing Engineer Support to Armoured Divisions" by Brigadier P J Sheppard OBE, £20
"The Global Positioning System" by Major M C Breach, £20
"Chieftain Armoured Vehicle Royal Engineers" by Lieut Colonel D J Holtby, £5

Book Reviews

DESIGNED TO KILL
MAJOR ARTHUR HOGBEN

(Published by Patrick Stephens Ltd, Wellingborough, Northants—Price £12.50 ISBN 0-85059-865-6)

MAJOR Arthur Hogben is uniquely qualified to write the history of British bomb disposal from the earliest days. He brings together the work of the three Services and tells many stories of great heroism.

Bomb Disposal in 1938/9 was a problem which no one wished to grasp, and was pushed around between the three Service Ministries, the Home Office and the Air Raid Precautions Department. It was at one stage proposed that a specially recruited force under the Home Office, be recruited from the ranks of the British Legion. The invasion of Poland in August 1939 showed the danger from unexploded bombs and in November 1939 the first RE Bomb Disposal Parties were raised. The training given was flimsy, information on enemy weapons non-existent and the technique was initially to destroy bombs *in situ*. Inter departmental wrangles continued until 11 May 1940, two days after the first enemy bomb was dropped on mainland Britain, when the War Office agreed to accept, with some exceptions, responsibility for Bomb Disposal. The raising of the RE Bomb Disposal units and their subsequent expansion is well recorded.

The various technical advances made to counter the fuzes of the first bombs; and then the multiplicity of fuzes used not just to cause delay but to kill the bomb disposal operator are covered. Many of these are recorded by the individual acts of neutralisation and disposal. The members of the bomb disposal committee and the scientists, who left their desks to deal with unexploded bombs, particularly when new techniques were being evaluated, have had their activities well recorded. Although there is mention of inter-service rivalry and bureaucracy it comes across very clearly that at working level there was a great deal of co-operation between those engaged in practical bomb disposal operations. The book pays tribute by name to the many officers and senior ranks who were actively engaged in clearance work. We must not forget the many unnamed and unsung men who worked in this field carrying out the digging, shafting, supporting in many practical ways this dangerous task. The book makes interesting and exciting reading in covering individual clearance activities.

Although Bomb Disposal may have reached a peak in 1940/41 in the UK, thereafter as the scale of air attack diminished the work continued at a steady pace. The German Butterfly Bomb, one of the earliest sub munitions, was a very effective weapon in causing casualties and denying the use of an area for a long time. This bomb had three fuzes and was extremely sensitive. German attacks on the East Coast left considerable numbers of unexploded bombs in standing crops, fields and hedgerows as well as among the houses. Clearance was a long and difficult process and many civilian casualties were caused by those picking up or moving Butterfly Bombs.

As the British Army advanced across Europe there were more clearance tasks: of our own weapons, of carefully placed booby traps and of equipment and ammunition dumps left by the retreating enemy. Post war activities both in the UK and overseas and operations in Northern Ireland are included.

The Falklands Campaign reminded us of the threat from air attacks and here for the first time is recorded the full extent of the unexploded bombs in, and damage to Royal Navy and RFA shipping. Although the *RE Journal* of June 1983 touches on the EOD activities much of it was limited at the time the article was written. Now the extent of the damage is recorded which shows that had more bombs exploded the Task Force would have suffered greater casualties and its operations severely affected. Clearly Bomb Disposal has been restored to a high priority activity.

This is a highly recommended book, which covers a particular role of the Corps which is known only to a few. It fills a big gap in the Corps History, Volume VIII covers the whole subject in nine pages. Arthur Hogben is to be congratulated on a first class work.

JBW

MAIN BATTLE TANKS
Developments in Design since 1945
ROLF HILMES, TRANSLATED BY RICHARD SIMPKIN

(Published by Brassey's—Price £25 ISBN 0347568)

THIS book brings together in one volume a series of articles originally published in the Bundeswehr Journal *Soldat und Technik* and now translated into English (your reviewer remembers reading them in the original German).

The author has been involved with tank technology for the past twenty years. He offers a comprehensive survey of tank developments since the war, considering advances in subsystem technologies and the technical problems facing developers. After an assessment of national philosophies the author concludes with a look at the future.

Throughout the book the author shows how difficult it is for designers to escape from conventional concepts. Since the war over forty different types of tank have been developed, most going into production. Yet very few show any radical change in design.

As the translator notes, the book is one of the few texts in English dealing in depth with tank technology. It should appeal to anyone requiring a grounding in this subject and forms a sound basis for further study by virtue of the comprehensive reference list drawn from around the world—much of it in German.

The Sapper should note that there is no discussion of variants and protection against mines is only mentioned in passing.

