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Editorial

INTO THE SECOND HUNDRED YEARS

THE main article in this issue is the Report on the Centenary Meeting. The presentations on the *past* and the *present*, which set the scene for the discussions on the *future*, are given in full so that Members who were unable to attend may join in the written discussion. The discussion at the Meeting took a little time to flow freely, and, as might have been expected, had to be cut off when it was in full cry. After the Meeting, in the exhibition room and over the buffet tables, the interchanges were much more exciting. Many of the questions posed remained unanswered. Many answers merely raised further questions. Two Members have already submitted written contributions to the discussion, both are provocative. It is hoped that other Members will join in and submit their ideas. Kites will be flown, differences of opinion will be aired but axes and knives will be banned! *It is not necessary to be disagreeable to disagree.* Contributions should be limited as far as possible to about 300–400 words. One hundred copies of the complete proceedings, including the written discussion, will be prepared and will be available to Members on a "first come first served" basis. These Commemorative copies will be autographed by the President (for authenticity) and will cost a maximum of £5·00 each. The actual cost will be dependent on the number of pages required to cover the written discussion.

As we move into the second hundred years of our existence we look again at the First World War, partly to emphasize one of the points made by General Jackson who, when dealing with the Fifth Era in his talk at the Centenary Meeting, said "The junior officers of 1914, who gained such a brutal schooling in the First World War, became the commanders and policy makers of the Second . . ., they directed it with great skill, giving us the victory with minimal loss of life"; secondly to re-emphasize that there are *always* lessons to be learnt from the past and thirdly to emphasize that the immediate view of the individual is seldom reflected in the whole picture.

We also turn again to Northern Ireland. Firstly, Peter Rhodes who wrote the very informative article on the "Structural Assessment of Buildings Subject to Bomb Damage" in the June 1975 issue of the *Journal* has been persuaded to submit a follow up article on Repair of Bomb Damage. Secondly we have an interesting article on Gunniting, a well tried civilian technique, which was used for an essentially military purpose. These are two examples of the use of "civilian" knowledge to advance military expertise, this was one of the points made in the discussion at the Centenary Meeting.

As has already been stated the Centenary Meeting posed many questions, it is up to us to find the answers, preferably in advance of impending disaster. Without at least some of the answers we will limp from crisis to crisis. This is sometimes unavoidable but it should never be accepted as normal practice, such an acceptance is an abdication of responsibility. As Mr Hanning, in the discussion on the future said, "The future is unpredictable and forward planning must take account of this unpredictability, indeed it must be a positive parameter of our thinking."

Centenary Meeting of the Institution of Royal Engineers

LIEUT-COLONEL J B WILKS, RE

THE Centenary Meeting of the Institution of Royal Engineers was held on 27 November 1975 at the Institution of Civil Engineers.

The President, Major-General J C Woollett, CBE, MC took the Chair and 218 members, guests and friends of the Institution attended, An exhibition of photographs and models had been arranged in the Brunel Room and was well patronised both before and after the Meeting.

The Chairman opened the Meeting, having welcomed all present, by reading the message we had sent to Her Majesty The Queen

> "The Members of the Institution of Royal Engineers, assembled at their Centenary Meeting, at the Institution of Civil Engineers, London, join with their fellow Members serving in many parts of the world in conveying their loyalty and devotion to your Majesty, our Patron"

to which Her Majesty had graciously replied

> "As Patron of the Institution of Royal Engineers, I sincerely thank the Members, both at home and abroad, for their kind message of loyal greetings, which they have sent on the occasion of their Centenary Meeting. It gave me much pleasure to receive this message and I send my warm good wishes to all concerned on this notable occasion"

The Chairman introduced General Sir William Jackson, GBE, KCB, MC, *ADC*, The Quarter Master General, who spoke on "Our Sapper Heritage".

Our Sapper Heritage

"IT is a great honour to give the introductory talk at this historic Centenary Meeting of the Institution of Royal Engineers on 'Our Sapper Heritage', but the richness of our history, the eminence of the engineer and military talent gathered here tonight, makes it a daunting prospect. I am probably addressing several 'Henry Fords' to whom 'History is bunk' but I think most of us would agree that, although history cannot be used to forecast the future, it is the data-bank of our inherited experience and its myths and legends are our inspiration.

"Like our Corps motto, our history is a two-sided coin; '*Ubique*' representing the Corps' historic and continuing originality, ingenuity and versatility based upon our extensive engineering experience, and '*Quo Fas et Gloria Ducunt*' reflecting the inspiration of our military past.

"This evening I will sketch briefly the highlights of five periods, into which I believe our history falls, mentioning some of the personalities who have inspired us and those events, which have a relevance to us today; and I will conclude with my own personal assessment of what we should prize most in our heritage."

FIRST ERA
THE FORTIFIERS—1066–1713

"I WILL not dwell long on the 650 years of this first period from the Norman Conquest to Marlborough's Wars which I have called the Era of the 'Fortifiers'. Men like Sir Humphrey de Tilleul, who was William the Conqueror's Engineer-in-Chief, and who is depicted on the Bayeux Tapestry establishing the Norman 'firm base' after the landings near Hastings; and Bishop Gundulf, who built the Great White Tower in the Tower of London, were essentially well educated men—the first important point which I wish to emphasize—who might, and did, build cathedrals just as well as castles and had little or no connection with the Army, such as it was, in those days.

"Regrettably, English engineers lagged behind their Continental colleagues, who under Vauban's genius, had begun to demonstrate the vulnerability of fortresses to methodical attack by engineers and artillerymen working in close co-operation and had already started the decline of the 'Fortifiers' before we knew it. We, insular British, not for the last time, failed to appreciate what was happening—and this was to cost us dear in the second era."

SECOND ERA
THE SAPPERS AND MINERS—1713–1815

"THIS period covered the next 100 years and included the Seven Years' War, the Great American Rebellion, the Siege of Gibraltar, Wellington's campaigns in India and, finally, the Napoleonic Wars of which the Peninsular War was the most important to the Corps. During this formative period of the Corps' history there were four notable developments:

"First, armies became regular and needed regular military engineers. Engineer officers were commissioned for the first time; later they were formed into the Corps of Royal Engineers and other ranks were raised, initially, as Soldier Artificers, and later, as Royal Sappers and Miners; and by the end of the period, the officers and other ranks had been brought together in our present Corps of all ranks.

"Secondly, fortresses did become more vulnerable to the efforts of Sappers and Miners, who not only constructed the batteries for the artillery, but also led the infantry in the assault from the saps, which they had dug towards the walls. The Sappers also provided devices like scaling ladders to force a way through imperfectly made breaches. During assaults they wore tracing tape around their hats so that they could be recognized in the dark, hence the Peninsular War cry: 'Follow the Sapper'.

"Thirdly, the need for thorough Engineer training was belatedly recognized. In 1812, thanks to the efforts of Charles Pasley, the RE Establishment was set up at Chatham to correct the amateurishness of the British Sappers and Miners. In the Peninsular War Wellington had written: 'In the attack on Badajoz we had six out of seven general officers employed, all their staff, and a very large proportion of officers, killed or wounded. These great losses would be avoided, and in my opinion, time gained in every siege, if we had properly trained people to carry it on. . . .'

"And fourthly, and most significantly, there was Wellington's decision, taken after Waterloo, that the Royal Engineers should keep their 'hands in' in peace by assuming responsibility for 'Fortifications and Works'. Monuments to our skill as latter day fortifiers litter the world as do our efforts as barrack builders. Pasley's training, and the Iron Duke's 'Fortifications and Works' policy, laid the seeds for the third great period which was to follow."

THIRD ERA
THE IMPERIAL ENGINEERS—1815–1898

"THIS era included most of Queen Victoria's reign and was exemplified by the Corps' design of the Crystal Palace for the Great Exhibition of 1850. It was, indeed, a 'Golden Era' for the Corps as well as the country. Thanks to the establishment of the Royal Military Academy (first, at Addiscombe and Marlow, and finally at Woolwich), and to the expansion of Pasley's RE Establishment (to include courses in civil engineering, architecture, survey and, later, construction), the officers of the Corps were well trained by the standards of the day in both civil and military engineering principles.

"The continued existence of Sapper and Miner units in both the British and East Indian Company armies ensured that young Sapper officers became practical military engineers early in their careers, with that invaluable asset, the 'Engineer Eye'.

"It is hardly surprising that many Sapper officers found themselves seconded to flourishing Colonial administrations, helping to open up the expanding Empire in various fields. Among these were:

"Road construction work through difficult country like the Canadian Rockies; Sapper's Town in British Columbia becoming Vancouver.

"Railway and port work in undeveloped places like Abyssinia during Napier's campaign.

"Dams, irrigation projects and canals, like Colonel John By's Rideau Canal, which enabled British shipping on the Upper St Lawrence to avoid the American batteries on the south bank; his construction camp called Bytown, becoming Ottawa.

"The Survey of vast tracts of country in such projects as the North American Boundary Commission which delineated the 49th Parallel between Canada and the United States of America; and not forgetting Andrew Scott-Waugh's self-denial when, as Surveyor-General of India, he announced the discovery of the world's highest mountain and named it after his predecessor, Colonel Everest, a Gunner.

"Nor did the Corps lack battle experience. The steady stream of small Imperial Campaigns, together with the Indian Mutiny, the Crimean War and the Omdurman Campaign, ensured plenty of active service; the Corps winning twenty-five VCs and five of its officers rising to the rank of Field Marshal.

"At home, Pasley's School of Architecture turned out the designers of many pieces of Victoriana, which are still with us today, such as The Albert Hall, The Victoria and Albert Museum, Edinburgh's Museum of Science and Art, Dublin's National Gallery and London's drainage system!

"Thus the Corps became an important part of the Victorian Imperial Establishment, providing some sixty Colonial Governors, a Viceroy of India, a declined Prime Ministership and our three great figures of Victorian legend, Napier of Magdala, 'Chinese' Gordon and Kitchener of Khartoum.

"Significantly, the Institution of Royal Engineers was established at the height of this golden era, strengthening the links between the Corps and the Engineering Profession which were to play such an important part in the last two eras."

FOURTH ERA
THE INNOVATORS—1898–1920

"THIS era really overlaps that of the 'Imperial Engineers', but for chronological simplicity I have given its starting date as the beginning of the Boer War when the nation's purse strings were loosened, not only by the conflict in South Africa, but also by the realization of the growing threat to British interests from the ambitions of Kaiser Wilhelm's Germany.

"The Sappers, as the only scientifically trained Corps in the Army, were able to show their inventiveness to the full, developing the Balloon Service, the Telegraph Service, mechanical transport (based, at first, on steam traction), submarine mining with its complementary specializations of searchlights and harbour defences, including wire-guided torpedoes.

"The Boer War, however, was little more than the 'Hors d'oeuvre' of the era. War, and with it the Corps, was changing dramatically. National mobilization had become militarily fashionable with von Moltke's success in the Franco–Prussian War of 1870. In 1914, whole nations tramped to war, and with them went their civilian as well as military engineers.

"In the hideous holocaust which followed, the Corps gave birth to an enormous brood of children, the most famous of which were The Royal Flying Corps, which was developed from the Air Battalion RE (as was the Royal Naval Air Service), The Royal Tank Corps, inspired by three great Sappers (Swinton, Elles and Martel), and the Royal Corps of Signals whose formation in 1920 recognized the rapid growth of the RE Signal Service. The famous 'Waterbabies' Christmas Card sent to Douglas Haig's Engineer-in-Chief, Sir George Fowke, by his staff lists some of the other 'babies' such as Tunnelling, Artisan Works, Electrical and Mechanical, Tramway, Road Construction, Gas, Forestry, Sound Ranging, Land Drainage, Port Construction, Camouflage, Inland Water Transport and Boring Sections. The Corps expanded from 25,000 Regulars and Territorial Army volunteers to over 300,000 by 1918. This

massive expansion, in numbers and in engineering specializations, would never have been possible without the close links which the 'Imperial Engineers' had established with the nation's Engineering Profession."

FIFTH ERA
THE PROFESSIONALS—1920–1945

"THE period from 1920 to 1945 will be remembered for such great feats of military engineering as the Mulberry Harbours, but there is another, and deeper, reason for my choice of the title 'Professionals' for the fifth and last era.

"World War II started only twenty-one years after the Armistice of 1918, an unusually short interval between major wars. The junior officers of 1914, who gained such a brutal schooling in the First World War, became the commanders and policy makers of the Second. The changes, which they made in the inter-war years, were based upon personal knowledge and realistic appreciations of what was likely to be needed. In spite of drastic financial stringency caused by the world depression of the early 1930s they laid sure foundations. When war came again in 1939, they directed it with great skill, giving us the victory with minimal loss of life.

"The principles, followed by these experienced men in developing the Corps between the Wars, found many inspirational echoes from the past:

"Gundulf and the 'Fortifiers' provided the educational tradition. All RE officers received university degree training in the broadly based Cambridge Mechanical Science Tripos, giving them a scientific academic discipline, a multi-handed engineering capability, and a qualification accepted by the Engineering Profession whom they were to lead in war.

"The 'Sapper and Miner' tradition of close co-operation with all Arms was carried forward by the Corps playing its full part in the development of tactics and organization of the Army at home, and in the Imperial Policing and minor campaigns abroad.

"Wellington's decision on 'Fortification and Works' was not forgotten. Between the two World Wars, and for some years afterwards, all officers were rotated between field and works appointments to give them balanced engineer experience. The exceptionally well optimized Sandhurst Barrack Blocks stand today as monuments to this period. No barracks, as I know from personal experience as Quarter-Master General have ever been so well designed, 'Soldier proof' and yet architecturally satisfying.

"The close links forged by the 'Imperial Engineers' with the Engineering Profession were further strengthened through a large and active Reserve Army that provided most of the Corps' specialist units, many of which were based upon individual civilian firms; through the fullest use of the Engineer and Railway Staff Corps for engineer advice; and through the Professional Institutions.

"And a fifth echo came from the 'Innovators', where strong links with the scientific world were consolidated by the establishment of the Military Engineering Experimental Establishment (MEXE) at Christchurch. The MEXE success, which will always be remembered, was Sir Donald Bailey's war winning Bailey Bridge.

"All this led to the professionalism of the Corps in the Second World War campaigns: Demolition, covering the withdrawals in Norway, France, Greece, Crete, Malaya and Burma; mine warfare in the Western Desert, Tunisia, Sicily and Italy; bridging to defeat German demolition plans in Italy and North West Europe; airfield and road construction virtually everywhere; construction of logistic installations and development of Lines of Communication, in all theatres; and the three greatest feats of all:

Breaching the Atlantic Wall by the Assault Engineers
Construction of the Mulberry Harbour on the Normandy coast and
Crossing the Rhine which heralded the end of the War in Europe.

"The Corps had again expanded to about 300,000, but this time had only half the

number of casualties of the First World War—although the Second World War lasted one year longer."

CONCLUSION

"In conclusion, what should we prize in our heritage? Looking back over the 900 years I suggest that all that is best is our history can be summed up in three short captions":

UBIQUITY

"That multi-handed military engineering versatility which stems from a combination of broadly based engineering degrees and their associated scientific discipline, together with a rigorous military engineer training that have given the Corps its well deserved reputation for originality and ingenuity."

AN ARM AND A SERVICE

"Our unique position in the Army as an Arm and a Service exemplified, on the one hand, by our great proconsuls of the past, and by our provision last year of twenty-three of the General Officers of the Army; and, on the other hand, by our major engineering projects undertaken over the centuries in peace and war."

ENGINEERING PROFESSIONALISM

"The development of our Engineering Professionalism which has given us our special position in the wide spectrum of the national Engineering Profession and has enabled us to mobilize the country's engineers so successfully in two World Wars.

"I must leave you to discuss what the opening speaker at the Bi-centenary Meeting will christen the era since the end of the Second World War—I have my own ideas—but I must not pre-empt the Engineer-in-Chief who is speaking on 'The Present' or the discussion on 'The Future'.

"I have only sketched some of the highlights of our Corps history. To those of you who are not 'Henry Fords' I can thoroughly recommend Derek Boyd's short *History of the Corps* which has just been published in the Famous Regiment Series by Leo Cooper. I am indebted to him for making the research for my talk so much easier."

* * *

The Chairman introduced Major-General J H Foster, Engineer-in-Chief, who took the story forward.

The Present

"It is my privilege to look at the period since the end of the last war and I will start with a quick summary of the major changes because it is these changes which have affected every aspect of the life of the Corps. The period—perhaps we sometimes need reminding it is thirty years—has seen our withdrawal from 'the Empire' and a reduction in our overseas commitments. The years immediately after 1945 left us with occupation forces in Germany, Austria and Japan and from then on we have been involved across the whole spectrum of military operations from the Korean War and Suez to the counter-terrorist type of action. The Corps has been involved in all of these in Malaya, Aden, Borneo, Anguilla, and is still in Northern Ireland. There was also Palestine, Kenya, Cyprus—the list is a long one.

"As a result the British Army and the Corps has been in action continually—apart from a short time in 1962—in some part of the world or other as well as training for a wide variety of contingency operations.

"Initially the need for this country to play its part in the three great alliances, the North Atlantic Treaty Organization, the Central Treaty Organization and the South

East Asia Treaty Organization, generated considerable interest and investment in defence. Steadily the very success of our alliances brought about a decline in the national will to commit its resources to defence, a trend accelerated by periodic economic crises. As a result of the traditional wish of Government to reduce defence expenditure, and as the cost of manpower has risen relative to equipment, so the need to cut the manpower bill has become even more important. The Corps has been steadily reduced in size from some 300,000 in 1945, to 17,000 in 1962, when National Service ended, to 14,000 today.

"These changes have happened in a period when science and technology have advanced, or should I say galloped, at an increasing rate and when the range of engineering subjects has grown in complexity and sophistication. I would cite here as an illustration, the increase since 1945 in the number of professional institutions concerned with engineering.

"Finally in society there is the attitude of the individual, the man, to his country, to defence, to his profession and to his relationship with others. Life is less of a struggle and many of the traditional 'wants' have been removed; society is more materialistic and the individual more self-interested; but above all else there seems to be the lack of aim—at least a clear national aim—which the individual can grasp and within which he feels he has a part to play.

"On 1 July 1945 the British Army, still at war, stood at three million men but by 1 August 1947 it had reduced to a little more than three-quarters of a million. This large Army was maintained by the National Service Acts and through our hands passed, for the next fifteen years, nearly all the young male talent of the nation. The short period of service meant that training time was limited and it was difficult to develop fully an individual's professional skills. I believe that this period taught us a very valuable lesson, namely, that a man of high quality and intelligence will assimilate training easily and develop his potential much more quickly than traditional military thinking had previously accepted—a lesson we have carried forward to today's Regular Army.

"We have also seen the continuation of the trend of removing sections and functions of the Corps. However, the reasons tended to be different. Previously these elements were transplanted and grew to full maturity in their own right, but the new motives were rationalization and economy. The major surgery, which occurred in the mid 1960s, was the removal of our responsibility for Works Services for the Army, initially to the Civilian Works Organization which then became part of the Ministry of Public Buildings and Works and which is now part of the Department of the Environment. This was, in its effect on the Corps, like a strike of lightning which not only removed a large section of the professional engineers in all ranks but also left in question the future need for professional engineers. The scar is healing well but even now there is some evidence of this traumatic experience and the Corps was thrown off balance at that time. Fortunately, due to the troubled times that we were living in and the requirement all over the world for a military engineering capability, there still existed a definite, albeit intermittent, requirement for our professional engineers. These were, to name but a few; the complex facilities required for the nuclear tests firstly in Monte Bello and latterly in Christmas Island, the requirements for military accommodation in Malaya, Kenya, Cyprus and Aden, and the logistic engineering facilities in Borneo. The civilian departments could not provide the speed of reaction nor accept the operational conditions in some of these places and thus a military engineer organization, together with the appropriate support in this country, came to be accepted on a limited scale. This part of the Corps is therefore back on its feet although it is a matter of debate whether it has fully recovered its balance.

"In the 1960s rationalization took away our responsibility for transportation, which passed to the Royal Corps of Transport, and also altered our interface in certain areas with our sister engineering Corps, The Royal Electrical and Mechanical Engineers. Changes in methods of transportation steadily reduced the dependence

on railways and our involvement in railway engineering; but there was a corresponding growth in air transport and the need to construct and maintain airfields and airstrips of all kinds. At about the same time rationalization worked to our advantage when the Corps took over the function of the Airfield Construction Branch of the Royal Air Force; an area in which we were heavily involved during the last war for forward airfields. The responsibilities we assumed, together with the introduction of new types of aircraft such as Harrier, and the requirement for Airfield Damage Repair highlighted by the Arab/Israeli War of 1967, put us very much in business as one of the ground engineers to the Royal Air Force. It is of interest that we repaired Nicosia airfield this summer at the request of the United Nations and gained valuable, practical experience in this role.

"Concurrent with these changes and as the technological advances got into their stride, there arose the idea that the machine would largely replace the man. The combat engineer was increasingly realizing his ability to modify the battlefield to his advantage and there was a distinct trend in our equipment and organization to overrate the machine and under-rate the man. The Corps took time to realize the correct balance between the two and that mechanization only enhances the skill and potential of the man and that the man is still the key element.

"I would like to return here to my theme of a sense of purpose. Recognition by the Army of the importance of engineering on the battlefield has never really been in doubt and the importance of the Sappers' place in the order of battle has been maintained in the eyes of the Army and has provided suitable impetus to the combat engineer side of the Corps. The problem has been that, with nominal peace and with a regular corps of professional soldiers, something else was needed to enable us to come to grips with challenging tasks when we were not training directly for war or involved in the 'brush fires'; something was needed to help us maintain our engineering expertise and a sense of purpose—at the risk of over-simplification—to give us 'job satisfaction'. This sense of purpose was found with the steady growth of what we call 'project 'work which is carried out in a variety of guises.

"Firstly, we undertake tasks directly for the Army and the other services both at home and abroad; for the Royal Navy we have built gangways of Heavy Girder Bridge straight onto the deck of an aircraft carrier to speed up loading and unloading; for the Royal Air Force we have built the mole at Akrotiri; for the Army Sailing Association at Netley we have built a new clubhouse.

"For the Foreign and Commonwealth Office we have undertaken work overseas; examples are Bailey Bridging in Malawi in 1974; a road in Kenya built as part of a squadron exercise in 1973; well drilling in Botswana by the Well Drilling Specialist Team; famine relief work in Ethiopia where a Specialist Team supervised local labour on road building into the disaster area.

"Thirdly, support for the Civil Community at home; examples being the Broadford Airstrip on Skye, one of several small airfields which we have built in the remoter parts of Scotland, on Shetland and the Inner Islands; we also gain valuable training from construction tasks such as the Youth Hostel which was built on the Isle of Arran. (*Readers Digest* in November gave us excellent publicity on this aspect).