The book is naturally strong on West German developments. However, since the original articles were published in 1982 and 1983, there are few details of the Challenger, the US M1 and the T80 and supplementary sources are necessary.

Throughout, the author makes comparisons between contemporary tanks. Today he might well revise some comments on M1 and Challenger after this year's Canadian Army Trophy tank gunnery competition and the performance of III US Corps during this year's Exercise *REFORGER/CERTAIN STRIKE*, whose M1s all came from stockpiles in Europe.

JEN

AN IMPROVISED WAR
The Abyssinian Campaign of 1940—41
MICHAEL GLOVER

(Published by Leo Cooper—Price £18.00 ISBN 0 85052 2412)

THE British Campaign in Italian East Africa in 1940/41 was an amazing feat of arms by any standards. At the time, it was overshadowed by more threatening events closer to home and it has never received the public attention it deserves. Michael Glover's concise and graphic account is therefore a welcome reminder of the bold strategy and dashing tactics employed by General Wavell and his commanders.

Five Imperial divisions, two Indian, two East and West African and one South African, defeated an Italian Army of 250,000 men operating on interior lines. 700,000 square miles of the most inhospitable territory imaginable were conquered and the rear of our forces operating in Libya secured. The generalship was some of the most brilliant of any campaign in that war and produced several outstanding commanders of the later years. Slim, who commanded the brigade in the abortive attack on Gallabat-Metemma afterwards criticised his own actions in that battle as too timid!

Although the campaign was swift and the enemy soundly defeated, Michael Glover reminds us that it was by no means a walkover. The fight for Keren was brilliantly contested, one in every two men in the forward positions becoming a casualty.

To the Sapper reader the space given to the vital role played by Engineers in this difficult country is tantalisingly brief. Perhaps one day someone will write an account to do this justice? The heroic feat of 2nd Lieutenant Preminda Singh Bhagut of 21 Field Company Royal Bombay Sappers and Miners on the approach march to Gondar and for which he received the Victoria Cross is covered.

It is a very readable and enjoyable book, the only disappointment is the poor quality of the maps. One can only suppose that modern economies in printing preclude the use of fold out maps that can be referred to at the same time as the text.

SEMG

PASSCHENDAELE

PHILIP WARNER

(Published by Sidgwick and Jackson Ltd—Price £13.95 ISBN 0-283-99364-2)

THE word Passchendaele has become almost a synonym for mud in the English language. Certainly this small Belgian village's association with mud and slaughter is unquestionable by even those who were born long after fate determined that it, and the low ridge to which Passchendaele gives its name, would be etched in the annals of horror forever. The name conjures up, to English-speaking men, what Verdun does to Frenchmen. The devastation, the tragedy, the futility and the pain of war spring to mind at its mention. So too, does the indomitability of the human spirit, courage and sense of humour in incredible adversity.

With the passage of over seventy years since Passchendale became famous, however, few people can now say with confidence why the name brings such images to mind. Philip Warner has done a great service by providing the answers. His well-researched book is an excellent example of a thorough campaign study which goes much further than merely providing a catalogue of events. He describes in detail the battle which lasted from 31 July until 6 November 1917, including much of specific Sapper interest; and he does so with commendable compassion for those who endured it. At the same time he provides an enlightened insight into the military and governmental politics which put the battle into context. It is the lot of architects of pyrrhic victories forever to be castigated and Field Marshall Haig, in particular, attracts much critism from Warner. However the dominant feature of the book is the greatness of the simple men whose unenviable job it was to fight. Their courage, stoicism and ultimate achievement can never be overstated.

But this book is not only for historians. It does, perhaps unintentionally provide food for thought for those who envisage a modern war in Europe. Given the scale of deployment of Warsaw Pact artillery, for example, and the devastation which its use would cause, would modern plans for a highly mobile armoured battle rapidly resemble those for the infamous "cavalry breakthrough" in World War One? With the scars of European conflict as yet unhealed would the now much more prosperous civilian community of Western Europe so readily accept its defence by destruction? Would a military commander ever again be able to ask so much of those under him? Certainly there could be no secure chateaux to cushion them from the effects of their decisions.

Napoleon was credited with saying that if one wants to know the future one should study the past. Philip Warner's book is both an excellent study of a truly horrific campaign and a foundation for thought for all those who would, in Clausewitz's terms, seek to extend politics by the use of war as a tool.

Passchendaele is one of those "hard to put down" books which deserves to be read by all officers who pursue the study of their profession.

CMD

SEND PORT AND PYJAMAS

DAN RASCHEN

(Published by Buckland Publications Ltd—Price £9.50 ISBN 07212 0763 4)

THOSE who enjoyed Dan Raschen's first volume of light-hearted autobiography, *Wrong Again Dan*, which took him up to his twenty-second birthday and covered the aftermath of the Second World War in the Dutch East Indies, will be delighted by *Send Port and Pyjamas*. This second volume continues in the same vein and tells of the author's experiences in Korea; besides being even harder to put down than the first, it is a significant historical record which fills a gap other writers have ignored.

The Korean War is now almost a forgotten war, but for those of the author's generation who were involved it was an education in many aspects of war which stood them in good stead for the rest of their service. Because the fundamentals have not changed, the lessons learnt in Korea are as valid today as they were thirty-five years ago. Unlike almost all other post war conflicts, the war was fought on both sides by armies rather than by brigades and battalions. Latterly the British contingent formed the major part of the unique 1st Commonwealth Division, which by the armistice was one of twelve divisions in the front line of a multi-national United Nations army commanded by an American general.

Ostensibly Dan volunteered to go to Korea

because he understood that once there he would enjoy unrivalled opportunities to bag pheasants. Thanks to his ability to laugh at himself and to exploit the art of understatement while telling a good tale, he has painted a vivid picture of the second half of the conflict as seen by a fun-loving young Sapper officer fresh from two years at Cambridge. He arrived to find himself involved in an almost static war being fought in mountainous undeveloped country with a climate which ranged from the bitter cold to the hot and sticky; not only does he succeed in evoking the feel of what it was like to be a troop commander and a junior staff officer under such conditions, but he also tells the reader how he got his pheasants.

This is a book everyone will enjoy and learn from: for those who served in Korea at any time it is a must. I hope we don't have to wait too long for Volume 3; soldiering anywhere with Dan must always have been fun and full of surprises.

JNE

GUNGA DIN

RUDYARD KIPLING
Illustrated by Robert Andrew Parker

(Published by J M Dent & Sons Ltd—Price £6.95 ISBN 0 460 06282 4)

RUDYARD Kipling's immortal Barrack Room ballard, written in the cockney English of an 1890 British Soldier, recalls an obscure incident in some Frontier campaign. It is based on the story of Juma, water carrier to the Guides at the siege of Delhi in 1857. Robert Andrew Parker, an avid Kipling fan from Connecticut, who has won several American awards has illustrated this new edition and Kingsley Amis has written an introduction.

What makes it special are the pictures which both recall Imperial splendour and give some faint inkling of the life led by a British soldier serving his Queen and Country in the days before air conditioners and air trooping. Some are vaguely reminiscent in a starker background of Edward Ardizonne's work.

Perhaps with its message from the days of the Raj it would make an unexpected gift for nephew or grandson. Better still give it a wider audience and present it to their school library.

MBA

PLAN YOUR ROUTE

VICTOR SELWYN

(Published by David & Charles—Price £10.95 ISBN 07153 8892 4)

Plan your Route, the new approach to map reading by Victor Selwyn contains a wealth of shrewd observation and lays much emphasis on common sense as is proper for the subject. It is written in an individualistic style that sometimes irritates but nevertheless presents its message enthusiastically, convincingly and pragmatically.

Much useful, detailed advice is to be found in Parts 1—6: the importance of planning carefully in advance, and appreciating scale in terms of time as well as distance; the need to evaluate information outside the borderline of the map and within the map face; the differences between navigating on foot and in vehicles and the significant factors which arise when crossing deserts, mountains and urban areas; and the value of considering the psychological state of mind of those who have to navigate particularly in hazardous terrain.

Although other parts will be irrelevant to the normal user the book is nevertheless a useful reference volume that will provide excellent guidance to anyone wishing to improve their route navigation skills. The depth of detail will ensure the beginner can start to acquire the skills which can be built on by practice and experience but will benefit the more experienced navigator too.

JGF

ASHANTI 1895-96

IAN MCINNES AND MARK FRASER

(Published by Picton Publishing (Chippenham) Ltd—Price £17.95 ISBN 0948 25112 3)

THE appearance of previously unpublished material concerning the Campaigns of the Victorian period is always welcome, albeit that in the case of *Ashanti 1895-96*, much of it is found interspersed between medal rolls. Readers should be aware that this book is of more interest to the medal researcher and collector than to those seeking a definitive work on the campaign in general and the work of each unit in particular.

On its value as a reference work on the Ashanti Star and its recipients, the latter are better served

than the former. It would have been helpful to have a little more background information about the design and particularly the naming of the star. We know a little concerning the naming of the stars to the West Yorkshire Regiment but nothing about those to Sappers which have been named.

The text in places begs a number of questions and there are some typographical errors which should not have occurred. However, the book does add to our knowledge of the campaign and its medalic rewards to those who took part—it therefore fills a gap and still leaves room for others to write further on the subject.