"Although not projects but coming under the grouping of aid to Civil Ministries we are often called upon to assist with disaster relief and can provide both trained assistance and organizational expertise. These tasks test our ability to react quickly and vary in scope from building a hutted Camp in Skopje after the earthquake, repairing roofs in Glasgow after a violent storm in 1968, and bridge repair operations in Bangladesh after the major floods in 1972. Emergencies such as Northern Ireland, including the need to rebuild the Maze Prison after it had been burnt down, and other work that has been required, add point to this.

"Out of all this we have now developed a reasonably well defined responsibility for engineering support to the Services which give an adequate, if not ideal, base for our professional engineering capability and face us with a range of engineering

challenges in unusual places at home and abroad.

"However, the world and conditions keep changing. The Services' eyes are now almost exclusively focused on Europe although we hope to continue to have some opportunities for training elsewhere in the world. The developing countries are more self-reliant and there are our own national economic problems as well as their effect on our ability to give overseas aid. There are very real and practical problems of man-management in ensuring, for example, a reasonable domestic life for the married man based in this country. Despite all these, we must be continually looking for new fields to operate in and to make the most use of our limited resources.

"We already do a variety of tasks for the Army which save money on the works services vote and this area looks promising as there are very real advantages to all parties. There is the whole area of the engineering aspects of the construction industry's drive abroad and of defence sales where I believe we can be more involved and could serve national as well as Corps interests.

"In all this we will have to rely heavily on the expertise available to us in the Reserve Army and the Engineer and Railway Staff Corps to supplement the relatively small number of real specialists we will be able to maintain in the future. As food for thought I would take this even further and suggest that the engineering professions have a responsibility not only to support us but to help us find the opportunities to maintain our skills and professionalism.

"It might be of value, as we are approaching the general discussion, to have a brief look at the Engineer Corps of other Armies. The United States Corps of Engineers have traditionally a very large commitment in professional engineering both in support of works services to the Army and also in major construction programmes within the United States, mostly concerned with waterways, water conservation and water as a source of power. They also have a Federal responsibility for Disaster Relief work. If anything they have concentrated less over the period on their combat engineer capability although they have the remarkable American ability to react on a large scale to field problems. The German Army, re-formed in the 1950s on a conscript basis and confined in its operations to the territorial limits of West Germany, have become almost entirely a Corps of 'Pioneers'; that is with only a combat engineer role. The French Army have maintained the responsibility for works services as well as their normal combat duties but seem to have lost status since the great days of the Napoleonic era when their engineers were regarded as in the forefront of their Army. General Bertaux, their Engineer-in-Chief, on a recent visit was amazed to find the Corps of Royal Engineers producing such a high proportion of the General Officers of the British Army. The Australian Engineers not only keep a foot in both camps of works services and combat engineering but additionally have the responsibility for the staff aspects of quartering for their Army—an interesting system which must be more economical than the present British method of having a branch of the staff dealing with this subject.

"Political and other factors have all had their effects and there appears to be no particular common thread. There is, however, a consensus of opinion that there is a continuing problem in all engineer corps over the relationship and the balance between professional and combat engineering.

"This conflict is inherent in our own Corps. The combat engineer capability maintains our place in the front ranks of the Army whilst the need to specialize as professional engineers, and to keep abreast of the advancing techniques of modern engineering, presents continual problems of training, opportunity and career time. Clearly we must have a foot in both camps and I believe our aim should be to have good, all-round engineers each preferably with a specialization either on the staff or in some engineering discipline. Above all we must give our officers something to strive for and they must continually be faced with real engineering challenges which in turn will give them a sense of purpose and achievement as well as giving them pride in their profession as military engineers."

* * *

The Chairman introduced Major-General M E Tickell, CBE, MC, Commandant, Royal Military College of Science, who introduced the concluding discussion on "The Future" as Chairman of a Panel formed to help focus that discussion.

The Future

"We have now had an insight into the highlights of Corps history and the problems of the immediate past and present. The time has come to look into the future. This is your task—the task of the audience. How far into the future? Well there are strong reasons for taking a long view. We are celebrating a centenary and launching into the next hundred years. The current economic crisis with its attendant rather harsh Defence Review should not be allowed to dominate our thinking too much. And there is a lot to be said for focusing on the young officer now going through Sandhurst, Chatham, Cambridge or Shrivenham and getting some feel for what the Corps will be doing or should be doing when that young man is in a position of real authority in twenty to twenty-five years time. This helps us to decide what we should be teaching him now and what kind of experience we should be planning for him when he finishes his early training, and hence what the Institution should be doing to further these needs. We, the Panel, would like you to focus your minds therefore somewhere near the end of the millennium while ranging also over the period between now and then.

"What is the role of the Panel? Even though my fellow-panelists are men of great distinction in their own right, we see ourselves as primarily acting as catalysts to activate a lively discussion. The ideas must come from you—we are here to provide something fairly solid to bounce balls off if they come our way although we hope that most of them will bounce about amongst the audience.

"It is about time I introduced the Panel and I will do this in no particular order and very conscious that because of the time factor I will be doing far less than justice to each; here is a quick pen picture for those who do not already know them well.

"*MR HUGH HANNING* a well known writer, journalist and commentator on international affairs with particular reference to defence matters. He was Defence Correspondent of *The Guardian*. He is currently Director of that august body, 'The British Atlantic Committee'. He is no stranger to Sappers and has written a classic on the peaceful use of military force.

"*PROFESSOR ALAN HARRIS*, the Senior Partner of the Consultants, Harris and Sutherland, is also Professor of Concrete Structure and Technology at Imperial College. He is a Colonel in the Engineer and Railway Staff Corps and had six years distinguished war service in the Sappers including involvement with Mulberry Harbour and the big Rhine Bridges. A pioneer in the use of prestressed concrete in UK he is currently a Member of Council of the Institution of Civil Engineers and Vice-President of the Institution of Structural Engineers.

"Two of the best known Territorial Sappers of recent years, complete the Panel. Both retired this year, thus ensuring that none of my fellow panelists have any current military responsibilities so that they are quite free to be as provocative as they like. I am of course referring to *COLONEL BILL HARRISON*, the County Surveyor of West Sussex since 1968, and *COLONEL TOM INGRAM*, who is the Project Manager, Forties Field Development for British Petroleum.

"To give some forward momentum to our discussion I am going to ask two of the Panelists to say a few, perhaps provocative, words and keep the other two in reserve. To help us to view military engineering against a wider backcloth, I have asked Hugh Hanning to throw out a few ideas on matters that the UK might be primarily concerned about in say twenty years time and then I will ask Professor Harris to throw some more pebbles into the pool."

Mr Hanning suggested that looking ahead today is not as easy as it was in 1875, new influences are proliferating and we cannot look too far ahead. The future is

"unpredictable" and forward planning must take account of this unpredictability, indeed it must be a positive parameter of our thinking. We must try to avoid "accidental" events. The spread of the means of violence and the increased availability of explosives and weapons, including nuclear weapons, make an "accident" more likely and more terrifying. There is a real need on an International basis for an accident prevention and damage control organization in much the same way as Local Government has its Fire Brigade, Police Force and Ambulance Service. World opinion is moving towards this view of mobilizing the forces of stability. Television and the Press expose the effects of instability and bring them home to all. A recent example in 1970 was in Bangladesh, popular opinion was aroused, and Governments were forced to send aid. This produced a novel situation with aid being provided by West Germany, Russia, United Kingdom and other countries and all inter-operating with each other. The United Nations, twenty-five years after it was formed, was forced by the event and popular opinion to enter into the Disaster Relief field.

Professor Harris expressed the opinion that there was, and still is, an immense fund of goodwill towards the Corps in the civilian engineering professions but he feared that this would diminish with reduced contacts with the Corps as the more senior members of the professions, who had served in WW2 or completed National Service, retired from active life. Until two centuries ago engineering was exclusively military in connotation. Then came Civil Engineering, the term was deliberately used to distinguish it from the military profession. In this country Civil Engineering grew outside the Army, but in the Empire the Military Engineers remained paramount. The difference in growth between the engineers in this country and in France began in the 18th Century when, in France, retired Army Officers with Professors of Mathematics and Logic, in the service of the Monarch, established the exclusive Ecole Polytechnique. French engineers were learned, authoritarian and prestigious and enjoyed great rewards. In the United Kingdom, in contrast, the engineers were essentially tradesmen "on the make", working at the orders of Joint Stock Companies. They were not intellectuals, they were essentially artisans. This was not a profession for gentlemen! The Corps has always had the advantage of both the academic training and the practical experience. There is a close relationship between the military and civilian engineering professions. For the Military Engineer time is generally all important, for the Civil Engineer the need is profitability. Time versus Money. The separation is not so deep as might be supposed as the two motivations are inter-related.

The discussion opened on considerations of disaster relief. It was argued that withdrawal from overseas stations had reduced our capability for immediate reaction to disaster situations. Although "emergent" nations are often reluctant to ask for assistance, when it is offered it is generally accepted, indeed the Foreign and Commonwealth Office view is that the Army has met every request for help that has been made. It was therefore suggested that there was no specific additional need for a designated disaster relief force. It was stated that a military organization ensured that the people on the ground who were suffering did in fact receive the aid and that there were less holdups through lack of a movement organization or because of bureaucracy. The comment was made that it was a pity that we had to depend on other peoples' misfortunes for our training. In summing up on this subject it was recommended that Sappers should take part in disaster relief because this type of work was true emergency as was War. In addition it provided very good training opportunities and responsibilities, particularly for our Junior Officers and NCOs, which were unobtainable in normal day to day soldiering.

The discussion moved to "intermediate technology". It was considered that we could provide support for emergent nations by providing instruction in the mid-level technologies, in teaching people to help themselves. This would be a positive contribution to the countries concerned in addition to providing excellent training for our technicians. It was considered better to take technology to the countries than for the

countries to send individuals "overseas" for training.

In considering the relationships between the military and civilian engineers it was generally agreed that in war, or indeed in any large scale emergency, it was relatively easy to train a civilian engineer into the ways of the military because of the excellence of the well practiced military training machine. It was suggested that the big difference between the civilian and military engineers was that in civil life the engineer was becoming more and more specialized and the military engineer was becoming more a manager in its broadest sense. This was shown by the performance of our officers on long attachments with civilian organizations. It was felt that on really large multi-discipline or multi-national projects, where management was vital, the Corps could make a major contribution in such management. The difficulties of doing this should not be underestimated as there was the problem of finding suitable posts, of finding organizations prepared to accept the military engineer at that level. Introducing an "outsider" into an organization created promotion difficulties, real or imaginary, within that organization; such a move could also affect the military promotion prospects of the officer so introduced. It was generally agreed that the Sapper officer had been trained in management from the beginning of his military career and that this was one of his greatest strengths.

In returning to the theme of our future role a number of questions were raised which remained unanswered. It was argued that the main role must be Combat Support to NATO, internal emergencies and the maintenance of public services. The Government does not keep the Army in existence for disaster relief operations nor to do Department of the Environment's work for them "on the cheap". The Government keeps us in being for Defence. What sort of Defence? A week-long war in Germany? Possibly an internal conflict? Reaction to man-made disasters in UK? Each of these implies an emergency and surely the strength of the Corps relies on our ability to fill the gaps which only an emergency creates and where our inventiveness and versatility can be utilized.

The point was made that we cannot really plan for the "unpredictable" because the financial and logistic support required by the Services would only be provided if they could be shown to be justified. Unpredictability was no basis for such justification. We had to look ahead and we had to specify objectives as without objectives there would be no support.

The division of the Corps into two sub Corps, Combat Engineering and Construction Engineering was discussed. Why is the Corps not satisfied with a Combat role alone? Would this provide sufficient motivation to recruit and maintain the Corps at its required strength? Are we able to provide the intellectual challenges required by the young men (both officers and soldiers), of today? What sort of jobs could we be doing to ensure these challenges can be met?

It was suggested that more use could be made of our professional capabilities in support of the Foreign and Commonwealth Office and Defence Sales. There is scope for planning and supervision of work in those areas to which Her Majesty's Government gives aid. If other Armies can do this why can't we? We have the ability to train others as already had been mentioned but we seem to concentrate in Combat Engineering training. Why not in the professional/technical field? What can we offer? We have specialized in improvization and the use of manpower when machines are unavilable. We specialize in planning, particularly forward planning, which is a natural part of the military function together with simple yet positive control. One of the strengths of the military engineer was to plan and see a job through to the bitter end regardless of the difficulties.

As in all interesting discussion time ran out leaving many questions unanswered. In his summing up of the discussion, Major-General Tickell concluded that however much Defence Priorities may focus on Europe, the UK is bound to be involved with what was happening in the developing world and the tasks which could be imposed on the military engineer were as unpredictable as they have ever been, whether in the UK, Europe or elsewhere overseas. There was a strong body of opinion that the

military engineer was a good planner and manager, qualities which must be sustained. These points and many others emphasized very strongly the need to maintain the engineering professionalism of the military engineer and the range of his knowledge and experience.

Unlike most other countries, military and civil engineering had developed separately in the UK. The ever-widening horizons and sophistication of the civilian engineering profession could further aggravate this dichotomy. Very special effort was needed to maintain the links and forge new links between the military engineer and the great engineering profession as a whole. He liked the concept from one speaker of one profession of which military engineering was a part. The Reserve Army and the Engineer and Railway Staff Corps must play a prominent role in the welding process. It was particularly important that the Institution, whose Centenary we were celebrating, should take a strong lead. It was clear from the goodwill which had been shown in the discussion that civilian engineers are only too ready to respond.

He concluded by saying that although he had missed out many other highlights of the discussion this was perhaps a good note on which to close.

* * *

The Chairman invited the Chief Royal Engineer, General Sir Charles Richardson, GCB, CBE, DSO to close the Meeting.

The Chief Royal Engineer referred to his own experiences of crystal ball gazing and seeing the problems straying away from the predicted paths. To meet unforeseen events we needed a very high standard of young men with a good intellectual capacity and a broad based academic training. If we were able to provide him with a long and varied military training we could continue to expect, in the next twenty-five years, the same successes as in the past. There was, and always will be, a problem of balance between the combat and the professional engineer. "We will depend more and more on the profession outside, we can turn to the Professional Institutions and other Corporate Bodies outside, we will continue to be dependent on the Reserve Army. We are most grateful for the support we receive from all of these organizations and look forward to its continuing in the future."

The Chief Royal Engineer thanked the speakers and the Panel for their contribution to a most stimulating meeting. He also thanked all those who had helped to organize it.

* * *

After the Meeting the discussion continued over drinks and supper and two Members, having had time to collect their thoughts, have already submitted written contributions to the discussion. These are published as part of the Meeting. Further Correspondence will be published in subsequent issues of the *Journal.*

Major Steve Hobden ERD writes:

"Colonel Harrison suggested that we should, if a way could be devised, eliminate the distinction between civil(ian) and military engineers so that both could operate in each others fields to mutual benefit. Is there any real difference between them now? Civil engineers provide for the needs of the civil organizations in the same way that military engineers provide for the needs of soldiers, so might not the mutual benefit be brought about through the pages of the New Civil Engineer?

"When an RE officer saw an advertised post which interested him, he would, with the approval of the Engineer-in-Chief, apply for it. If successful he could be granted leave (to maintain his pension, etc rights) but would be paid the salary offered and provided by the civilian body. On completion of the project he would return again to the military fold. Both the individual and the military would gain from the experience obtained, whether it be a contractors attitude to the importance of time

and money or a consultants attitude to planning, in addition of course to increased knowledge in the field of pure engineering.

"In the other direction, should a military project require special expertise, the post could be advertised and a successful civilian could be granted a temporary, or contract, commission at a rank commensurate with the responsibility. The benefits to the military would be not only the available expertise but also that some of the expertise would be transmitted to the soldiers associated with the project."

Colonel D E Townsend-Rose writes:

"At the meeting on 27 November, the need for the Corps to be prepared to provide engineering support in unexpected forms and conditions was mentioned, but was not discussed further. If the Army cannot forecast all possible tasks in detail, how much less can its engineers do so and train in detail for all eventualities.

"Combat engineering is based on sophisticated equipment and well rehearsed drills, but logistic engineering depends on the individual skills of our soldiers and the engineering knowledge and experience of our officers. The individual skills of our soldiers are provided by our dual trade structure, but I believe knowledge and experience in many of our junior officers is completely inadequate. It may not be generally realised that the only formal training our young direct entry officers from Universities get is five months at Sandhurst and a six months YO course, the engineering content being almost entirely combat engineer. Surely all engineer officers should have a good grounding in practical engineering. The recent increase in involvement in project work by units must be maintained, but we should also try to increase the involvement of our young officers in engineer work in emergency situations. The main reason for not achieving adequate training and experience is simply shortage of officers. The sooner we can get back to the situation where we had one or two young officers in each squadron who were not commanding troops, the better; we could then devote to them the time required for training and gaining good experience. The first priority of the Corps should be to establish and then recruit a higher proportion of officers to soldiers."

* * *

A Short Visit to South Vietnam

LIEUT-COLONEL D R WHITAKER, RE, MA, FI Nuc E

Do you know the pile built village where the Sapo-dealers trade—
Do you know the reek of fish and wet bamboo?
Do you know the steaming stillness of the orchid-scented glade
When the blazoned, bird-winged butterflies flap through . . .
Kipling

TRAVELOGUES have little place in this journal and, anyway, descriptions of countries based on an acquaintanceship of but a few days are always suspect. Nevertheless, Vietnam is not a country to which Sappers regularly go so that some impressions of a short visit there may be of interest to readers, particularly since the visit took place in March 1975 during the time that the North Vietnamese Army made the large territorial gains which led to the fall of the South the following month.

As a British soldier it is inevitable that one should compare Vietnam, both the country, the people, the weather and the conduct of the war, with Malaya. To some extent it is a valid comparison. The Vietnamese have many of the characteristics and looks of both the Malay and the Chinese; both countries are long and narrow with central jungle covered highlands and coastal and southern plains, and the war was fought over a long period with a tempo and character which varied considerably from time to time and from place to place. What made Vietnam so different to Malaya was the much greater political pressures from outside which escalated the war so greatly. South and North Vietnam were independent states fighting each other, each with massive outside help, whereas Malaya was a colony fighting an enemy who had no real political or state backup.

Saigon is a place which inevitably visitors saw first. For a city which, when I was there, well knew it could at any time come under bombardment by, or fall to, the NVA it was remarkably unwarlike. Some key buildings were of course well wired up but in many cases this was to keep out burglars as much as Viet Cong. Many of the young men were in uniform and gun fire at night had been a common sound for

Photo 1. "Do you know the reek of fish and wet bamboo?"

Photo 2. ". . . in the heart of the city."

years. There was a curfew which was increased while I was there from midnight, to 10 pm until 5 am every morning, but there was no austerity except that forced by common poverty, and certainly no obvious panic or restlessness.

Saigon city is completely flat with a mesh of roads running at right angles to one another rather like New York. The river Saigon which runs through the centre is about as wide as the Thames at Westminster and has in the heart of the city the equivalent of the Embankment Gardens, but unlike that river, harbours both stilt villages and, at that time, active gunboats of the Vietnamese Navy in the heart of the city. There are no skyscrapers and the Continental and Majestic of Grahame Greene's

Photo 3. "The traffic of Saigon before the fall requires special mention . . ."

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time were still the most important hotels. The French influence remained strong everywhere and, although it was somewhat run down, was still the dominant of the western cultures. The gracious tree-lined boulevards are still beautiful, even if a bit grubby, and the lovely colonial villas and administrative buildings are often shabby but mercifully remain. Young Vietnamese tend to speak better English, or, more accurately, American, than French but it is easier to get French cooking than hamburgers. Ceiling fans have mostly only been augmented, not replaced, by air conditioners, and tiled floors and bidets and mistresses have all survived Dien Bien Phu. Most of the motor cars are small and French and only the remaining Americans drove large ones. The many largely empty military bases had already acquired distinctly Vietnamese atmospheres. A visitor five years from now may find it difficult to believe that 55,000 US Servicemen died for this country but he will have no difficulty in ordering café filtré.

The traffic of Saigon before the fall requires special mention and I have no doubt is still much the same. You could make a funny film about it, or draw lessons from a Buchanan type report on it, or use its accident statistics in a safety campaign. On the whole the former would be the most worthwhile. Eighteen vehicles out of twenty have two wheels, one out of twenty has three and only the twentieth has wheels all round. That is not to say, however, that all do not do duty as load carrying vehicles or family conveyances, or indeed, as public transport. It is clearly considered uneconomic to have less than two passengers on a bicycle or three or four on a Honda, and trishaws propelled by one frail old man often move whole families on shopping expeditions. There are several alternatives open to the traveller shopping or viewing the city. He can hail a bicycle or Honda and ride side-saddle to his destination (side-saddle by law because it is apparently too easy for a pillion passenger sitting astride to conceal a grenade between his thighs), or he can go at slow walking pace in a trishaw, or he can have a sauna *en route* in a bus, or he can go by one of the thousands of 1950 vintage mini-taxis and have a row about the fare. Two things not to do are to go on foot, when he would be safe neither off the pavement nor even on it, or by "Cyclo". The latter is a motorized trishaw whose overloaded engine lays down an automatic smoke-screen to confuse the rest of the traffic and makes you feel as passenger exactly what the warhead of an anti-tank guided missile must feel as it

Photo 4. Shopping in the city.

Photo 5. Very much like Malaya.

flies through a squadron of enemy tanks, though I believe Cyclos have slightly less chance of a first round hit. Cars and lorries are all left-hand drive but this is the only hard evidence I could find that you are supposed to drive on the right-hand side of the road. The manoeuvres which take place at every crossroad reminded me strongly of the Musical Ride of the Kings Troops RHA but with vehicles of different speeds and a lack of guiding music complicating the timing.

I had the chance to see the highlands of Vietnam only from the air but they looked very like what I remember of the highlands of Malaya. Areas of jungle covered slopes have been cleared perhaps rather more widely by the Montegnards than by the Aborigines of Malaya, but they still offer the kind of barrier that only grinding foot slogging can penetrate. Da Lat, the main hill station, is much larger than the Cameron Highlands and is the main vegetable growing area of the country. Its future at the time was uncertain, and the Saigon housewives were already complaining of the shortage of vegetables in the market. Pleiku and Kontum, to which I was to have flown, had, alas, been evacuated a day or two before and indeed with NVA and VC units in imprecisely defined locations and equipped with SA7 SAMs and other AA weapons, the areas of central Vietnam over which it was wise to fly without some very pressing reason were limited.

The east coast, too, looked to me very much like Trengganu and the Beach of Passionate Love. From the air you can see the coral reefs off the calm sandy beaches and the fishing villages and single winding coast road. We landed at Qui Nhon which is about half way up, where our party was met by some Save the Children workers who, for no apparent reason, provided a Land Rover and gave us a superlative luncheon. For little credit and less worldly recompense, but for what must be enormous quiet personal satisfaction, these Samaritans laboured at undoing some of the evil of the endless war. Towns such as Qui Nhon on the east coast were at that time within days of being abandoned by the South Vietnamese or at the best of becoming cut off outposts supplied by sea or air, and everyone in them guessed it might happen. I got the impression that the Save the Children organization would soldier-on whatever happened, their usefulness increasing exponentially with the deterioration of the military situation.