GH

MUCK SHIFTING FOR KING GEORGE

MAURICE H SANDERS

(Published by Cortney Publications, Bainson House, Alton Road, Luton, Beds LU1 3NS—Price £3.95 ISBN 0 904378 34 9)

THIS slim booklet is a collection of reminiscences by the author, who trained as a plant operator and was a driver in plant units in the last war. It has some good photographs of plant including an armoured dozer and a Centaur dozer tank. Mr Sanders contemporaries, whose plant exploits are described, will enjoy this book. Those of us who are concerned with the use of plant in modern warfare will not find much useful material in it though it is a powerful statement of how plant was used in many theatres then.

RHS

A SOLDIER OF THE SECOND WORLD WAR

JOHN HALL

(Published by John Hall—Price £2.95 ISBN 0-951 2575-0-1)

ALTHOUGH the author records his experiences in this book as a Gunner he began his service career as a Territorial in the Searchlight unit of the Hampshire Fortress Company of the Royal Engineers. This privately published book can be obtained from Mr J O Hall, 36 Keith Road, Talbot Woods, Bournemouth BH3 7DU.

REJ

The following books have been received:

EXPLOSION INVESTIGATION

H J YALLOP OBE MA BSc C CHEM FRIC

(Published by The Forensic Science Society and Scottish Academic Press at £4.00 per copy, post paid in UK ISBN 0-7073-0272-2)

THE SOCIAL CONSTRUCTION OF TECHNOLOGICAL SYSTEMS

New Directions in the Sociology and History of Technology

EDITED BY WIEBE E BIJKER, THOMAS P HUGHES AND TREVOR PINCH

(Published by The MIT Press, Price £29.95 ISBN 0-262-02262-1)

BOOK NEWS FROM INSTITUTION OF CIVIL ENGINEERS

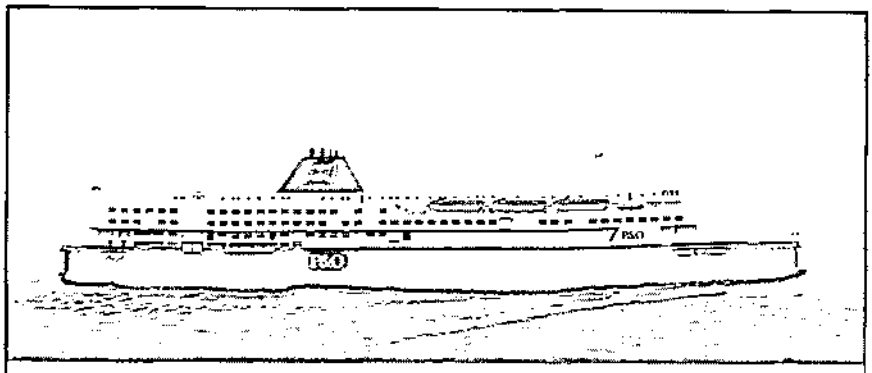
All books in this section are published by Thomas Telford Ltd and are obtainable from Thomas Telford Ltd, Telford International Bookshop, 1—7 Great George Street, London SW1 3AA

TRENCHLESS CONSTRUCTION FOR UTILITIES NO-DIG 87

International Society for Trenchless Construction conference proceedings

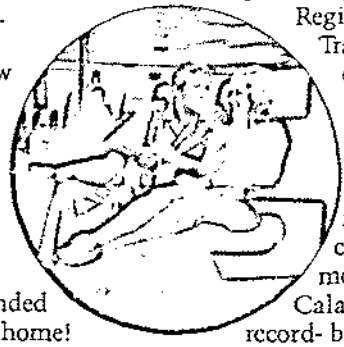
Price—£25 in UK, £30.00 overseas ISBN 07277 1310 8

In the two years that have elapsed since the first conference, trenchless technology has become a widely understood and accepted term to describe a variety of techniques which often have little in common except the specific characteristic of being able to install pipes or ducts without disturbance. Whatever utility is concerned water, sewage, telecommunications, gas, electricity, cable TV and oil—if it goes underground, trenchless technology can be used.



The fastest way to feel at home

Nip home with P&O European Ferries — it's the fastest and the friendliest way to go by ship. Drive aboard and you feel more than half way home already. For a start, you're among friends. There's a cheerful, English speaking crew on all our smart, modern ships. And with the good food, comfortable easy chairs, videos on the longer sailings, and even a friendly 'Local', you're surrounded by all the comforts of home!



The fast routes home

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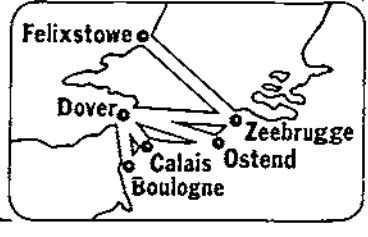

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