It was in Qui Nhon that for the first time I got some slight feeling for the real

tempo and scope of the war. Strangely, in Saigon, even with good contact with people whose business it was to know what was going on, there were large grey areas on the map of which all anybody knew was that something was happening in them. The papers, which for some reason appeared with the next day's date, tended to report actions of three or four days previously. One would hear positively, for three or four days running, that such and such a town had been overrun by the NVA, yet the ARVN would still claim they had units occupying it. But on a local scale it became clearer. One realized that a move of, say, a regiment of NVA through a jungle area had to be a gradual process. Lightly armed elements moved first but managed to dominate a new area with guerilla-type tactics. It took some time for heavier equipment to be moved and for any kind of a well supplied foothold to be established. These leading elements may well have been sufficient to cut a vital road but insufficient to exploit the success in the manner in which the large red arrows on a map may suggest they were capable of doing. Such tactics are possible and necessary only in areas of close jungle and are made easier with weapons such as 107 mm rockets which in the simplest terms are artillery shells which do not need guns to fire them. Thus it seemed to me that a road through the Highlands could be cratered and mined, and culverts or bridges be closed and then dominated by fire by the relatively light vanguard of an NVA formation, but it may have been some days before the "thrust across highway X" consisted of any real strength.

It is worth recording here that the ARVN engineers had an enviable reputation for repairing in quick time the physical damage which the NVA would cause to a route to try to close it. You must never of course refer to a South Vietnamese military engineer as a Sapper, the word has assumed locally a totally different and well-known meaning.

Just such a cut as I have described above had been made to the west of Qui Nhon a few days before I arrived and had succeeded in isolating most of an ARVN formation. Nevertheless, there was no great panic amongst the Vietnamese inhabitants in the town because they were about to be overrun, nor any obvious preparations there to prevent that happening. However, to make a visit some three or four miles away it was deemed advisable to go by helicopter rather than road so there must have been some reports of VC or other activity pushing towards the town. The fact that the Army were able to produce a helicopter at all, and at no notice, seemed to me remarkable in a military situation in which one would have thought they were gold dust.

In the Delta Plains around Saigon of course it was a different story. VC activity, such as cutting culverts and bridges, had been going on for years, and all such points were guarded. How effective such guards were against determined Sappers it is hard to say. When you have sentried a bridge on a normally used road for ten years without incident it must be tempting not to pay too much attention to alertness. The area of great interest whilst I was there was at Tay Nhin, some fifty miles to the north, which the Communists were said to have been trying to cut off. On a drive towards it we overtook a convoy of supplies, including artillery ammunition, but everything else was the usual peacetime bustle and activity. Gradually, however, there was an obvious change. Shops in the kampongs were shuttered and there was little traffic about; groups of people were gathered, presumably discussing the situation, but there was no stream of refugees and nobody stopped our own progress. We passed some M113 APCs in what looked like fire positions fifty yards from the road and some artillery was firing in a desultory fashion over our heads into an area of coconut palms two or three miles away. Some locals said that smoke ahead was where some rockets had hit our road. Not wishing to cause a diplomatic incident by getting too involved, we turned back. Ten days later, when I left the country the road was still variously reported as cut and re-opened and I subsequently saw a photograph in the local press of one of the M113s which we saw, this time looking much more warlike and with fewer small boys and chickens crawling over it.

I do not want to give the impression that hard fighting never occurred in Vietnam;

Photo 6. "We passed some M113 APCs . . ."

of course it did, as ARVN casualties running at three or four hundred a day (total, not killed) testified. It is just that to me the war was being fought in a manner unrelated to any of the principles of war drummed into me at Sandhurst. The action I have described above, for instance, was taking place just over an hour's easy drive from Saigon; Saigon is thick with troops; the NVA had no air support of any kind whereas the ARVN had excellent fighter ground attack aircraft; it is difficult, therefore, to see why the Communists were allowed to continue to threaten this vital road. There must have been a reason but in my short visit I was unable to discover it.

Photo 7. Vung Tau.

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Photo 8. ". . . where they make the local pottery."

Vung Tau, which is the nearest coastal resort to Saigon, was another place I managed to visit. It is a beautiful place, the main town consisting largely of lovely French colonial villas overgrown with untended bougainvilia and a seafront with cafés and stalls selling shells and coral and the usual bric-a-brac of the seaside. Along the coast is two or three miles of sandy beach backed by what used to be "the United States Army rest and recreation centre and austrarian Compound" (*sic*), as a board announcing the opening of a club stated. In between is a French hotel (where you could get lobster thermidor for under a £1 and enormous prawns curried for less) and a couple of wharfs packed with fishing boats. It was from here that the mass exodus by sea took place as the South moved towards collapse.

The last visit I was able to make was to a small village outside Saigon where they make the local pottery. With unmade-up roads and stretched around a junction of two rivers the whole atmosphere was exactly as it had been in so many riverside kampongs in Malaya.

To end on a more cheerful note. The business and diplomatic social life of Vietnam went on unabated except by the curfew almost to the end. With no shortage of servants it was still possible to live the life of a gentleman without getting too overdrawn at the bank. I felt the curfew was generally welcomed, its effect being simply to make dinner parties shorter and somewhat livelier. The atmosphere was exactly as it used to be at Cambridge with lockup at 10 pm but with military police instead of Proctors looking for late revellers. Sleep, disturbed only by the light gun fire rather than heavy traffic, was then possible until 5 am when the Honda hoard charged again and the city bustled into life, with the war talked about rather as we discuss the weather.

* * *

The Repair of Damaged Buildings

PETER S RHODES, C Eng, FI Struct E, FGS

THE brief comments in this paper refer, and are confined, to the repair of buildings that have been damaged. They are intended to be read in conjunction with the paper "The Structural Assessment of Buildings Subject to Bomb Damage" published in the *RE Journal*, in June 1975, No 2 Volume 89.

As with that earlier paper it is necessary to divide buildings into three major groups:

Compressive, where the main body of the structure is of masonry or brickwork, and tensile members are of timber.

Intermediate, where some tensile material is provided by cast iron, or by a very early use of steel.

Tensile, where the whole or the major part of the structure depends upon steel as a tensile material, either in the form of rolled steel sections or as reinforcement in concrete.

Compressive Buildings

Because many of the buildings in this class are quite old there is a great likelihood that they would have been in a decrepit condition *before* suffering the accidental damage. There is not space here to describe repairs under normal maintenance but it is only fair to point out that any engineer who professes to a knowledge of building structures may be asked by his client to attend to the repair of older buildings which in fact constitute the larger part of our towns today. Therefore the engineer *must* be aware of and understand the building construction methods of yester-year and their compatibility with modern materials.

Returning to the immediate problem of repair after bomb damage or other accidental mishap, if a loadbearing building is to be reinstated to its original condition then many of the old materials as well as the old methods of building may be needed. Both of these requirements present problems.

It is often difficult today to find tradesmen with the skill to handle masonry, particularly if carving is involved. The same thing applies in lesser extent to fancy brickwork. Even if the men and the materials are to be found, the cost of the work could very well be prohibitive when compared with the value of the building, measured in terms of its reasonable expectation of life. There is always likely to be a difficulty in obtaining matching materials. Most of the old stone quarries have closed and many of the bricks, particularly those of special shapes, are no longer obtainable. About the beginning of this century many brickworks had standard catalogues of shaped bricks so that the builder could buy, for instance, a complete set for an arch over a window. Sometimes each brick was numbered on its back. To replace these today would be almost an impossibility.

However, before deciding to abandon a damaged old building the engineer should consider other methods of repair. It may be permissible to render the façade of the building and this would permit the use of non-matching materials. Damaged lintels as well as brick and stone arches could be replaced by precast or *in situ* concrete beams. Note that if such a lintel must be curved to replace an arch it is not sufficient to have only tensile reinforcement in the bottom of the beam. A cage of bottom and top bars with plenty of small diameter binders is essential; otherwise spalling of cover is likely to occur at the soffit of the crown.

Old and large timber bressummers could be replaced by steel joists, bolted together with spacers of gas barrel slipped over the bolts. If the original building had timber floors it could be dangerous to replace them with reinforced concrete as this would add considerably to the dead load and could cause settlement of the foundations.

Carved stonework can be replaced with reasonable matching by the use of care-

fully coloured precast concrete. It may be necessary to remove some of the undamaged stones so as to allow the precasting specialists to make matching moulds. These are then lined on the exposed faces with a rich mortar consisting of carefully selected sand and an appropriately coloured cement.

Steel tie bars may be a convenient expedient in restoring stability to walls that had bulged or become disconnected from their cross walls *prior* to the bomb damage and which now present a problem of overall stability. The end plates do not have to show as ugly scars on the façade. Made of galvanized flat steel plate, if the wall is to be rendered they can be slightly recessed into the wall so that the rendering conceals them and the end of the tie bar. In stone-faced buildings where there is a backing of reasonably thick brickwork it is possible to remove some of the facing stones and to set the plate against the brickwork, suitably mortared to give an even bearing. Holes are then cut through the wall at about half a metre to each side of the tie bar so as to allow two "throughs" of stone or coloured concrete to be inserted. After dressing the backs of the stones that will actually cover the plate, the facing stones are then replaced. The ideal place for a tie bar is usually between the floor joists. On long spans of more than about three metres the bars should be supported by nogging pieces nailed between the joists.

When replacing old masonry or brickwork, care should be taken to match the new mortar to the old which probably contained no cement at all. Modern builders add portland cement to the lime and sand in order to produce a quicker set but the resultant mortar is much harder than the old and traditional lime mortar and may cause cracking of finishes. It can also produce on the outer face very unsightly efflorescence which is most difficult to remove. The usual specification is for one part of lime putty mixed with three parts of sand, to be gauged at the time of use with another three parts of sand and one of portland cement. This quantity of cement should never be exceeded for the repair of old work. In certain parts of the British Isles so-called "black mortar" was much used up to about 1935 or a little later. This consisted of lime putty mixed in a mill with cinders in the proportion of about one part of lime to four or five parts of cinders. As cinders are not now available as they were then, if new pointing is to be matched to old it may be necessary to add a black pigment to the mortar mixture as described above.

The repair of damaged timber floors and the common rafters of roofs should present few problems but if large members of timber roof trusses are damaged it may be simpler and cheaper to scrap the whole truss and replace it with a new one of steel.

Sometimes damage may reveal that existing timbers have been attacked by dry rot and it would be folly to leave these in place without treatment. Of course, if compensation is to be paid to the owner of the damaged property the award should exclude the cost of the removal of the dry rot or other existing faults, this work being listed as "betterment". If a first inspection shows that only a short length at the end of a timber beam or joist has rotted it may be possible to remove the rotten part and to splice on a replacement. With floor joists or common rafters it may be possible simply to nail or bolt an extension piece of the same or equivalent cross-section on to the shortened existing member, but for the bottom ties of roof trusses, etc. the repair is best done with a pair of steel angles, unequal and with the longer legs bolted through the timber beam.

The dry rot infection tends to travel along the central axis of a timber baulk and may show as a darker patch on the newly exposed cut end. Further amputations should be made until there is no visible trace of rot. Then, a further 300 mm or so from the end, a hole or holes of about 12 mm diameter should be bored down from the top of the beam to about 25 mm above the soffit. The holes should then be filled with creosote and sealed with ordinary cork bungs. There should be a hole for every 75 mm or so of width of the member. This will help to protect the timber against further attack by undetected strands of the fungus.

An experienced nose can usually detect the presence of dry rot but one way of

recognizing it is that the attacked timber, usually brown and dry, hence the name, shrinks and cracks parallel to the grain but also with characteristic short cracks at right angles to the grain. Thus the rotted timber tends to break up into quite small cubes. Care should be taken to ensure that all new timber coming into contact with the walls or old timber is protected against dry rot. A further consideration is that if a damaged building has been exposed to the weather, as is almost inevitable, all the existing timber and much of the masonry will be very damp. When the building is again made weathertight and the heat turned on the ideal conditions for dry rot are produced. Therefore provision should be made for treatment by specialists of the whole of the building as soon as it has been made weathertight but before plastering and decoration begin.

Intermediate Construction

Reference should be made to the paper in the *RE Journal*, June 1975 for descriptions of the various forms of construction that come within this general class.

In most instances repairs are likely to be difficult because much of the material used, notably cast iron, is now not available for replacement except possibly by "cannibalization", when it might be possible to repair one part of a building and rebuild another part. Modern steel stanchions and beam sections cannot readily be married to the older work and it may be necessary to demolish large portions and to reconstruct with steel and concrete or timber.

Damaged jack-arch construction has been successfully replaced by modern steel beams and concrete slab floors, the whole being much lighter than the original, but if this kind of replacement is only partial great care must be taken to see that the horizontal thrusts from the remaining arched construction are properly abutted by the new work.

Patent fire-resisting floor construction may be partially replaced by *in situ* reinforced concrete, but wholesale replacement may be dangerous because of increased dead weight. Pre-cast hollow units of the "Bison" type are sometimes satisfactory provided that some tying can be provided across the main beam to restrain buckling of the top flange. Otherwise, hollow clay pots may be used to form a ribbed construction of *in situ* concrete.

There is not a satisfactory method for repairing cast iron. It cannot be welded and splices may not cover hidden fractures. The holes required for bolting may further weaken the beam. Sometimes it is possible to replace a floor-to-floor length of damaged cast iron column by a suitable weight of steel tube or rectangular hollow section. The cap and baseplate would need to be built up out of steel flat plate to counterfeit the shapes of the original cast iron column, and these parts should be welded to the shaft at the fabrication works.

Shop front construction, with its wide beams spanning over big display windows and often rather precariously supported on brick or masonry piers, tend to be the first to suffer from a car bomb in the street. Shoring to the upper part of the façade may be needed and the wall above the opening would have to be supported by proper needling and propping. Usually the pavement in the street will support the external props but the internal ones may present a problem. If there is no basement and the ground floor is not "on solid" it would be necessary to open up both the window floor and the main floor below in order to base the props on the ground. If there is a basement it is usually simplest to prop the ground floor from below and then to erect the next length of the prop off suitable spreaders laid on the ground floor and directly above the prop in the basement. Folding wedges would be needed at both basement and ground floor levels and these should be checked frequently to ensure that they are tight. Props are often made up from timber planks, 225 mm by 75 mm, bolted together in twos or threes according to the anticipated load. Nailing together has been seen to be inadequate for this purpose. The needles are most conveniently of rolled steel joist or stanchion and should be long enough to leave ample room, particularly on the outside, for the insertion of the new beam or beams.

The needles should be inserted under the wall sections between the first floor windows and should be designed to carry a centre point load of all the appropriate amount of masonry, together with a generous allowance for floor loading.

In many instances the façades of shop buildings, particularly those that began their lives as houses, are not very well tied back to the main structure. In such buildings it may be desirable to provide some ties and the best way would probably be to attach round mild steel bars to the new beams over the display windows and to anchor their opposite ends to some convenient inner wall. If no such wall is available then the tie bars could have flat plates welded to their inner ends to permit of bolting to the sides of the first floor joists. If the floor boards are new or in good condition and well nailed to the joists the whole floor will act as a beam, very stiff in the horizontal direction and usually capable of offering considerable restraint to the front wall.

Damaged masonry piers between the big display windows may under certain circumstances be replaced by steel columns, in which case the tie back to the main building would be essential. However, there would always be problems with the foundations and generally it is better to replace the pier as nearly to the original as possible.

Modern Tensile Construction

When reinforced concrete members are damaged, provided that the joints remain sound so as to preserve the original geometry of the frame, repair is reasonably straightforward.

If a hole is blown in a reinforced concrete wall the damaged concrete should be removed and the sides of the often cone-shaped damaged area should be cut back to square. Some of the reinforcement may have been severed but commonly it will only have been bent rather badly out of shape and lengthened in consequence. Such bars are cut at the mid-point of their exposure and straightened as well as possible. Then a new piece, of the same diameter, and long enough to give a tension lap on each side of the cut is securely tied to them. It may be necessary to enlarge the hole to provide the necessary tension lap. A similar treatment may be applied to normal solid floors and also to columns provided that the damage does not terminate in a joint. If the joint is damaged it has to be cut out completely and the repair will then terminate within the span of the incoming members.

There is no useful purpose in applying cement to the old concrete provided that it has been well wetted. The new mix should give a compressive strength commensurate with that of the original design but should have a big slump. Therefore, to compensate for the extra water, additional cement should be used. The new and rather wet concrete should be poured and vibrated up to about 75 mm below the top of the hole and then left to harden for at least seven days. Finally, the top 75 mm should be filled with a much dryer mix, well rammed in by hand. Timber forms treated lightly with emulsion and made leakproof with tape or by other means tend to produce the best finish and to avoid the unsightly appearance of dark patches of inadequately hydrated new concrete.

If a flat slab fails by shear at the column it may be that there is a change of size of the column at that point. In such a case it may be possible to cut a new supporting ledge on the column. If this is not feasible or if the upper and lower columns are of the same size it has been found expedient to drill the lower column and to bolt onto it short lengths of heavy steel angle. In cutting out the damaged slab care should be taken not to bruise or otherwise damage the top steel that passes through the column. Hand picking may be necessary.

An explosion close to a retaining wall, either free-standing or as part of a basement, may produce cracks. These will probably be radiating cracks passing normally through the wall and terminating in a roughly circular crack that will be cone-shaped and widening outwards. Such cracks should do little harm to the strength of the wall but may impair its ability to retain water. If leaks do occur they may be

cured by pressure grouting, using a chemical rather than a cement grout unless the cracks are visibly wide. A high pressure of about 1·5N/mm² will be required.

Occasionally, when a column has been damaged or removed the overlying structure may droop slightly. It can be replaced by inserting temporary wooden props on folding wedges and then removing completely the damaged column and all its reinforcement. After rendering smooth the upper and lower exposed surfaces a new steel column is inserted into the gap. The column must be capable of supporting all the load of the overlying part of the structure. Stout projections are bolted with HSFG bolts to opposite sides of the stanchion and these are used to force up and raise the building back to its original position by means of two heavy hydraulic jacks. The stanchion base is then wedged and grouted up. Later the projections are removed and the whole stanchion is cased in concrete in the normal way.

The provision of temporary propping has sometimes presented a problem particularly in the provision of suitable foundations. When a building is supported on piles in soft ground it is difficult to find a means of carrying temporary props that may, in theory, have to carry a full column load. Fortunately there have been many instances to show that this kind of support is only rarely needed with a monolithic reinforced concrete structure. However, if the building faces on to a public street or similar it may be necessary to provide props so as to satisfy the local authorities and to reassure the passer-by.

In the repair of steel framed buildings there is little upon which to comment that would not be obvious to anyone accustomed to working with steel. On one occasion a car bomb damaged a ground floor length of stanchion, removing some of the concrete casing and bending the steel shaft inwards by about 25 mm. After a careful check of the loading it was found that for architectural reasons the casing was larger than the minimum and if it was all replaced using 4/20 mm bars at the corners instead of the original 4/⅞ in bars the resulting column would be more than adequate to carry the load, ignoring the bent steel stanchion within. The repair was so done and no apparent trouble has arisen.

Conclusion

An editorial comment on the earlier paper about bomb damage was "It does use some 'trade terms' but the meanings can be deduced". The author does not wish to appear to "teach Grannie . . ." and so in writing these rather random notes it has been assumed that the reader is a competent engineer though not necessarily skilled in dealing with buildings. "Trade terms" have again been used, However, it would be wise to warn that there could be great danger to the public if repairs are inadequate, particularly as regards overall stability. Dealing with building structures, particularly the older ones, must be classed as specialist's work and the engineer should not hesitate to seek further advice for any doubtful point. The '*S*' of "*Structure*" must also, and primarily, stand for "*Safety*".

Gunniting the Creggan Wall

MAJOR A COWIE RE, BSc(ENG) AND
CAPTAIN P LILLEYMAN RE, BSc(ENG)
12 FIELD SQUADRON RE

12 Field Squadron who are based in BAOR were stationed in Northern Ireland between February and July 1975 in support of the 8th Infantry Brigade whose Headquarters are in Londonderry

INTRODUCTION

The Wall

After the "Free Derry" areas were occupied in the early summer of 1972, it was decided to build a new base camp for operations in the Creggan area. This camp was centred on a hill overlooking the Creggan Estate. Built on a barren hillside facing a hostile area it was decided that a strong defensive barrier was needed between the camp and the estate. Sandbagging was thought to provide a quick solution, so a wall 100 m long by 3·65 m high was built, containing some 40,000 sandbags and approximately 1,100 ton of sand.

From all accounts this was no small operation, sand was transported from the beaches of the Foyle to Fort George in Londonderry. Here it was bagged by the 2nd Bn The Light Infantry and moved on to the camp site. At the camp site the bags were laid by the 1st Bn Grenadier Guards supervised by 33 Field Squadron RE. The operation took several weeks to complete. By late 1974 however the wall was deteriorating in condition as the hessian rotted and it became apparent that its useful life was limited to one more winter at the most. Despite a diminishing threat, in and leading up to the current "ceasefire", the requirement for a strong defensive wall was confirmed by the G Staff.

Design Options

Factors. Three main factors influenced the design of the replacement wall, these were:

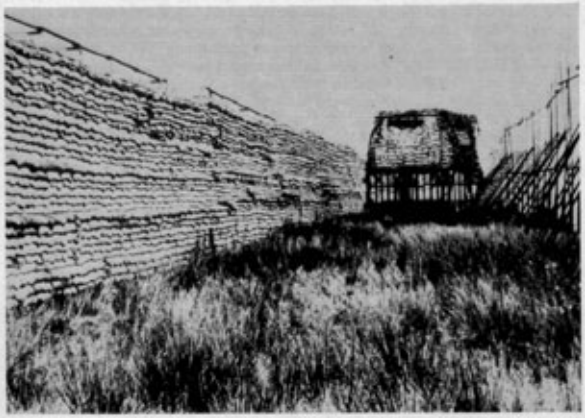

Photo 1. The Creggan Wall—East (outer) face. Note the difficult access and marshy ground.

Gunniting The Creggan Wall (1)

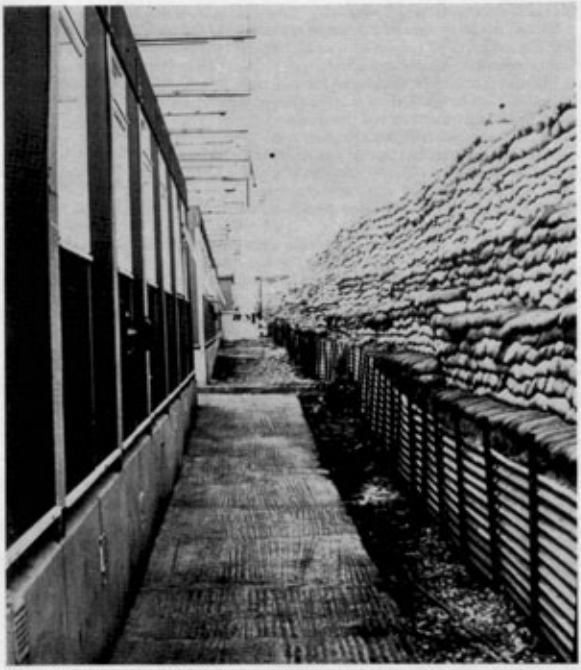

Photo 2. The inner face. Note the original revetting at the base; this was incorporated into the gunnite structure.

(a) Tactical
(b) Space Restrictions
(c) Engineering Considerations

Tactical. The East, or outer, face of the wall was directly exposed to the Creggan Estate and, even though a "ceasefire" situation existed, protective measures had to be taken when working on the wall. Similarly the camp defences had to be maintained throughout the operation.

Space. Creggan Camp was filled to bursting point with infanteers and their vehicles, day and night. Camp roads were narrow and the amount of engineer plant, vehicles and resources had to be closely controlled and restricted.

Engineering. The major engineering problems were access to site and availability of plant, vehicles and men.

(a) *Access to Site*. In addition to the tactical restrictions affecting access to the site, nearby buildings and camp defence works severely limited vehicular access to the wall. On the home side access was only possible at two points, neither had turning space. On the exposed side vehicle access would have been over soft ground and

Gunniting The Creggan Wall (2)

would have necessitated the temporary removal of other defence works.

(b) *Availability of Resources.* Limited resources and the need to retain operational flexibility necessitated the use of a small working party for the minimum of time. Cost of materials, vehicles and plant (other than hired items) was considered to be a subordinate factor to protection, labour and time, though not to that of disruption.

Options Considered. The options considered were basically:

(a) Reinforced concrete wall cast *in situ*
(b) Concrete wall built from precast units
(c) Dense concrete blockwork wall with buttresses
(d) Refurbishment of the existing wall by the use of Gunnite, a protective layer of concrete applied by spray techniques.

Option Selected. The use of the gunnite technique was selected for the following reasons:

(a) The existing wall could still provide continuous protection for the camp and for those of working party inside the wall.
(b) Vehicle access to the front of the wall was not needed, necessary vehicle access to the rear was minimal.
(c) It was estimated that this was the quickest and simplest option.
(d) Permanent on-site labour could be restricted to one field section and one plant operator (wheeled tractor).

Lessons Learnt

The refurbishment of the wall by the gunnite technique drew our attention to the merits of the technique and caused us to consider it for other work in Ulster.

Aim

The aim of this article is to describe the process as used on the Creggan Wall in order that its military applications may be reconsidered.

THE GUNNITE PROCESS

The process of Gunniting is simple and has been in use since just before World

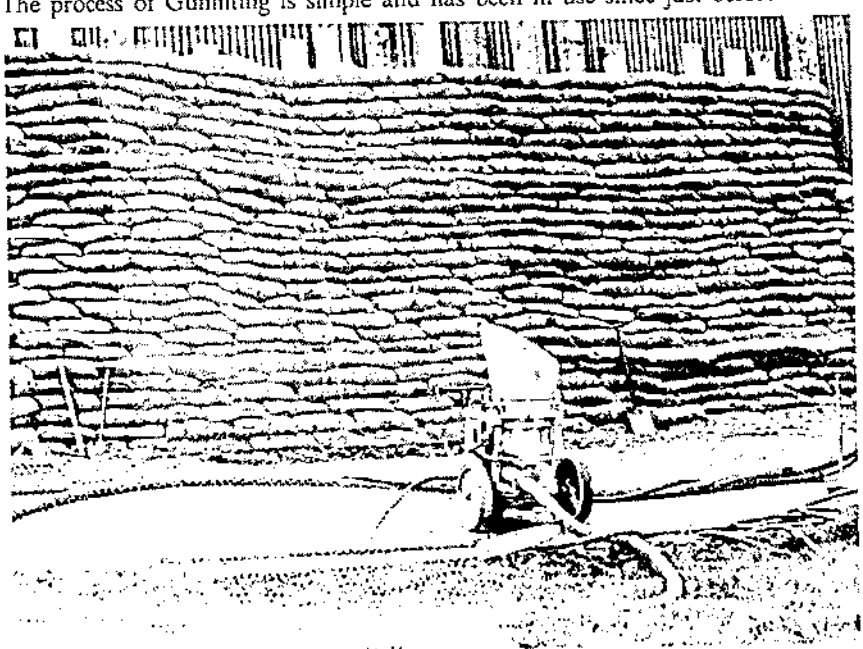

Photo 3. A mock up of the Creggan Wall used to practise (in safety) the construction team in the fixing of the chicken-mesh key and to test the equipment and the technique itself. The airline (small diameter) and dry mix hoses are shown connected to the hopper.

Photo 4. Gunniting in progress. Note the chicken-mesh key, the nozzle and the separate pipes for the dry mix and water.

War II. The fundamental concept is that a mix of dry sand and cement is carried along a flexible hose under air pressure and mixed with water immediately prior to being sprayed onto the target. When set gunnite is a dense fine grained concrete; high cube strengths are easily obtained because of the high degree of compaction and the low water/cement ratio.

By regulating the air pressure and water flow, a stiff mix is formed which adheres to the target no matter what attitude it may be in. To aid adhesion, and to provide reinforcement, steel mesh can be fixed to the target area prior to gunning. This mesh

Gunniting The Creggan Wall (4)

is given some "standoff" to allow the gunnite to completely envelop it and ensure a good bond when set.

When gunning vertical or suspended surfaces a maximum thickness of 50 mm can be achieved, beyond this limit the adhesion is insufficient to prevent the gunnite parting company with the target. Subsequent layers, however, can be added after the initial set of the previous layer, no further mesh being required, provided the loose "rebound" material is first brushed away.

One of the most interesting characteristics from a military view is the speed of the process. It is possible to achieve a laying rate in excess of 2·5 tonne per hour, without difficulty. In terms of a 50 mm thick layer this is equivalent to a rate of approximately 20 m^2 per hour—one side of a double decker bus in ninety minutes. For structural work time must be allowed to position any steel reinforcing and framework. In the case of the Creggan Wall where protection from further deterioration and not extra structural strength was required all that was needed was a layer of "chicken-mesh" to provide a bond. Laying of mesh may be a concurrent activity provided it remains ahead of the gun nozzle.

A small proportion (10 per cent) of the material is lost in rebound and dust. These deposits do not however, stick to anything and can be easily swept away when the gun has moved on.

The Equipment

The gunnite gun itself is no larger than a hicycle generator and the gun nozzle merely a ring of water spray jets fixed to the end of a flexible hose. The gun however requires a considerable back up force of compressor, concrete mixer, water at pressure and dumpers and shovelling plant.

(a) *Compressor.* The requirement is for a compressor to drive the gun's mechanism and force the sand/cement mixture through the pipes. It must be capable of delivering 0·28 m^3 per sec at a working pressure of 0·69 N/mm^2. On the Creggan task a Broomwade 200 was used satisfactorily.

(b) *Concrete Mixer.* A mixer capable of mixing 4:1 dry sand/cement by volume at an output of at least 2·5 tonne per hour is required. At Creggan a Benford 7/10 with an electric shovel and automatic hoist was used and this only just kept pace with the gun.

(c) *Water at Pressure.* An ideal working pressure of 0·4 N/mm^2 is required. The gun will function at lower pressures but with a much reduced output rate because a corresponding reduction in air pressure is needed to allow sufficient water to enter the air pipe. The ideal was unobtainable at Creggan and the camp fire engine had to be used to maintain a satisfactory water pressure.

(d) *Dumper.* Because we prefered to keep nudging our stockpile of sand into the range of the electric shovel instead of frequently moving the mixer, we had an Allis Chalmers MWT on site the whole time, and used this to transport mixed materials to the gun.

(e) *Shovelling.* The gun's hopper needed continual manual filling.

Costs

Exact costs were not established but the following estimates were made (labour and transport not costed) as an indication of likely costs per m^2 of 50 mm thick gunnite:

Materials	*Item*	*Cost £/m^2*
	Cement	0·51
	Sand	0·22
	Mesh	0·60
	Fuel/Oil	0·12
	Tie Wire	0·02
	Fixings	0·30
	Total	£1·77

Plant Assuming a rate of 20 tonne per day laid:

Item	*Cost £/day*	*Cost £/m²*
Compressor	12·85	0·07
Gun	3·57	0·02
Mixer	4·57	0·03
LWT or MWT	11·43	0·06
	Total	£0·18

TOTAL COST per m² £1·95

THE CREGGAN WALL

Materials and Quantities. The projected surface area of the wall was 800 m² but the surface texture prior to gunning was highly irregular owing to the way the sandbags had been laid. The average thickness of the gunnite was probably more in the region of 80 mm than the required minimum of 50 mm. The mix used was 4:1 by volume.

Sharp sand passing a 5 mm sieve and Ordinary Portland Cement was used. The sand had to be maintained in a dry condition otherwise it had a habit of clogging in the pipes. This was a persistent problem at the Creggan owing to showery April weather. The only remedy was to stop work and beat the rubber pipe from the gun to the nozzle, then blow out the blockages with compressed air. The mixture could have been made drier by increasing the proportion of cement to sand, but this was considered too expensive. Total quantities were as follows:

Sand	120 tonne
Cement	20 tonne
Diesel (Comp/mixer fuel)	750 litre

Time. A time given in days on site would not be strictly relevant as we had three days on site initially when no work was done. This was due to mechanical faults in the hired compressor (eventually replaced), problems of water pressure and problems of getting the right airline connections to suit both the compressor and gun (hired from different sources). Once work had started rain and snow caused further delays. However providing the mix was kept dry prior to shooting the process continued in light rain or drizzle, and one hour after the gunnite had been placed only the heaviest of storms dislodged it. Twelve days were spent on site actually shooting but seven good dry days would have been sufficient. The average working day was ten hours.

Labour. The wall was seen as a field section task and undertaken by 1 NCO and 6 men, a plant operator mechanic (POM) stayed on site with the Section to operate the Medium Wheeled Tractor (MWT). Labour was split as follows:

Mixer	—	2 men
Gun	—	2 men: one maintaining a watch on the air flow and the other shovelling.
Nozzle	—	2 men: one to operate the nozzle and control the laying, the other to support and prevent the hoses from snagging.
Allis Chalmers (MWT)	—	1 POM: the POM was also very useful in administering first aid to the other items of plant.

A further party of three men would have been required for mesh laying had this been planned to run concurrently with the gunning.

SUMMARY

The Process

Gunniting is a speedy method of applying layers of high density concrete in a highly compacted form to either formwork or existing structural surfaces. With the addition of mesh an excellent bond can be obtained; without mesh the bond is still good on all but the smoothest of surfaces; with strong mesh acting as reinforcement a very strong structure results.

The process requires a small labour force and only one item of specialist plant—the gun and hopper.

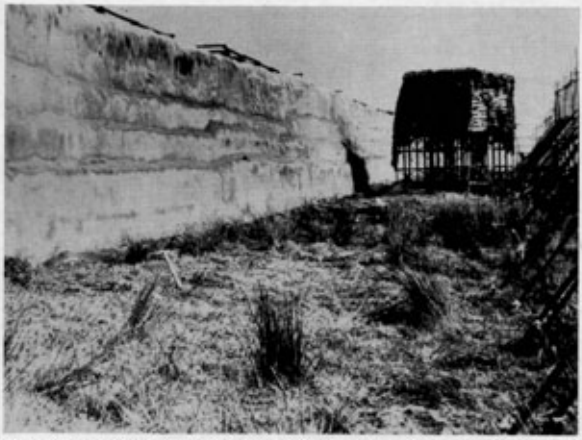

Photo 5. The completed outer face. Just visible over the wall is the mortar protection on the roofs of huts.

Photo 6. The complete inner face. Note the loose waste which has fallen onto ledges and ground.

Gunniting The Creggan Wall (5 & 6)

The flexible hose and small size of gun and hopper enable the technique to be used even though immediate access to the task is very restricted.

Other than to ensure a continuing availability of dry sand, water at a pressure of 0·4 N/mm² and a compressor with a minimum capacity of 0·28 m³/sec at 0·69 N/mm² pressure there is little to burden site management.

Although the total cost was in excess of £1·95 per m² of surface covered the military advantages of:

(a) speed on site
(b) ability to add additional or lasting protection to existing structures without removing them
(c) small manpower requirement

are such that this order of cost can be accepted.

Creggan

The main wall protecting the camp which was beginning to collapse has had its life extended for an indefinite period without reducing the protection it afforded during the construction period. Whilst there must be some danger from frost action due to the existing water content of the sandbags, natural internal drainage should reduce this to a minimum risk and sufficient repair will be achieved by pointing up any cracks which develop.

The task was completed with far less disruption to the camp's routine and facilities than would have been the case had the wall been removed and rebuilt. The Sapper force required was only a section for some twelve days overall thus allowing the resident Field Squadron to retain flexibility and undertake other tasks elsewhere.

OTHER MILITARY APPLICATIONS

Having tried out a technique not commonly used for military tasks nowadays and finding that certain advantages are most attractive the following paragraphs are included to stimulate further thought on the technique and its applications in the military environment.

The Internal Security Role

The resilience of the finished product and the speed at which it is laid has obvious potential in the IS role.

A Gunnite "Train"

The most difficult obstacle to the "tactical" use of gunnite is the requirement for plant, water and large storage areas for materials. If the process were to be used regularly this obstacle might be overcome by the adaption of existing plant and methods to formulate a drill. A flatbed truck could be adapted to take a compressor and pressure-tight water tank; one outlet from the compressor would be connected to the water vessel, thus providing water at the required pressure; another outlet would be available to drive the gun; the gun could be trailer born with its piping, and towed by the same vehicle. The sand/cement dry mix could be transported to site in a "ready-mix" truck and discharged directly into the hopper of the gun. We would then have a two vehicle train capable of laying about 5·5 tonne of gunnite per hour.

Trial Sangars

One quick attempt has been made to evaluate gunnite in the building of sangars. A trial sangar was built in dry blockwork, complete with fittings, then sprayed with gunnite. Some steel mesh was incorporated in the structure to offer reinforcement but this is not an obvious requirement and had there been time to perform controlled and programmed trials it might have been demonstrated that the texture of the concrete blocks would have in itself been sufficient to key in the gunnite. One wall was without mesh and the product appeared to have the same resilience to sledge-hammer attack as those with mesh, but fibre glass hairs had been included in the mix

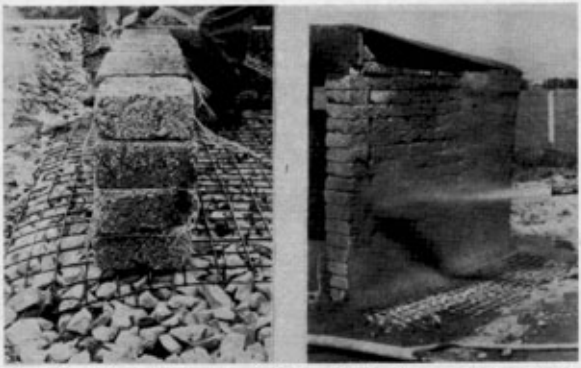

Photo 7 [L and R]. A trial for a sangar/OP. Square Mesh Track was used to give a strongly keyed base. The structure was built in three hours, (designed on site and using materials to hand), and had one open wall and only one embrasure due to imminent withdrawal of the Gunnite equipment and consequent lack of time and materials.

and this may have provided a large part of the bond. Embrasures and doors were formed by merely incorporating prefabricated frames into the dry block walls and gunning round them. Any gunnite which lands where it should not can be scraped away before it sets. By placing CGI atop the structure and gunning over it, a concrete roof is formed; in all probability mesh is necessary under these circumstances because of the smooth CGI surface.

Other IS Applications. It is suggested that gunnite may be used in the rapid construction of blast walling around camp areas or temporary hutting; the sealing of derelict buildings. (Hardboard backing could be nailed to the broken doors or window frames and wire mesh fixed over them to provide a key for the gunnite. A backing of hardboard would not be required if either the door or the window was intact.)

Summary. In many cases the initial construction of a defensive structure, which itself offers a degree of protection, amounts to a quick semi-skilled task within the capability of sappers and many assault pioneers given a design and prefabricated fittings. The second stage, gunniting, is again quick, and need not follow on straight away and the team or local SF benefit from the protection of the first stage structure.

In the Conventional Role

Gunnite will never be a front line technique (for reasons of setting time if nothing else, though even this could be improved with additives), but the ability to lay quickly concrete of a structural quality with minimum use of shuttering may be useful in a conventional war setting. It could be used well to the rear of the battle zone, in the lines of communication or in front line areas immediately prior to hostilities. The types of task which come to mind include:

(a) The conversion of housing or other buildings into defensive strong points
(b) Rapid repairs, or the rapid preparation, of defences in areas where digging is impractical, eg. flanks of NATO
(c) The strengthening of road blocks or other obstacles
(d) The preparation or improvement of bridge grillages and damaged piers and abutments

Gunniting The Creggan Wall (7a & 7b)

(e) The preparation of reserve demolitions prior to hostilities (tamping of pressure charges—protection of detcord circuits).

CONCLUSION

Although some of the ideas expressed may seem a little far fetched or unrealistic it is suggested that Gunnite is a well established commercial practice which merits a reappraisal for military use.

The task at Creggan could not have been so effectively done by any other means; it may be that other uses will be identified by those who read this article and perhaps a proper study initiated.

* * *

Gunniting The Creggan Wall 8

Nepal 1934

MAJOR-GENERAL S H M BATTYE, CB

PICK up a Sunday paper and study the travel section. It won't be long before you find Nepal's capital Katmandu in the headlines. Worldwide tourism has penetrated this Himalayan kingdom, in fact you can join an Everest expedition on a tourist ticket. But it was not always so. In the days of the British Raj Nepal was an independent kingdom in treaty relationship with India.

Yet Nepal remained a closed country to Europeans. No roadway existed from the network of India over the lower Himalayas to the valley in which Katmandu lies. There, however, life was a little less rugged with some twelve miles of roadway linking the various townships, roads that carried a few official motor-cars and some country buses, laboriously transported over the mountains in pieces and assembled in the capital. There was also a cableway running over the heights and spanning the gorges, carrying some of the day-to-day essentials for life in the valley, a somewhat tenuous but vital lifeline. The rest, furniture, trade, goods, pianos, kerosene, petrol, people—in fact, what you will—were carried over the mountains on the sturdy backs of the Nepalese. But this is to anticipate.

Under the original treaty the Government of India maintained a representative in Katmandu who went by the imposing title of Envoy Extraordinary and Minister Plenipotentiary. In the years of which I write the incumbent was a British Officer of the Indian Political Service. With him was a doctor and an educational adviser who together formed a minute British community. One further civilian, an engineer, was employed by the Nepalese Government, to be responsible for public utilities, including the mountain cableway.

It is curious that Nepal should have remained an isolated country for so long. The Indian Army contained ten Gurkha Regiments. These regiments were officered by British officers but only occasionally was one permitted to enter Nepal for recruiting purposes. This then was the state of affairs in the "thirties", virtually a closed shop, and no young officer bent on adventure could hope to get permission to enter the Kingdom.

But then Vi, a sister by marriage, came over the horizon. Vi knew everybody, at any rate everybody who counted for anything. And well she might. Her father had been one of the "Heaven Borns" who numbered amongst his more senior appointments Foreign Secretary to the Government of India, and Resident in Kashmir. Vi and her sister had, twenty years previously, been known as the "Rosebuds of Kashmir", a well deserved compliment to two gorgeous young things in the years before the Kaiser's war.

Vi returned to India after a lapse of a dozen or so years for a second visit and deftly made use of her contacts which ranged from Mysore in the south to the Himalayas in the north. It was whispered that the British Minister in Nepal had, in his younger days, sought to gather nectar from the Kashmir rosebud, but found no response to his advances. Nevertheless a friendship had continued and so it came about that Vi received an official invitation to visit her old friend in Nepal, "but" he added, "since my wife is at home in England perhaps you should be accompanied by an escort in order to maintain the proprieties". Vi wrote to me suggesting that I accompany her as ADC. I needed no second bidding.

The hot winds of April were now sweeping across the Gangetic plain raising dust from the parched fields and blanketing the trees in a haze which seemed to accentuate the sun's heat. I paced the platform at Gorakhpur whilst Nasru, my bearer, squatted by the baggage. Presently the overnight mail came panting in, an even thicker dust haze shrouding its passage. There was Vi in khaki shirt and jodhpurs, terai hat and all, hot foot from watching the final heats of the Kadir Cup. We bundled on to a metre gauge railway which had conveniently waited for the mail

train. Presently we were clanking and swaying over the shimmering plain heading for Raxaul and the road to Katmandu.

How long this part of the journey took I cannot now remember. The sun declined, the shadows lengthened and the hot wind ceased, giving way to a clear rose tinted twilight, which rapidly darkened into night. Vi had been generously supplied with a hamper by her erstwhile hostess and this was unpacked as we rattled along. Later Nasru came through from the servant's compartment to unroll our bedding along the lower bunks.

Sometime early the following morning we crept across the Ganges, the steel bridge girders reverberating hollowly to the clinkety-clunk of the bogies. Hoping to find a restaurant on the station at Raxaul we patiently waited for breakfast. Alas, we had miscalculated the devastation caused by the Bihar earthquake which some three months previously had suddenly rocked the lower Himalayas and the Terai bordering Bihar and Nepal. Raxaul station was there but the buildings were not, instead, *chattai* screens had been erected for the most essential offices. These did not include a restaurant, so Vi's hamper was again investigated, whilst Nasru, ever resourceful, produced tea and some tinned milk from somewhere. Refreshed, we took stock of our situation. A narrow gauge line connected Raxaul with Amelkganj just inside Nepal, but the earthquake had dealt that a very nasty side swipe and no trains were running.

The alternative was a country bus. Country buses whether in India, Pakistan, Persia or Afghanistan tend to be of a type. The basis is a sturdy, if old, 30 cwt engine and chassis. On to this is built an openwork body, partly of wood and partly of metal. A substantial roof rack crowns the lot and substantial it has to be. But the real glory of the bus is the paintwork. Varied in hue and ornamented with a portrait or two and the most alluring slogans, in Hindi, Urdu, Persian or whatever, there is no mistaking its ownership and the superlative service offered. Inside there are usually two classes; alongside the driver in front is first class, the rest is anybody's guess for seats athwart or lengthwise are occupied by all and sundry, well-to-do *bannias*, *burqa* clad females, snotty children and lesser live stock, whilst outside, when the driver is not looking, mount the ticketless outriders to be shouted at and thumped into scurrying departure at the next stop.

Vi and I travelled first class. Somewhere up above Nasru had stowed our gear in amongst the bundles, tin boxes, bicycles, wicker baskets, chickens and inevitable paraphenalia of the passengers below. We left Raxaul in the cool of the morning, but it was not long before the sun climbed and the hot wind started to wisp its way across the road stirring up dust and leaves until the air was thick with haze. Behind us the pall was impenetrable for several hundred yards, but fortunately there was little traffic and we rattled merrily along. Merrily at first but gradually the heat and dust had its effect and we tied scarves round our faces in an attempt to filter the worst. What it was like behind us in the main body defied description. Yet everyone seemed to take it as a matter of course, accepting discomfort as part of life. Most of them had never known anything else. Gradually the track rose through the lower hills, dry cultivation gave way to stunted thorn bushes dotting the crevices and rutted hillocks, eroded by past monsoon rains. The cross wind was actually a blessing, for it dissipated both body heat and the more fœtid effects of compact humanity.

We drowsed through the day, somehow the fifty-mile journey ticked away and as the afternoon light lengthened we crossed the border and came to a halt at Bhimpedi. Once inside Nepal, Vi became a VIP and I basked in some of the reflected light. A reception committee was there to welcome us, willing hands seized our impedimenta, stalwart backs shouldered our baggage, whilst two ponies were led forward for us to mount. We had traversed hundreds of miles of India on broad gauge railway, then metre gauge, to be followed by country bus, now the real stuff was to come, four legs or two.

I looked at the track ahead as it rose steeply round the curve of a hill. This was the beginning of the lower Himalayas proper. Our destination for the night lay

several miles ahead. I looked at Vi's slender figure as she mounted a white, shaggy, little pony, and I loooked at Nasru's thick set, rather stout, unathletic torso.Nasru, bearer, camp cook, waiter at table, tiger skinner, general factotum, was too valuable an asset. Motioning him to mount the second pony, I took my khud stick and set off on foot.

Some hours later and two thousand feet higher we arrived at the Government Guest House as dusk was falling. It is very comforting at the end of a long and tedious journey to find everything laid on. Vi's friend, Clendon, had ordered in food, firewood and such essentials as were necessary to our comfort. The Guest House was a simple affair with a living room, one bedroom and a bathroom, zinc bath, washhand stand, thunderbox and all. Outside, a tent had been pitched for me, but with what luxury—a brass-bound iron bedstead and mattress—no canvas camp stuff here.

In no time drinks were carried in by Nasru (the pony ride had been a wise precaution) then supper, served in this case by the *chowkidar*. He was garrulous to a fault, regaling us with talks of travellers long since gone, of "high-borns" padding by on elephants up the winding track over the passes and down into Katmandu. This occupied the meat course. For sweet and dessert the real *pièce-de-résistance* was those terrifying minutes when fissures opened, water spouted, villages subsided, trees cracked and fell, all the horrifying details of that terrible earthquake. I found it a stimulating account but Vi said somewhat tartly, that he had been indulging, possibly with some of the drink supplied by Clendon. She was not a little bored with this voluble henchman, but since she could scarcely understand a word of what he said it was not surprising.

The sun was just touching the treetops when we breakfasted next morning. Far behind lay the dust and heat of the plains. All was cool and clear, with the stimulating call of the dawn birds. We were still in the region of the rain forests, straight backed sal trees marched alongside with cotton trees; flame of the forest made a vivid splash of scarlet in the olive greens and browns of the lower slopes. Presently, on our upward way, we came in sight of terraced cultivation, layer upon layer of bank and pancake rising from the valley to ridge, an incredible feat of agriculture, which had taken years to accomplish. Gradually rain forest gave way to chir pines, whilst higher still we came upon mountain oaks, wild cherry, wild pear with here and there a glistening magnolia, interspersed with the sudden crimson flash of a giant rhododendron.

All the morning we toiled upwards, the porters now strung out behind us. Vi's terai came out as the sun rose higher warming our backs. The temperature was delightful and the air clear enough to reveal the unfolding view as we topped the first pass about midday. To our right the cable hummed its quiet way over the mountains. Pigeons fluttered and jostled for the grain spilled from the sacks loaded on the freight platforms. In one stupendous sweep the cable spanned a two-thousand foot gorge. Later when I met Mr Lilburn, the engineer, I asked him how the continuous cable had ever been hoisted into position. "Quite simple", he replied, "it was carried over the heights by coolies and laid in place beneath the pylons". I had visions of a monstrous millipede traversing the mountains to string out this thread-like cable.

We were now above the tree line and having lunched we started on a decline to the next valley. Vi kept to her pony, I to my two legs, Nasru quietly slipped off the second pony on the easy slopes in order, I suspected, to keep up appearances. Other travellers passed us making for India, whilst we overtook hillmen carrying the heavy loads which earned them a living. One had a pack of six two-gallon petrol cans balanced on his back, the rope head-band taut against his forehead, his leg muscles bulging and straining at every step. Another supported a cradle in which sat, facing rearwards, a smartly dressed Indian gentleman, umbrella and all, incongruous but somehow not surprising.

In places the track resembled the Giants' Causeway, rocks were worn smooth by

the passage of countless bare feet. Soon we were down in the trees again, the heady scent of pine trees warmed in the sun surrounding us. Then we were skirting a ridge, the pathway running horizontal for a mile or two. In the afternoon we climbed to another pass and finally descended wearily to the welcome Guest House as evening was coming on. That was the longest stage of the journey, seventeen miles over a couple of passes with a two-thousand foot gorge in between. Again Clendon had stocked the larder and arranged for our comfort. We sat looking out on the deepening shadows creeping up from the valley below, chasing the last of the sun's tints from the tips of the trees, till all were in shadow. As the stars came, and the chill of evening set in, Nasru discreetly announced that supper was ready. This time we never saw the *chowkidar*, he was a very different chap from the previous one and let Nasru do the waiting.

The final stage was largely down hill as the track dropped away into the main valley of Nepal gradually broadening out into a road and there, on the outskirts of Patan, was Clendon with a car to meet us. Soon we were threading our way through narrow streets stacked with rubble from shattered buildings, then on to the plain and so up a slope to Katmandu.

The British Legation was like an English home, a double storied house set in a delightful garden which was clearly Clendon's pride. His official duties being light, he was able to devote time to his garden. Day after day bowls of fresh flowers would appear in the house his speciality being the matchless rose-buds that he cultivated. What a contrast it was to relax in such comfort after the arid bachelor bungalows of the plains. Early mornings saw me out on a pony kindly provided by our host, whilst after breakfast Vi and I made the most of our time sight-seeing. We visited the nearer townships, Katmandu and Patan in more leisurely fashion, Bhatgaon and Swayambunath, all now to be found in the tourist guides. But in those days they were a unique privilege for European eyes. Everywhere there was evidence of the earthquake. Villages had subsided, roads shifted, houses collapsed in rubble.

Katmandu sprawled across a valley and over low ridges on either side. In the valley lay the old town, temples and bazaar, while climbing the ridge to the east lay the Government buildings. Tucked away further still was the Royal Palace and the Prime Minister's residence. On the western ridge was the British Legation which looked across the valley towards the Government buildings.

The *Hanuman Dokha*, the Royal Council Chamber, was cracked across and across. In contrast, the Legation had hardly been affected, which carried some significance to the superstitious and greatly enhanced the prestige of the British. Down below in the old town area the bazaar was a fascinating place of narrow streets and open shop fronts. These seemed to have survived with only minor damage. Shopkeepers were cheerful and eager to do business. We wandered along looking for small presents to take to friends at home. We haggled over this and that and soon discovered that it was prudent to enquire for two prices—one price was local the other "Company". The "Company" price was a relic of East India Company days when goods from India carried a "Company" mark up.

Adjoining the bazaar the damage was greater. Temples had been torn apart revealing to profane eyes, perhaps for the first time, the deities enshrined. But the magnificent *stupa* at Swayambanath with its all-seeing eyes gazing to the four points of the compass, mercifully remained intact. Erotic frescoes, bas-reliefs or carvings leapt at us from doorways, the walls of ancient buildings portrayed voluptuousness in many forms. Sex seemed to vibrate in the air. Clusters of tall stone *lingams* sprouted from temple precincts, encircling *yonis* clinging to their bases. At first I was embarrassed, but not so Vi, "Oh, you must expect this sort of thing," she said, taking it in her stride, "it's all part of their religious mystique."

Even the earthquake had its lighter moments; when rescuers reached a Hindu and a Muslim buried together but still living, a feeding tube was passed down to relieve their suffering but an altercation immediately arose as to who should have first suck. The Brahmin wailed that he would lose caste if the Muslim first defiled the

tube and the Muslim refusing to touch it if an infidel had sullied it. Then there was the fruit seller who was entombed with his stock in trade. Nine days later he was released none the worse, orange peel everywhere.

In the evenings it was usual for the other English families to come round to the Legation for a drink and a chat or a game of billiards, rather like dropping in at the Club. The doctor was a keen entymologist. I have never seen such a superb collection of butterflies and moths, some as big as fig leaves. This set Vi off on another line. What about a few specimen's for a nephew? Next afternoon we set off like a couple of schoolchildren into the countryside armed with butterfly nets. At first we wandered along without seeing much then we got into *lantana* country and things began to liven up. "Muffed", from Vi as I missed a forehand swipe, only to retrieve the game with a deft backhander. Childhood enthusiasm awoke and soon we were scampering after swallowtails, camberwell beauties, maps, purple emperors and hosts of other exotic specimens. Our eventual bag was over fifty different species which was so well received by the nephew in due course that they were set up professionally.

The days passed quickly and it was time we paid our respects to the Maharajah, the hereditary Prime Minister of Nepal, who virtually ran the country. (The King, Maharaj-di-Raj was revered in godlike isolation far removed from mundane affairs of State.) We duly presented ourselves, were introduced by Clendon, and received in audience. The conversation was somewhat desultry being conducted through an interpreter, for although Urdu was freely understood, custom decreed that such a vulgar language was not to be used. The Maharajah kindly inquired about our journey, comfort and welfare, to which we made suitable replies, thanking him for this unique opportunity of visiting his fascinating country. As a parting gift he presented Vi with a complete Nepalese costume, whilst I received a silver embossed ceremonial *kukri*, one of my most prized possessions. Finally he invited us to visit his "Jew". We took our leave mystified as to what this meant. However next day we were driven to the outskirts of the city and into an enclosure which turned out to be the Zoo. It was rather a pathetic affair with a few antelope, *bara singha*, and some tsarus cranes. Two spit-fire tiger cubs retreated snarling to the back of their minute cell-like cages, and I came away saddened at their miserable existence.

Soon it was time for us to pack up and go. Clendon bade us farewell as we mounted the ponies and ascended the track from Patan. We reached the Guest House without undue fatigue being by now accustomed to the heights. Next day we faced the long seventeen miles stage. It was a glorious day and the panorama of Himalayas whichever way you looked was superb. The same forest, the same terraced cultivation all looked different in a different angle of light.

Late in the afternoon, clouds gathered over the nearer ridges. Soon lightning began to flicker and thunder to rumble. Suddenly there was a blinding flash, a roar like a barrage exploding and a tree split asunder in a pall of smoke just to the right of the track. This sent us scampering and slithering down the last hundred yards as great drops began to turn the dust into mud, and we ran panting into the Guest House just as the clouds burst in a torrent of rain.

That evening we supped with a log fire hissing in the hearth, while the storm outside gradually rolled away. The *chowkidar* never uttered a word. Perhaps Vi had been right, and the drink had long since died out of him.

We set off next day under a clear sky, down the last steeps to Bhimpedi, and into the bus. The sun was ten days higher in the sky and the atmosphere that much hotter. At Raxaul in the railway carriage the fans hummed and whirred stirring the stifling air as we continued our journey southwards. Our next stop was Lucknow where, unbeknown a further adventure awaited us. But that is another story.

Call in at a travel agent and book yourself a package tour. You can reach Delhi overnight by air and be in Katmandu in another two hours. You can stay in comfort at one or other of the international hotels, see the sights and enjoy the ease of modern travel, but, by heavens, you'll miss a lot too.

The Third Month of World War I (Cont)

Parts I, II and III took the reader up to 7 October 1914, twelve days before the "official" First Battle of Ypres (19 October–22 November 1914). In this instalment we move forward. This is the period covered in Corps History, Volume V, pages 201 and 202.

Readers are reminded that the author was Section Officer, No 2 Section, 17 Field Company RE, 5 Division of II Corps.

PERSONAL NOTES JOTTED DOWN BY THE WAYSIDE (Part 4)

K B GODSELL 17 FIELD COMPANY

Thursday, October 8th, 1914.

We had breakfast at 8.0 am. A very nice room and the house and grounds were quite pleasant. Pottinger and I drove to ABBEVILLE in the light cart and did a morning's shopping, getting back about 1.0 pm. There were a lot of people in the town and we had quite an interesting time. As regards food, times are good, as we are passing through an untouched country, and eggs, butter, etc are obtainable at quite reasonable prices. About six of us gorged in a "Patisserie" before a large and admiring crowd. At 2.0 pm I paid the Company and had a hair cut, my first since leaving the Curragh, both tool carts turned up and also eighteen bicycles. Herring brought both and overtook us on the march. We paraded at 6.0 pm but did not start till 7.0 pm being blocked by the Gunners. The march was good until approaching billets when it became very slow. We finally got to our destination and billetted at 2.30 am in VITZ.

Friday, October 9th, 1914.

Breakfast at 8.0 am. We rested all the morning and stood by ready to move at 2.0 pm, and at 3.0 pm, and finally started at 6.0 pm. We heard a rumour that the Germans had been routed—but it turned out to be incorrect. We marched five miles to a spot where we were to be met by motor lorries. The transport left us and proceeded by a different route. No lorries turned up so we slept where we were on a very bleak hill top. Luckily there was a straw stack where we halted and the men soon made themselves quite snug. I found it very cold but my woolly muffler saved the situation. It was a beautiful moonlit night, frosty with a cold breeze and passed without event.

Saturday, October 10th, 1914.

We had some food at 9.0 am still waiting by the roadside. In the early morning we had some trouble with the East Surreys over the straw! We got into the lorries at 10.15 am. My breakfast consisted of bully, biscuits and butter scotch. The main body of the Company stopped at BRIAS. Smythe and I with three loads went on to DIVON where we stopped. We came back to DIEVAL by lorry where we billetted for the night. The Germans are said to be attacking the French at ANNEQUIN. There was a muddle about our section transport which finally turned up at 8.15 pm. Sapper Cree provided us with an excellent cup of coffee.

Sunday, October 11th, 1914.

We had breakfast at 6.0 am. We had a grand pork chop cooked by Smythe! We joined the main body of the Company who are with the 15th Infantry Brigade. We marched from DIEVAL to BETHUNE. No 2 Section were attached to the Dorsets. I went down to the canal at LA CROIX DE FER and found very little to do so returned to Company HQ. BETHUNE is a very difficult place to find one's way in, I got lost four times. The Infantry were occupying an outpost position covering the bridges over the canal. I did a little clearing for them and sited their trenches. As an advance was contemplated early in the morning no serious work could be attempted. I saw Count Gleichen by the canal and asked if I should prepare the bridges for demolition, he was most indignant and told me we should be in

LA BASSIE to-morrow. We came across a Battalion of French Territorials and I overheard a most amusing conversation between the CO (an aged Frenchman) and Count Gleichen.

Monday, October 12th, 1914.

We had breakfast at 7.0 am and advanced by the Major's circuitous route over the canal to GORRE CHATEAU where we halted for some time. I went on with No 2 Section to GIVENCHY with the Bedfords to put it in a state of defence. We had great difficulty in getting into the village owing to shell and other fire. We made two excursions into the village crawling along a ditch in the second case. It was quite unnecessary as it turned out. I saw the CO and decided nothing could be done till dark. I got the section into the village after dark and we worked from 7.0 pm to 1.15 am. We dug some very efficient trenches and converted some "lying" to "standing" with some success.

Tuesday, October 13th, 1914.

I got back with the section to the road fork just west of GIVENCHY where I had left the wagons and where my section billet was. I slept till 4.15 am, it was very cold but after tea and toast for breakfast I felt better. Got orders to assist Bedfords on attack on LA BASSIE. GIVENCHY can only be a MISSY without the cellars. I went up to GIVENCHY with my Section and reported to the HQ of the Bedfords who were delightfully vague about any idea of an attack. I met Smythe with No 1 Section in the village just after the Bosch had started shelling the place like blazes. I went down the street and there found the tool carts of both sections which I sent back to my section HQ out of harms way and then I returned to the Bedford HQ with my section and No 1, Smythe came back later and we waited there till 2.30 pm. The bombardment of GIVENCHY continued without stop and we were lucky to have got out of it. That a German attack was in progress was without doubt so we started preparing a line—a back line—along the FESTUBERT–PONT FIXE road on the east side. The Dorsets whose right rested on the BASSIE canal, and who occupied a line some way on the far side of GIVENCHY, were enfiladed from the railway embankment and were driven out of their trenches with a terrible loss as they had to retire across an open plain. The Bedfords on their left had to conform to the movement. The result was of course that everyone came streaming back until they met something to stop 'em. Herring was on the PONT FIXE, then Smythe and then myself. We stopped everyone coming down the road and made them man the trenches we had dug—many stopped with great reluctance and there was of course a great shortage of Officers who were still up in GIVENCHY. Herring collected six men and fired up the canal bank with combined sights! (these AA for M's). The thing that really saved the situation was a couple of French lorries fitted with MG's which fired from the PONT FIXE and the very noise was an excellent stimulant to "morale". At this period the situation was really bad. The Infantry were streaming back and it was very difficult to get them to stay in the trenches we had dug, many of them going straight through. Part of No 2 Section, who were holding an advanced portion of the line, were being enfiladed so I withdrew them and sent them back to wait for orders in the billet at the road junction. They mistook the orders and went back to Company HQ where they were useless. I remained with Smythe and No 1 on the road where we continued digging and occasionally had a shot whenever a Bosch appeared. By this time the Germans were in complete possession of GIVENCHY which, being on the top of a rise, commanded the road from end to end. Two 4.5 howitzers came into action behind a row of houses on the road and stuck it out very well and did not withdraw until dark having nearly taken the roofs off the houses in the meantime. The attack was not pushed home by the Bosch although there was practically nothing between him and BETHUNE. Towards dark some sort of order was established and the Infantry were settled into their new line. We returned to FESTUBERT where the rest of the Company were for the night. A bad inter-section fight, No 1 and No 2 about billets—No 1 won—No 2 rather in disgrace.

Wednesday, October 14th, 1914.

I went down to the Bedfords HQ early with the section and dug a shelter trench for the Battalion HQ. Their billet had had rather a bad shelling during the night and early hours of the morning. I then did a walk round the line which I found fairly good. The line consisted of a few pits and here and there some connected trench. It was not over pleasant going round as the Bosch was sniping from GIVENCHY but he must have been 500 yards away or more. The right of our position near the PONT FIXE was heavily shelled. Nothing very exciting happened all day. Our guns shelled GIVENCHY and set it on fire in several places and also quietened the snipers who were very active. At night there was a bad scare and a tremendous amount of rifle fire. I got a verbal message from a cyclist orderly telling me to return to Company HQ. I went back and found the message was all wrong so we returned to the Bedford's HQ. We soon started digging and continued all night. The Infantry were very short of tools and could do very little for themselves. We had collected a little wire from the local fences and, with some pickets similarly obtained, we ran a trip wire along the front of the Bedfords, the moral effect of which was far greater than the material. The Reserve available for the Brigade at the moment was 15 Division Cyclists under a subaltern. The Infantry were very tired and shaken.

Thursday, October 15th, 1914.

After a short but sound sleep I took the Section down to the Bedford's HQ where we remained all day. It was now very difficult to do anything in daylight as any movement drew artillery fire and the snipers were very active. We buried a dead horse and I returned with the Section at evening to the section billets sending back the tool carts of No 1 and 2 Section to Company HQ by a cross country route which necessitated the removal of bits of hedge, etc here and there. While so doing we were all alarmed by hearing a terrible swish in the air and thought there were at least six Black Marias coming over but it turned out to be a flock of starlings flying low. No 1 Section went out at night to the bridge to assist the Devons.

Friday, October 16th, 1914.

About 6.30 am I received an urgent message from Smythe to bring my section down to help him. A patrol sent out by the Devons had found a large farm, near the German lines, unoccupied. It was a very misty morning and the two sections proceeded under the cover of the mist to the farm to put it in a state of defence. It was a most jumpy business as the main German line was only eighty yards away and the mist kept rising and falling. If the mist cleared away we should be stranded for the day. There were no Infantry there, so before starting work we had to send out a few men to act as covering party. The men dug like smoke and we soon had an excellent fire trench under the hedge all round the building. When we got to the farm we found two dead Bosch belonging to a Saxon Regt. We continued to watch the mist with great interest and at length the Infantry Garrison came up. Having completed our job we packed up and started back to the road. When half way the fog lifted and there we were some fifty of us strolling about in full view of GIVENCHY. We were not fired on. I rejoined the Bedfords and soon after a report was received from a patrol to say GIVENCHY had been evacuated. An officer of the Bedfords had been badly wounded in the morning trying to get into the place. We then moved up into the village and through it on to our old trenches on the far side. I put the section on to digging a new trench in consultation with the OC Bedfords. GIVENCHY was a horrible sight and dirty. There were many corpses and dead animals in the village and the few inhabitable houses were in a filthy mess. The Germans are dirty livers. The ground on the far side of GIVENCHY was worse than the village and was strewn with dead, both English and German—and littered with paper and equipment and packs, etc which bore clear evidence of having been very thoroughly looted. There was also an old gun position of ours from which the two guns had been removed. Most of the gun crew including the Officer lay dead near the pit. Among other things a bomb was discovered. The Infantry were very frightened of it and of course I was sent—as an expert! Knowing nothing about it I took hold of a part

that looked as if it should unscrew and found it did. This turned out to be the detonator which I threw into a pond and put the rest away in a hollow tree. This was the first hand grenade we had come across but I don't think the Bosch ever used them in anger against us until much later. The German trenches and shelters were not of a very high order. The parapets were thin and there was not enough earth on the shelters to keep out shrapnel. On completion of digging I returned to the section billet but had to go back owing to an impending night attack. Everyone was tired after their very hard digging in the morning and afternoon and sick at having to turn out. We waited in GIVENCHY for ages but were not required as the night attack did not proceed according to plan. I spent a most uncomfortable night and slept on a bar. There was a tremendous lot of firing and a lot of noise during the progress of the attack. Every night one or two more houses were set on fire in GIVENCHY. The Church Tower was shelled every day and daily diminished in size.

Saturday, October 17th, 1914.

Orders were issued for an attack at dawn on Saturday and accordingly I had my Section on the canal tow path at 4.30 am. Later we moved to the road which runs through a small cutting and dug ourselves shelters in the bank. The attack did not come off so we continued to wait. The attack seemed to be of a similar nature to the orders received the day we approached GIVENCHY which contained instructions for the Brigade to form up in the Square at LA BASSIE at 2.0 pm! No 2 Section were again attached to the Bedfords for this attack. The position was made very difficult as any advance from GIVENCHY was entirely enfiladed from the direction of VERMELLES which had been reported captured by the French who were on our immediate right but who had till now been unable to capture it. I spent a lot of time at the Bedfords HQ and had a meal. Corporal Dobson's horse was hit with a bit of shrapnel so I sent the toolcarts back to their old home. There was a devil of a cannonade going on. Our objective was again LA BASSIE. We did nothing all the afternoon but at night we were sent out to CANTELEUX to dig an outpost trench for the left of the Bedfords. The men worked very well and got the job done quickly. The position of the enemy in front was not known but they had a machine gun post on the right by the bridge over the canal which was only 400 yards away, and the moon was bright. This bridge was the point which held up the night attack. Just as we were finishing an order came recalling the post. We returned to our advanced billet by the canal, Smythe and I were occupying a cottage there, and our batman got a fire going. Smythe had a bad night, as mistaking some white scum on the surface of the canal for concrete he stepped on it confidently and found himself in the water. He spent the night in the kitchen drying—there was some fun whilst this process was in progress. A quaint habit of the Hun which was noticed in most cases was his love of emptying all the drawers of a room on to the floor what ever the contents might be. I think he used them for bedding. He was also distinctly dirty about the house.

Sunday, October 18th, 1914.

There was very little doing in the morning but the OC came up and told us to start burying some of the dead. We spent the morning doing this which was not a pleasant job as the bodies had been lying about for some time. Before burying the poor fellows we removed such articles as the Bosch had left and sent them to the Battalion HQ together with the men's identity disc. On one officer of the Dorset Regt I found over 2,000 francs in French notes—when ordered up to GIVENCHY he had just returned from BETHUNE with his Company's pay. We put all the bodies into a big grave. The Bedfords had removed into Brigade Reserve so I remained to assist No 1 if required. The French carried out an attack through the Devons on the left of the canal. They advanced in splendid order in artillery formation and crossed the open country without great loss. When they reached our established front line they were badly held up by machine gun fire and were unable to advance and suffered severe loss. Orders were continually being received for us to attack and the hour was postponed and postponed and nothing happened. The

Devons who were comparatively fresh, having replaced the Suffolks, were getting very fed up with the inaction. In the afternoon I spent most of the time looking for barbed wire which had to be taken from the local fences, put on a stake and used for wiring the front line—this was our sole source of supply. A very slow process and not economical.

Monday, October 19th, 1914.

Reveille 6.30 am. Breakfast 7.0 am. A lot of the French were in the Devons trenches and later took over all the trenches south of the canal. It was a very quiet morning and we buried more Dorsets, in all we collected and buried some thirty corpses. It was a most unpleasant job. About noon we moved to RUE D'OUVERT due north of CANTELEUX. Smythe brought the dismounted men across country while I took the wagons by road also the cyclists. On the way I called at Company HQ at FESTUBERT. We arrived at VIOLAINES before discovering our mistake but finally we fetched up at RUE D'OUVERT. That night I went out with Smythe to help the Devons but did not find them very helpful in the digging line. We returned to our billet at RUE D'OUVERT at 11.30 pm where we were joined by Pottinger and were quite a cheery crowd—like old times—Fowle with No 4 was in VIOLAINES which he did not like. I went for a bike ride with Pottinger in the afternoon to try and find Captain Lloyd but heard he had been wounded in the morning.

Tuesday, October 20th, 1914.

Reveille 6.30 am. Breakfast 7.0 am. We had a thorough wash and shave and spent the morning in a general clean up—much required after living in filthy cottages for so long. Our present billet was a farm house which was very nice and clean. I went to GIVENCHY in the morning to see the Bedfords but found there was nothing on. At night they started dropping some shrapnel on the billet but did no harm. I was ordered up to RUE DE MARAIS to do some work and having got there with my Section I was ordered back to the Devon HQ where I dug some trenches or shell slits for the Battalion HQ designed for fire and communication purposes. I returned to billets about 11.30 pm meeting No 1 on the way. When at RUE DE MARAIS we had to stand by behind some houses as patrols reported the Bosch attacking. He started off with intense musketry fire and then shelled the place at very close range with field guns. It was most unpleasant. Pottinger with No 3 moved off to QUINQUE RUE. The 14th Brigade were reported to have been pushed back in the morning and the usual scare followed in consequence. The Cheshires repulsed an attack without having to call on the reserve company (Bedfords).

Wednesday, October 21st, 1914.

Reveille 6.30 am. Smythe and I had breakfast at 7.0 am. Shells began to fall very close but did no harm. A Gunner driver was killed near an observation post. We did practically nothing all day so I got some letters written and later we collected wire and stakes. At night I again took the section to RUE DE MARAIS to assist the Devons and again we were caught in a night scare. Bullets, shells and fuzes were buzzing all over the place. I think the Germans were quite as frightened as we were. The fuzes had a most comic appearance as they went bounding over the fields leaving a train of sparks behind them. When things had quietened down we completed the wiring and returned to billets. No 2 on this occasion rather wiped the eye of No 1.

Thursday, October 22nd, 1914.

Having got to bed full of hope and confidence we were very much annoyed and considerably alarmed to find ourselves woken by heavy musketry fire. Shortly afterwards most of the Cheshires came streaming back through the village, so we packed up as hurriedly as possible and got out of the village and withdrew to FESTUBERT. I was very annoyed as my batman left my latest *Punch* behind. It later transpired that the Cheshires had sent out all the troops holding their advanced line to dig a new line some 150 yards in advance of the old one. This was done without any covering party although the morning was very misty. The Bosch crept up unobserved to within a few yards and then rushed. The diggers had even piled their

arms some twenty yards behind them and the whole lot were scuppered. The troops in support could not fire as our troops were so badly mixed up with the Germans. This local reverse caused great consternation and alarm and led to a partial withdrawal on both sides. The troops in GIVENCHY had a very anxious time. The artillery in support behind VIOLAINES had to come further back as the Bosch had gained the observation and overlooked all their battery positions. We reported to HQ on arrival in FESTUBERT and were soon after ordered out to spitlock a new front line from GIVENCHY towards VIOLAINES to which the Infantry would retire at night and dig themselves in. I took my section up to GIVENCHY and started work on the ridge just north of the village. We were spotted working and the Bosch proceeded to shell us. After about twenty rounds they got our range and made some very pretty shooting. Unfortunately Sergeant Payne was wounded in the chest but we were lucky to have no other casualties. We were however forced to stop work at this point and I moved this detachment to a less exposed position where they could work under cover. We returned for a meal and some rest and then went out and dug some of the line we had marked out. It was a very long and trying day. Company HQ and the transport moved back from FESTUBERT to a farm some two miles in rear. There was too much shelling going on at FESTUBERT and the horses had to be moved.

Friday, October 23rd, 1914.

We returned to the billet at FESTUBERT, which now became our section billet, at about 5.30 am and half asleep consumed some breakfast, after which we turned in for some sleep. Alas it was only a very short time before our friend Black Maria had us out of bed and on the hop. We (No 1 Section also) therefore evacuated FESTUBERT and returned to Company HQ which we reached at noon and remained there for the rest of the day. After lunch we prepared to put up wire which entailed skirmishing parties to look for wire and stakes in the local fences. At 6.0 pm I took my Section to GIVENCHY where I was working with the Norfolks. Herring came with me and Smythe was working on my right in front of the village. We had several alarms whereupon everyone with a rifle fired as hard as he could into the air. The Germans were as bad as we were and fired so high that they even went over the trees which lined a road some 300 yards behind the front line. Having no serious trouble we put up 400 yards of apron fence and knocked off about 2.0 am.

Saturday, October 24th, 1914.

We spent the day in slumber and went out again at night, with Fowle and Smythe to GIVENCHY. It was a night of alarms and rumours of attack. Colonel Ballard of the Norfolks was in charge at GIVENCHY and in addition to his own battalion had two battalions of French under him who were very excited. He was extraordinarily calm and had his Headquarters quite close to the Church which was always a shell trap. The French kept asking for reinforcements but he was insistent that the Bosch would not attack and they got nothing out of him. We got on very well with the work which was very trying at one point as we were wiring in front of the French who were fresh troops and simply itched to let off their rifles. I had great difficulty in keeping them quiet while we were wiring their front but we managed it alright and joined up one fence with No 4 Section. I collected the Section and sent them back in the village to wait for me at a certain house and I went and had a final look to see that all was right. When I came back I passed a French sentry who challenged me. When I replied "Genie" he asked if the job was finished. I told him. He replied with an excited gesture "Then I may fire!" I told him for all I cared he could (in my best French). He chuckled and turned round and blazed away into the darkness and continued to do so all night probably. He had not finished by the time I was out of earshot. I had just left the front line when a heavy bombardment was opened on the position in general and on the village in particular. My section who were waiting for me in the village had a very rough time. A house some of them were sheltering behind had the roof blown off. They eventually got into some pits in the side of a road cutting on the western fringe of the village. I found myself in the open and bolted for

the first bit of cover I could see—this was a large—very large it seemed—hole into which I jumped with a sigh of relief. When I had time to look round I discovered I was in a grave but there were no corpses in it but by the light of a star shell I could see several on one edge ready for burying. I did not tend to a quieter frame of mind, I was now as anxious to get out of the blasted hole as I had been to get into it. Added to which I was extremely anxious about the section from whom I was cut off by a succession of shells of large calibre. When finally the shelling subsided I went into the village to look for the section and met one of the men in the street. Four new fires had been started as a result of the shelling and the road was obliterated by debris in several places. The sapper had come back to look for me as Smythe had been wounded. My section had joined his and all made for the pit in the sunken road and some of the men instead of going to ground at once were wandering about looking for their pals. Smythe came out of his pit to chivvy them into cover when a shell came over and hit him badly shattering his elbow. He was in great pain. We borrowed a stretcher from the Infantry and had to carry him up to GIVENCHY and out of the village by the main road. This was a work of great anxiety as we never knew but what they would start that infernal bombardment again. Added to which Smythe was heavy, the roads full of holes, and covered with stones, bricks, timber, etc and every jolt gave him most acute pain. Having kept eight men to carry the stretcher I sent the rest of the two sections back to Company HQ by a cross country route. We took Smythe to the Casualty Hospital on the FESTUBERT–PONT FIXE Road where he was dressed. It was then discovered that he had a tremendous wound behind from which he was bleeding profusely. In the middle of the dressing the Bosch started dropping large shells in the middle of the road. As there was no chance of an ambulance being available before daylight I borrowed a bicycle from the MO and sent back for the Mess Cart. When this arrived we put Smythe in it and he was taken to the hospital in CORRE CHATEAU where he would be more comfortable.

"Over the Hills and Far Away . . ."

"MORE MAJOREM"

"FOUR hundred men of the Royal Engineers will march into the Bavarian town of Donauworth today at the end of a march commemorating Marlborough's forced march of 1704 which culminated in the battle of Blenheim.

"They will be welcomed by Dr Alred Boswald, the Burgermeister who will give permission for them to fix bayonets and march through the beflagged streets with drums beating."

(*Extract from the Daily Telegraph 23rd June 1973*)

It was raining steadily as we marched along the eastern bank of the Wornitz on the last stage of our journey to Donauworth. We were still several miles from the town, but through the damp mist, and even from this distance, we could make out its spires and rooftops, wet and shining against the darkening grey of the sky. Clearly visible and brooding sullenly over the town was the domed hill of the Schellenberg, the massively protected stronghold where 270 years earlier had been fought the first of the two great battles of Marlborough's campaign of 1704; but on this occasion the arrival of British troops into the town was to be marked in a different fashion. . . .

So ended an exercise that had begun exactly four weeks earlier in the summer of 1973. It had been designed for an engineer regiment whose home base was some 350 miles to the north on the edge of the vast expanse of Luneberg Heath. In a number of ways it could be described as having been an unusual exercise and it might seem that it had little relevance to the normal role of the regiment, but there were special

circumstances operating at the time and it was the influence of these that suggested its design and led to its inclusion in the programme for that year. This is an account of that exercise and the circumstances that played a part in its planning.

Towards the end of 1972 the Commanding Officer spoke to the regiment about the coming year and what it had in store for us. It was going to be an interesting and rewarding year, the regiment were told, when we would have an opportunity to concentrate on all those things which for reasons outside our control had been neglected up to now. At the end of the year we would be going to Northern Ireland to operate as infantry and we would spend a few months beforehand preparing for this, but for the rest of the time we would be left largely to our own devices. All in all, it was going to be a year when we would have a chance to put our house in order, to consolidate, and to take breath.

We needed this chance to take breath. Since its reorganization early in 1971 and because of the demands of Northern Ireland, the regiment had not enjoyed an opportunity to function as an entity for more than two or three months at a time. The need to provide squadrons for Northern Ireland had also meant that the regiment was usually operating at about half its normal strength, and as can be imagined this made it very difficult to train properly for our BAOR role and at the same time provide an acceptable level of support to our own brigade. But this was a problem common to all units and it was generally agreed that the resulting pressures were more than offset by the experience Northern Ireland provided of active service conditions. However, its effect on individual training was not so beneficial and there was little doubt that the lack of time and opportunity to give a thorough grounding in the basic skills was resulting in a steady erosion of standards. This was a cause of real concern and it was apparent that we would need to give extra emphasis to this aspect of training in the programme for the coming year. Additionally, it would be prudent to make sure that the training programme was not only designed to cope with our immediate problems but also those likely to arise in the year following our return from Northern Ireland when, no doubt, the same frenetic pattern of life would re-establish itself. With these needs in mind a general shape to the year began to emerge: the first four or five months were to be devoted to individual training in combat engineer, specialist and artisan trades; the middle of the year was to include a bridge camp and a limited amount of combined training with other units of the brigade; and the last few months were to be spent in preparation for our tour in Northern Ireland. On top of this a major effort was also to be directed towards sport and adventurous training activities.

It was felt, however, that although this programme would achieve the main objectives we had set ourselves, there was still an ingredient lacking. We wanted to introduce some form of exercise that would act as a highlight to the year and provide a break from day to day routine and the normal pattern of training. Ideally, we also wanted something that was unusual and colourful; something that would excite the imagination and serve to arouse the interest of every member of the regiment. We had not been able to attempt anything like this over the last two years, but now that we had the opportunity to do so we intended to take advantage of it.

All this reads like a long list of benefits to be extracted from one element of the training programme, but it was evident that a gleam in the eye already existed in certain quarters when early in the New Year the Second-in-Command stole quietly away to the south of Germany. He returned after a few days not only with the confirmation we were seeking but also with a name for the exercise: "Exercise Rough Rambol"—an anagram of "Marlborough"—and a clue to the nature of the event, no less than a re-enactment of the Duke of Marlborough's march to the Danube in 1704.

With a concept thus agreed it was now possible to begin planning the detail. We proposed to hold the exercise in the middle of June and the actual march was to be limited to cover only the last 130 miles of Marlborough's original route—even now we could not spare the time to be away from our home base for more than a maxi-

mum of two weeks. It was intended that the whole regiment would take part, leaving behind only a small rear party and such of those who were still engaged on individual training courses. We planned to march between ten and fifteen miles a day, confining the actual marching to the early morning and forenoon so that the rest of the day was free for other activities. We had no intention of trying to set new marching records or indeed of trying to equal old ones, this was not the object of the exercise. We wanted a reasonable target to aim at and felt that ten to fifteen miles marching every day would achieve this, but we also wanted to do other things in keeping with the declared aims of the exercise. We wanted to savour the changing nature of the countryside as we passed through it, we wanted to promote social and sporting contacts, and we also wanted time to retrace and absorb the historical aspects of the march.

In keeping with another of our declared aims it was also our intention to make the event as colourful as possible. This would probably be the first occasion that the British Army had visited the area in force since the time of Marlborough and we intended to celebrate this by carrying out the march with as much style and panache as we could muster. We proposed doing this by carrying out ceremonial marches through certain of the towns and villages that we passed through, and in six of the larger towns we intended to end the day's march with a freedom ceremony. All this of course added to the scope and complexity of the exercise and meant that the administrative arrangements had to be planned in the most meticulous detail, a requirement in itself not without historical relevance.

The early weeks of the New Year were spent in further visits to the exercise area to finalise details of the route and the ceremonies, and to select camp sites and tie up the other administrative arrangements. At about this time too, a significant alteration to the scope of the exercise was made. Since the idea was first conceived it had always been a matter of regret that we could not spare the time to march over the whole of Marlborough's original route. Even at the speed at which we proposed to march it would still have taken a month to complete, from the starting point at Bedburg, near Cologne, to the finishing point at Donauworth, a distance of 350 miles. We felt that the regiment's final entry into Donauworth after marching only the last 130 miles would not be nearly as satisfying as if we had marched the whole way. It was therefore decided to form a composite troop which would indeed cover the whole route, starting the journey two weeks earlier than the rest of the regiment and joining us for the final stages.

While these details were being finalized, preparations within the regiment were well in hand, quickening and building up as day by day the event drew nearer. There was additional tentage to be collected, the loan of extra vehicles negotiated, and modifications to be carried out on other vehicles to turn them into mobile armouries, stores and wardrobes. In the last few weeks we hardened our feet with progressively longer marches and learnt, in case some of us had forgotten, how best to avoid getting blisters. At the same time as these preliminaries were going on the atmosphere of eighteenth-century warlike preparations was heightened with lectures and briefings on the campaign of 1704, and further enhanced by the *rat-a-tat-tat* of drums and the shrill sound of flutes as for one hour every day the Corps of Drums practised. The Corps of Drums had been formed some months before Exercise Rough Rambol was officially launched. Its members were largely recruited from Regimental Headquarters and played in the Drums in addition to carrying out their normal duties as clerks, storemen and drivers. How they were formed, equipped, and taught to play their instruments is another story, but they were to have an important and distinctive part to perform in the exercise and knowing this they practised assiduously.

Most of our administrative problems were solved from within the regiment's own resources or with the help of other units within the division. In this way we were able to arrange for detachments of the postal and medical services, the military police, and a mobile bath unit to accompany us. We were also able to persuade the brigade flight to spare one of their helicopters and there was yet one other area in which we

were able to enlist help from outside the regiment, and that was in the provision of extra uniforms. Through his contacts with other units the Quartermaster was able to equip every man in the regiment with three new sets of denim trousers and khaki flannel shirts, the form of dress it had been decided we should wear on the march. By use of a twenty-four hour laundry service previously negotiated along the route, we were able to change into clean and freshly pressed uniforms on every day of the march, with a further change for the more important ceremonies. In the event this proved to be a smart, practical form of dress which was entirely suited to the peculiar conditions of the exercise.

Eventually, the day arrived for the first stage of the exercise to begin. On the 23rd May the composite troop, henceforth to be known as "Marlborough Troop" and composed entirely of volunteers, left Bedburg at the start of their long march to the south; this was one week later than the date that Marlborough's Armies had started from Bedburg in 1704. We had arranged to receive daily reports of the Troop's progress, but they were confident that they would all still be marching when they met up with the regiment some 220 miles further on, and still together for the final march into Donauworth on the 23rd June.

Two weeks later the great day also dawned for the rest of the regiment. On the 10th June we travelled by coach the 300 miles from Hohne to our first camp site at Mundelsheim on the River Neckar. The camp had already been set up by the Administrative Party who had travelled down two days earlier. They had chosen a superb site, just outside the town and nestling between the river and the terraced, vine covered slopes which rose steeply from the floor of the narrow valley. A perfect setting from which to start the exercise—we were truly in the South of Germany and had left the cold featureless plains of the North behind us. It was also appropriate that our first camp was at Mundelsheim, the town where Marlborough and Eugene first met, and not far from where Marlborough having crossed the Neckar turned South East and confirmed at last that he was headed for the valley of the Upper Danube and not for Alsace.

The following morning at 6.30 am the regiment formed up on parade with the Corps of Drums and with the Commanding Officer mounted on his horse "Drummer" —"Drummer" was a personal flourish towards giving the exercise colour and panache, and had been carefully selected and brought over from England just for the occasion. We were formed up at the town of Gross Gartach and were there to meet Marlborough Troop who were due to join the regiment that morning at the end of the first section of the march. Precisely on schedule they marched on parade, at full strength and looking very fit after their long journey. Compliments were exchanged, Marlborough Troop took its place in the regimental column, and the exercise proper began.

Although the general pattern of the march remained much the same throughout the two weeks of the exercise, the changing nature of the countryside and the variety of our day to day experiences ensured that every day differed from the one before in some way or other. For the first few days our route took us through the valley of the Neckar; its walled, fortified towns strung out along the length of the river and its intensely cultivated fields and vineyards forming a distinctly medieval panorama. Leaving the Neckar we skirted the urban sprawl of Goppingen and eventually marched into the long sweep of forested, hilly country which hereabouts separates the upper reaches of the Rhine and its tributaries from those of the Danube. It was this range of hills that presented Marlborough with such difficult problems, both in its crossing and because once crossed it would separate him from the Rhine Valley, the eventual route for all his supplies and reinforcements. Hampered by the most appalling weather it had taken Marlborough's armies eight days to negotiate these ranges, but since that time many new roads have been built and we were able to clear them in one morning. The road we chose took us straight up the escarpment to the south of Geislingen and overlooking the Pass through which Marlborough had struggled; we avoided the Pass on this occasion because it is now

Photo 1. On the road near Geislingen.

the route of a major highway, heavily used and far too dangerous and unpleasant for marching troops.

Through the hills and out of the forest we eventually debouched on to the plain of the Upper Danube. This sparsely populated area with its simple, intensely religious farming communities has changed little in the last few hundred years. The air has a still, limpid quality even in the drowsy heat of summer and as we marched through the gently undulating countryside we could see far into the distance. Occasionally, the regular pattern of field and forest would be broken as a village came into view, its existence revealed when still several miles away as the distinctive onion-shaped cupola of the church first appeared, was then hidden from view, and then re-appeared from behind a succession of wooded slopes.

Our day started early with reveille normally sounded at 4 am, although in this respect we were guilty of staying in bed one hour longer than the soldiers of Marlborough's Army! After breakfast we would strike camp and then before we moved off there would be a short brief on the historical background to that particular day's march, these briefs being complementary to the lectures that had been given earlier in barracks. At about 6 am the day's march began. The Administrative Party were left behind to complete the task of clearing the camp site, and having done this they then moved ahead to prepare the camp for that night. It usually took us two or three hours to reach the town or village where we were to hold our first ceremonial march of the day. At a suitable forming up point on the outskirts of the town an element of the Administrative Party would already have set up facilities enabling us to refresh ourselves, wash away the dust of the road, and change into ceremonial drill order. Awaiting us too, would be the Corps of Drums, ready to play us through the town, and "Drummer" being given a final grooming for his part in the proceedings. With all preparations complete the march began. On these standard ceremonial occasions we marched straight through the town without asking for formal permission to do so (the freedom ceremony as we know it is unfamiliar in Germany and we were not offending protocol in any way—on the occasions when we did

Over the hills and far away (1)

request permission it was regarded as being a very friendly and diplomatic overture on our part). The march ended at a dispersal point on the far side of the town where to meet us once again would be the Administrative Party. After changing into normal drill order we would be off once more on the next stage of our journey. At the end of the morning we finished the day's marching with another ceremonial march or, alternatively, a full freedom ceremony.

For a full freedom ceremony we changed into a fresh uniform at the forming up point and the Corps of Drums changed into Full Dress. The march through the town took very much the normal form except that at a suitable point, usually outside the *Rathaus* or Town Hall, there was a short ceremony at which the Commanding Officer in his best German and in a carefully rehearsed speech, asked the Burgermeister for permission to march through his Stadt with drums beating and bayonets fixed. Permission having been given, the ceremony ended with the Corps of Drums Trooping in slow and quick time, playing airs that were familiar to the soldiers of Marlborough's time, such as, "The Grenadiers' March", "Over the Hills and Far Away", and "The Ash Grove". This Troop by the Drums was undoubtedly the highlight of the ceremony and always attracted the greatest applause. With the ceremony complete, we resumed our march through the town to the dispersal point and our camp site for the night. Once again the Administrative Party would be there to meet us with the site fully prepared except for the setting up of our own individual tents.

More than any other single aspect of the exercise it was the freedom ceremonies which attracted most attention and served to arouse interest in the march itself. The first freedom ceremony took place at Lauffen am Neckar and although on this occasion we did not attract many spectators, it served to announce our coming; a message that was taken up by newspapers, television and the radio, and promoted with even more vigour by the Regimental Public Relations Officer practising a role he was shortly to be performing in Northern Ireland. As a result, the crowds that came to greet us grew rapidly in size, and the interest in our venture remained constant until the last day of the exercise.

Photo 2. The Freedom Ceremony at Marbach—the "Troop" by the Corps of Drums.

Over the hills and far away (2)

Photo 3. Marching through Amerdingen—very early in the morning!

It was perhaps the freedom ceremony at Mundelsheim on the second day of the march that really set the pattern for the days that were to follow. Our publicity juggernaut was well under way by this time and because of this we were confident that we would get an enthusiastic response when we marched into the town—we were not disappointed. For such a small town the crowds thronging the streets were quite enormous. They gave us a very warm and friendly reception and everything we did was vigorously applauded, from the Commanding Officer's speech to the Troop by the Drums and our march off after the ceremony. But the extent of the town's hospitality did not end there and the celebrations continued well into the evening, as late in fact as an early reveille the following morning would allow. One of the main attractions was a football match between the regimental team and the local side. At the same time as the match was taking place the Officers' were entertaining the Burgermeister and a number of other guests to drinks and a little supper in the Mess. Above the party chatter we could clearly hear the cheering coming from the football match, rising and falling but with an occasional cheer louder than the rest. Every time this happened we laughingly said, "Ah! That must be another goal!" Three times this happened, then four, five, six—surely not! A message was sent to the football officer. He came back just before the end of the game, and with just a trace of embarrassment in front of our guests said, "It's true, we're winning fourteen nil!" News of this result also travelled ahead of us and none of the other matches we played were ever quite so easy.

At Marbach, the birthplace of Schiller, the crowds were as enthusiastic as at Mundelsheim but if anything even larger, swelled by the children who had been excused school so that they could watch the parade. Once again every action of the ceremony was greeted with applause and we were told afterwards that not even the visit of the President one month earlier had attracted such crowds or generated as much excitement. While we were relaxing in camp that afternoon we were surprised when a van drove up to the Mess and several technicians emerged and began installing a television set, tapping the power supply from a nearby house. We had invited the Burgermeister to dinner that evening and as the day's ceremony was to

Over the hills and far away (3)

be shown on television he was thoughtfully making sure that we would all see it.

Our overnight camps were usually located on the outskirts of the last town we had marched through that day. At Giengen we actually camped at the Sportsplatz in the centre of the town and were given free use of the swimming pool and the other amenities provided within the sports complex. Being located within the town like this meant that we became a novel and easily accessible attraction and we were consequently inundated with visitors until late that night. Family parties came on special excursions to look at us and old soldiers meandered about the camp in nostalgic little groups exchanging nods and odd words at familiar sights and sounds. The children, fascinated by soldiers as only children can be, were everywhere and in everything, and when dusk fell and most people had gone to their homes, their places were taken by young couples who deserted their favourite walks to wander hand in hand through the shadowy lines of tents.

Needless to say, the prime object of all this curiosity responded in the familiar, open, friendly way that has always made him the most acceptable of guests whether asked or uninvited, and to friend and foe alike. However, it is as well to record that on this occasion his response was also tempered with a certain amount of natural artfulness as he capitalized on the British soldier's instinct for recognizing when he was "on to a good thing".

There were other moments to remember too, and one such took place early one morning when we marched through the village of Trugenhofen. This little village was distinguished in no particular way, except that its white church and neat little houses represented in quite perfect form what we had come to picture in our mind's eye as a typical Bavarian village. On their reconnaissance earlier in the year the Commanding Officer and the Adjutant had stopped here for a few moments. As they drank in the scene before them it wasn't difficult to allow their imaginations full rein and picture it as it might have been in Marlborough's time. The villagers would have been aware of the advancing army and also that by the standards of the day this army was singularly well behaved and disciplined. Nevertheless, their approach would still arouse some apprehension and so when the Drums and Fifes were heard and when the leading elements of the army were first seen rounding the hill to the West, the bells of the church would be rung to give warning of their approach and that sensible precautions with regard to self and property should be taken. An amusing picture to conjure up and after discussing it for a moment or two the reconnaissance continued.

On the day in question we were approaching the village from behind the same hill when the Adjutant arrived to say would we please stop and form up as the village was waiting to receive us and the bells would be rung as soon as we were seen rounding the hill. It was an extraordinarily evocative moment as we marched through the village with the sound of the bells ringing in our ears over and above that of the Drums and Flutes, and with the few villagers who were not working in the fields standing quietly watching us.

In the course of the exercise we allowed ourselves two rest days when no marching at all was attempted. On one of these days we visited the field of Blenheim, and with the whole day available we were able to devote as much time as was needed to visit several vantage points and follow on foot the movements of the British troops in the battle. The battlefield has altered very little since Marlborough's time. There is now a railway line running between the Danube and the range of the hills to the North, but as it closely follows the old road it does not intrude in any way. The course of the Danube has also changed since then, but evidence of the old bed of the river still exists as a swampy ditch and indicates very clearly where the flanks of the opposing armies once rested. Apart from this there has been little change. The village of Blindheim, from which the battle gets its name, has grown of course, but not to any great extent, and the surrounding countryside has changed not at all.

After we had spent most of the day touring the battlefield we stood, finally, at the spot where the British troops initially took up their position. We were there some

Photo 4. The Freedom March through Giengen an der Brenz with drums beating and bayonets fixed.

seven weeks before the anniversary of the battle and the crops were still standing, but we could still see all the important features. Immediately in front of us was the Nebel, running at right angles to the Danube and still the same marshy stream that the British infantry, and later the cavalry, had to negotiate before their assault on the French positions. On the other side of the stream stood the village of Blindheim itself and beyond the village we could see the spire of the church at Hochstadt, the direction in which the French had fled when it was clear that all was lost. If we turned to look behind us we could see spread out along the plain the villages that the British troops had marched through on their way to the battle, and standing out clearly was the church tower at Tapfheim from where Marlborough and Eugene had first surveyed the battlefield.

As we stood in two ranks with bayonets fixed it was not difficult to picture the scene as it must have appeared before the battle. The steady throbbing of the drums, the colour and sparkle of so many uniforms spread across the valley and covering the slopes to our right, and the general noise and bustle as thousands of men and horses manoeuvred into their appointed positions. The moment was made all the more poignant as we tried to imagine the feelings of those others who had stood here so long ago. They had already completed the great march to the Danube, fought the bloody battle of the Schellenburg and were now to fight what was to prove to be one of the decisive battles of history.

And so, eventually, the last day of the exercise arrived, the day of our entry into Donauworth. Until now we had enjoyed the most glorious weather but as luck would have it on the last day it rained, easing just sufficiently at midday to enable the freedom ceremony to be held. Nevertheless, in spite of the weather a large crowd gathered to welcome us. As we marched to our dispersal point after the freedom ceremony it was hard not to feel a certain amount of regret that Exercise Rough Rambol had ended. It had taken so long to prepare for and now, suddenly, it was all over. Whatever benefits we did or did not derive from it there was no doubt that it had been a unique and colourful event and there were few of us who imagined we would ever take part in anything quite like it again.

In summing up the exercise it would be as well first of all to try to assess whether or not it achieved its aims. For the majority who took part the answer would surely

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be that it had. It succeeded in providing a break from normal routine and training and got us away, for a while at least, from the world of Deterrence, Flexible Response, and Mobile Defence. It also provided us with an opportunity to see and experience a different part of the country and to bring alive a chapter of our history. The daily marches and the training we had carried out beforehand also built up a reserve of fitness which we were to capitalize on in the months ahead. The other benefits were of a less tangible nature, some hoped for but others quite unexpected. The attention that the exercise received from the press, radio, television and an enthusiastic public all served to build up a sense of atmosphere and occasion. Most soldiers, although they might not admit it, enjoy being part of such occasions and it would not be too extravagant to claim that one effect of all this was to provide a lift to the morale of every individual member of the regiment and a lift to regimental esprit de corps. In this respect the exercise more than fulfilled our expectations.

There was another area in which the exercise was to produce unexpected benefits and this was in our relationship with the public. For most of the people with whom we came into contact we provided the first real glimpse they had ever had of the British soldier, certainly in any numbers. Their reaction to this experience was both interesting and pleasing. As might be expected they were very impressed with the ceremonial, the Drums, and the drill; but even more, they were struck by the quality of the individual soldier. They were impressed by his appearance, his turnout, and his behaviour, and they were particularly impressed by his haircut! But there was another quality which was noticed and remarked upon, a quality which we call "bearing". There is no doubt that when abroad the British soldier still displays the same attitude of cocky, self-assurance that has always marked him; for him it is still a case of *Roma Caput Mundi*—Rome, the master of the world. It is not a bullying or arrogant attitude, but one born of the firm belief that whatever is happening around him, the self-same destiny that has guided the fortunes of British soldiers throughout history guides him today. It is an attitude of supreme self-confidence, and it was this that was recognized and respected. If the mounting of Exercise Rough Rambol achieved nothing else, we felt that this additional and unexpected bonus provided more than sufficient justification.

Finally, as a postscript to the exercise and in answer to the question "Would you do it again?", the following story became popular during the last days of the exercise:

"Have you heard that the Quartermaster has been told to indent for 4,000 extra blankets?"

"No, why?"

"Next year we're doing the retreat from Moscow."

Clerking in a Hurry

LIEUT-COLONEL C F W MILLER RE (Retd)

HAVING retired from the Corps as long ago as 1948, the writer sometimes gets bored with his occupations of Bridge, Chess, Bowls, and the cultivation of roses, and takes any job that is offered, generally during the summer months. All of these expeditions, except one, have provided recreation, interest, and a little profit. They have included running a coffee-bar, a wharf in a minor seaport, and the spare-parts store in a busy motor garage. The exception, which looked like a straightforward job of clerking, furnished an eye-opening revelation as to what the future holds of civilized man.

For centuries farmers have run a few chickens along with their other stock. The chickens had an agreeable life, provided a few eggs, and ultimately, perhaps, a good dinner for somebody. That was the situation before factory farming was introduced.

Now the poor hens shut up in scientifically designed cages spend their lives laying like mad, with every particle of their food and water carefully controlled and measured, every requirement of heat, light and ventilation catered for, continuously monitored and watched over. Productivity is raised sky-high; the farmers wax rich! and the housewife benefits!! But what sort of life is this for the battery hen?

For centuries, too, clerks have plodded away under fairly easy conditions, keeping accounts, filing correspondence, and generally having an agreeable, if rather dull, life. Through the years Commissions and Committees have been appointed to look into the working of Government and Service offices and suggest economies. After making cuts of 5 or 10 per cent of obviously redundant personnel they have gone their way, leaving things pretty much as before.

The writer had heard that modernization had come to many business offices. He was unable to imagine what could be done to revolutionize the quiet life of clerks in the sacred name of productivity. He was soon to learn. Factory farming methods have quite definitely come to the clerical world!

A position as relief clerk was offered and accepted at the office of the nearby Branch Depot of the Lengo Oil Company, one of the big groups whose tank-wagons run around our streets providing petroleum products to local garages. On a fine May morning, the writer innocently reported to the office to take up his duties.

Enlightenment began.

The Lengo Company, an American-controlled group, has refineries at several major ports. These provide the oil to local Branch Depots at strategic points all over the country. These, in turn, supply the pumps of garages in four or five adjacent counties. Each Depot has about two dozen tanks, for the storage of close on a million gallons of the eight types of oil fuel commonly used, and two dozen 4,000 gallon tank-wagons which distribute to the garages.

The local Lengo Depot had been distributing to the garages in ever increasing quantities for many years. The office was a comfortable old two-storied building, with a clerical staff of eight, including a telephone girl (considered essential to keep the customers sweet), a cashier, and a typist. Then, a few years ago, the "time and motion study boys" from USA moved in.

They rebuilt and reorganized the whole place producing a situation whereby *three* clerks, working at frenzied speed, distributed more and more fuel at less and less cost; and so civilization advances. In the writer's opinion, the clerks are now like the battery hens producing without thought or rest. The only real difference is that the clerks know it and complain continuously! Although accustomed to strong language in the Army and the Docks the writer was amazed at some of the outbursts in the otherwise quiet Lengo office. This proved to be just a nervous reaction from men who were desperately and permanently over-stressed.

Since capital expenditure appears to be of no moment to American companies the old office building was scrapped, and a modern single-floor office was built, tiled cemented, polished, air-conditioned and equipped with gadgets to the *nth* degree. The new main office, which replaced the several rooms previously comfortably occupied, was now a single large room provided with three telephones, three adding machines of the latest type, and three double desks, occupable on either side. There was one large cabinet, which contained a card for each customer, but no files or filing cabinets. The only typewriter was kept in the Manager's own office and used by him alone, and that very rarely. There was a wall safe, like the night-safes used in Banks. Into this the truck-operators—wagon-drivers—placed the wallets containing the money they had collected from the customers as they went on their rounds each day.

"Clerk 1", the Routing Clerk, had the task of collecting the orders received from the customers (mostly on the telephone), co-ordinating them, and making out the invoices and routes for each of the twenty-four wagons for the following day. This was a biggish task, with five counties to cover. He also had numerous other duties in his programme.

"Clerk 2", in whose place the writer officiated, was the Head Clerk (responsible for the smooth running of the whole office), Cashier and Progressing Clerk.

"Clerk 3" was the Billing Clerk, who dealt with all post-facto negotiations with garages, including arguments about bills, wrong deliveries etc.

The time and motion team were equipped with data from other sources, for example how many bills a human being, working flat out, could calculate, address, fold into a window envelope, and place ready for despatch in, say, sixty minutes. They had similar sixty minute figures for other tasks, such as counting money from the night-safes, which happened to be part of Clerk 2's job. Starting from scratch, and disregarding all local practices and precedents, the team reorganized the routine completely so that each clerk had exactly one hour's worth of work to do each hour of his eight-hour working day. By the end of the day the clerks were exhausted—there was no built-in margin for mistakes or unforeseen delays! The conveyor-belt principle, the knowledge that the next man's stint would be hopelessly snarled up unless one completed one's own bit on time, kept the clerks on tip-toe and hard at it.

Petrol progressing is rather specialized work, so a more easily understood example on the handling of cash is used to illustrate the speed at which the work was paced. Some £8,000 per day, say £2,000,000 per year, in mixed cash and cheques, passed through the Depot office. Most of it was brought in by the twenty-four truck drivers who delivered the petrol. You would think that this large amount of money would provide employment for at least one whole-time cashier. (In a well-run Government office perhaps even an assistant cashier might be justified to look after two million pounds.) But at Lengo, not on your life! Exactly one hour, 10 am to 11 am daily, was allotted in the time schedule for Clerk 2 to open the night-safe; extract the twenty-four wallets; count the money; list it under the three heads of cash payments, bill payments, and deposits; add the cheques received by post; hand the whole lot in a special satchel to the Manager who would take it immediately to the Bank. Of course, the task is feasible. Indeed, the writer, in the end, achieved it. But how would you like to have eight such rush jobs, day in day out, in every working day? Remember that Clerk 2, nominally the Head Clerk, was considered to have a relatively quiet job. In fact, he had seven other jobs of this magnitude, including such items as progressing of lubricants and the distribution of advertising matter, inside his regular working day.

Every individual worked on a carefully arranged time schedule, with every hour packed with set tasks. Even tea-breaks were catered for. At 11 am and 3 pm precisely, Clerk 1, the junior, had a ten minute gap in his programme, during which he made tea and placed the cups on the desks of his colleagues. There was not a minute's waste of time even there. The offices were kept spotlessly clean, not by specially employed Mrs Mopps, but by the night watchman, who had to be there for security reasons, anyway. Staff-pay, Insurance Stamps, and Income Tax deductions were all dealt with centrally by London, together with a number of other domestic chores which commonly clutter up executive offices.

In normal office practice, it is often found that distance, which does not matter in the conduct of correspondence, is confused with time, which does. The absence of correspondence files in the Depot was explained by the fact that nearly all the consumers queries and similar matters were forwarded to the London office of Lengo, and dealt with by specialist clerks there. London might be two hundred miles away, but letters put in a big post-bag and posted by 6 pm could find their way on to the specialist clerk's table by 9 am the following morning, and get dealt with as quickly as if they had just moved from one table to another in the Branch. Lengo, realizing that the use of the postal services overnight involves practically no delay at all, deliberately centralized large sections of their activities—and it worked! (Though some modification may be necessary now if postal services continue to worsen!) How very different from the military idea that no reply can be expected from the next higher formation in under a couple of weeks. As for the Ministry of Defence—prepare to wait a month or longer!

Other labour saving measures included the mounting on wheels of the main card index file, containing the customers names and particulars. It looked like a giant perambulator but it could be gently propelled across the office floor for reference, without clerks having to get up from their desks. There was no typing of addresses. Each card held a sort of copper engraving plate on which the customer's name and address was shown. It was so arranged that a single pressure on a stamping machine could address up to five copies of a document. One copy could readily be folded and placed in a window envelope for posting and the other copies were available for costing, forwarding to the London office, or whatever.

Another ingenious device, not previously encountered by the writer, was the use of "throw-away" carbons. In other offices, carbons are thick and costly sheets, to be carefully attached, taken out, re-attached and used again, without much thought for the time wasted in cherishing the actual carbon paper. Not so with Lengo. The carbon was a very thin piece of paper, found stapled exactly where required, to be used once, and then torn off and thrown away. The main business of accepting orders, supplying and billing for petrol was carried out on one form, called the "Invoice". These came from the stationery store in pads, ready made up with carbons. The top copy, which was white and shortest in length, contained the information for the customer. The second copy, pink and about an inch longer, had space at the bottom for routing instructions for the driver. The third, yellow, contained an additional inch of space for costing, and so on.

The example of the invoice is given in some detail because it was the most important and most easily understood of the prepared forms and letters used to eliminate correspondence by specially composed letters. In the stationery office there was a Lengo Forms Manual with instructions for the use of over a thousand prepared documents, each made up with the correct number of carbons and different coloured copies, to deal with a great number of situations. For instance, if a customers cheque had "bounced", there was a prepared letter to deal with that. In fact there were several more, of varying degrees of severity, to deal with second and third "bouncers". Finally, there was a strong one, placing the matter in the hands of our Solicitors, Messrs Haggle and Daggle. And all of them could be used without a single word of typing!

Another measure to avoid any waste of time was the staggering of arrival and departure times for the clerks, and of their lunch hours. In many offices no serious work really starts, during the first hour of the morning, until the mail is sorted. Close programming avoided this sort of waste of time altogether. Every clerk was kept hard at it every moment of his working day.

While each of the measures described, and others found at Lengo, were reasonable enough in themselves, their cumulative effect was very exhausting. The writer asked the clerks, all three experienced men of obvious worth, how they had been persuaded to accept such arduous conditions. The explanation given was that as each cut in staff was made, the survivors were given a small increase of pay or promised a better pension. So, by gradual moral suasion, they were worked into their present overloaded position. There was no system of rebuke or reprimand, to keep them up to the work and prevent any slacking. The whole thing was done by artful psychological persuasion. Each job waited on the next in a subtle way, each man was kept in a position where his failure would let down his colleagues so he did his best to keep up.

The higher offices seemed to exert their pressure while remaining quite anonymous. Each day at noon the Manager of the Branch Depot was telephoned by a man in London we called "Big Brother". He was asked how much petrol had been sold that day, and how much money had been paid into the Bank. If the report was not quite ready the only comment was a mild "Tut-tut". It seemed to have a magical effect. It was said that Big Brother himself was telephoned daily by "BIGGER BROTHER" in New York, but the writer had no means of verifying this. Whatever the method, a most remarkable standard was maintained without any obvious pressure or display of high-powered leadership.

As a result of his curious worm's-eye view of the working of an office which had been completely re-organized by modern methods of works-study, the writer was made to realize that about half the effort expended in our old-type offices was wasted and could be eliminated. But, if Lengo is typical, a fully modernized office is an extremely unpleasant place to work in. A place to be avoided at almost any cost.

The writer returned to his Bridge, his Chess and Bowls, and the growing of roses, his heart full of thanks that he had been born when he was, and not forty years later. . . . Before very long modernization of this sort will surely come to all our offices. Productivity per head will increase immensely—but what about poor old human happiness?

Will nobody remember the fate of the battery hen?

The Sapper's War

This article, reproduced from The Times *by permission was written by their Special Correspondent on 30 November 1914. It emphasized the varied role and was subtitled "A Worker By Night".*

THE siege, not of cities but of countries, continues on a 250-mile front from the Yser to the Argonne. Ten departments of France are invaded. But France is calm, and she has reason. There is nothing in the world so demoralizing as the sense of impotent aggression, and the "Boches" have been knocking their heads against a wall for six weeks. The whole line is one fortress.

The cavalry have gone into the trenches like moles and their horses are eating their heads off picketed in a sufficiently extended line far in the rear. Their time will come. In the meanwhile the sapper emerges and takes the place that was his when the British Army last fought and swore in Flanders.

The sapper is too much preoccupied to swear much now unless he is left at the railway base to run trains. This is perhaps the most unwelcome variety of work that can fall to an engineer in war time, especially when the railway is in a foreign country and civil trains cross the lines of communication. The Railway Traffic Superintendent is the most preoccupied of officers, but he is not too much preoccupied to swear. The complications are enough to tie a man in knots, and a mistake may mean no bread, or stale bread, to a division at the front. When he finds horses destined for three different railheads in the same truck his language is worthy of the traditions of Flanders. Orders to report himself at Headquarters for work at the front come as a most welcome release.

This new phase of the war is the sapper's own particular "show". Spades are trumps; it is a *guerre taupinière*. His is the kind of fighting that calls for a peculiar quality of nerve. He is not given trenches to hold under heavy fire. He is seldom called up to take a position. He carries a rifle, but he rarely uses it. His weapons of attack are bombs and hand-grenades and mortars. He sleeps in the day, when he has time, and is at work all night. It is half-blind, stealthy work in the dark, almost feline, generally over the ground between the enemy's trenches and our own. It requires the least common kind of courage. As the weeks pass the spade work is becoming less. It fell heavily on the sappers at first. But the infantry make their own trenches and know how to dig themselves in. They have not moved much lately. Even the cavalry have become adept. The art of loopholes and parapets is well understood. The steel head-shield, such as the French have been using, is a great resource.

MINING AND DYNAMITING

Mines have not played such an important part in this mole-work as might have been supposed. We have heard the enemy mining and we have tried it ourselves, but one

strikes water in this country between seven and eight feet down. The enemy's sapping is mostly approach work. We sap out to meet them, but the deep shaft undermining a position is rarely possible with the water so near the surface.

There have been the shallow trench mines of which one has heard a great deal, but that ruse is nearly played out. One does not occupy an empty trench now, one jumps it. "A month ago we lifted them", an engineer told me. "It was not a proper trench we had been holding, but a low natural ditch with a small bank to it. It was rather a salient point, and we were glad to clear out. We left it mined, and in the evening the enemy came in. We made them jump." The Indian Army have played the same trick.

Every night there are wire entanglements to be put up which have been broken during the day. However stealthily the sapper sets to work it will only be a few seconds before he draws the enemy's fire. Word has been passed to the look-outs in the trenches to expect him, but he does not always get the benefit of the doubt. It is jumpy work for the sentries too.

Then there are buildings to destroy. The enemy will have occupied some house from which they can snipe our trenches, having sandbagged the windows on the second floor. They are too near to make it safe to shell the building. So the work of destruction falls to the sappers. This is another night job. If it is a cottage three or four charges will generally suffice, which means only one expedition. But the country is islanded with farmhouses with enclosed courtyards like Arab caravanserais. These are a more difficult matter. After the first explosion one has to return again and lay more charges. The enemy are thoroughly on the alert. If there is a flashlight it will be turned on, and the proportion of casualties will be heavy.

THE SAPPER AS A FIGHTER

All this is part of the night's work. But the sapper is doing a great deal just now that is not being talked about—the kind of old-fashioned fighting in which a man does good work if he can suppress his nervous system and embody the physical virtues of a terrier and a ferret.

There was a day of desperate fighting last week. Three Indian regiments and one British had been shelled out of their trenches by mortars, and in the darkness they had recovered them—or it was believed that they had recovered them. Nobody was quite sure. A sapper was sent to find out.

He found the Indians in their trench; in the *melée* the three regiments had become mixed. There had been a great deal of bayonet work. It was a long trench, and he knew every inch of it. He found it thinly held. Towards the far end the dead alone were in possession; he had to step over them. There was an unnatural stillness, and the smell of unburied corpses from a neighbouring field poisoned the air. He came to an empty space between two traverses; beyond this he heard men whispering, but could not distinguish whether it was German or Hindustani. At a low pitch of the voice the two intonations are strangely alike. As he stooped and listened a bomb struck the earth at his feet and he was thrown to the ground. He thought he was blinded. A fragment had struck his eyebrow, another his chest; he had wounds in his neck and ribs. But he rolled over and crawled back through the dead bodies again to his men. He directed the attack lying on his side till he was carried away. The last Germans were driven out of the trench afterwards by bombs and hand grenades.

Nerve in the trenches under shrapnel or in the attack is, to some degree, collective. Everyone who is in with you helps. The weakest is sustained by that strong fountain of courage, regimental prestige. He soon finds himself shaken down into familiar and neighbourly relations with death. He may even become used to seige-gun fire, though it is not an acquired taste. But in these lonely night reconnaissances one has to find the stimulus in oneself. "Darkness, isolation, uncertainty, suspense—all the ordinary concomitants of fear"—encompass him as he goes about his work. It demands "the least common kind of courage".

* * *

Memoirs

LIEUT-GENERAL PREMINDRA SINGH BHAGAT PVSM VC

Supplementary Memoir to that published in September 1975, extracted from the tribute paid in the *Military Engineer* published by the Institution of Military Engineers, India, to whom we are also indebted for the photograph.

"This is the Happy Warrior—this is he
Which every man in arms should wish to be"
William Wordsworth, "The Happy Warrior"

The individualism which was to create the Bhagat charisma began early in life, the jaunty angle of the cap began when he was a Gentleman Cadet. As Chairman of the Damoder Valley Corporation, an appointment he was holding when he died, he converted a slumbering establishment into a paying venture.

Lieut General Premindra Singh Bhagat PVSM VC

BRIGADIER J E CLUTTERBUCK

Born 8 May 1898, died 27 August 1975, aged 77

JACK ERNEST CLUTTERBUCK was commissioned into the Corps on 26 August 1916 and joined the Guards Divisional Engineers in France in 1917. From 1918 until he retired from the Active List in 1950 he was in India except for a two year Supplementary Course in the early twenty's, the Narvik campaign and a tour in Persia in WW2.

The breadth of his engineering experience on railway work was phenomenal, from Assistant Executive Engineer to Chief Engineer, a tour in the Transportation Directorate in GHQ Delhi, service with the CIC, EI, NW and GIP Railways, working in the Khyber, at Lundi Khotal, Ranchi, Jamalpur, Calcutta, Karachi, Jhansi, Akola, Bombay, Bina, Dholpur, Lonavla, Khandwa, Bhusawal, names which will bring back memories to many Members. He was one of that band of railway engineers who did so much to develop the communications and the potential prosperity of the land masses of the old Empire.

R D W writes:

"I was at Jawrud when he was at Lundi Khotal. Our meetings were few and far between and though he was rather shy and reserved he was very likeable and we got on well together. His father was a big noise (Inspector General of Forests in India and Burma) of the India Forest Service and I think Clutterbuck spent much of his leave in the jungle with his family."

H J C M (ex India Forest Department) writes:

"He was a keen sportsman and a loyal friend. In fact I rate him one of the finest men that I have known in my lifetime. Although I had never in fact met him he was most sympathetic and kind when my wife was taken ill in the remote jungle; he arranged transit accommodation, ayahs, a special carriage and an ambulance to meet us at Bombay. A lasting friendship continued from that day until his death. In his company we visited numerous temples and ancient forts, the study of which was of consuming interest to him."

R W P Y writes:

"In WW2 he had one object and one only, to defeat our enemies. A serious minded non-smoking teetotaller who was absolutely trustworthy, he greatly disliked his time from 1942–45 in the Transportation Directorate in GHQ Delhi where he had to serve under officers uncongenial to him."'

L S J writes:

"My first meeting with Brigadier Clutterbuck was in 1932 when I took over from him as Resident Engineer, Akola, in the Central Provinces. As Resident Engineer he had been responsible for the track between Bhusawal and Nagpur as well as for all works services in connection with buildings of all kinds, bridges, roads, water supply, etc. Work similar to that of a Garrison Engineer. I well remember the "Handing-over Notes" he prepared for me on that occasion; running into many pages of detailed and useful information, they were a model of perfection. He was a marvellous organiser; whether it was a complicated operation on the track involving temporary closure of the line or simply a weekend duck shoot. Both would be planned in meticulous detail and treated as a military operation! No one would be in any doubt whatever about the objective and how it was to be achieved. He would spend much of his spare time walking in the jungle or duck shooting or visiting ancient forts and old temples. During these excursions he would always find time for conversing and joking with the villagers. What impressed me most was his great love for India and its peoples."

A truly professional railway engineer and soldier, a meticulous planner, a man of compassion. A man not well known to the Corps at large, the specialist nature of his work precluded this, but a man highly-respected in India and Indian Railway circles and by all who met him.

COLONEL M G L ROBERTS, MBE

Born 25 October 1928, died 11 September 1975, aged 46

MICHAEL GORDON LINDFIELD ROBERTS was born on 25 October 1928, and died tragically as the result of a motor accident on 11 September 1975. So ended a life of deep devotion and service to the Corps at a time when he still had so much to give.

Michael Roberts was the second son of General Sir Ouvry Roberts, one time Quarter-Master-General, and followed his father into the Corps in May 1947. He passed top of his batch at Sandhurst, and well deserved his first appointment as ADC to his father. After a year as a troop commander in Germany, he went to Cambridge University where he graduated with an Honours degree in Mechanical Sciences. It was here that he met his wife, Val, and began a partnership which was to be a joy to all who knew them.

His next appointment was with 4 Field Squadron in Germany. His squadron commander at the time, who is currently Quarter-Master-General, described him as the best squadron second-in-command he has known—an excellent administrator, with a very clear brain and a great capacity for getting things done. He attended the Staff College in 1959, and was appointed to command 59 Field Squadron in Malaya in 1965. It was for his work in this appointment, and in particular for the major part which his squadron played in the reconstruction of the Op Crown airfield, that he was awarded the MBE in 1967.

He was promoted to acting Lieutenant-Colonel in September 1967 and posted as Military Assistant to Deputy SACEUR—an appointment which gave him some qualms as his predecessor had left rather hurriedly! He need not have worried. His general found him absolutely first class at his job, and says that he was tremendously popular with all nations and every rank at SHAPE. From there he went to command 38 Engineer Regiment in Ripon, an appointment which he regarded as the happiest and most rewarding of his career. Perhaps above all he will be remembered for his compassion and generosity in dealing with the men and units under his command. Those of us, and our wives, who had the honour of serving immediately under him at the time have remained united in a close bond of friendship.

He returned to Germany on promotion to Colonel as CRE 2 Division, where his unqualified professionalism and extensive knowledge of the army earned him respect throughout the division. His final tour took him on a Defence Fellowship at University of London King's College, where he studied the evolution of defensive warfare. As a result of his brilliant thesis, as yet unpublished, he was to have been awarded the singular honour of a Doctorate of Philosophy. He was "managing" the Centenary Meeting of the Institution when he died. The subsequent success of the Meeting was, to a large extent, due to the foundation he had laid.

Mike Roberts was a man of complete integrity, absolute sincerity, and deep moral courage. He had an easy cheerful and unassuming manner, and a total lack of pomposity. A serious deep-thinking man, he none the less had a great sense of fun and an intense enjoyment of first, his family, and then of a wide range of academic and sporting activities. He served the Corps and the army well, and would unquestionably have risen to high rank had his life been ordained differently.

To his wife Val, his father, and his six children we extend our deepest sympathy.

RJ-H

DRC writes:

"I first encountered Mick Roberts when I was BM 26 Engr Gp(TA) in our funny Nissen hut HQ which was co-located with HQ Southern Command at Wilton. The Command staff, which by a sleight of hand included the BM, was summoned to hear the Army Commander tell us the form. In the course of his talk, the General quoted the opinion of his ADC, who, hardly by chance, happened to be his son Mick. I remember pondering at that time that this young man seemed experienced beyond his years.

"Later I was posted as SI Bridging at Chatham. Once we had achieved a *modus*

operandi I was to enjoy two very happy years with Mick as the AI Bridging. He had a particular flair for training officers who, after all, were only marginally younger than himself—often a good deal older. With the young, one felt he was striving, well beyond the scope of the syllabus, to suggest almost a way of life which was entirely comprehensible and always stimulating. Inevitably, he would get frustrated and even irritated with those—junior and senior—equipped with less sophisticated mental kit. Things did not always go according to plan. Mick had designed a 'two-faced grandstand' overlooking the Medway and the new Gundolph Pool which suited a novel presentation of equipment in which Tim Gartside and I were apt to indulge from time to time. Mick phoned me: ready for inspection, he said. We clambered up the Hilton-type Bailey structure—it had a sort of motorway running through it—and gasped at the possibilities it offered. The wind was about force 5 SW. After making suitable noises, I said tentatively: 'Mick, I think Rochester is moving backwards and forwards.' He glared down at the town and agreed with me; it was. We looked at each other, knowing that Rochester simply did not behave like that and slowly realizing that the vertical sway-bracing had somehow been omitted!

"I sometimes wondered if the post-war Army was a big enough vehicle for a person who was, at once unconventional and intellectual in outlook and yet so able in execution. There can be little doubt that he was a very kind and accomplished father and husband. I often pondered where he would finish; indeed Mick never failed to inspire thought whatever the subject. I must be one of very many who are deeply regretting that we shall never have a satisfactory answer to that question."

Colonel M G L Roberts MBE

MAJOR-GENERAL B T WILSON CB DSO

Born 12 December 1885, died 30 October 1975, aged 89

BEVIL THOMSON WILSON born in Toronto, Canada, was educated at Clifton and RMA and was commissioned into the Corps in 1905.

For the first seven years of his service he was with Military Works Service in India, first at Rawalpindi gas works, then Risalpur NWFP and finally at the 1911 Delhi Durbar of King George V and Queen Mary. Between 1912–1915 he was in the Sudan as a Bimbashi EA in command of Egyptian engineer conscripts involved in the construction of camps at Gederef and Kassala in the Eastern Sudan. In 1915 he was sent from Alexandria with a shipload of engineer stores and a detachment of his Egyptians to build the road to Constantinople.

In September 1915 he took command of the 1/2 Lowland Field Company RE, 29 Division at Suvla Bay and was evacuated from both Suvla and Cape Helles. In France and Italy, first as Adjutant 29 Division and later as OC 1/2 West Riding Field Company RE he took part in many battles for which he was awarded an immediate DSO and gained five mentions in despatches. In 1920 Brevet Major B T

Major-General B T Wilson CB DSO

Wilson DSO took command of 7 Field Company which had been reduced to cadre strength in 1919 but had been reformed to support the Army of Occupation at Cologne. This was his last Sapper command. From 1952 to 1954, by a pleasant coincidence, this Company, now 7 Field Squadron, was the affiliated Squadron with 91 Lorried Infantry Brigade in 11 Armoured Division when General Wilson's son was Brigade Major.

The brevets of Major, Lieut-Colonel and Colonel give an indication of his ability.

After completing Staff College in 1922 he had fewer appointments in the Corps than he would have wished. To list all his subsequent appointments would be pedestrian but four are worthy of mention. Chief Staff Officer, Sudan Defence Force, Brigade Area Commander Lahore, Brigade Commander Nowshera NWFP (where he took over from Field Marshal Lord Alexander of Tunis), and finally Commander of 53 Welsh Division TA, which to his great disappointment he did not take to France in 1944. He retired from the Active List in 1941 after thirty-six years service.

He certainly did not retire from active participation in the world around him. He was with SOE in the Levant and West Africa, with UNRRA and the Control Commission in Germany. Back in London he busied himself as a military commentator writing papers for the *Army Quarterly* and the *Journal* of the RUSI. Many Members will remember his countless erudite book reviews published in this *Journal*. On one occasion he even "talked" his son into reviewing for us! He was a Member of the Publications' and Library Committee of the Institution for many years. For fourteen years, until the age of eighty he was a member of Council of the Royal National Institute for the Blind, for nine years he was in charge of the Vicarage flats of St Paul's Church, Knightsbridge and was Treasurer of 29th Division Association.

General Wilson was a man of boundless enthusiasm for life, was interested in all that was going on around him and really cared about it, but above all he was a man of understanding and humour.

In April 1918 he married Florence Erica, daughter of Sir John Starkey, Bart, for many years Conservative MP for Newark. To his widow, daughter and his son, Lieut-General Sir James Wilson, GOC South East District, we extend our deepest sympathy.

MAJOR-GENERAL L D GRAND CB CIE CBE FICE

Born 10 August 1898, died 22 November 1975, aged 77

LAURENCE DOUGLAS GRAND was commissioned into the Corps in 1917. Unlike most of his contemporaries, towards the end of WWI and the years that followed who lived for the present, LDG was imaginative and far seeing—if not quite so forceful as fellow Rugbeians who also became Under Officers at the Shop almost automatically—he was unique and being out of the ordinary was sometimes suspected.

He served in France in 1918 and later in North Russia. He was invalided from Finniemore's Company at the front up the Dwina but "deserted" the Hospital ship and turned up a few days later in Archangel—he did not want to be out of the party. In 1920 he went to India and with the Madras Sappers and Miners he moved first to the Khyber and then to Mesopotamia where he served with Field Companies in the Iraq Rebellion. As a Lieutenant/Acting Major he was DAQMG Iraq Levies in the operations in Kurdistan during 1922–23. It was in Kurdistan that the plight of the Assyrian minority group came to his notice and LDG made great friends with their leaders. One of his first acts on returning home, for his Supplementary Course at Cambridge, was to lobby Whitehall on their behalf which, from a Subaltern, must have caused raised eyebrows in some quarters. It was on this same course that he decided that public speaking was an art to be cultivated and cultivate it he did. Years later he unsuccessfully stood for Parliament. A further four years in Iraq with the

Military Mission serving with the Iraq Army on the General Staff was followed by command of 40 Fortress Company at Portsmouth and a tour as Garrison Engineer in Aldershot. In 1934 he became Deputy Assistant Director of Mechanisation in the War Office dealing with the design and production of wheeled vehicles for the Army. It was at this time that a big drive was launched to publicise the Army. Chepstow and other military establishments came up with models of weaponry, made in their workshops, the scale was about one tenth full size. LDG decided that models of "soft" vehicles were required and he persuaded, pressed, almost "blackmailed" the major manufacturers of vehicles to produce the models he thought necessary at their expense.

Between 1938–40 he headed Section D of the Intelligence Service, one of the organizations from which the Special Operations Executive was developed. His job was to investigate those of the enemies methods which could be used back at them. "He had the vitality, enthusiasm and the natural leadership qualities needed to head a team which at one time numbered nearly 150 officers." One day, out of the blue, I received an invitation to lunch with a "Mr Douglas" at a West End Hotel. The lift opened straight on to LDG's private suite. Over lunch he was as effervescent as ever and no word of the nefarious underground activities he was conducting in Europe was mentioned. Unfortunately he rubbed a great many bureaucrats the wrong way, and to get up against Churchill was to be in distinguished company. He returned to military engineering. "But he left behind the basis of a good organization manned by very talented people who were to prove that his concepts were both effective and efficient."

He returned to his beloved East, he was involved with the planning of the defences of the North West Frontier, in 1941 he was a CRE in Iraq and later Deputy CE (Defences) North Iraq. After a short time in the Western Desert he was flown back to UK to plan the Denial Scheme for Calcutta. As Chief Engineer 4th Corps he was responsible for the construction of airfields for the China Lift in Assam and the Imphal and Tiddim Roads before moving to Delhi to become Director of Engineer Resources, a vast task. After the war he was CE Home Counties District, flew to the Middle East to arrange the evacuation of the engineer stores from Palestine and finally was appointed DFW in 1949, a post he held until he retired.

Although he held a number of sophisticated appointments of growing importance he seemed to become more and more a man of mystery. This was especially so on retirement when he would laugh off questions about what he was doing in his own firm—"Engineer Planning and Resources". He was not the sort of chap who could be bullied and, to balance this appreciation of a fine brother Sapper, at times he was much critized. But he got things done.

"Leave it to me . . . and it will be quite all right" could have been his motto. He was fearless and one who with great courage "looked ahead, bending forward and never backward". It was a privilege to know him, none of us really understood him but we appreciated him.

CEFT

BRIGADIER J H D BENNETT, CBE

Born 22 June 1900, died 19 August 1975, aged 75

JOE BENNETT, construction expert, pioneer ocean-racing yachtsman, and forthright Irishman from Cork died suddenly at his home in Surrey last autumn.

He was commissioned from RMA Woolwich in mid-1919, in the days when nothing but a very high place in the Army entrance exam could make Sappers. He had strong family links with Cork, Blair Castle, where he learnt his yachting at an early age; but for schooling he went to St Lawrence's, Ramsgate.

In 1925 the first race round the Fastnet Rock from Cowes was held. It was the

Brigadier J H D Bennett CBE

first ocean race in which handicap was based on a reasonable measurement formula, and it set the stage for ocean races worldwide. In *Fulmar* REYC Joe was mate and they won 2nd prize in a tough race. Next year Joe was again mate in *Ilex* REYC when she won the Fastnet Cup. Joe was a founder member of the newborn Ocean Racing Club, now the RORC.

He took a construction course and went to India for a five-year spell in the MES. Early in WWII he joined General Tickell's team in Cairo to run GHQ Engineer Workshops with tremendous gusto, turning out the urgent needs of the Desert Army with great ingenuity. He was awarded the OBE then. As war traffic round the Cape built up fast, Joe was moved off to the Suez Canal at Ismailia to build and manage a shipyard for large self-propelled lighters capable of taking over 100 tons on their decks. With unskilled Egyptian labour he built over 100 of these Z craft. His control of all ranks, all natives, was magnificent: cheerful, quick-witted, robust, and with such a sharp pounce on slack work, the slacker, and the cover-up lie.

After the war he became Commandant Chatham Wing, SME, for which he was splendidly qualified after his own spells there as recruit-party officer and as Instructor. He then became CE Gibraltar as a Colonel, where he was decorated with a CBE. Finally he took up his last post as CE Eastern Command.

Last spring he was an official guest at the REYC dinner as the sole British survivor of the early ocean races—races which have stimulated the world. His success in life was rooted in fearless outspoken sincerity, quick wit, and complete dependability.

He leaves a widow, two daughters, and four grandchildren, of whom one has already competed in the Tall Ships Race.

WGF

Correspondence

Brigadier H L Graham CBE MC
Pond Farm
Derby Green
Blackwater, Hampshire

NARVIK CAMPAIGN

Sir,—Having read Brigadier Stokes' article on the Narvik Campaign in the September *Journal*, I can say that I am in agreement with all that he has written. I only regret the omission of any reference to the final Despatches of General Auchinleck, reviewing the various factors that contributed to the misfortunes of the British troops. He was emphatic that only soldiers thoroughly trained in Arctic Warfare could have made an efficient fighting force in that wild northern terrain. Moreover that to commit them to a campaign in which they could not be provided with air support was to "court disaster".

In looking back upon our long retreat from Mo I consider that no report since published has adequately depicted the hopeless conditions endured by the men of my Battalion. Exhausted, with nothing but their personal weapons and what they stood up in, they were expected to check the advance of fully trained and splendidly equipped German troops, acting in close co-operation with an unchallenged Air Force.

The enemy was completely mobile, whereas we were more or less restricted to the single road by thick snow. We were bombed and machine-gunned continuously—my own car was riddled with bullets on several occasions. Our flanks, which consisted of wooded hills covered in snow, were vulnerable to the German ski-troops and it was a miracle that we were able to reach our Embarkation Area without more casualties.

Throughout these operations I saw much of the fine work done by the Sappers under conditions of exceptional difficulty.—Yours faithfully, H L Graham.

Editor's Note: Brigadier Graham was in Command of the 1st Scots Guards during the greater part of the Campaign. (*RE Journal*, September 1975).